



CEPIS

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Informatics in Europe today and tomorrow**

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- **Informatik-Spektrum**, journal published by Springer Verlag on behalf of the CEPIS societies GI, Germany, and SI, Switzerland
- **ITNOW**, magazine published by Oxford University Press on behalf of the British CEPIS society BCS
- **Mondo Digitale**, digital journal from the Italian CEPIS society AICA
- **Novática**, journal from the Spanish CEPIS society ATI
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(The full schedule of UPGRADE is available at our website)



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Editorial

On the 20th Anniversary of CEPIS

A twenty year jubilee is an anniversary that deserves more than just a passing reflection. If it concerned a person it would indicate the end of adolescence and the start of adult life. In the life of an organisation, such a jubilee is no less important for many reasons. First, it shows that establishing the organisation has had a rationale and reasons of a permanent nature. Next, having existed for twenty years clearly shows that it has found its place and that it is performing to expectations. Last but not least, it also shows that there is a vision of the way ahead as expected by its founders and its members. Coming of age also implies new responsibilities. This is valid for people as well as for organisations. Let me therefore outline what important issues are likely to lie ahead in the future of CEPIS.

By informatics today we understand much more than just information technology and its related areas. It is a rather young field of scientific, professional and business endeavour compared to established disciplines of natural, technical and social sciences. Informatics started less than a century ago, in theory as the formulation of a special mathematical theorem and, parallel to that, in practice, as the construction of a programmable computing machine. Both beginnings were reflected in their names: computer science, and information technology. Even without a special plan it was obvious that both fields had much more in common than met the eye in the beginning. The natural progression was the convergence of both to result in what we know today as informatics.

Initially, practical achievements were used in universities to satisfy scientific curiosity, but soon they attracted first the interest of the manufacturing industry and then businesses in general, which discovered therein a new and promising niche that held the potential for an increase in productivity and eventually of profit. Since then, the deployment of computers as a means to boost productivity and improve business has been increasingly intensive. Those that have been able to follow the process will remember the evolution of the deployment of computer applications, which in turn have grown into computer-aided processes, before finally reaching the present state of Internet-based solutions and services generally recognised by the prefix e-. Today the networked computer is an indispensable tool and aid in every activity. The ubiquitous networked computer has brought about a completely new development in society that we generally recognise today as the information society. Consider the one hundred and fifty years of the industrial society and compare this with the mere half century during which we have used computers - the phenomena that we observe today are very probably only a pale shadow of the world of the future.

Parallel to that evolution, the awareness of the importance of new computing machinery has increased, not just

in science and business but as a means that will impact society at large. E-democracy was a virtually unknown concept only ten years ago. Computers grant power to those who use them or to those who control their usage. The power in itself is neither good nor bad; it is the way that the power is employed that makes it the one or the other. This new aspect could not have been properly dealt with by any other entity from the traditional sectors than civil society, as it is independent from both governments and industry, which brought about the establishment of national computer societies. Very few computer societies are more than fifty years old, which in itself is proof that informatics is a young discipline and at the same time bears witness to its importance and potential to change society as we know it today. The information society is not something to be expected in the distant future, and even less an abstract concept. It is a reality that must be dealt with adequately and competently.

However strong and perceptive they may be, it has become obvious that national computer societies alone have neither the ability nor the power to influence politics on a larger scale. They may be influential nationally but this is not sufficient in the long run, as the 'Europe of countries' has been transformed into an association where national politics and strategies must be planned, adopted and executed in a coordinated manner. This has been essential in informatics, firstly due to its lack of tradition and then due to its importance and potential impact on development in general. The answer to this challenge was to establish the Council of European Professional Computer Societies. Its mission, to put it briefly, is to represent European informatics professionals. I believe that we have been successful in the process but there is still much to be done. CEPIS has contributed immensely to developing the computer skills of Europeans. Moreover, it has helped develop a European global export product which is only now receiving the worldwide recognition that it deserves. It has also developed a learning and certification scheme for computer professionals that has not come even close to its potential. CEPIS has also become visible in the institutions of European Union which is an important fact if it wants to represent the European computer professional.

In view of the jubilee, we must consider not only technical progress but also the development of our environment. As a European organisation, CEPIS must be aware of what is going on in this arena. In the last twenty years we have seen massive changes in the political and economic landscape of Europe. The European Community has become a European Union that is slowly but surely transforming into a legal person in its own right. Its membership has almost doubled since 1989. Several new countries have emerged in this period, the youngest of them not even one year ago. All of this requires careful study and adequate reactions.

The historian Arnold Toynbee made a lucid observation regarding the rise and decline of empires: challenges come about with time and they must be responded to in an appropriate manner lest they are harmful. The art and wisdom lies in the choice of the most appropriate reaction so that the threat is fended off with the least effort. The correct responses to the same challenges are not necessarily the same forever but must take into account the effect of the reaction. Those that have been productive in the time when empires grew were harmful if not outright fatal at the time of their prime, and may have contributed to their decline.

This wisdom applies also to CEPIS. We must understand the challenges of the time; we must be able to tell the crucial from the less important ones and react accordingly. For this reason there is an effort underway to outline a strategy for the near future to be able to react to the challenges in a consistent and productive way. The strategy must take into account the reality of CEPIS, of its mission, its potential, its environment and its constituency. First it must be understood that CEPIS has been established by national computer societies and has to be of service to them. Besides member societies, there are also regional associations of computer societies which are increasingly important in the Europe of regions. This is one more area where CEPIS must be active, as practically all regional associations consist of CEPIS member societies. It seems only reasonable therefore to support their activities. However, being an entity in its own right, it must also have an agenda of its own, but one which must not be in conflict with the ambitions of CEPIS's founders. These requirements may seem to be conflicting but are not necessarily so, provided that there is guidance that can be used to avoid conflicts.

The issues that are extremely important today and that will be no less so in the foreseeable future are professionalism, ethics, and privacy. Let me comment briefly on each one. Professionalism can be defined as performing a job according to the rules of the trade and in a legal manner. Professional attitude is a composite of personal traits and knowledge and is something that is expected from anyone who performs an activity. Informatics, being a young discipline, suffers from a lack of tradition but there is also a shortage of trained and certified people who can prove that they are competent in what they do. We have all heard of

job-killer applications that have abolished traditional jobs such as typesetters for example. Much less is heard of no less important killer applications. More and more devices and systems – and consequently people – depend on the correct functioning of software which, if faulty, may lead to great damage, even deaths. Professionalism is one more safeguard to ensure that such situations are less likely to arise.

Regarding ethics, it is important to mention that any profession can be carry out in a legal manner that is not necessarily ethical. Most, if not all, CEPIS member societies have adopted codes of ethics, codes of conduct, or similar documents to the same effect. The purpose is to obligate their constituencies to perform their service not only in a legal but also in an ethical way. The expected result can be the greater confidence of clients and users and consequently a greater respect for informatics professionals, all of which outcomes are desirable.

Privacy has become a hot topic in the last five years or so. And not without merit: bearing in mind recent developments in social networks and Internet communities, we have reason enough to be concerned. Again there is a conflicting situation; on the one hand nobody would like to reveal their identity unnecessarily – or, indeed, at all – while on the other, no-one likes to deal with someone who does not want to reveal his or her identity. This is also to do with the disclosure (or not) of personal data, data retention in general, privacy in public places, and similar issues.

My sincere conviction is that CEPIS will continue to be able to identify important subjects in the future as it has been able to do so in the past, deal with them, and advise those that have a legal responsibility related to these and other hot issues that will arise in the future, or even authority to adopt respective laws. I would like to live to see the day when an authority says: We must (or must not) adopt such and such regulation because CEPIS advised us so. I believe that CEPIS has the knowledge, wisdom and resources to be able to enjoy this kind of trust and will enjoy it in the years to come.

Niko Schlamberger

President of CEPIS

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Presentation

Introducing CEPIS

Robert McLaughlin, Fiona Fanning, and Nello Scarabottolo

After twenty years of existence, the Council of European Professional Informatics Societies (CEPIS) has much to be proud of. This monograph offers a mere sampling of the technical expertise of informatics professionals throughout Europe that comprise CEPIS's 36 member informatics associations. With contributions from throughout greater Europe, this issue provides an overview of the diversity of informatics today from a range of geographical perspectives. The thematic articles address the "hot topics" of concern to the Information and Communication Technologies (ICT) industry, and therefore to CEPIS, while the third section shows

the evolution of the organisation through the eyes of Past Presidents over the past two decades. The final paper gives us a glimpse into our future: the next twenty years.

CEPIS is above all an organisation of informatics professionals. Its mission is to improve and promote high standards among Information Technologies (IT) professionals in recognition of the impact that informatics has on employment, business and society. The papers that follow are contributions by IT professionals and academics, for IT professionals and IT academics and the enormous range of roles that those two designations comprise.

The Guest Editors

Robert McLaughlin, Bachelor in Science (BSc) Chartered Engineer (CEng) Fellow of the British Computer Society (FBCS) Fellow of the Irish Computer Society (FICS) graduated from Queen's University (United Kingdom, UK) where he studied Applied Maths and Quantum Physics and completed a postgraduate diploma in computing. After working in the aircraft industry he joined the Computer Centre at Queen's University, where he spent 20 years developing major operating systems and computer applications on a large range of computers, varying from large mainframe systems to small systems based on networked computers. He was an honorary lecturer in Computer Science and lectured on many aspects of the design and implementation of computer and communication systems. He is also joint author of a book on Microcomputers and in 1970 set up the first spin-off company from Queen's. Having devoted 40 years to the British Computer Society, Robert has served terms as Vice President and President and is currently a Trustee. He is chairman and major shareholder in four small computer companies (Opt2Vote, WesternConnect, ALTA Systems and President Computers Ltd). He was involved in the design and management of a number of European Union (EU) and UK government awareness programmes in computing and telecommunications, the most notable of which were the EU STAR and Telematique projects, IT82 the UK awareness programme to encourage the uptake of IT and the UK Government's premier technology transfer scheme (TCS) from 1986 to 2000. <robert@pres.demon.co.uk>.

Fiona Fanning, Master of Arts (MA) *Diplôme d'Etudes Universitaires Françaises* (DEUF) International Bachelor of Arts (BA Int.) graduated from Dublin City University (Ireland) with a Masters in Translation Studies and a specialization in Law.

She also holds a BA Int. in French and German and a DEUF from *Université Lyon III*. Ms. Fanning's previous positions include owner and Director of Beyond Words Translation Services, Director for the American Red Cross and Project Manager for an international relief and development organisation overseeing operations in West Africa. She is a professional translator specialising in legal and IT-related matters. Ms. Fanning is currently Policy and Communication Executive for CEPIS. <fanning@cepis.org>.

Nello Scarabottolo, born in Milan (Italy), graduated *summa cum laude* in Nuclear Engineering at the *Politecnico di Milano*. Full professor in Computer Engineering since 1994, he joined the *Polo Didattico e di Ricerca di Crema* of the *Università degli Studi di Milano* in 1998. His research activities include various aspects of computer architectures and information processing applications. In particular, he studied topics related to microprocessor systems (mainly system software for real time applications and hardware tools for performance monitoring), parallel and distributed systems (parallel and distributed architectures, programming techniques for loosely coupled systems), and dedicated architectures (innovative architectures, mainly based on in-field programmable devices, for high-performance, high-reliability applications). He is (co)author of more than 100 papers, has been involved in various European Commission projects, served as director of the Euromicro society, and Editor-in-chief of the "*Journal of System Architecture*", edited by North-Holland. Since November 2003, Professor Scarabottolo has been member of the Executive Committee of CEPIS, initially as Vice President, then as Honorary Secretary and presently as Honorary Treasurer. <nello.scarabottolo@unimi.it>.

Since its inception, CEPIS has been working on the issue of professionalism in IT. The article "*A Profession for IT?*" addresses the need for a more formal profession and a clearly expressed professionalism in the practice of IT. The author, **Declan Brady**, Chief Technical Officer (CTO) of Fujitsu and CEPIS Vice President, outlines the work of CEPIS in this domain and encourages IT professionals throughout Europe to become a part of the process to best serve the needs of the public, industry and practitioners, now and for future generations.

The recent financial crisis has impacted all sectors, including ICT. In the article "*The European ICT Industry: Overcoming the Crisis and Helping Others along the Way*", Dr. **Hara Klasina**, Manager for Digital Economy Policy affairs at DIGITALEUROPE, reviews how the crisis has affected the European ICT industry, discusses how the industry will overcome the challenges it is currently facing and demonstrates how ICT enables other sectors to face their own woes.

The final thematic article addresses the increasing importance of legal and security issues in ICT for the Information Society. Authored by CEPIS LSI, a high-level expert group focused entirely on legal and security issues and led by Dr. **Kai Rannenber**, Dr. **Marko Hölbl**, **Eleni Kosta**, **Les Fraser**, and Dr. **Joop Verbeek**, this article outlines their work in areas such as cryptography, e-commerce, online banking, social networks and data retention.

The geographical perspective of informatics in Europe begins with the Germanic regions in the D/A/CH area (Germany /Austria / Switzerland) and provides an overview of informatics in these countries with particular emphasis on recent successful programmes geared towards raising awareness of the importance of informatics for society in general and in particular for the economy and education.

The Anglo perspective is provided through an interview with **Michiel van der Voort**, Executive Director for International, from the British Computer Society, who discusses current and future developments of informatics in particular with regard to the professionalisation of the IT industry, and the need for common standards of IT competence to cope with the increasingly international aspects of every IT role.

José Cardoso de Matos, Master in Business Administration (MBA), Chair of PROFIN, Portugal and **Fernando Píera-Gómez**, Vice President of ATI (the Spanish Informatics Society) provide a perspective on the Iberian Peninsula. In two separate papers, they depict the current situations in Portugal and Spain respectively. Based on a paper published in APDSI (the Portuguese Society for the Development of the Information Society), which aimed to launch a discussion on digital discrimination and the digital divide in Portugal, **José Cardoso de Matos** examines the underlying social and economic issues that lead to digital exclusion, and provides options to overcome these issues in the future. Describing the situation of informatics and information technologies in Spain during the current economic crisis of 2009, **Fernando Píera-Gómez** portrays data

about the economic significance of informatics in Spain, the human resources involved, the implications for education and the state of digital contents.

The article on the current state of informatics in Central, Eastern and Southern Europe is provided by **Plamen Nedkov**, Chief Executive of IT Star, with contributions from **Balint Domolki**, **Giulio Occhini** and **Niko Schlamberger**. It provides a panoramic view of the information society, education, ICT research, and economics in the region along with individual assessments of the various countries.

UPGRADE has long provided a valuable service to IT professionals throughout Europe. As CEPIS celebrates 20 years, it would be remiss not to look at the story of UPGRADE, a CEPIS publication that will soon celebrate 10 years of existence. **Rafael Fernández-Calvo**, former Chief Editor and co-founder of UPGRADE offers his view of the people and facts involved in its creation, growth and consolidation.

The final section of this issue provides a historical view of the development of CEPIS through the eyes of Past Presidents. CEPIS Chairman **Francisco López-Crespo** (1991) describes the infancy of CEPIS, its legal registration, formation of an Executive Committee and formulation of "The Way Ahead". Past President, Professor **Maurice Elzas** (1992-1993) provides insight into collaboration with the "Dynamite Delors" Commission when CEPIS participated in the European ICT strategy and gives us a behind-the-scenes glimpse of the friendships and adventures at CEPIS Council meetings.

Past President Dr. **Jaakko Kivinen** (1993-1995) describes the various CEPIS activities with European stakeholders, his concerns for a young CEPIS and explains how the European Computer Driving Licence (ECDL) was introduced. Past President **Giulio Occhini** (1995-1997) describes the period of accelerated cooperation with the European Commission (EC) and the initial ECDL proposal. Past President, Dr. **Roger Johnson** (1997-1999) outlines the development of a sustainable model for ECDL, the creation of CEPIS Secretariat and the emergence of the European Certification of Informatics Professionals (EUCIP).

Past President **Peter Morrogh** (1999-2000) discusses the diversity of CEPIS members, their commonalities and their disparities and how this has been reflected in the strategic development of CEPIS. Past President Dr. **Wolffried Stucky** (2001-2003) provides insight into expanding CEPIS's sphere of activities with the European Commission and various other European groups such as the European Centre for the Development of Vocational Training (CEDEFOP) and the European Committee for Standardization (CEN).

Past President **Jouko Ruissalo** (2003-2005) presents a time of change when CEPIS moved its Secretariat to Brussels and became increasingly involved in EU projects such as Harmonise. Past President Dr. **Geoff McMullen** (2005-2007) reflects on the successes of CEPIS as well as the challenges that led to the stronger, older and wiser CEPIS that now exists.

The rapid, unparalleled development of technologies has

challenged IT professionals in a way that no other profession has encountered. Dr. **Vasile Baltac**, CEPIS President, predicts that the future of the ICT industry will continue to make no less challenging demands on our IT professionals; he outlines what these challenges are likely to be and how CEPIS can put its experience to use in addressing them in years to come.

CEPIS Publications

In addition to **UPGRADE**¹ and a regular newsletter, CEPIS is involved both directly and indirectly in the production of many informatics publications and research activities. The following provides short summary of some recent publications.

e-Skills Foresights

The report examines the key trends that will play a role in influencing the supply and demand of each of the three types of e-skills. A list of ninety "change drivers", covering social, technological, economic, environmental, political and values-related forces are examined. The impact of each driver on demand for ICT practitioner skills is analyzed, and the three main factors that are strong determinants of the supply and demand of IT professionalism are extracted, together with existing empirical data. These are used to create a model which forecasts shortfalls/surpluses of IT professionals, based on 6 potential scenarios occurring over the next 10 to 15 years. The three main factors considered in the creation of these scenarios and forecasts are:

- The rate of ICT innovation (technological change).
- The Economic growth (both within the European Union and beyond).
- The degree of off-shoring undertaking within the industry.

For more information please go to the "Activities" section of CEPIS website².

A Review of Certification Schemes for ICT Professional Qualifications in Support of greater Harmonisation across Europe and beyond

HARMONISE reviews existing qualification and certification schemes in the context of learning provision that leads to certification, and clarifies the underlying profiles, terminology and curricula. The project's aims involved clarifying existing arrangements to support greater transparency, and influencing the harmonisation of vocational learning and qualification schemes for ICT professionals at the European Union level.

The results of Harmonise are valorised by EUCIP³, a pan-European qualification scheme for people entering the IT profession and for IT professionals wishing to continue their professional development. The qualification will enable existing IT professionals to document their competen-

cies and skill sets for employers or prospective employers and in addition, increase their market value.

For more information please go to the "Activities" section of CEPIS website.

Euro-Inf

CEPIS was a key partner in the now completed Euro-Inf project. Led by the Accreditation Agency for Study Programs in Engineering, Informatics, the Natural Sciences and Mathematics in Germany (ASIIN), and funded for an 18-month period by the European SOCRATES programme, this project investigated the different approaches to the accreditation of informatics (computing) higher education courses in European Member States, with a view to clarifying the common principles that could form the basis for a pan-European set of accreditation standards, and to agree a possible European framework for such accreditation.

Following the success of the project, the results of EURO-info can be seen in action through its successor: the European Quality Assurance Network for Informatics Education (EQANIE). EQANIE is a non-profit organisation founded in January 2009, whose mission is to promote the implementation of quality assessment practice for informatics education systems in Europe.

For more information please go to the "Activities" section of CEPIS website.

IT Practitioner Skills in Europe - Labour Market Survey Report

In spite of an extended period of discussion about the IT skills gaps in Europe many questions remain about the extent of the problem. This CEPIS report surveyed the state of IT practitioner skills within the EU and present an overview of the IT practitioner labour market.

For more information please go to the "Publications" section of CEPIS website.

CEPIS Membership

CEPIS membership is open to national computer societies from all countries belonging to the Council of Europe. International or pan-European associations are also welcome as affiliate members.

For more information see <<http://www.cepis.org>>.

¹ <<http://www.upgrade-cepis.org/>>.

² <<http://www.cepis.org/>>.

³ <<http://www.eucip.org/>>.

A Profession for IT?

Declan Brady

This article addresses professionalism in Information Technologies (IT), the need for a more formal profession and a clearly expressed professionalism in the practice of IT. The author outlines the work of the Council of European Professional Informatics Societies (CEPIS) in this domain and encourages IT professionals throughout Europe to become a part of the process to best serve the needs of the public, industry and practitioners, now and for future generations.

Keywords: CIO, Code of Ethics, DG Enterprise and Industry, DG Information Society and Media, e-Skills, EU Symposium on Professionalism, Innovation Value Institute, IT professional, IT professionalism, IVI, PPARS.

1 Introduction

The word "Professional" projects an image of well-trained, highly qualified and concerned individuals, working diligently to serve the needs of their clients. Whether they are doctors, lawyers or engineers, *professionals* are thought to serve a higher calling than mere profit; with exceptions, we tend to think of professionals as trustworthy because they are called "professionals" [1]. More and more, in both technology and business, people are aspiring to this status [2].

As a technology, IT enjoys a ubiquity unrivalled by almost any other; no other modern technology has progressed so quickly to touch the lives of so many people in so many different ways. Perhaps television has come close, but even then television in the 21st century has become part of the IT revolution.

"*With great power comes great responsibility*", Stan Lee has Uncle Ben say to Peter Parker before Peter becomes Spider-Man. But these words could so easily have been chosen to describe the challenge facing IT as it enters its eighth decade¹ (still a relatively "young" discipline, and an even younger Profession).

The *great power* is evident. IT systems underpin most of modern life: you cannot make a telephone call, watch television, start your car, or pay your bills without IT. The great power, of course, is also evident in its "dark side": viruses, Trojans, denial-of-service attacks, cyber-warfare, scare-ware, data disclosure and so on are good illustrations. The power to improve and facilitate goes hand in hand with the power to disrupt, damage and destroy; and here naturally comes the *great responsibility*: the responsibility of

Author

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those with the power to use it to benefit not just themselves, but society at large.

At a more mundane (but perhaps more fundamentally important) level, the *great responsibility* also carries with it the responsibility to create and deploy IT systems to the highest possible standards, with the highest levels of quality, and with the fewest possible defects. This naturally demands that these IT systems should be created and maintained by individuals with the best "professional" skills (e.g. such as being able to strike the "best" balance against the tension that exists between those who create software and those that want to deploy it).

This particular facet (software engineering quality) has already been recognised as fundamental, with tentative moves, at least in the United States, to recreate software engineering as a licensed profession [3]. But one of the challenges of IT, its great strength as well as its great weakness, is that it is so much broader than that, with ill-defined boundaries; the breadth of IT has been likened, in Physics terms, to "*stretching from super-string theory to car repair*"².

2 The Demand for More

There are those to whom the question of Professional-

¹ At least since the creation of the first stored-program programmable computer.

² Ralph Dum, addressing the Presidents of CEPIS member societies in Vienna (Austria), April 2006.

Box 1: Characteristics of Professionalism.

It will come as a surprise to many, but as no surprise to some, that the terms Profession and Professionalism should mean different (often subtly different) things in different cultures across Europe. Within each culture, there is often a natural or "obvious" meaning to these terms, which other cultures can sometimes find alien. Nevertheless, thanks to the history of trade and sharing of ideas throughout European history, there is an emergent shared understanding of what is meant by the terms Profession and Professionalism. Although this is the subject of continuing robust discussion, I have tried to capture its essence below:

The Profession

This is the total embodiment of the lay or public understanding of Information and Communication Technologies (ICT), those who practice it, and the manner in which it is practiced. Therefore it incorporates:

- The individual practitioners within the profession, i.e. the professionals themselves.
- The understanding of the domain of interest with which these practitioners are concerned and with which they are expected to be familiar in order to practice, i.e. the body of knowledge.
- The types of skills which practitioners are expected to have and the manner in which they are expected to be employed, i.e. the professionalism that is practiced.
- The organisation, society or other construct that coordinates the profession and provides its validity to the lay community.

The Professional

The Professional is a practising member of the profession (and in this respect is distinct from the student, trainee or apprentice). The Professional is usually understood to have the following characteristics:

- Someone whose "offer to society" is within some kind of recognisable or specified field or domain of expertise (in this case, the domain is IT).
- Someone whose right to make an offer is externally validated (through membership of a guild, possession of licence, an earned reputation, endorsement by peers, etc.).
- Someone whose capacity to perform is understood as (in a sense) *guaranteed* by this external validation (i.e. possession of a licence (or similar) confers both a right to practice and an expectation of practice to a particular level or standard or quality).

Professionalism

Professionalism expresses the way in which the practitioner is expected to practice the profession, i.e. skills, practices, behaviours etc. Professionalism can therefore be understood as having the following characteristics:

- Practice and Performance is subject to a (possibly implied) "promise"³.
- Because of this "promise", a professional will attempt to ensure that they can perform acceptably, i.e. to a recognised level of competence.

Also because of the "promise", professional groups will expect members to have the proper skills on entry, to maintain those skills to an acceptable level (so they can continue to perform against the "contract"), to practice those skills to some agreed standard, and will sanction (de-list, un-licence, fine, etc) or cause to be sanctioned (e.g. through the community or state) those who fail to keep up the grade⁴.

³ A "promise" can be as simple as the legitimate expectation of the consumer regarding how well the work will be done: because someone is a Professional, they are expected to complete their job correctly; else some action might be taken against them to seek redress for bad or improper performance. This perhaps is the major concrete distinction with the non-professional.

⁴ This makes the Professional skill portable: if the individual is a member of a group, then the "promise" says that the individual has, at least, the capabilities professed by all other members of the group.

ism in IT is seen as something of a solved problem. Certainly, from a technical skills perspective, there is no shortage of qualifications, courses and course providers, all intent on ensuring that the latest technical skills are readily available to those that want them⁵. However, to most people, Professionalism is about more than simply technical skills; it also encompasses such things as ethics, experience-based capability and validation of competence (see Box 1). There are various societies, clubs and institutions throughout the world, both national and multi-national; and yet participation in these bodies by people employed in IT practice is low⁶. With estimates in the United Kingdom suggesting that perhaps as many as 50% of IT staff there do not have formal IT qualifications [4], it is perhaps understandable why this might be so, but no less of a concern.

Although it is largely true that there is not (yet) a universal clamour for the creation of a formally defined universal IT Profession with clear membership rules, there is nevertheless demand for something more than the current status quo, expressed in some of the following ways:

- The dramatic fall off in the number of school leavers seeking to study IT, even in the enormously broad number of ways that it is currently offered, indicates that school leavers do not see IT as an attractive, promising, long-term career [5]. The fall off in IT (and generally in Science, Mathematics and Engineering) is so severe as to undermine the sustainability of IT as a platform for European growth and therefore threaten the Lisbon Agenda.

- Some Chief Information Officers (CIOs), seeking to increase the benefit that their departments give to their parent organisations, want more assurance about the quality and capability of their staff (and, indeed, the staff of external organisations providing services) [6].

- High-profile IT "failures" (e.g. the PPARS system at the Health Service Executive in Ireland) are focussing attention on the way large, costly, IT systems are specified, designed and implemented.

- Incipient consumer dissatisfaction with the quality of consumer devices containing significant software elements is focussing attention on fitness for purpose in the European Commission (EC) and elsewhere.

- The dramatic effect of economic cycles on IT departments (IT budgets are almost the first to be cut) has caused IT practitioners to demand more structure in IT careers, and seek ways of validating experience in the face of the almost ephemeral nature of various IT technical skills.

Among these, there is a diversity of views regarding whether there should be a single, all-encompassing Profes-

sion, or a federation of sub-professions, whether a Profession should be self-regulated or state-regulated, whether or not a Profession should be licensed, and other related questions that are too detailed to explore here.

3 The Need for a Profession

Whatever the need for a more established profession to exist in the domain of IT, there is nonetheless a clearly expressed need for more (and more visible) professionalism in the practice of IT [7][8][9][4].

What would the purpose of more Professionalism, or a more formal Profession, be? There is a wide range of opinion in this area, but broad consensus is that it should include elements such as:

- Protecting the interests of the public through ensuring that IT Professionals are properly qualified for the work which they undertake, and perform that work according to a recognised code of ethics.

- Promoting high standards of practice in the profession and among professionals and inspiring high levels of performance.

- Working with standards bodies, both national and international, to establish appropriate levels of quality for all aspects of the practice of IT.

- Working with industry to distil, preserve and maintain bodies of best practice.

- Working with practitioners to establish measures of capability and competence for IT professionals that are readily comparable across both the IT industry itself and across IT roles in other industries, and providing a framework to enable practitioners to grow their careers.

- Communicating and reflecting a passion for creating opportunity through the application of IT, and be recognised for improving the capability to exploit the benefits of IT [10].

- Maintaining the profession, its standards, competencies, processes and ethics, in an open and transparent way, so as to foster (warranted) trust and respect among the public⁷.

- Enabling free movement of IT Professionals, through promoting international equivalence of qualifications, and thus facilitating balance of supply and demand.

- Promoting the Profession to the public at large so as to attract high quality people into the profession.

These are clear and unambiguous benefits which a formal profession would provide, and most IT member associations espouse these qualities; yet there is still some fundamental essence absent, else these organisation would undoubtedly be, in combination, the embodiment of the IT Profession despite the widespread belief that, somehow, they fall short.

What is this fundamental essence? What missing element is needed to bridge the gap between aspiration and reality? Due, again, to the wide cultural diversity that is enjoyed across Europe, it is unlikely that there is any single factor, but an interplay of multiple local and international factors, on the subject of which much debate and discussion is likely to be

⁵ The question of whether or not there are sufficient people seeking to have relevant skills is a separate one.

⁶ The British Computer Society, one of the more successful and well regarded Professional bodies, estimates that its current membership represents just 7% of those employed in IT roles.

⁷ This must include, however controversially, seeking to sanction professionals that fail to comply with the relevant standards and codes, either directly, or indirectly through such legal means as may be available.

expended over the coming months and years. Nevertheless, anecdotal suggestions from work carried out by CEPIS indicate that at least the following are fundamental:

- A wide and unambiguous demand from Industry, particularly multinational organisations, for a commonly defined Profession.
- Europe-wide agreement on standards for undergraduate and post-graduate education in IT (a process now commenced through the Bologna Accord).
- European-led support for progress in this area as being beneficial and compatible with policies for growth, e.g. through the e-Skills Strategy of Directorate General (DG) Enterprise and Industry and through collaboration with DG Information Society.

4 What Form Would a Universal Profession Take?

Among all the discussion what is undoubtedly clear is that the IT Profession clearly needs to have a structure. The structure of the Profession is intended as a visible representation to the public that it serves of its capacity to act as a Professional body, and therefore to be the locus of the necessary trust being placed in the Profession by the public⁸.

While the details vary, most of those involved in the discussion are happy to agree that the structure of the IT Profession should be something similar to that illustrated by the diagram in Figure 1.

The overarching purpose of any Profession is to provide a service to society. That service is provided through employing certain technical competencies (the *body of knowledge* belonging to the Profession). The manner in which tasks are undertaken by members of the Profession is described by various non-technical competencies (soft skills, quality, communication, etc.) and is governed by adherence by practitioners to a system of ethics (a *Hippocratic Oath*, if you will, for IT Professionals). The Profession ensures that its members have all the skills necessary to practice through a system of continuous professional development or formalised lifelong learning, through which new skills are acquired or old skills are brought up to date.

All of these structural elements, then, are brought together in a system of validation: validation by the Profession that a given practitioner is competent and capable to be called a Professional and so engage in practice of the Profession; and, equally importantly, validation by society that the public trust placed in the Profession is merited.

5 Some Further Thoughts

According to Gleason [11], what really sets a (classically understood) Profession apart is that membership of that profession confers on the Professional some right or

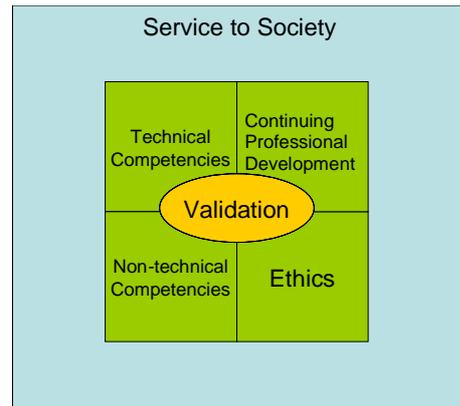


Figure 1: Structure of the IT Profession⁹.

power that the rest of the population cannot do or exercise, that therefore distinguishes or separates the Professional from the "lay community," or non-Professionals. For example, consider the privilege of lawyer/client confidentiality, or the right of doctors to prescribe drugs. It is not at all clear whether the IT Profession must differentiate itself in this kind of way; what is already clear, particularly from developments in the Web 2.0 sphere, is that the IT Profession, in whatever form, is unlikely to hold a monopoly on the IT domain. To be successful, then, and provide benefit to its members, industry and the public, the IT Profession must create a value proposition that is compelling in the absence of compunction.

Another open question, and one that is perhaps a little surprising in context, is what exactly is IT? In other words, from across the broad spectrum that is associated with IT, for the purposes of creating a Profession, what should be considered *in* and what should be considered *out*? What areas must be included, because they are core or fundamental? What can be safely omitted, because it is peripheral? And by extension, though more controversially, who should be considered as eligible and who as ineligible?

6 Actions from CEPIS

The European Computer Driving Licence (ECDL) and European Certification of Informatics Professionals (EUCIP) programmes [7] were well established in the CEPIS community when, in April 2006, the Presidents of the member societies of CEPIS gathered in Vienna (Austria) to consider future strategy.

The Presidents' meeting gave a clear direction that the Profession and Professionalism was a significant concern, and must be part of CEPIS's strategic programme and be a significant part of CEPIS's engagement with the EC. Cognisant of this, CEPIS Council established a Task Force on Professionalism [2] charged with producing "*a position paper for CEPIS on Professionalism. The position paper will take a pan-European view, and will reflect the opinions and needs of Member Societies*". As part of this, the Task Force is intended also to consider:

⁸ It should be apparent that if a Profession lacks trust, then it is not a Profession at all!

⁹ British Computer Society, adapted with permission.

■ *Definition of interest domain*, i.e. achieve a universally applicable definition of what is meant by the term "IT Professional" by consensus.

■ *Professionalism Programme*, i.e. what is the CEPIS "business best-practice" package to member societies on Professionalism?

■ *A European Symposium on IT Professionalism*, i.e. to draw together the various strands, and to help achieve the objective of raising awareness among member societies and within the EU Commission.

A series of Task Force workshops has already led to the formulation of a CEPIS policy on professionalism [12], endorsed by CEPIS Council in April 2009. This policy establishes the framework for activities on the definition of the interest domain, the focus of which is currently an expert panel survey¹⁰ of the member societies and concerned industry partners, through cooperation with the Innovation Value Institute (IVI), which will lead to an initial paper being published at a European Symposium on IT Professionalism to be co-hosted by DG Enterprise and Industry and the European Economic and Social Committee, supported by CEPIS and the e-Skills Industry Leadership Board in November 2009.

7 Last Words

There is something happening in the world of Professionalism in IT. While it is often lamented that IT is so "young" that it has failed to become "mature" and so has not benefited from becoming a formal Profession, in my view it is IT's very youth that gives it the opportunity to create a Profession (perhaps a new form of Profession, unencumbered by historical precedent) that best benefits all its stakeholders. During this process, we are likely to have to sacrifice some cherished notions, and perhaps to take on board views that are alien at first sight. Nevertheless there is a great opportunity here; opportunity to embrace and above all to innovate. CEPIS, through your member society, is your opportunity to be a part of it, and help give it the right kind of shape to best serve the needs of the public, industry and practitioners, now and for future generations.

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¹⁰ Delphi-based.

The European ICT Industry: Overcoming the Crisis and Helping Others along the Way

Hara Klasina

The financial crisis that started in the summer of 2007 and the subsequent economic downturn have left few business sectors unscathed. Along with other sectors, Information and Communication Technologies (ICT) has felt the impact. However, crisis can sometimes be an opportunity for growth, a time when (out of necessity) new business models and innovations arise. This article briefly reviews how the crisis has affected the European ICT industry, discusses how the industry will overcome the challenges it is currently facing and finally demonstrates how ICT enables other sectors face their own woes.

Keywords: Broadband, Digital Recovery, DigitalEurope, EU eSkills Week 2010, i2010 High Level Group, ICT Industry, Next Generation Networks, OECD, Recession, R&D investment.

1 Introduction

The financial crisis that started in the summer of 2007 and the subsequent economic downturn have left few business sectors unscathed. Along with other sectors, ICT has felt the impact. However, crisis can sometimes be an opportunity for growth, a time when (out of necessity) new business models and innovations arise. A recent Organisation for Economic Co-operation and Development (OECD) report cites the example of budget airlines: they grew dramatically during the recession in the early 1990s [1]. Just as consumers surged towards no-frills flights during that time, today's businesses are bound to surge towards innovative and cost effective ICT solutions that increase efficiency and enhance productivity. This article briefly reviews how the crisis has affected the European ICT industry, discusses how the industry will overcome the challenges it is currently facing and finally demonstrates how ICT enables other sectors face their own woes.

2 The Effect of the Crisis on the ICT Industry

Even though diminishing consumer confidence and restrictions on capital expenditure have driven down the demand for ICT services and products, growth in the sector has not collapsed as was the case when the so-called "Internet bubble" burst in 2001-2002; according to statistics cited in a recent paper by the European Commission's i2010 High Level Group, in 2008 the growth of the ICT sector in Western Europe was estimated at 1.2 per cent [2]. At least in part, growth has not collapsed due to the restructuring the sector underwent at the time and which rendered businesses more resilient. However, the most important fac-

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tor probably lies elsewhere. Implementing the most innovative ICT solutions in the supply chain has helped the ICT industry adapt much quicker (compared to other industries) to the crisis through instantly reducing production rates where and when appropriate. This has been a significant advantage compared to the downturn in 2001-2002.

It also seems that different parts of the ICT industry have been affected to different degrees. Impact on the demand for software, IT services and telecommunications services has been mild; on the other hand, the consumer electronics and the ICT manufacturing sectors (especially when it comes to semiconductors) have suffered more [2].

As far as employment levels are concerned, the OECD reports that in 2009 ICT employment "is performing reasonably well" compared to general employment levels, particularly when compared to sectors such as the automotive

industry and finance [3]. The exception is the Internet firms: the top 10 Internet firms in OECD countries have announced 2% job cuts of their total workforce in 2009 [3].

What lies ahead for the European ICT sector? Will recovery be timely and swift or slow-coming and painful? Experts are being cautiously optimistic about economic recovery in general and estimate it will start only in late 2009; predictions at this stage are difficult [1]. Having said that, the ICT sector has two big advantages. First, ICT infrastructures are crucial to businesses of all kinds and thus investment in relevant products and services is unlikely to be negatively affected for long. And secondly, ICT holds the key to recovery for all sectors: in a time of tight budgets, efficiency and cost reduction are the holy grail, a grail which comes within reach through using ICT products. In the following sections we will discuss on the one hand how the digital technology sector can overcome the crisis it is facing, and on the other how digital technology can be a catalyst for the recovery of the economy at large.

3 Overcoming the Crisis on the Home Front

In simple terms, the ICT industry will return to rude health if consumers and businesses continue to invest in its products at a relatively high rate. In turn, such investment will continue to take place if the industry's products are consistently highly innovative and offer better value for money than ever before. It is therefore imperative that, even as companies in the sector endeavour to cut costs, they do not decrease investment in Research and Development (R&D). At the same time, private and public R&D investment should cater to the short innovation cycles typical in the ICT industry.

It is also widely acknowledged that recovery of the ICT sector is intrinsically linked to upgrading network infrastructures around Europe. Fast and reliable Internet connection is key to making available and creating demand for a host of new digital services and content. Given that rates for commercial lending are currently high and credit is not readily available, there is a danger that rolling out next generation networks (NGN) will be stalled. Consequently the public sector should step in and make the necessary investments in NGN deployment. The 1 billion euros funding for rolling out broadband in rural areas announced in the European Commission's recovery plan of November 2008 [4] is certainly a step in the right direction; it remains to be seen how EU Member States will implement this promise in practice and utilise the funding available via the European Agricultural Fund for Rural Development.

Broadband investment aside, it is difficult to overstate the importance of equipping the general population with sound eSkills and sustaining a pool of bright and well educated ICT practitioners; the two are sine qua non conditions for a vibrant digital technology industry. As far as the general population is concerned, technology-savvy users utilise ICT products and services intensively and are bound to conduct large parts of their lives online: shopping, consuming digital content, banking, filing their taxes, etc. As far as

the ICT industry per se is concerned, it is crucial that, even as industry players are rationalising their workforces, young people are being encouraged to undertake degrees in science and follow careers as ICT practitioners. Once the crisis is over, companies will be looking to recruit large numbers of computer engineers and software architects; this implies that industry, national governments and the EU must encourage secondary school students today to graduate with ICT-related degrees in four to five years time. Initiatives such as EU eSkills Week 2010, to be funded by the European Commission, are of crucial importance in this context. The Week, which will take place in March 2010, will be an awareness campaign on the significance of eSkills both for the general population and for people considering higher education or a career change. It is imperative that industry works closely with national educational authorities and the European Commission on such initiatives so as to reiterate the crucial role ICT skills play in people's life and work choices.

Returning to measures national governments of EU Member States can take to help the ICT sector emerge from the financial crisis, we should not overlook measures encouraging the entry and growth of new players in the market. This is an often repeated argument when discussing how to increase the competitiveness of the European industry as a whole and of course holds true in the current economic situation. Encouraging venture capitalists to invest in new businesses, reducing red tape for setting up new companies and providing favourable conditions for restructuring ailing companies are measures which would give impetus to new entrants in digital economy markets and inject the sector with new innovative products.

4 A Catalyst for Recovery at Large

The digital technology industry provides the necessary tools for addressing the biggest challenge that businesses in all sectors face in the current economic climate: how to rationalise costs and at the same time sustain high demand for their products. In today's world, and even more so in the near future, all European industry sectors can stay competitive only if they implement the right ICT solutions and have access to the corresponding eSkilled workforce.

ICT increases efficiency and brings costs down in numerous ways. To take two obvious examples, the crisis has led to increased use of teleconferencing (as travel budgets have been restricted) and teleworking (as pressure to decrease overheads has increased). However, the biggest efficiency gains probably lie in the field of energy. The European Commission estimates that ICT-based monitoring and managing of resources can reduce energy consumption in buildings by 17 per cent [5], whereas smart electricity grids also contribute to energy efficiency. The latter are a prerequisite for feeding into the networks electricity generated from renewable energy sources. Aside from the environmental benefits of such technologies (it is estimated that ICT can lead to a 15 per cent reduction of carbon emissions [6]) it is clear that ICT can lower operational costs signifi-

cantly.

Sustaining high demand for products is intrinsically linked to being able to continuously innovate and offer good value for money. Again ICT is key here, as it facilitates designing new or improving existing goods and services.

When it comes to overcoming the crisis, by far the most important offering of the digital technology industry to all sectors is broadband. A fast Internet connection encourages eCommerce and the creation of new digital content and services, makes internal company processes more efficient, facilitates developing new e-business value chains, enables cloud computing and allows collaborative R&D [1]. All in all, broadband, powered by NGN, is an engine for growth, productivity and job creation in Europe.

5 Challenges and Opportunities

The European ICT industry, for all the challenges it is currently facing, is bound to emerge from the crisis and surge ahead through innovation and efficiency, aided by high speed Internet connections, a workforce dextrous in eSkills and the growing demand for cutting back on energy consumption. In the process of doing so, the industry is acting as a key enabler for the recovery of the economy as a whole. In fact this theme will be explored in an economic study, to be published in autumn 2009, which has been commissioned by DIGITALEUROPE, the leading advocacy organisation for the European ICT industry [7]. The study is being conducted jointly by Forrester Research and Dr. Jonathan Liebenau from the London School of Economics. As DIGITALEUROPE already declared in March this year, the recovery will indeed be digital [8].

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Legal and Security Issues in Informatics

Kai Rannenberg, Marko Hölbl, Eleni Kosta, Les Fraser, and Joop Verbeek

Legal and Security Issues of Information and Communication Technologies, and their applications, are of increasing importance for the Information Society. As these issues become more and more complex they require independent insights from informatics professionals. Consequently the Council of European Professional Informatics Societies (CEPIS) has a major responsibility in this field. The Legal and Security Taskforce (CEPIS LSI) undertook this responsibility and brings together experts from CEPIS member societies with the mission of collecting, synchronizing, and providing independent professional expertise from CEPIS experts to relevant and interested European parties. This article outlines the work of CEPIS LSI.

Keywords: Cryptography, Data Retention, Information and Communication Technologies, Information Security, Law, Online Banking, Privacy, Social Networks.

1 Introduction

Legal and Security Issues of Information and Communication Technologies, and their applications, are becoming

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ing of increasing importance for the Information Society. As these issues become more and more complex they require independent insights from informatics professionals. Consequently CEPIS has a major responsibility in this field. CEPIS LSI [1] established with Prof. Alexander Verrijn-Stuart († 2004) as Chair and Leon Strous as Secretary shortly after CEPIS itself was founded in 1989, undertook this responsibility.

CEPIS LSI (which later became a Special Interest Network, SIN) brings together experts from CEPIS member societies with the mission of collecting, synchronizing, and providing independent professional expertise from CEPIS experts to relevant and interested European parties. The main focus areas are ICT-related legislation and ICT security issues, where the interdisciplinary dialogue between ICT experts and lawyers has proved especially fruitful.

The activities of LSI include the development, discussion, and promotion of publicly visible statements on issues in the area of ICT-related legislation and ICT security; providing expertise to European politics and stakeholders; and contributing security knowledge to the European Computer Driving Licence (ECDL) and other education, training, and certification projects of CEPIS.

CEPIS LSI has always been at the forefront on ICT topics related to legal and security issues. Today's main challenges include raising awareness of privacy issues, such as highlighting the problems and challenges of privacy in virtual worlds and online environments¹. CEPIS LSI is constantly monitoring different fields of ICT security and legal issues, and regularly provides advice to various stakeholders.

On occasion, rather than issue a general position statement, CEPIS LSI has considered it more appropriate for CEPIS to issue a specific position statement or letter of support direct to stakeholders and decision makers.

2 Current Work

Currently CEPIS LSI has one letter of support and one statement in preparation.

The letter of support gives CEPIS support for the work

¹ Authors' note: Also legislation changes on the European level are moving towards more restrictive regulation of ICT. While organisations and companies are repeatedly endorsing and employing security mechanisms, which intent to increase security, but often only hinder the adoption of e-services without providing any security benefits.

of the European Data Protection Supervisor, Peter Hustinx, with regard to data protection in the framework of police and judicial cooperation in criminal matters. We support his warning against a dilution of data protection standards.

The statement deals with privacy-consistent banking acquisition. We discuss many areas including access rights of banking employees, deleting of gathered information, cross-branch access to data, the interrogation of clients, logging of data access, and the general conditions of European banks in relation to the necessity and proportionality principle.

With the ever growing importance of ICT for society and the ever more complex issues in this area many further burning issues can be expected.

3 Previous Work

3.1 The Statements

So far, CEPIS LSI has produced six statements.

Cryptography

The first CEPIS statement, prepared by CEPIS LSI in 1996, addressed restrictions on cryptography and the introduction of key escrow mechanisms. It discussed whether the import, export, and production of cryptographic tools and their use should be restricted. Recommendations were proposed regarding the unrestricted use of cryptography, the ability of all individuals and organisations in the private and public sectors to use cryptography, not reducing the opportunities for individuals or organisations in the private and public sectors, and that governments should agree on a common policy relating to their access to computerized data.

One of the lines of discussion in politics then was to implement crypto restrictions, and especially key escrow, to ease the fight against organised criminals using cryptography. The CEPIS statement introduced the issue that in particular, closed groups such as criminal organisations would use steganographic techniques to avoid any detection short of physical access to the terminals they use. Thus restrictions on encryption would be of very limited help in the fight against organised crime.

On the other hand, the essential security of business and private communication would be seriously imperilled and economically hampered should they be subjected to insufficiently secured key escrow.

Therefore CEPIS recommended to governments to seek the best possible advice, which access mechanisms to computerised data were an effective, efficient and adequate way to fight (organised) crime and mount effective prosecution of criminals, and how to implement the policy whilst minimising the security risks to organisations and individual citizens. It was also noted that evaluation and implementation of the policy would require regular review as the technology evolved².

What today seems to be natural was indeed an issue and required such a statement less than 12 years ago.

E-Commerce

In 1999 a statement on e-Commerce was published in which e-commerce was considered as a desirable development given appropriate governmental and societal regulation and discipline. It recommended the development of appropriate standards, generally accepted codes of good practice and codes of conduct.

Associated with these should be the institution of competent compliance boards and other forms of assistance. This statement reflected one of the paradoxes of the early discussions during the dot-com-boom, where some proponents thought that all commerce would soon be e-commerce, while others could not imagine at all that e-Commerce would have any major impact on serious commercial activities. The statement helped to explore a realistic middle ground between the extremes.

Data Retention (1)

When data retention issues first arose on the European level, CEPIS LSI reacted by publishing with its first statement on Data Retention CEPIS on 1st January 2004. At that time CEPIS identified some crucial issues to be taken into account when the EU regulated the issue of retention of traffic and location data. CEPIS LSI pointed out that privacy should be given proper consideration in a future data retention directive and had focus on the problem of the duration of the retention period, as well as the issue of when and who should be given access to the retained data.

Data retention (2)

The European Data Retention Directive was adopted on 15th March 2006. CEPIS LSI, keeping in mind all the recommendations included in the first discussion paper of 2004, analysed the Data Retention Directive and expressed its concerns on the dangers it brought to privacy. It discussed protection of privacy of citizens as well as major problems in the technical and financial realization of data retention of such a vast scope.

It urged the Member States to take into account the layered structure of services in the internet, in order to avoid

data being retained more than once, when they transpose the Directive into their national legislation. CEPIS LSI, among others, also urged Member States to opt for the shortest retention period of 6 months.

The recommendation highlighted the reduction of the retention time, the amount of the retained data, and legal necessity for public authorities to assume costs for the necessary data retention facilities.

Online Banking

In 2007, when issues regarding security of online banking were exposed, CEPIS LSI produced a statement regarding authentication, and security issues and measurements of on-line banking. The popularity and wide use of online banking can lead to abuses, activities by malicious and criminal users, and a rise in organized criminal attempts (e.g. phishing). In the statement, contemporary authentication approaches used by European banks were reviewed, and the fact that complex and error-prone security measures may not provide any tangible security improvement is highlighted. The recommendations in the statement were targeted at different parties e.g. banks and other financial institutions and organisations, governments and regulators, professionals and customers.

Since banking activities are by nature more sensitive, higher security standards are required. A short review of on-line banking security measures was conducted focusing on authentication approaches. These approaches were classified into four categories, each of which can differ in the actual implementation. In addition, specific trade-offs have to be considered in order to achieve usefulness and the appropriate level of security. Hence, this is usually a very difficult task.

In the statement particular authentication approaches were evaluated, examining how much they contribute to security and at the same time do not represent a burden which could prevent wide adoption. The aim of the trade-offs topic was mainly concerned with Transaction Authorization Number (TAN) approach and its derivatives for which the main drawbacks were highlighted.

Additionally, dangers related to online banking were considered in the concerns raised by the statement. These include: the use of complex and error-prone security measures which may not provide any security improvement and are perceived as an unnecessary burden that will discourage or prevent users easily entering the electronic marketplace. Persistent use of cumbersome security measures that are negatively portrayed by the media are damaging to the reputation of all security endeavours, and raise concerns regarding unprofessional behaviour if known shortcomings that could damage our profession's reputation are not fixed.

In conclusion, several recommendations were issued not only for banks and other financial institutions and organisations, but also to governments, professionals and users. Each of the recommendations was aimed at a specific target group and seeks to encourage the contribution of each group to increasing the level of security of online banking

² Authors' note: Looking back one can see that the CEPIS statement helped to advance the level of discussion in the European arena and some member states, such as Germany.

while maintaining its usefulness.

The statement was endorsed by CEPIS in 2008 and is accompanied by a background paper.

Social Networks

In 2008, CEPIS LSI prepared a statement, together with its associated background paper, which explores the security and privacy issues with social networking sites, and virtual worlds, from both a business and personal perspective. Whilst many people view Social Networks as beneficial, they do not necessarily understand the extent to which their personal information can be exposed and misused in unexpected ways. At a time when the use or misuse of personal data is said to be of great concern to the citizen, this same citizen may voluntarily place information on social network sites and see no contradiction.

The extent to which this information may be mined for other purposes is unclear to the individual. The extent to which international law has kept pace with the need to protect the citizen against hostile acts in a global environment is also unclear. In a corporate environment the use of social software as a part of the business process brings security issues which require a new security model. The organisation cannot ignore the usefulness of social software sites in various aspects of the business, particularly in communicating and collaborating with others, yet it becomes reliant upon sites over which it has no control and whose objectives may not align with corporate needs. Some recommendations were made for the way forward.

The statement was endorsed by CEPIS in early 2009.

3.2 The Letters

An example of a letter issued by CEPIS LSI is the one to the European Network and Information Security Agency (ENISA). During ENISA's inception in 2003 CEPIS LSI was the first to note that the proposal did not incorporate a representation of academic and research stakeholders in ENISA's Management Board, which catered only for Member States, the European Commission, industry and consumer representatives. Notified by CEPIS, the European Parliament amended the respective regulation, which proved very helpful for ENISA's development.

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The Germanic Perspective: Informatics for All - Everywhere, Any Time

Peter Federer, Gerald Futschek, and Jorg Ruegg

This article introduces the D/A/CH area (Germany/Austria/Switzerland) and provides an overview of informatics in these countries with particular emphasis on recent successful programmes geared towards raising awareness of the importance of informatics for society in general and the economy and education in particular.

Keywords: Austrian Computer Society, Bebras Contest, D/A/CH, Informatics, *Gesellschaft für Informatik*, GI, Informatica08, OCG, SI, Swiss Informatics Society, Week of Informatics, Year of Informatics.

1 What is Informatics? [1]

People have always had the need to communicate their ideas to others, not just as direct contact via the spoken but ephemeral word, but by means of more durable symbolic representation. Both the inventions of writing and number systems are milestones on the way to structuring perceptions and manipulating them on the basis of their symbolic representation. This marks the beginning of systematic information processing, long before mechanical calculating machines and, later, computers were invented for this purpose.

Informatics as a discipline of the systematic, automated processing of information has roots reaching far into the past. Although its name (an abbreviation of the combination of information and automatic) was not defined until the 1960s, it actually dates from the completion of the automatic calculating machine Z3 by Konrad Zuse in the year 1941. This proves that informatics is not just an engineering science; it must also be considered as a basic and systematic science with experimental elements. Its mathematically defined models, data structures and algorithms have enabled an exponential growth of processing and communication speed, while simultaneously reducing costs. A data model based on the simple mathematical theory of relations has created a billion-euro industry in the area of databases. Breakthrough discoveries in the theory of complexity now make it possible to create simulations (independently of hardware improvements) with a precision, visualization quality, and speed unthinkable only a short time ago.

Perhaps the best example for explaining the essence of informatics as a systematic science are the Enterprise Resource Planning systems (ERP), which express the extraordinary complexity of a modern enterprise in great detail using models and giant software architectures based upon those models. The aim of current efforts around service-oriented architectures is to modularize and simplify those models and software architectures. In their own small way, all members of our information society need to control systems. Every annoying deficiency in the user-friendliness and

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reliability of our systems, each virus on our computers that was not discovered in time, brings this home to us.

The proliferation of the computer has also resulted in informatics becoming a cross discipline which now influences all areas of life and science. Bio-informatics develops novel pharmacological products; new medical developments such as pacemakers or the technical control of intensive care units were only made possible by informatics. With the help of informatics, meteorologists collect vast amounts of data and conduct extensive observations on the weather and the climate. The exploration of space is unthinkable without informatics: simulations enable the meticulous planning of expensive missions; robots explore alien planets and moons independently.

Informatics has radically influenced change in the methods and means of work in the economy. A product can be examined and tested carefully during development, even if it does not yet exist physically. Computers simulate chemical reactions or electrical circuits. They demonstrate the outcome of a crash on an automobile or the kind of light

that various light-emitting elements can produce. In production they do not merely control materials flow, they control complex and security-critical manufacturing processes.

Informatics has wrought change in entire industry structures. One example is the revolution in the media and service sectors in recent decades; text, photography and music are now processed digitally and become available via new distribution channels. This means that in publishing, products must be created, adapted and produced in ways which are totally different from those applied just a few years ago.

Any information may now be freely collected, downloaded and exchanged via mobile or stationary devices which are linked to local or internet networks. In this way, people are able to get support in their daily life or work in the most varied ways and ambient intelligence systems will soon independently adapt the environment to man. Learning and teaching, too, are supported by computers and networks which will adapt to individual learning processes.

Of course, our culture will also change: in addition to the worldwide intercultural information exchange, new rhetorical and aesthetical forms of expression will develop, along with new forms of communication within our society. Political deliberation and decision making may become more transparent with online discussion forums and online voting¹. However, the disappearance of space and time boundaries will often result in people being isolated, and both new and old networks must counteract this development.

Future generations will move within an environment which has been vastly shaped by informatics. That is the point at which the command of the methods and tools of informatics will become the fourth cultural skill after reading, writing and arithmetic. This will bring with it a central obligation, not just of a technical, but above all of a societal nature: to grant and to guarantee all people the self-determined use of their data.

2 Informatics in the D/A/CH Area (Germany, Austria, Switzerland)

The German speaking area of Europe is a core area of informatics. This is where decisive milestones of the methodical and technical development were set. This is also where the scientific and technical aspect of computer sciences started to be connected with the embedding of information processing within the social and economical environment of humanity. The first informatics courses were introduced in 1969 at the Technical Universities of Karlsruhe, Munich and Vienna concurrently.

At roughly the same time [2], informatics research centres were established in Switzerland, at the ETH Zurich, the EPUL (from 1968: EPFL) Lausanne, and the universities of Berne, Fribourg, Geneva and Zurich. Scientific development

began even earlier. In 1950 the ETH Zurich installed Konrad Zuse's Z4, the first "automatic calculating machine" at a university in continental Europe, and soon important scientific contributions were made to computer construction (ERMETH), to programming languages (Algol, later Pascal) and to numerical mathematics. For decades, Switzerland has been ranked highly in informatics applications: one example is the "invention" of the World Wide Web (www) 1989 at the CERN in Geneva. Global informatics corporations run research and development centres in Switzerland: IBM's Zurich Research Laboratory opened in 1956. In 1986 and 1987, researchers at this laboratory earned back-to-back Nobel Prizes for physics; first for the invention of the scanning tunnelling microscope, then for the breakthrough discovery of high-temperature superconductivity [3]. More recently, international corporations such as Google, Microsoft, SAP and Yahoo have set up research and data centres in Zurich, St. Gall, and Avenches.

Today there are over 150 informatics courses at universities, universities of applied sciences, and professional academies in classic core informatics, as well as in application areas such as Economic Informatics, Medical Informatics or Bio-Informatics, to name just a few examples.

There are current focus points for informatics: "Ubiquitous Systems", "Light Information and Light Software", "Effects of our Science upon Users and Society" and "Role and Self Image of Informatics" [4]. Those are core subjects of the informatics Societies of central Europe. One of our main duties is to make our science interesting for the younger generation and to ensure that its contents are firmly anchored in our educational systems.

We must not forget our responsibilities to the future and the challenges it will bring: climate change, aging societies, access and participation for all to modern information society, information self-determination, data protection, secure systems, and many more subjects whose discussion would exceed the scope of this article.

In 2006, 2007 and 2008, the three informatics societies of the D/A/CH countries (GI, OCG and SI) have (in anticipation of this development) organised a broad portfolio of events, competitions, congresses and practical demonstrations to inform and motivate the public and to make people generally more aware of this fourth cultural skill. See below for examples of those activities.

3 German-Speaking Countries (Germany, Austria, Switzerland): Examples of Initiatives on "Informatics for All - Everywhere, Any Time"

3.1 Germany

The Science Year 2006² [5] was devoted to the field of informatics. It followed the Einstein Year 2005 and was the seventh in a series of Science Years launched by the German Federal Ministry of Education and Research. GI concentrated its projects on raising awareness, motivation and know-how, thereby implementing its claim 'Informatics inside'. Many more activities were undertaken to commu-

¹ E.g., GI uses Web based online voting for society board and presidium elections since 2005.

² More than 450 actors participated in about 1.500 events in more than 150 towns.

nicate the significance of our science to the general public. Just a few examples are shown here:

3.1.1 A week of Informatics, Dresden, Autumn 2006

95 individual events, 44 participants, 14 thematic clusters and 8,000 visitors in Germany's "silicon valley" area of Saxony. There were clusters of events for children and adolescents with subjects treating informatics as a science or considering networks of medicine with informatics; there were numerous individual events, "Informatics inside" in the framework of the "Night of Discoveries" and informatics in industrial practice such as: manufacturing at VW, informatics at Deutsche Telekom, at the Fraunhofer Institute, at Infineon, Qimonda, Accenture, Microsoft, ...

3.1.2 Informatics in the Field, Germany, 2006 - today

21 events with a total of 26,000 visitors, ranging from Braunschweig in January to Berlin in December 2006. Each event is shaped within the context of distinctive local activities (biotech, data security, Informatics and Navigation, history of informatics, gaming, e-culture, e-inclusion, e-participation, education...), wherever there is informatics "inside".

3.1.3 Bebras Contest for Kids, Germany 2006 - today

The International Bebras Contest is aimed at students in grades 5-10 (aged approx. 11-16). The low access threshold of this competition opens informatics to an entirely new group of the population and helps trigger their interest in the subject.

Germany started this competition in 2006 with 2,000 participants. In 2007 the number of participants was 22,000 students from 300 schools, of which 38% were female students (48% in the youngest age group). In 2008 the numbers grew to 53,602 students (22,042 female students) from 417 schools.

3.2 Austria

Informatics is the key technology of the 21st century. It has pervaded all areas of our daily lives with its applications and very often we are not even aware of this. It is a decisive driver of our education, our economy, and our society.

3.2.1 Week of Informatics 2007 in Austria

In the week of the September 19-28, 2007, the Austrian Computer Society OCG, the leading Informatics Society in Austria, held a *Week of Informatics* [6] to underline the significance of informatics for society.

A number of substantial IT-events were set covering the whole of the Austrian territory. The list of events included large-scale conferences such as the prestigious *International Conference on Very Large Databases (VLDB)*, the national conference on *Electronic Democracy in Austria*, or the gala-event for granting the *Multimedia & e-Business Austrian State Prize*.

The overall objective of the Week of Informatics was to

strengthen informatics in economy, science and education. It was particularly felt that the awareness of the general public and of politicians of the importance of informatics needed to be strengthened and better articulated.

In addition, the Week of Informatics and its many multifaceted conferences and events provided a visible presentation of the importance and productivity of informatics in Austria. Themes were devised for each of the six days:

- History of Informatics Day.
- IT-Economy Day.
- Informatics Research Day.
- Research Centres Day.
- Media Day.
- Education Day.

Personalities from politics, administration and science devoted themselves to the success of the Week of Informatics. The computer pioneer, Prof. Heinz Zemanek, made a keynote presentation at the Technical Museum in Vienna on the History of Informatics Day. The internationally renowned professors Bruno Buchberger and Georg Gottlob participated in the podium discussion about the future of informatics Research in Austria. Federal minister Werner Faymann held a keynote speech on the subject of the substantial economic weight of Information Technology in Austria. Secretary of State, Heidrun Silhavy took part in a podium discussion about the IT-Economy.

The Week of Informatics made a substantial contribution to an improved awareness of the importance of informatics for achieving significant progress in all areas of everybody's life. In order to consolidate a positive public image of informatics and Information Technology, further efforts must be undertaken and constantly maintained in the coming years.

3.2.2 International Bebras Contest

The International Bebras Contest is aimed at students in grades 5-10 (approx. aged 11-16). The low entrance threshold allows the participation of entirely new population groups and helps trigger their interest in informatics. The competition was first implemented in Austria in 2007 with 1,400 participants. In 2008 the numbers grew to 3,910 students [7].

3.3 Switzerland

For many years the Informatics Societies of Germany, Austria and Switzerland have maintained a culture of pragmatic **cooperation** which has repeatedly yielded interesting results and brought many advantages to all our members.

In 2006 the Swiss Informatics Society (SI) realized its project **ECDL Barrierefrei** which secures computer access for all people with disabilities or special needs. The success of this project relied to a large part on the experience and assistance of the Austrian Computer Society (OCG) which initiated a similar project in Austria a year earlier.

In 2008, SI proposed the **Year of Informatics (Informatica08)** [8] a huge project for which the coopera-

tion of the most important professional associations in Switzerland led by ICT Switzerland was secured. The Federal Government lent its active top-level support but the substantial costs of the project were entirely sponsored by private organisations. The promoters of this project were greatly encouraged and supported in their plans by the German GI and its management who had gained experience from their own Year of Informatics in 2006.

Briefly, these were the main **objectives of Informatica08**:

- To communicate and make the general public aware of the significance of informatics and to show how all our lives are intimately interwoven with all aspects of the science and its applications.

- To communicate and make the young and their parents understand what a fascinating science informatics is, and how all those involved in taking up the science or its applications as a profession may well have a critical part to play in helping to shape the economy of the 21st century.

Now, in mid 2009, we can safely say that those aims were largely achieved and awareness of informatics in all areas of society was increased significantly. Judging by the astonishing interest shown by the media, the government, politicians in general, entrepreneurs, managers, and many members of the general public really heard the message.

Just a few facts and numbers to illustrate this:

- 100 school classes and 2000 students aged 12 to 18 (in addition to many professionals) attended the big summer event of Informatica08, the Day of Informatics in Zurich. They eagerly participated in dozens of activities and showed enormous curiosity for all subjects presented. Their enthusiasm was contagious and everyone, presenters and visitors alike, learned a lot that day.

- At the end of 2008 the number of articles published in the written press was an astonishing 1,289. In addition, countless reports, references and discussions were broadcast by radio and TV stations.

- May we be bold and attribute, at least in part, the slight increase in the 2008 autumn enrolments of first year informatics students at Swiss universities to the effects of Informatica08?

- The best news is saved for last: A number of the activities developed specifically for Informatica08 are continuing and will be deployed in the coming years. Professional associations, politics, the government and important corporations and organisations involved in informatics and its applications have begun talks aimed at pooling all efforts in the interest of bolstering the very objectives identified for Informatica08.

There is a high degree of urgency in pursuing the objectives outlined above: countries all over the world have identified similar objectives they need to achieve if they want to compete successfully in the 21st century. In a recent address to members of the American National Academy of Sciences, "*President Obama outlined a number of budget and policy priorities. Key among them: boosting interest among youngsters in science and math (with an eye towards encouraging*

them to consider careers in allied fields)" [9]. United States of America's President Barack Obama also said "*we know that the nation that out-educates us today will out-compete us tomorrow*".

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Challenges for IT Professionalisation

Interview with Michiel van der Voort

"For Information Technologies (IT) to truly at last flower into a real profession on the same lines as the Law, Medicine or Accountancy, we need to start listening to what business wants from us in terms of "marketing" our competencies; and it's about time we were held to the same levels of trust as the man who builds our new house or to whom we entrust our physical well-being". This interview presents this and other views of the man charged with leading the British Computer Society's (BCS) drive for greater internationalisation of its products, services and messages.

Keywords: BCS, IT and Business, IT Leadership, IT Profession, IT Professionalisation.

Box 1: What is the British Computer Society?

The British Computer Society (BCS)¹ is the leading body for those working in IT in both the United Kingdom (UK) and, increasingly, abroad. With a growing global membership of 70,000 members in over 100 countries, BCS is the awarding body behind the widely-recognised IT professionalism status Chartered IT Professional (CITP) while also acting as local representative of a wide range of cross-border qualifications for both the IT professional and the user of IT.

The organisation's roots go back as far as 1956 when a group of data processing pioneers in London banded together. It was incorporated in its current form by Royal Charter in 1984, with the mission of promoting the study and practice of computing and to advance knowledge of and education in IT for the benefit of the public. The organisation now has 15 International Sections in countries as diverse as Belgium, Mauritius and Pakistan and 40-plus Specialist Groups on topics ranging from IT and the Law, Information Risk Management, Software Testing and Open Source.

A registered charity, the BCS is licensed by the UK Engineering Council to award Chartered Engineer status (CEng) and Incorporated Engineer status (IEng) and by the Science Council to award Chartered Scientist status (CSci) to its members, as appropriate.

"For IT to truly at last flower into a real profession on the same lines as the Law, Medicine or Accountancy, we need to start listening to what the business wants from us in terms of "marketing" our competencies; and it's about time we were held to the same levels of trust as the man who builds our new house or to whom we entrust our physical well-being". That at least, is the view of the man charged with leading the BCS' drive for greater internationalisation

Interviewee

Michiel van der Voort, Executive Director for International, British Computer Society (BCS), has extensive experience in the international IT and education business, mainly in Europe and the United States (US). His interest in IT is broad, ranging from issues around the digital divide, proper certification of user skills, the environmental impact of IT, IT as a true business enabler, learning and development in general and the future of business in a European context. In the role of international director, van der Voort is responsible for the international strategy and the internationalisation of the BCS products and services, identified as the IT professionalism agenda and moves towards Green IT. Van der Voort represents the BCS on the executive team of the e-skills Industry Leadership Board, and he is also chair of its Certification Council, while simultaneously holding a Directorship of the Skills Framework for the Information Age Foundation (SFIA). Previous to his role at BCS, van der Voort was one of the founders of the European e-skills certification consortium and of the Chief Information Officer (CIO) Platform of The Netherlands. For a number of years he was member of the IT Infrastructure Library (ITIL) Qualification Board. <michiel.vandervoort@hq.bcs.org.uk>.

of its products, services and messages, especially in the European theatre of informatics.

The BCS (see Box 1) is, in 2009, celebrating over 50 years of operation in terms of being a professional body for UK members of the IT field, though many of its 68,000 members are often based far from the shores of the UK. With this lineage and unique international perspective, the organisation would always be well placed to offer insight into the future developments of European informatics; but in what has been a formalised role for 18 months it has a specific executive, Michiel van der Voort, who is tasked with the mission to develop a truly international and cross-border role for the BCS, its qualifications, services and "voice".

For this special 20th anniversary edition of UPGRADE, we conducted a wide-ranging conversation with Michiel van der Voort in his main office in The Netherlands.

Q: What do you see as your role and responsibility as International Executive Director at the BCS?

A: The ambition of BCS is to be the leading *global* body for IT professionals. Certification and Continuous Profes-

¹ <<http://www.bcs.org/>>.

sional Development are important elements of the professionalism programme, without a doubt, which is partly why we now have a presence in over 100 countries and 15% of our membership are not based in the UK. Certainly, some of those non-UK based members are ex-pats who find themselves either posted abroad or who are seeking to develop their careers by working in locations such as the Middle East, North America or Asia-Pac. But many are citizens of other countries who see great value in what we do. Many top Project or Service Managers, IT leaders, senior professionals in all sorts of disciplines in countries like the US or India want to be BCS members and be connected to our network. So my job is to develop and build on that interest. I have a four-person team who under my direction are all very busy looking for opportunities for us to forge better links abroad, look at how we can meet the needs of the IT communities of places like the Middle East, see how what we do can help them and be adapted and improved in general. This is in essence an opportunity for growth. We have a great track record, we have impressive growth and retention rates around our membership figures, we see direct relevance in our experience and products to the international agenda, so it is definitely time to move forward here.

Q: Is this a very recent recognition by the organisation of such interest?

A: Not at all. BCS has always had an international dimension to its work, right from the start. We have an excellent education programme, as I've just said, and that's very widely acknowledged. If you are interested in best practice around an area like Business Analysis we have exams and support materials that will be of great help to you, and have been too many people outside the UK. But beyond that, we think we have built up expertise in a number of universal IT issues that deserve (and are finding) a much wider audience than just in the UK.

Q: Is this your work around the BCS CITP (Chartered IT Professional)?

A: That is a key part of it, yes, but really it is the set of messages and guidance we are building up about what professionalisation means, as relevant to people in the US, Canada or India as Europe, which I'd like to explain in more depth if I can in a minute. But then there are issues like Green IT. This is a new topic (though some do say it's "always" been with us) that's attracting great interest globally, and people are coming to the BCS to hear what we have to say about it from all over the world. Now, that's just one example of what we can offer. What I think is really key, especially for the Council of European Professional Informatics Societies (CEPIS) audience, is the news that the BCS has decided to intensify its endeavours and be more proactive in this area so as to really drive the agenda around the *professionalisation* of our industry.

Q: Can you be more specific about what you mean here? After all, this is a topic we in IT have been discussing for many years now, seemingly without universal agreement on what *professionalisation* really means.

A: Indeed, though there are many commonalities about

what all those various definitions and visions have to say. But yes, there are some issues about what we mean when we say IT "career" or "job". For instance, here in the Netherlands some years ago an exercise was conducted to compile a full set of definitions about all the specific roles there are in IT. When it was revised only a few years later, it was found to be mostly redundant. That's because you could have a definition of a "Dutch" IT job that didn't map on to what a "German" or "Canadian" IT job definition was.

Q: How can that be so? A Java programmer is a Java programmer is a...?

A: Because not all IT roles, especially around senior or cross-functional functions like Project Manager or IT Architect are so bounded. They are roles that are in fact not limited to what one country wants to define as an IT job but are multi-national. Plus, there's the factor of the internationalising of IT itself. The Outsourcing revolution has led our colleagues in India or South Africa and so on to have to work the way we in the West wanted, say, a Service Management leadership function to be followed. So we have a number of roles that are really now "international" in scope and understanding.

Q: So there's surely no problem. We all now "know" what these IT roles are.

A: Not so, it just isn't that simple. There is a divergence in our common understanding of what IT is all about and what being a true IT professional might convey on two axes. One, the local, national characteristic level, as it were; two, the split between what the IT industry says it is all about and what our colleagues and customers in business want from us.

Q: Sounds very complex, yes. Can you explain?

A: If I am a German IT professional, it's all about the Diploma. That's the frame of reference for your expertise, and for a German IT person in a kind of managerial or leadership role that solid, academic, very formal background is essential; it's probably near-impossible to get to that level without it. Yet their colleague from Holland or England has a very different approach; what they studied at university is of course relevant, but we are much more focused on their competence for a particular position.

Q: So you see a kind of cultural split here?

A: I have heard it argued that in IT we have a difference between a "Continental European" approach, based on the Diploma, "*my career is based on what I achieved as a young person in education and that is the platform for my later achievements,*" and the "Anglo-Saxon" ideology, which is allegedly more like "*my contribution is based on what I have learned, the accumulated job experience and training that I have built up over the years since I left university*". If you like, that approach does inform the spirit of the CITP. But then the Dutch example, and many others across Europe and beyond Europe, Middle East and Asia (EMEA), makes that distinction a bit too simplistic, I think. I mean [he laughs], if you really wanted me to, I could probably eventually find my Mathematics Diploma from the mid-1980s (it's somewhere in the house) but really in this soci-

ety, Dutch society, we don't really worry so much about it. And Belgium is different to France, and so forth. I sometimes joke we have 27 different countries in the European Union (EU) so we have 28 different attitudes about things!

Q: Right. So we have a set of attitudes in different countries, you're saying, about how to value an IT person. Is it experience or letters after the name?

A: Which would be fine, but like I said, that's not the only axis of difference and debate in IT. You have an equally big gulf between what we say we are doing in IT and what the rest of the business thinks we are doing.

Q: Surely this is not an issue in 2009?

A: To answer that, look at what Airbus (a truly European company, if ever there was one) has to do when it sources an IT person. It has to have one common, core set of job descriptions, for which quite rightly a German, a Spaniard, a Hungarian can all equally apply. But it just wouldn't work (Human Resources couldn't process any of this) if it didn't work at a higher level than both the local, national definition of the individual's IT "worth" and the specific, technical set of knowledge he possesses. So, they think less of "we need a Wi-Fi expert" or "show me all the people who know Cisco routers inside out" than what the individual can do to contribute to the business as a whole. The business wants a Business Analyst who can slot in and work with many sorts of people; they want professionals who excel at conflict management.

Q: If I grasp you right, you're talking about the ongoing issue around "soft skills" (that IT people are too often perceived as too technical, inarticulate and so on)?

A: Not at all. What I mean is that the business wants to hear about competencies and skills, not niche areas of knowledge. Five years ago we hardly ever talked about wireless, in five years it might have come and gone.

Q: So the thought here is that there are all these different, local ways of validating professionalism and competence in IT that, if not in conflict, are at least disparate, and that meanwhile the wider organisation and customer base has a different way of measuring competence altogether. Is a synthesis at all possible?

A: Very much so, but I am the first to acknowledge that there are some keywords, some core agreements, that we still haven't quite found yet. Key to this, I and the BCS believe equally, is proven, demonstrable in-post accomplishment. To be an IT professional you need to be good at what you do. There is also a very important element of education, perhaps less of the foundational education or degree path, if for no other reason than the very pragmatic one that so many IT professionals didn't study Computer Science but have come in through a wide variety of routes, but more of the ongoing, industry, vocational, variety. To be a BCS CITP, to take a small but extremely relevant example, certain skill elements need to be regularly tested and refreshed or we withhold the right for you to use the title. We think this sort of approach is the right basis for a more universal definition of what an IT professional would be all about.

Q: So it all comes down to technical competence, re-

ally, even if that's not necessarily based on formal qualifications?

A: I have to answer that question with a question. When you contract with a lawyer or an architect, are you solely interested in their technical knowledge? Do you not worry at all that they are honest, reliable, won't defraud or bankrupt you?

Q: What is your point?

A: We at the BCS think professional *ethics* is a huge component of overall professionalism. What is the difference, ultimately, between committing to building a new network or offering to do the books of a small company? In both cases, there must be trust that the requirement is not impossible to fulfil and that the result is of high quality and fit for purpose. A dentist, a solicitor, any kind of expert, professional consultant one engages with, one expects that they will approach a commitment in the same way. We want the same, explicit element in the definition of IT professionalism and projects. We have some interesting ongoing debates with colleagues across Europe who think this is already implicit, but we think it's too fuzzy. An open code of conduct and code of ethics for IT, where the individual commits to being honest, fair, not taking on work they can't accomplish, we feel would be a very big step towards IT becoming a profession on a par with the other expert, knowledge-worker jobs out there in modern society.

Q: But you must still be able to deliver the network!

A: And that's the way the business itself sees it, they want both. I don't think there's a conflict.

Q: It's probably useful to draw together these strands, then. A focal point for that could be the fact that in this issue of UPGRADE we are celebrating 20 years of informatics in Europe. What does your experience and role at BCS equip you to say about the next 20?

A: [laughs] I couldn't possibly give any kind of useful prediction about the technology changes we'll see between now and 2029! I doubt anyone would be so brave. What I do see, what I am completely convinced of, is that the integration of computers and digital technology in the wider society will be a trend that only increases in pace. There are computers everywhere and in everything now. If you doubt me: turn off your cell phone for two days and see if you can cope!

Q: OK then, what about the informatics community and the way our profession may evolve?

A: I am convinced that many of the issues we've been discussing here will coalesce. IT will move more and more towards being recognised as a full and equal profession by our peers. To do that, we will move away (as we already are) from our previous emphasis on niche, technical jobs based on skill A or technology B to more generic, sustainable roles. The business, I'm afraid to quote you back, doesn't want a "Java programmer" so much as a Business Analyst or IT Project Leader. As part of this, we in IT will become more familiar and expert in the business domains we work in. It might have been all right 20 years ago for a

Banking CIO to sit in his data centre in the cellar; in 20 years, surely sooner, he won't have a job if he doesn't also know about what makes his bank good, what the best fiscal approach is to a problem, he will be combining that with his IT expertise, which I think will be a really powerful combination. I'd also like to see the field less male dominated and approaching the same gender split as the rest of business, more 50-50. And above all, we will stop talking about the IT "solution" and more about the IT "contribution," the innovation and difference we as true, competent, measured and validated IT professionals will and do make.

Q: To sum up, then, what is the overall BCS message to the CEPIS audience on this landmark anniversary of European informatics?

A: We need to combine what's specific and local and works well at the country level in IT with the higher set of issues around IT professionalism in general. There is an increasing international dimension to every IT job that just has to be acknowledged. We need to look at how we can benefit from best practice elsewhere and fit or adapt it to our needs as part of such a process.

Q: And if we don't do this, what are the consequences? Or to make it more positive, what is "in it" for me as an IT professional in such a process?

A: As an IT professional it's in your interests anyway to see a truly international, global definition and set of agreements and common standards for IT competence evolve. A global set of definitions would mean a global recognition of core qualifications which would also support greater job mobility, country to country as well as locally. The real message, I think, to European informatics and computer societies is to seize this opportunity, look for commonality and leverage what works best and put it on the common agenda, and maybe [smiles] let one or two such bodies take a lead and see where it gets us all as a profession.

The State of Informatics in Portugal

José Cardoso de Matos

This article is based on a paper published in APDSI (the Portuguese Society for the Development of the Information Society) which aimed to launch a discussion on digital discrimination and the digital divide in Portugal. The author examines the current situation and the underlying social and economic issues that lead to digital exclusion, and provides some options to overcome these issues in the future.

Keywords: Development, Digital Discrimination, Digital Divide, ECDL, Economy, Education, ICT in Portugal, ICT Skills, Information Society, PROFIN.

1 Digital Discrimination: Myth or reality?

Digital discrimination results from economic, social, educational, cultural and political factors that lead to different levels of participation in the information society.

It is clear that digital discrimination is a direct consequence of economic exclusion as people with lower incomes have more difficulties in acquiring equipment and services and paying for Information Technologies (IT) education and training- all factors that limit their access to the benefits of the Information Society. But we must also realise that digital discrimination can be a result of political, cultural and social motivations, which can leverage the negative impact of the economic factors.

Understanding this issue is fundamental if we are to create the basis from which to effectively fight the roots of digital discrimination. It is not enough to act on the economic front, important as it may be, as it is not enough to have a computer and Internet access. If people do not have the skills to use the tools in an effective way and if complexity is still prevalent in accessing the information, there will always be barriers preventing people grasping the benefits of using IT as a means for full participation in the information society.

Once created, digital discrimination also contributes to generating economic, cultural and political exclusion. This is even truer since we live in an increasingly online world and digital discrimination has a linguistic side that we cannot ignore despite the growing presence of Portuguese in the digital world.

It is a circular phenomenon that needs to be broken. By reducing digital discrimination we can reduce the economic exclusion that can, in turn, lead to a further reduction in the digital discrimination.

Digital discrimination creates a situation of exclusion from the benefits of the information society for many people on the wrong side of the digital divide. The reality of a situation of info-exclusion, or e-exclusion, for a large part of humankind, arises not only from social and economic discrimination, but also from cultural and political discrimination.

At a time when the importance of e-Government initia-

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tives is emphasized as a means of facilitating citizens' lives and making public administration more efficient and transparent, it is vital to take into account the fact that the fight against digital discrimination must be considered to be a democratic imperative, fostering citizens' equality of access to public services.

By not considering the importance of this phenomenon, we risk increasing the political, social, cultural and economic discrimination and creating obvious situations of inequality of opportunities among citizens, thus challenging some of the principles of the democratic system. With this in mind, it is vital that politicians understand the importance of the fight against digital discrimination, lest we increase even further the digital divide, creating a deeper gap between those who have and those who have not full access to the information society.

In this context, the concept of digital literacy is paramount to understanding the benefits full integration in the information society, resulting in true equality of opportunities amongst the citizens of the world and a true participation in what we might call e-democracy, a phenomenon that is gaining importance, sometimes without everybody being truly aware of it, but which represents an unstoppable evolution that cannot and must not be ignored.

Digital discrimination exists as a frightening and sad reality, even when partially hidden in the impersonal and unclear figures of computer penetration per "x" inhabitants.

2 Digital Discrimination and Digital Divide

The digital divide has been defined as the gap between the individuals, groups and companies that have access to information and communication technologies and those who have not. It represents the disparity between those who benefit from digital technologies and those who do not have access to its benefits, those who participate in the information society and those who are left out of it.

It is important to note that the digital divide results from an unequal evolution process that, according to Jakob Nielsen [1], has 3 stages: economic, usability and empowerment. These 3 stages are in reality, and perhaps more correctly, 3 sides of the digital divide considering that they co-exist simultaneously. They are also perceived differently, which leads to different levels of intervention.

The economic stage is the easiest to understand and has been considered by many, to be the only cause of the digital divide, which has led to the fact that many policies aimed at overcoming it have been limited to providing hardware. This is easy to measure and as such politically more attractive, for example by the number of personal computers (PCs) per thousand inhabitants, the Internet penetration in homes or even more updated indicators, such the number of broadband Internet accesses, both fixed and mobile.

The usability stage, which we could also call the literacy stage, is more difficult to grasp, though it is a key issue in the digital divide. As we can easily understand, it is not enough to have computers and Internet connections if their users do not know how to benefit from them. Increasing the number of children using computers to play is important, as it makes them familiar with the hardware, but it does not contribute to enhancing their learning capabilities or to show-

ing them the benefits of the Information and Communication Technologies (ICT) for increasing their knowledge scope or to stimulating their curiosity to learn. We must bear in mind that digital literacy, as in the case of the alphabetic literacy, is not restricted to the basic uses of ICT; it only reaches its full potential when we have the capacity to use the means and tools provided by digital technology and understand the contents they can deliver.

Finally, the empowerment or participation stage presents an even bigger challenge, as inequality of participation generates a gap which is difficult to overcome. It relies not only upon the individual's access to the means, the knowledge and the skills, but also upon the will, availability and motivation to overcome the digital divide. And here the notion of user-friendly, particularly when related to software applications and websites, plays a key role in user motivation. To stimulate a larger participation of all members of a particular community is a growing challenge that we must be aware of, particularly when those communities tend to be increasingly virtual and not restrained by physical frontiers.

3 Current Situation in Portugal

If we take European statistics into account (Figure 1), we can see that Portugal is, according to indicators, surprisingly well positioned on ICT penetration.

However, when we look at the indicators in more detail, for example the number of households with computer per region, we can see that only 50% have a computer. Lisbon is clearly the region with a highest level of penetration, with the Algarve and the Islands coming close in recent

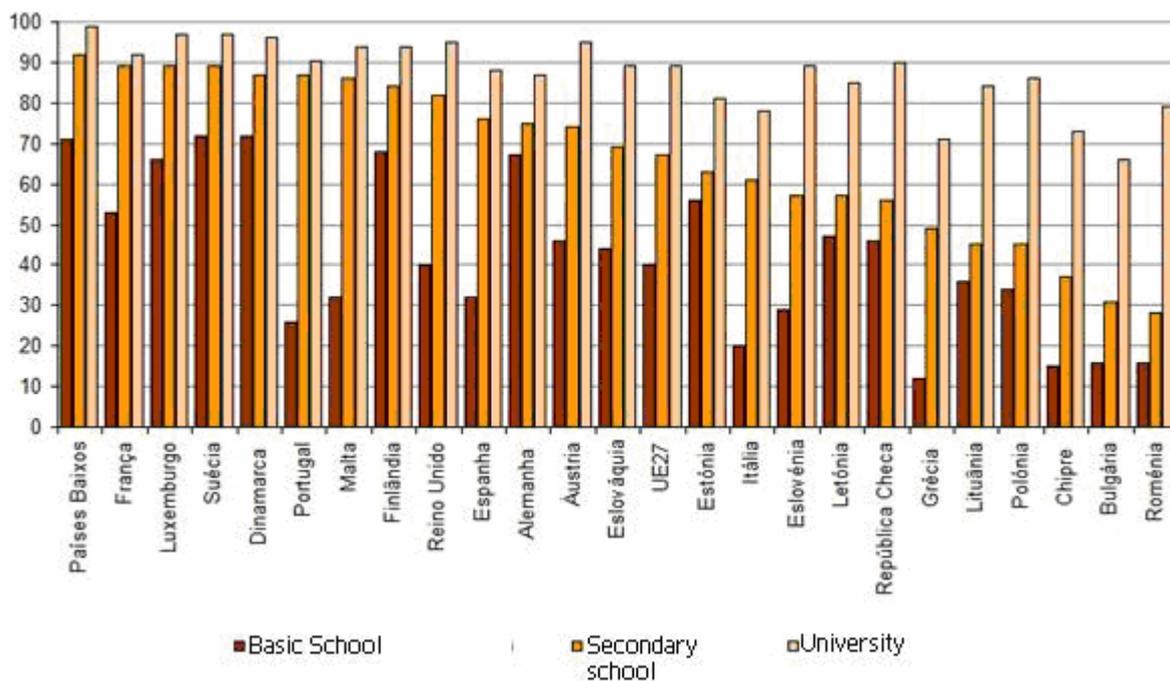


Figure 1: Percentage of Internet Users by School Level in the European Union member states, 1st Quarter 2008: Individuals between the ages of 16 and 74. Source: Eurostat.

years. Although this evolution shows an improvement in digital discrimination between regions and a more level playing field, it doesn't say much for the improvement in the already more digitised regions. On Internet penetration rates for households, although these are quite similar to the computer penetration rates, Lisbon is clearly ahead of other regions.

The Enquiry on the Household Use of Information and Communication Technologies 2002-2008 held by the Portuguese National Institute of Statistics and Knowledge Society Agency (INE/UMIC) found that, of the households without access to the Internet, the key motives indicated were: no interest/utility; **doesn't know how to use**¹; and the high cost of equipment and access. Much to our concern, this is a reality that still exists.

A more detailed analysis of this Enquiry provides additional information that shows a disturbing existence of a generation gap in the use of computers and the Internet. This discrimination is a reality that must be taken into account if we don't want it to contribute to being a source of economic and social exclusion.

4 Future Perspectives, Foreseen Evolution and Barriers

In an economic environment of *laissez faire*, i.e., without adequate policies to fight the economic exclusion, digital discrimination has a tendency to increase.

It is important to consider that the economic, social and technological revolutions at the core of human development, have also contributed to increase the inequality due to the asymmetric development they generate. If we take the industrial revolution as an example, due to its historical importance, we can easily see, as David Landes pointed out, that "*the industrial revolution put the world closer together, making it smaller and more homogeneous. But the same revolution fragmented the globe, separating the winners from the losers*" [2]. The same could be said of the digital revolution, only here the inequalities were further amplified by the fact that change occurred at a much faster pace, making it more difficult for an increasing number of people to adapt to the new paradigms. In reality, we can also see that the separation between the winners and the losers, between those who have and those who have not access to the information society is increasing. We could even say that more important than change is the speed of change, which is leading to a bigger divide and increasing digital discrimination.

Considering the fundamental connection between economic exclusion and digital discrimination it is in this area that a wide ranging intervention is likely to generate a higher potential for short term results. It is thus of the utmost importance to implement policies that can break this vicious circle (economic exclusion that generates digital discrimination that leverages a bigger economic exclusion) turning

it into a precious circle of growth.

For this, it is vital to create a set of objective stimuli for the adoption of actions leading to a wider use of the information and communication technologies. These should cover both the equipment and the training of its users, thus allowing for real benefit from the use of those technologies.

The evolution of business models leveraged by the digital revolution is reinforcing the role of innovation in the structure of more efficient value chains and on the development of value networks where the core enterprises become the centre of virtual organisations, and where the use of ICT is a key competitive advantage.

The implementation of these innovative business models requires a level of knowledge and skills in the use of technologies which are not compatible with traditional teaching models. This must lead to a reformulation of the educational paradigm, as the only way to ensure the conditions for a true economic integration and active participation in the information society for all.

5 Fighting Digital Discrimination

5.1 Challenges and Measures to Fight Digital Discrimination

Digital discrimination is at the origin of a number of challenges for society, its institutions, and for people. Digital discrimination is at the source of a digital divide that fosters info-exclusion and increasingly a social, political and economic exclusion of a sizeable part of the population, as social, political and economic institutions migrate to digital solutions.

The main challenges of an effective fight against digital discrimination pertain to the following areas of intervention:

- Reducing and gradually overcoming economic exclusion.
- Reducing the differences in education and access to ICT.
- Fostering training in ICT.
- Avoiding the discrimination of small and medium enterprises (SMEs).
- Simplifying the application processes for European Union (EU) funding.

To overcome these challenges, we propose a number of measures to address the core problems, very much centred in pragmatic programmes that will allow for short term results in critical areas for the fight against digital discrimination.

5.2 Reducing and Eliminating Economic Exclusion

Economic exclusion is a primary source of discrimination in accessing ICT, in terms of both equipment and training and education. Reducing and eliminating its effects requires a certain number of policies aimed at that objective. And here it's fundamental to have the end in mind and not confuse it with the means. The end that we aim for is to

¹ Highlighted due to its relevance.

broaden the access to ICT to all citizens, regardless of their economic means. The measures to achieve this should thus facilitate access for lower income families.

It is fundamental to consider here that the end is not to provide financial facilities for the acquisition of computers by those families, and the same could be said of Internet access at cheaper rates. The end is to ensure that those families have access to the benefits of the information society through the proper use of ICT. To achieve this, being able to have computers and Internet access at lower rates is fundamental, but not enough. It is a means to reach an end and not an end in itself, lest we foul ourselves with statistics that are "nice for the picture" but contribute little to either decreasing the digital divide or increasing the opportunities for those who are in the wrong side of that divide.

It is thus essential that granting the financial means for the acquisition of computers and access to the Internet be preceded by an adequate training of the potential users, and accompanied by positive evaluation. Society has a duty to integrate all its citizens, but it also has the obligation to ensure that the support it delivers is used in a way that effectively achieves the intended objectives. Would it make any sense to subsidize the acquisition of automobiles to citizens who do not have a driving licence, or the means to obtain it?

But it is possible to develop and implement a simple and pragmatic programme. Why set up national programmes, coordinated by heavy structures that tend to be inefficient and expensive? Why not opt for a voucher system that people can use for their training? Naturally, this would have to be within certain parameters and a used in accredited training centres. The risk of forgery and scams can always be lowered to a controllable level through the use of technologies that are already available.

Finally, it is important to mention open source software and the important potential of its widespread use as a means to fight the influence of economic exclusion in digital discrimination.

5.3 Reducing the Differences in Education and Access to ICT

This is an area where a lot has been done in the last few years and where we can see significant improvements, but here again it is important not to confuse the ends with the means to achieve them. The *e-schools* programmes have a very important role in providing easy to access computers and the Internet for all pupils in primary and secondary schools. It is now fundamental to ensure that the use of these means is productive and effective.

In training at schools is very important to ensure that, from entry level, there is a concern about ethics and safety in the use of ICT and that appropriate content for each age group is used, as well as the provision of technical aids for children with physical impairments.

The implementation of technological infrastructures and equipment in schools has allowed the creation of a national network that can also be used effectively to fight info-exclusion in the Portuguese population, through focused pro-

grammes aimed at the local needs of the population and of the companies where those schools exist.

5.4 Fostering Training in ICT

Training is one of the key areas in the fight against digital discrimination and reducing the digital divide, particularly in the adult population where the biggest gap is to be found.

But here also, it is fundamental that we take a pragmatic approach aimed at what we want to achieve: eliminating the digital divide. And this cannot be achieved by accounting for training hours in ICT; this can only be achieved by ensuring that all users know how to employ ICT in an effective and productive way.

If we want to fight effectively against digital exclusion and prevent the digital divide from widening, we need to concern ourselves with what really matters and avoid the temptation of using the number of training hours as a measure of success. The number of training hours is not an end in itself, merely a means of allowing us to learn how to use the ICT. That's why it is fundamental to ensure that all ICT training is validated through international standards. Imposing a level of quality in training through an internationally-recognized certification that validates the knowledge and skills obtained, such as the ECDL, ensures that there is effective management of the funds provided for training and provides a guarantee that they contributed to ensuring that the trainees know how to use the ICT effectively and productively.

The aforementioned use of vouchers for training could be another way to ensure that the training systems become more efficient and effective, by setting standards of quality that only open competition can provide. Naturally these vouchers could only be used in approved courses in accredited centres, to ensure that they have a minimum level of quality and are subjected to an audit of methods and procedures.

With this option, we could avoid the unfortunately very common situation of training centres with approved courses for funding having to search for trainees. Training must be adapted to the needs of the citizens and the companies and not to the needs of the training centres, which exist merely to provide service for those same citizens and companies, and not to have an autonomous existence, frequently subsidized.

The use of schools outside of the school hours for training geared to adults and the unemployed could also be envisaged, in a way that does not distort the market, but that allows them to fulfil a social function and optimize the investments made.

5.5 Avoiding Discrimination of SMEs

Bearing in mind the importance of SMEs in the Portuguese economy it is fundamental to ensure that ICT allows them to reach highly competitive levels.

Amongst the measures that can be implemented to increase the use of the ICT in SMEs we could include train-

ing programmes in the ICT, using some of the ideas above, and fiscal incentives geared towards simplifying the processes that allow, for example, companies to charge as costs all investments in computer equipment, both hardware and software, up to a certain value. This would provide them with an immediate fiscal incentive and a simplification of accounting procedures.

Other measures could include the setting up of innovation centres for SMEs that leverage the development of informatics solutions specifically for them.

5.6 Simplifying the Application Processes for EU Funding

EU funds are an important source of financing and support to projects of corporate modernization. The complexity of the processes to obtain those funds, the time required for analysis and the delays in making the funds available are not in line with the needs of the companies and with their capability to face the challenges of a global and increasingly competitive economy. And not even the slowing down of the world economy changed this framework; on the contrary, it is becoming more difficult for companies who cannot adapt rapidly to the structural changes.

As there are numerous cases of good practices in this area, it is vital for the State to set an example by promoting the dissemination of those good practices and expedite the migration of procedures through all government departments that handle EU and national funds.

6 Conclusions

The main objective of these measures to fight digital discrimination is to decrease the digital divide to enable, in time, all citizens to enjoy the benefits of full participation in the information society.

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Spain: The Situation of Informatics in 2009

Fernando Piera-Gómez

This article describes informatics and information technologies in Spain during the current economic crisis. The author provides data about the economic significance of informatics in Spain, the human resources involved, and the implications for education as well as the current situation of digital contents.

Keywords: Digital Contents, E-Commerce, Education, Electronic Content, Electronics, Hyper Sector, Informatics, IT Employment, PISA, R&D Investment, Spain, Telecommunications.

1 Introduction

Informatics in Spain has been evolving since the sixties of the last century and growing constantly. Spain installed its first big computer back in 1969 and both public and private sectors have become common users of these new technologies, which are commonly called Informatics or Information Technologies (IT).

One factor that is not normally considered when analysing the situation of informatics in a given country is the attitude of ordinary citizens as IT users. In the case of Spain, citizens did not have too many problems adopting this new technology for particular applications which met their specific needs. The most outstanding example of this is the use of digital banking via the Internet, and the use of Automatic Teller Machines (ATMs). Spain is in the leading group of countries for the use of both these informatics applications.

In this short article I will try to describe the situation of informatics and information technologies in Spain during the current economic crisis of 2009. In the paragraphs below the reader will be able to find some data about the economic significance of informatics in Spain, the human resources involved, the implications for education, and the current situation of digital content.

2 The IT Hyper Sector in Spain

The transformation of the Spanish economy through electronics and informatics is worth considering. Spain has to make use of the present economic crisis to make a qualitative leap forward, by carrying out the reforms needed to ensure that generations to come will have a future full of hope as citizens of an advanced society.

At present we find that the economic sector of information technology has become a sort of economic hyper sector with a wide range of reports and statistics, including telecommunications, electronic content and electronic commerce, entering into its data.

In Spain in 2007 the IT hyper sector was estimated to be worth 101,353 million euros. In 2008 this increased to 102,668 million euros, a hike of only 4% compared to a 9% increase between 2006 and 2007 [1].

Author

Fernando Piera-Gómez was born in Madrid (Spain), June 2, 1939. He is a Law Graduate from the *Universidad Complutense de Madrid* and an Informatics graduate from the Polytechnic University of Madrid. Fernando began his career in Informatics in 1967, and in 1969 he created the Data Processing Centre of the Spanish Ministry of Education, providing timesharing services to Spanish universities, among other services. In 1969, he also prepared the regulation for the first educational institution for Informatics, the *Instituto de Informática*. From 1974 to 1986 he worked for the Intergovernmental Bureau for Informatics (IBI) where he organized some international conferences, such as the first Transborder Data Flows International Conference, and he was Deputy Secretary of the 1978 SPIN Conference. At the IBI he reached to be Deputy Director General. Since 1988 he has worked for Indra Sistemas managing Research and Development (R&D) projects within the FP of the European Union (EU). He is currently 1st Vice President of ATI (the Spanish Informatics Society), President of the European Certification of Informatics Professionals (EUCIP) Spain Foundation and Chairman of the Editorial Board of *Novática* (journal of ATI). <fpiera@ati.es>.

In order to understand better the distribution of activities in the hyper sector, the data available for 2007 can be broken down as follows:

- Audiovisuals: 5.7%.
- Consumer electronics: 6.45%.
- Information technologies: 17.2%.
- Telecommunications: 30%.

In 2008, enterprises using computers in Spain represented 91.4% of all existing enterprises, and employees using computers represented 55.5% of the workforce. 72.4% of all enterprises had interconnected computers. But still only 41.3% of companies used electronic commerce. 39.1% of them bought products and services via the Internet but only 7.2% used the Internet to sell on.

3 IT integration in the Spanish Educational System

The first consideration to note is that available data indicates that there is a high level of familiarity with IT among

the management, teachers and students of primary and secondary educational institutions. They use it frequently in their daily activities and have reached a level of digital literacy much higher than the average of the Spanish population.

If we take the Internet as an example, about 90% of students over 11 years old and their teachers have some knowledge of how to use it, compared to only 49.4% of the total population [2].

The same disparities appear between the education community and the general population when we consider access to computers in the home.

In spite of this, the Spanish school system still lags behind the more advanced countries in the European Union when it comes to the availability of IT resources, although this has started to change. If we take the number of computers per educational centre, Spain would be in a relatively low position when compared to the data listed in the 2004 Programme for International Student Assessment (PISA) report that cites the 2003 average number of computers per education centre as 377 in the United States, 289 in Korea, and 255 in Australia. The figures for Europe show the leaders as The Netherlands, with 129, Belgium with 89, Sweden with 85, Italy with 77, and Switzerland with 70. But if we take more interesting and illustrative data such as the ratio of students to computer, the picture is very different. In Spain, the average is 11:1, with educational centres that provide compulsory education reaching 48:1. This ratio increases to 15:1 and 46:1 respectively if only computers used for educational purposes are counted. But this ratio is much better if we count only primary and secondary schools; it then becomes 7:1 and 58:1, and for 2008, 7:1 and 45:1, which is comparable to the ratios that appear in the eLearning Policy Indicators (European Commission, 2006) carried out in 27 countries (EU 25 + 2). According to this study, the countries that represented the best ratios were: Denmark with 5:1 and 37:1, Norway with 5:1 and 52:1, the United Kingdom with 6:1 and 28:1, and The Netherlands with 6:1 and 49:1.

4 Digital Content

According to [3], digital content in 2008 in Spain represented a business value of 10,362 million euros, an increase of 2% from the previous year. This area employs 41,263 workers, up by 5% over the previous year (see Figure 1).

5 R&D Investments

With regard to R&D expenditure, more than 2,000 million euros was spent in 2007, and in 2008 this increased by 8% to reach 2,351 million euros.

6 Personnel and Employment in IT

In 2007, the percentage of people employed in the IT sector increased by 3% from the previous year, but 2008 saw only a slight increase, bringing employment in the hyper sector to a total of 356,000 [4].

With reference to companies providing IT training for their employees, only 18.3% do so. 16.4% advertise on the Internet, and 13.6% make use of digital marketing.

The number of women working in the IT field as professionals now represents 40% of all workers in the IT sector.

Even with the present economic crisis, Spanish companies plan to increase the workforce in IT by 6.7%, which is more optimistic than in previous years. With regard to IT activities in 2009, most Spanish companies anticipate an increase in employees.

The personnel with academic degrees required for IT jobs represent 57% of the total: the percentage of traditional IT degrees requested has reached 30% since 2005, followed by telecommunications degrees at 20%, economics degrees at 9.5%, and industrial engineering degrees at 7%. The number of other degrees requested, including law, mathematics and physics, represents only a marginal percentage of the total. The average IT professional is between 33 and 40 years of age.

In the Information and Communication Technologies (ICT) sector as a whole we need to consider 80 professional categories in seven typical departments of the IT sector: a)

| Subsectors | 2007 | 2008 | % Variation |
|------------------------------|---------------|---------------|-------------|
| Audiovisual | 6,784 | 6,956 | 3% |
| Cinema/Video | 909 | 833 | -8% |
| Music | 284 | 254 | -10% |
| Internet | 482 | 610 | 27% |
| Digital Publications | 286 | 217 | -24% |
| Video Games | 719 | 744 | 3% |
| Content for mobile | 700 | 748 | 7% |
| TOTAL DIGITAL CONTENT | 10,164 | 10,362 | 2% |

Figure 1: Business Value of the Digital Content in Spain by Subsectors (in Millions of Euros).

commercial; b) administration; c) development technician; d) administrative-financial; e) operations; f) maintenance; g) acquisitions-logistics; h) infrastructure.

Salary levels vary according to the department and the employment category within the department. The highest salary level corresponds to commercial managers who have had an average annual increase since 2005 of 5.06%, reaching an annual average of 96,940 euros in 2008. On the other hand, managers in manufacturing continue to receive the lowest salaries; they have seen a reduction of 23.9% over the same period, reaching an average annual salary of 44,964 euros.

One thing to note is that the opposite happens with academic university degrees. Enrolment for medium level academic degrees has increased compared to enrolment for higher degrees. Medium-level degrees represent an average of 58% compared to only 36% for high-level degrees. The second consideration is that technical education has continued to increase since 2002, until the 2002-3 academic year in which it reached a total of 400,000 students, which is a decrease of 10% for the period, but with medium-level degrees experiencing an even greater decrease. A medium-level degree is equivalent to graduate level in the Bologna plan, and a high-level degree is equivalent to a Master degree in the Bologna plan.

For ICT degrees, the tendency is similar though more accentuated. Thus in 2006/7 the decrease amounted to 15% as against 10% for the whole of the technical engineering sector. If we consider the gender issue then we find that in the technical sector only 27% of enrolments were made by women; this figure is only 20% for the ICT sector compared to an average of 54% for the all university degrees.

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Current State of Informatics in Central, Eastern and Southern Europe: The IT STAR Experience

Plamen Nedkov (with contributions from Balint Domolki, Giulio Occhini, and Niko Schlamberger)

This article on the current state of informatics¹ in Central, Eastern and Southern Europe is based on the activities and experience of leading computer societies, representatives of academia, government, industry and civil society, as witnessed within the format of IT STAR², the Regional Information and Communication Technologies (ICT) Association in Central, Eastern and Southern Europe (CESE)³. While the article is only a "panorama shot" of the actual state of informatics in the region it provides many references to related proceedings and other sources of information for the interested reader.

Keywords: Central Eastern and Southern Europe, CEPIS, ECDL, EUCIP, IFIP, IT Education, IT Penetration, IT Star, Godollo, Research, R&D.

1 Introduction

As an introduction, we start with an anecdote which was narrated during a recent IT STAR event: There are three computer societies whose offices are on the same street. As part of its marketing strategy, the first society, with global operations, decides to install a huge display panel over its entrance with the words "The Best Society in the World". The effect is that the second society with European operations responds with a "The Best Society on the Continent" sign flickering on its billboard. The third society, poor as a church mouse, orders a doormat with "Welcome to the Best Society on this Street". The Street is supposed to represent the ICT scene in CESE and the three societies are IFIP, CEPIS and IT STAR.

To have a broader view on international activities, as perceived by the national professional societies in the CESE region, it might be helpful to briefly examine their participation in these three societies.

The "keyword" for IFIP is **technical work**. The region has given IFIP two Presidents, several Vice-Presidents and Technical Committee Chairs, one Executive Director and other officers. It has organised 3 World Computer Congresses and many other technical events. With regard to technical work, the CESE region's interests seem to gravitate around IFIP's Technical Committees (TCs): TC 1 "Foundations of Computer Science" (the first two TC chairs being from CESE); TC 2 "Software: Theory and Practice"; a traditionally strong participation in TC 3 on "Education", TC 6 "Communication Systems" and TC 7 "System Modelling and Optimisation"; TC 8 on "Information Systems"; and in some areas of computer systems technology, security, and society. The CESE region is represented in all IFIP TCs.

¹ Considered in its entirety (scientific discipline, professional activity and Information and Communication Technologies applications in society).

² <<http://www.itstar.eu>>.

³ Primary (but not exclusive) IT STAR membership region.

Authors

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Giulio Occhini was President of the Council of European Professional Informatics Societies (CEPIS) in the mid-90s during a period that was crucial for introducing European Computer Driving Licence (ECDL) on a pan-European scale. In AICA, the Italian Association for Informatics and Automatic Computing, he has held senior positions including National President and Chairman of the Board. Currently he is AICA's Chief Executive Officer and Coordinator of IT STAR. <g.occhini@aicanet.it>.

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The "keyword" for CEPIS is **professionalism**. Two CEPIS Presidents have come from the CESE region so far: one in the mid-90s during a period that was crucial for introducing the ECDL across Europe, and the current president. The incoming President comes from the region as well. With respect to participation, ECDL has been so motivat-

| | IT Spending/GDP in % | IT Spending per capita in EUR | Number of PCs per 100 population |
|-----------|-------------------------|-------------------------------------|---|
| EU | 2.74 | 614 | 31 |
| EU 15 | 2.75 | 747 | 35 |
| Austria | 2.81 | 826 | 41 |
| Bulgaria | 1.95 | 54 | 7 |
| Czech R. | 3.01 | 257 | 20 |
| Estonia | 2.88 | 171 | n/a |
| Greece | 1.12 | 190 | 16 |
| Hungary | 2.45 | 192 | 15 |
| Italy | 1.75 | 430 | 26 |
| Latvia | 2.29 | 102 | n/a |
| Lithuania | 1.66 | 86 | n/a |
| Poland | 2.36 | 122 | 14 |
| Romania | 1.90 | 46 | 7 |
| Slovakia | 2.34 | 149 | 14 |
| Slovenia | 2.14 | 297 | 29 |

Table 1: IT Penetration by Country, 2005. Sources: EITO, IDC, OECD.

ing that it would not be an overstatement to say that some of the biggest ECDL success stories stem from CESE. The current priorities in this respect appear to be to extend the portfolio of products in ICT skills and certification by introducing repackaged and new services, i.e. initiatives by Hungary for "ECDL Select" and the e-Guardian (ECDL Foundation Endorsed Partner Programme from Lithuania). There is also the European Certification of Informatics Professionals (EUCIP) [1] as a model to define and measure ICT Skills at a higher professional level, with Italy as its main champion. Furthermore, there are many other CEPIS programmes and initiatives, such as the Task Force and position paper on University Education and the ICT Industry, in which representatives of the region have provided leadership.

The "keyword" for IT STAR is **partnership**. IT STAR does not collect membership fees. The great majority of its member societies (currently 14, but soon to increase) are also members of CEPIS and IFIP. The usefulness of IT STAR to its membership is that it focuses on Information Society issues as they relate to the CESE region, but within a European and a global context. In doing so, it builds on existing experience and connections between national ICT professionals and organisations but also involves stakeholders coming from academia, government, industry and civil society. IT STAR provides a forum to members and participants from 3 "old" European Union (EU) member states, 8 "new" EU members and 3 countries aspiring for EU membership.

To complete the "international contacts" topic it is essential to say that both government and professional organisations hold the EU and its network of ICT related institu-

tions and activities as top priority. Since 2003, IT STAR has been monitoring the participation and progress of the region in the EU Framework programmes [2] and in other activities and programmes of the EU institutions, and has debated aspects related to the current state of informatics during its series of conferences⁴.

In the same vein, there are programmes and activities of the specialised United Nations (UN) agencies with a mandate in the Information Society domain, for example UNESCO⁵ and the International Telecommunications Union.

2 Information Society

Comparisons could be made between the accelerated rate of absorption of ICT in south-eastern Europe since 2000 and the same process that started in the mid-90s in Western Europe. At the start of this process, most experts were rather pessimistic about the Information Society take-up in Eastern Europe. It turned out that due to a number of circumstances related to the EU enlargement process, the period

⁴ICT and the Eastern European Dimension, Prague, 2004 (jointly with FISTERA-IPTS/JRC-EC); R&D in ICT in Central, Eastern and Southern Europe, Bratislava, 2006; Universities and the ICT Industry, Genzano di Roma, 2007; National Information Society Experiences, Godollo, 2008.

⁵ CESE is traditionally active in the Medium and Biannual plan and program activities related to ICT. It assisted the establishment of UNESCO's Intergovernmental Informatics Programme in 1985, which is now incorporated in the "Information for All" Intergovernmental Program, currently chaired by a representative of the region.

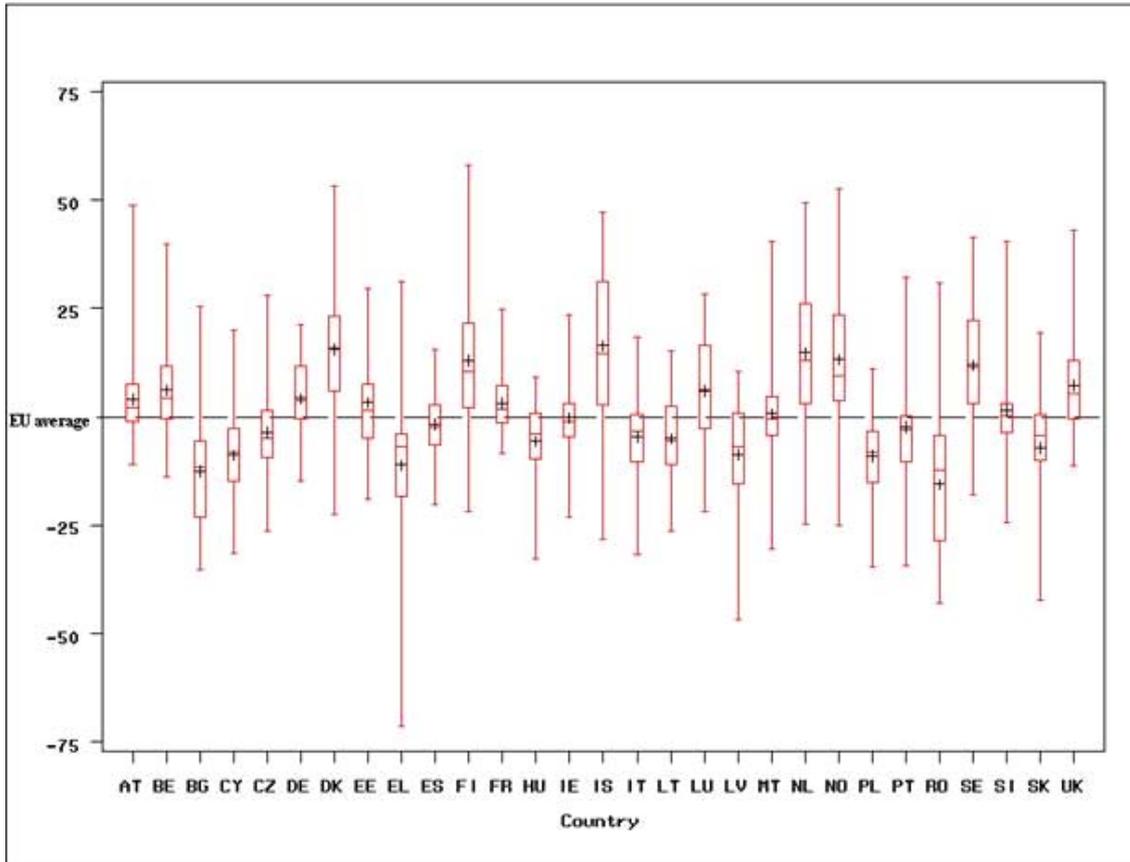


Figure 1: Countries Performance Relative to the EU Average. Source: Commission services <http://ec.europa.eu/information_society/europe/i2010/infso_today/index_en.htm>.

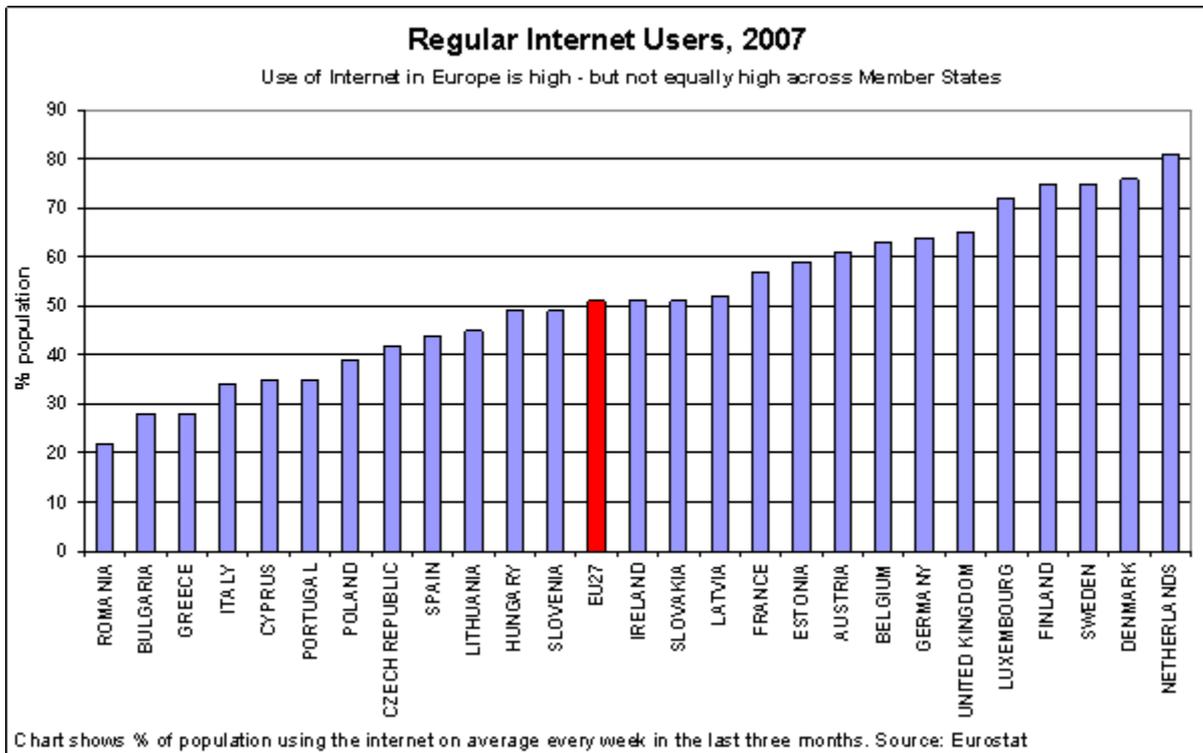


Figure 2: ICT Usage in Households and by Individuals, 2007. Source: Community Survey of ICT Usage in Households and by Individuals, 2007, Eurostat.

2003-2005 was of a relatively rapid catch-up in terms of IS Indicators. In some areas, Central and Eastern Europe (CEE) is performing better than some southern EU Member States such as Greece, Portugal and Spain [3].

The CEE region has a series of comparative advantages such as a traditionally good educational system, relatively well-qualified workforce and ICT specialists, a developed research infrastructure, acute interest on the part of the younger generation in ICT, lower labour costs and other.

The principal guiding document for Information Society (IS) development is the EU policy framework "i2010 - A European Information Society for growth and employment". The European i2010 policies serve as guiding principles to all EU Member States in the region and the annual evaluations positively influence national IS developments. The availability of EU structural funds in support of national IS projects is another important aspect which is especially appreciated by the new EU Member States.

All IT STAR countries have established a **principal strategy** that is supported by a framework of laws and regulations covering various aspects related to education, e-governance, industry, commerce and others, although their quality and their ability to adapt to changing circumstances is often questionable. The notion of the Information Society remains unclear for a large part of the population and indeed, there is no simple definition of what "Information Society" actually means⁶ [4]. This is compounded by the fact that measuring the processes and the generic phenomena of the Information Society has serious handicaps. It is essential for governments to carry out comprehensive and honest public relations activities related to the Information Society and the knowledge economy since after all, the awareness of the public is critical.

With regard to IT penetration we selected the Table 1 [5].

Figure 1 [6] shows how the countries are performing relative to the EU average on 52 Information Society indicators taken together. All EU countries have strengths and weaknesses with indicators both above and below the EU average. There are three groups of countries: most advanced, for which the box lies entirely above the line, least developed, for which the box lies entirely below the line and the rest with values distributed above and below the EU average.

Figure 2 [6] shows ICT Usage in Households and by Individuals as a percentage of the overall population.

The table and graphs are certainly indicative, however, in assessing IS development, technological and macro-economic indicators should be carefully matched with other "softer" socially oriented indicators reflecting cultural tradition and workforce specifics. A study [7] made available

at the 3rd IT STAR Workshop in Godollo (Hungary) argues that "frog-leaping" cannot be achieved by simply introducing more e-services and technology, that social environments have their own rationale, accelerators and breaks and the effect of transferring technological solutions from one country to another will be different depending on the social environment. A one-sided approach might lead to inadequate policies followed by questionable measures and investments.

3 Individual Country Assessments

The following short excerpts related to individual country assessments for the new EU members plus Austria, Greece and Italy are cited from Preparing Europe's digital future i2010 Mid-term Review [6]:

■ **Austria:** *"The information society at large (connectivity, ICT usage by households, enterprises and governments) is more developed than on average in the EU. However, Austria is not one of the frontrunners, except for e-government services, for which Austria has been leading developments in the EU consistently in recent years".*

■ **Bulgaria:** *"The benchmarking results make it clear that the information society in Bulgaria is at a relatively early stage of development. However, there are some strengths, such as the adoption of broadband by Internet users, and signs that Bulgaria is leapfrogging outdated technologies to catch up with its new partners in the EU".*

■ **Cyprus:** *"Cyprus is among the lowest placed in the ranking of most information society indicators but efforts in developing e-government services and a business environment relatively favourable to ICT investment, are laying the foundations for further development, in particular with a good e-skills base".*

■ **Czech Republic:** *"The information society in the Czech Republic is still lagging behind in comparison to general developments in the EU, and for most of the benchmarking indicators it is below the EU average. However, there are signs that this may be evening out with strong progress in e-government, rapid adoption of broadband by Internet users, and a business environment relatively favourable to ICT investment and with a good e-skills base in particular".*

■ **Estonia:** *"Estonia is well advanced in the information society, with many benchmarking indicators significantly above the EU average, notably in the area of broadband connectivity, households' Internet usage and e-government services. However, the take-up of ICTs by businesses does not keep pace with these positive developments".*

■ **Greece:** *"Strong policy commitment, notably the National Digital Strategy (2006-2013), has led to a stable improvement of most benchmarking indicators. However, despite this, the information society in Greece is still lagging behind in comparison to general developments in the EU".*

■ **Hungary:** *"The information society in Hungary is still lagging behind in comparison with the general developments in the EU, with most of the benchmarking indica-*

⁶The Slovenian Society INFORMATIKA (SSI) has proposed a definition. Interestingly, if SSI's definition is adopted as a measuring stick, most countries in the region would not qualify as information societies.

tors below the EU average. However, there are signs that this may be evening out with strong progress in developing e-government services and increases in the number of regular Internet users. The national e-Inclusion programme launched in 2007 aims to raise awareness and skills in digital technologies and should further consolidate growth. The strength of the ICT sector and the good base in e-skills in the country are also strategic assets for future development".

■ **Italy:** "Italy presents a mixed picture on information society developments. Italy is amongst the leading countries in terms of quality and availability of e-Government services but still below EU average for fixed connectivity, digital skills of the population and use of Internet by households".

■ **Latvia:** "The information society in Latvia is still lagging behind in comparison with the general developments in the EU with most of the benchmarking indicators below the EU average. However, a good skills base and wide dissemination of Internet usage in the population are laying the foundations for further development".

■ **Lithuania:** "Lithuania lags behind with many aspects of information society development, with most of the benchmarking indicators below the EU average. However, fast progression in Internet usage by households and intensive e-commerce activities are laying the foundations for further developments".

■ **Malta:** "Malta is well advanced in information society, with many benchmarking indicators significantly above the EU average".

■ **Poland:** "The information society in Poland is still only developing slowly and for all benchmarking indicators Poland is close to the bottom of the EU ranking".

■ **Romania:** "The information society is at a very early stage of development in Romania which is close to the bottom of the EU rankings for nearly all benchmarking indicators: connectivity, ICT usage by households, enterprise and government".

■ **Slovakia:** "The information society in Slovakia is still lagging behind in comparison to general developments in the EU with most of the benchmarking indicators below the EU average. However, Slovakia has strategic advantages for future developments: a strong ICT sector, a general high level of adoption of Internet by the population, and one of the fastest growth rates of regular Internet use. The slow development of broadband, however, remains a constraint".

■ **Slovenia:** "Slovenia is well advanced in the information society: many benchmarking indicators are significantly above the EU average, with a leading position for e-government services and significant increases in the last three years in ICT investment by firms".

4 The Role of Government

Governments in the region have a responsibility to provide a clear vision of their understanding of IS and on that basis to seek multi-stakeholder partnerships on IS strategies and policies. There is a need for better horizontal coordination

(between ministries and governmental agencies) and vertical coordination (within the sectors) on matters related to the Information Society. It is essential to have strong collaboration among government departments, academia, the business/application communities and civil society in extending the available products and services by combining and using the respective strengths and resources of all stakeholders. A particular information society-related responsibility of governments is to reduce digital illiteracy so as to include, or maintain, the active population in the labour market, and to assist the social inclusion of vulnerable population groups.

5 Education

A negative tendency in the 90s and the early 2000s was the slow but progressive decline of the educational system in most of Eastern Europe. There were many factors for this, mainly having to do with under-financing. Despite the problems, education remains high in the set of values of the population. An example of how competitive informatics education and training at the level of secondary schools was, and continues to be, is the organisation and results of national teams from the region in competitions of the International Olympiad in Informatics [8]. In some IT STAR countries there is a worrying trend of increasing the number of social sciences students at the expense of lower interest to study technical disciplines.

In 2007, IT STAR organised UNICTRY 07 [9] in Genzano di Roma (Italy) which provided a useful forum for a debate on universities and ICT education in the context of relations with the ICT industry. Along with the representatives of academia, strong input came from industry and, on the basis of the proceedings, a number of important conclusions and recommendations were made, as reflected in the following paragraphs.

All countries are involved in creating a Higher Education Area known as the Bologna Process. The next Ministerial (Anniversary) Conference will convene in Budapest and Vienna in March 2010 to consider an independent assessment report and a "Budapest-Vienna Declaration". This process is of convergence and comparability of university study programmes leading to an intensive exchange of experience and knowledge. There are important accomplishments but also weaknesses as experienced in a number of EU states, among them Austria, Bulgaria, Hungary, Italy, Romania and other. Further consideration at the national level would be important and IT STAR has recommended to its member societies to be actively involved in the discussion. In November 2009, IT STAR will provide a forum in Rome on *ICT Skills, Education and Certification: the Multi-Stakeholder Partnership*. The timing is appropriate and extends the possibility to academic and professional organisations as well as representatives of government and industry in the region to contribute to the assessment of the Bologna process.

The CESE region experiences a need for stronger collaboration between informatics departments and business/

application communities. There is also the need for strong engagement in multi-stakeholder partnership projects as the combination of governmental support, academic knowledge and business motivation positively influences the emergence of new products and services and increased competitiveness. Cooperation between universities and industry in defining competence profiles is essential to supply the labour market with professionals capable of satisfying industrial needs but also able to benefit from technological evolution.

The fact that user IT ignorance represents a major obstacle in successfully implementing and operating innovative IT solutions in business and public administration is generally underestimated. Consequently, a highly recognised and vendor neutral IT literacy programme, such as ECDL, is important in order to attain the goals of the i2010 strategy.

A few remarks with respect to ECDL: From the 8.72 million ECDL/ICDL Skill Cards issued internationally by the end of 2008, 6.67 million cards were issued in Europe and 2.04 million in the rest of the world. Within the EU, for the same reporting period there are 0.72 million cards in the new EU Member States and 5.95 million in the EU-15. On that basis and also accounting for other reported information (over 1.5 million ECDL skill cards in Italy alone) we could safely assume that approximately 3 million Skill cards are issued so far in the CESE region.

Figure 3 provides another perspective of the ECDL distribution by regions in Europe.

With respect to professional certifications there is a need to integrate new programmes and tools for the certification of professional competence, for example the European Certification for the Informatics Professional (EUCIP) programme, into university computer science courses. Respectively, industry recognition of ICT certifications is critical to support diffusion of certifications within universities. In this regard, the European Committee for Standardization/Standardization body for the Information Society (CEN/ISSS) Workshop on ICT-Skills and the European e-Competence Framework [10][11] could play a more prominent role, though until recently the participation of CEE representatives in CEN's Workshop on ICT Skills was negligible.

Governments have an important role and responsibility in supporting public universities and other higher education and research institutions and in promoting ICT-competences at all levels. Public awareness is critical and the further introduction of credible and internationally accepted ICT certification programmes would make it possible to successfully raise qualifications and implement new processes and ICT tools.

6 Research

The CEE countries have a legacy of well-trained ICT specialists, researchers and educators. However, in order to maintain and improve the quality of research, similar to education, sufficient financing is of absolute importance. Research is seriously under-funded which in turn has led to a significant "brain-drain" towards western research institutes, as well as from academia to the private sector.

In November 2006, IT STAR held a specialised Workshop on Research and Development (R&D) in ICT in Central and Eastern Europe [12] and the conclusions show that most of the IT STAR countries are seriously behind the Lisbon objective of the Gross Expenditure on Research and Development (GERD) reaching 3% of Gross Domestic Product (GDP). Additionally, the structure of GERD is far from ideal: most of its funding comes from government sources and much less from the business sector, therefore, establishing strong connections between academia and industry is an imperative objective in all countries.

Big multinational companies play an important role in the economies of the countries of the CESE region. There are efforts to diversify the involvement of multinationals to orient pure commerce and simple manufacturing towards more knowledge-intensive activities and this could lead to the establishment of high-level research centres in some of the CESE countries.

The internal structure of R&D activities was also considered during the Bratislava workshop. The importance of "curiosity driven" fundamental research was emphasised and this is also supported by the actions of the new European Research Council. On the other side, the research community should recognise complex software development tasks involving the application of innovative technologies as valuable results. The organisation, coordination and financing of R&D activities present a challenge for CESE countries. Measures need to be considered to help regional participation in projects within EU framework programmes (FPs), as these are the main financial tools through which the European Union supports research and development activities. FPs provide important mechanisms and sources for funding research. Unfortunately, the participation figures in previous FPs and in FP7 provide a mixed picture with some countries being seriously underrepresented *vis-à-vis* their R&D potential.

Figure 4 [12] illustrates the success rates of EU members (2006) in FP 6 - Information Society Technologies (IST).

7 R&D in the ICT Sector

With regard to ICT R&D expenditures, there is a huge disparity between Western (and in particular Northern EU members) and the new Member States (but also true for Italy and Greece), which show very low absolute levels and contribute to about 0.8% of the EU total ICT Business Expenditure on R&D (BERD) [13]. In the IT Equipment Sector most of the R&D in the Eastern EU members comes from foreign direct investment. In the Computer Services and Software sub-sector, the differences in R&D intensity and total BERD between Western and Eastern EU members appear not as large in proportion to the rest of the ICT Sector, which suggests that Software R&D could help establish a stronger R&D capacity in the region and in Europe as a whole.

8 Economics

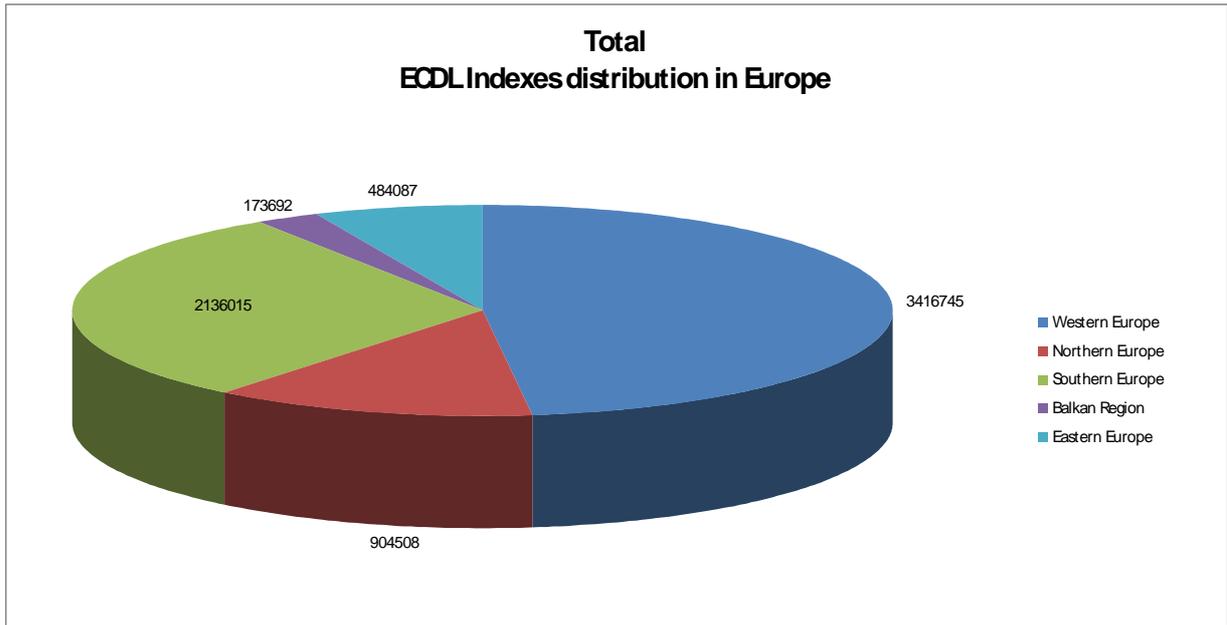


Figure 3: ECDL Distributions by Regions in Europe⁷. Source: ECDL Foundation.

⁷ Western Europe: UK, IRL, GE, CH, AT, LUX, NL; Northern Europe: DK, SE, NO, FI, IS; Southern Europe: ESP, IT, GR, MT, CYP, PO, TU; Eastern Europe: PL, HU, CZ, SLK, UKR, LIT, LAT, EST; Balkan Region: CRO, BiH, KOS, RO, BG, SI.

Submitted and successful participation and success rates in IST programme of 6th European Framework Programme, January 2006

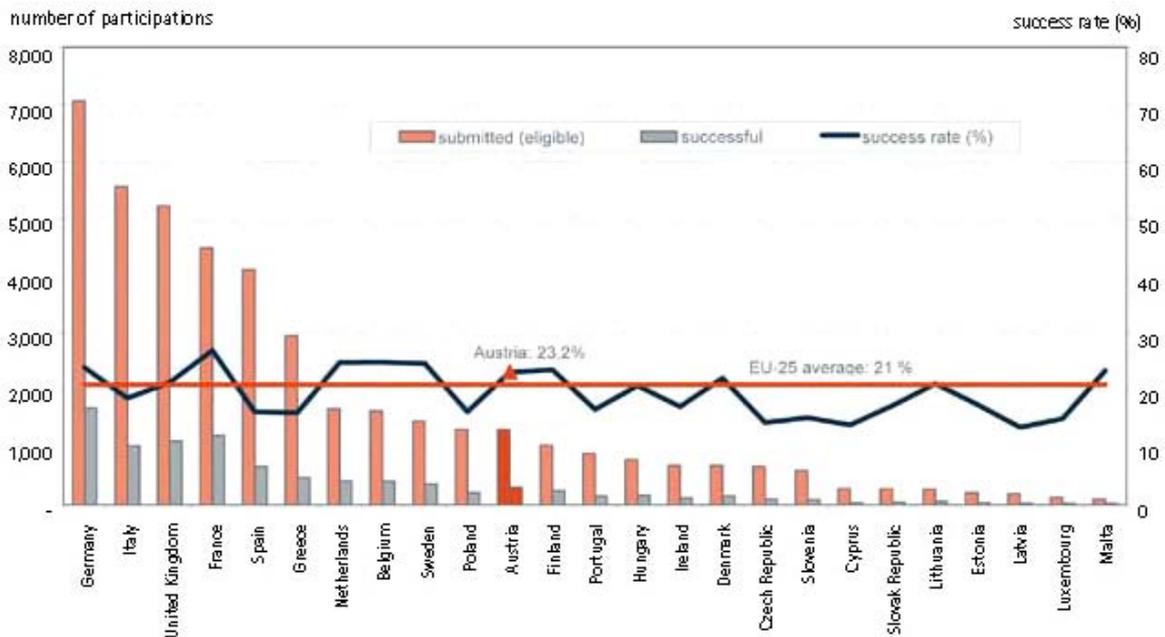


Figure 4: Success Rates of EU Members in IST, 2006. Source: ICT (bmvit Austria 2006 – Presidency of the EU)

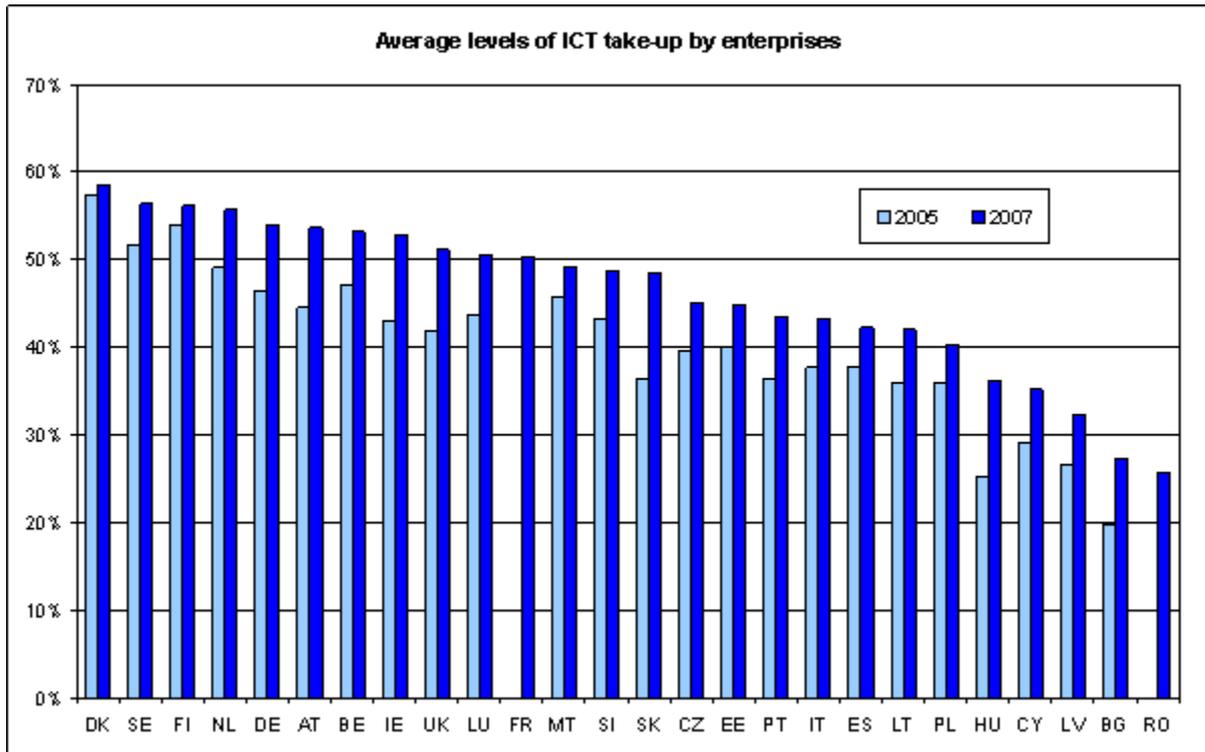


Figure 5: ICT Usage by Enterprises, 2007 [6]⁸. Source: Data refer to all the enterprises, excluding the financial sector. Source: Community Survey of ICT usage by Enterprises, 2007, Eurostat.

⁸ Data refer to all the enterprises, excluding the financial sector.

| | |
|---|--|
| <p>Strengths</p> <ul style="list-style-type: none"> - Traditionally good education system. - Steady improvement of broadband infrastructure. - Growing content in national languages. - High potential of IT services exports. - National policies support e-Learning. - Availability of modern IST. | <p>Weaknesses</p> <ul style="list-style-type: none"> - Recent slow-down of economic development. - Lack of national (private and governmental) capital for large IST investments. - Lack of adequate policies and coordination of IST sector developments. - Demographic problems, brain-drain, digital divide. |
| <p>Opportunities</p> <ul style="list-style-type: none"> - EU accession facilitates foreign investments in IST and contributes to workforce mobility, which in turn increases the attraction of these countries. - Niches for small specialized IST companies to meet needs across the EU. - European Regional Development Fund and Structural Fund subventions could increase competitiveness of Small and Medium Enterprises (SMEs). | <p>Threats</p> <ul style="list-style-type: none"> - Political and economic recession in the EU. - Aging population. - Competition of South-East Asia cheap software and outsourcing of services. - Development of a “subvention” mentality which could hamper entrepreneurship. |

Figure 6: SWOT Analysis of Factors for the Development of the Information Society in the Majority of New EU-Member States.

The economy of the region as in the rest of Europe is in a recession. Until 2008, the economic development of the 10 new CEE EU-members was increasing at a rate higher than that of the EU-15. Hopefully the current recession will be short-lived and these countries will soon reach a previously projected target annual growth of around 5%. Such a scenario would require a continued strong performance to catch up with the West. The ICT sector in most CEE countries has a steadily growing share of the generated GDP and the trade balance, and presents a lucrative market for foreign investment and for outsourcing activities.

The ICT integration in business processes varies greatly among countries. Slovenia's business sector is probably best equipped, but even there ICT is not sufficiently exploited in making companies more competitive (see Figure 5).

A valuable asset of most countries in the region is a relatively well-trained workforce in different fields of ICT that are available (for the time being) at lower costs than in more developed countries. How to make the best use of this asset by various outsourcing and "near sourcing" schemes, how to fight "brain-drain", on the one hand, and the competition of even lower income regions (India, China etc.) on the other, are problems that are confronted by all IT STAR member countries.

The big picture of the international ICT industry displays the cryptic slogan "Think Locally, Act Globally". If we consider the global processes and "critical mass" issue, ICT opportunities for the CEE region have far better chances of increasing within the EU format [14].

9 Conclusions

Obviously, some of the existing problems related to the Information Society in the region will disappear as economies expand and the living standards improve. However, this statement should not necessarily bring comfort to the political elite in the region as the new "info-culture" is rapidly changing the basic philosophy and practice of societal organisation. Governments, in cooperation with civil society and industry, need to be well equipped to monitor and manage the processes. Their most valuable resource is a well-educated and well-motivated population, sustained by a robust system of education and research. If these are not available they risk remaining in a position of continuously catching up.

In conclusion we offer the Strengths, Weakness, Opportunities and Threats (SWOT) analysis of factors, common for the majority of **new EU-Member States**, based on previous studies prepared for FISTERA (Figure 6) [15].

To exploit our strengths we feel that the new EU Member States and those aspiring to EU membership should concentrate on developing content in their national languages, on actively supporting the study of technical disciplines, and on investing in the ICT skills of their respective populations. In the process, EU funds and various kinds of financial support can be exploited, which is important, as any activity and change of orientation will necessarily require substantial financing. The issues that need to be compensated for are: the recession, unclear policies and demo-

graphic problems, all of which need special attention by the governments and demand actions to neutralize or overcome particular problematic areas. A revision of national Information Strategies would be most advisable, to be followed by realistic action plans with mandatory elements such as timeframes, finances, entities in charge, and deliverables. In this regard, IT STAR will continue to provide a forum for a regional and international exchange of experience.

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UPGRADE: The Unofficial Story of a Successful CEPIS Undertaking

Rafael Fernández Calvo

This article describes the story of *UPGRADE*, "The European Journal for the Informatics Professional", a digital publication promoted by the Council of European Professional Informatics Societies (CEPIS) and published by *Novática*, journal of the Spanish CEPIS society ATI (Asociación de Técnicos de Informática). The author offers his personal, unofficial view of the people and facts involved in its creation, growth, and consolidation.

Keywords: ATI, CEPIS, Digital Journal, European Journal, Informatics Professional, UPGRADE, UPENET.

Foreword

This article could just as easily have been co-authored by the other two founding fathers of *UPGRADE*, *Wolffried Stucky* and *François Louis Nicolet*, but the author has preferred otherwise because in this way they can get all the praise that both deserve for their key role in conceiving and implementing the CEPIS digital journal, a role that their modesty would have forbidden should they have had to share authorship.

In the same vein, the author sincerely apologises if some relevant person or fact has been inadvertently omitted.

1 Prologue

Providing useful services to its members is one of the main aims of almost any association worldwide, and for associations operating in fields related to science and technology, some kind of publication, a journal possibly, is commonly a flagship service/product, one that helps increase the prestige and visibility of the publishing society. *Communications* of the Association for Computer Machinery (ACM), *The Computer Journal* from the British Computer Society (BCS), *Informatik Spektrum* from GI (*Gesellschaft für Informatik*, the German Informatics Society) and *SI* (*Schweizer Informatiker Gesellschaft - Société Suisse des Informaticiens*, the Swiss Informatics Society), *Novática* from ATI (*Asociación de Técnicos de Informática*, the Spanish Informatics Society), are only a few but relevant examples in the field of Information and Communication Technologies (ICT).

Ten years after its inception in 1989, CEPIS, the Council of European Professional Informatics Societies, was in search of higher visibility among its approximately 30 national member societies and their large memberships (around 300,000 informatics professionals in that particular moment). A Product Task Force (PTF) was set up, led by *Dr. Wolffried Stucky*, who was Vice President of CEPIS at that time and champion of *UPGRADE* in the organization for years.

Another member of the task force and key protagonist of our story, *François Louis Nicolet*, Chief Editor of *Informatik/Informatique* (the magazine of the SVI/FSI, Swiss Federation of Professional Informatics Societies), suggested that a publication could be an important tool to that end,

Author

Rafael Fernández Calvo is currently journalist and teacher, after a long career in the Information Technologies (IT) industry as a software developer and Information Systems Consultant. He is Associate Editor of *UPGRADE* and Coordinator of *UPENET* (*UPGRADE* European Network), the network of publications from CEPIS member societies. He was Chief Editor of the Spanish journal *Novática* from 1996 to 2006, as well as co-founder of *UPGRADE* and its Chief Editor from 2000 to 2006. He collaborates with the News Service of *Cadena Ser*, the leading radio broadcasting network in Spain, and with the Latin American Service of the BBC (British Broadcasting Corporation) on topics related to Information and Communication Technologies (ICT) and the Internet. He is an Associate Professor in Computing Law at the Faculty of Law / ICADE of the *Universidad Pontificia Comillas*, Madrid, and is a member of the Board of the Spanish CEPIS society ATI (*Asociación de Técnicos de Informática*). <rfcalvo@ati.es>

one able to contribute to the professional update of the membership of the CEPIS member societies. "It appeared obvious to name this publication *UPGRADE*", read the minutes of the task force.

The PTF concluded that there was a need for a pan-European non-commercial publication for IT professionals, produced in Europe by Europeans, and CEPIS was perfectly placed to do this.

2 Tough Choices

However, on the one hand, since CEPIS was a multinational umbrella organization whose members are independent national associations (some of them having their own printed or digital publication) care had to be taken to prevent any interference or competition with them. On the other hand, it was unthinkable, and very likely always will be, that the budget of CEPIS could allow for a fully-fledged printed journal for the approximately 350,000 associates of its 36 member societies in 33 countries across Europe (current figures).

These constraints led to two choices by the CEPIS Executive Committee: firstly, the CEPIS journal had to be edited jointly with one of the existing journals of a member society; secondly, the journal had to be an electronic one.

A third highly important choice was not so obvious: had the publication to be open access and free of charge or accessible for a fee? Although discussion about this matter was ongoing for some time, a decision was made in favour of open access distribution initially. A wise choice which has been consolidated over the years by the rise of the vibrant movement for free knowledge (our readers will know that, as in the case of free software, here "free" is in the sense of freedom, not in the sense of *gratis*, although usually the two terms go together very well in this context).

It has to be remarked that some significant voices within CEPIS preferred a different publication, one rather more product and market-oriented, or even wanted no CEPIS publication at all. This legitimate opposition faded out over the years when UPGRADE demonstrated its potential as a quality publication that fosters the image of CEPIS in the ICT world.

3 Marching on

With the support of SVI/FSI, *François Louis Nicolet*, produced the April 2000 issue *Informatik/Informatique* as the pilot issue of UPGRADE, featuring the topic "Java - The Evolutionary Attraction". Shortly afterwards, the CEPIS Executive Committee decided that more issues were needed to check the success and viability of UPGRADE and issued a call for participation to member societies.

This marked the arrival of another key player: the Span-

ish CEPIS society ATI (*Asociación de Técnicos de Informática*) and its journal *Novática*, a printed publication created in 1975, which is currently the oldest existing ICT journal in Spain. Its Chief Editor at that time was *Rafael Fernández Calvo*, author of this article, who encouraged ATI to respond to the call.

ATI stepped forward and offered the editorial framework of *Novática*, as well as administrative support and hosting for the UPGRADE Website. Until 2003 this was provided at no fee by KPNQwest Spain, whose Chief Executive Officer (CEO) at that time, *Juan Antonio Esteban*, was a senior member of ATI.

Informatik/Informatique and *Novática* had a very similar and well proven editorial approach, which was used to establish the editorial model for UPGRADE: a monographic section dedicated to a topic of current interest at its core; refereed papers; and a bimonthly distribution. With minor adjustments, this is still the current model for UPGRADE.

The Hispanic-Helvetic partnership proved to be highly efficient and fruitful, and soon produced the first formal edition of UPGRADE, volume I, issue n° 1, in November 2000, with a monographic section dedicated to "Corporate Websites".

The inaugural issue appeared on the UPGRADE Website (Figure 1¹), designed in a rather austere fashion by the Chief Editor of *Novática* with simplicity, ease of navigation and access to relevant information in mind. Austere was also,

¹ All the issues of UPGRADE are freely available online at <<http://www.upgrade-cepis.org/pages/pastissues.html>>.

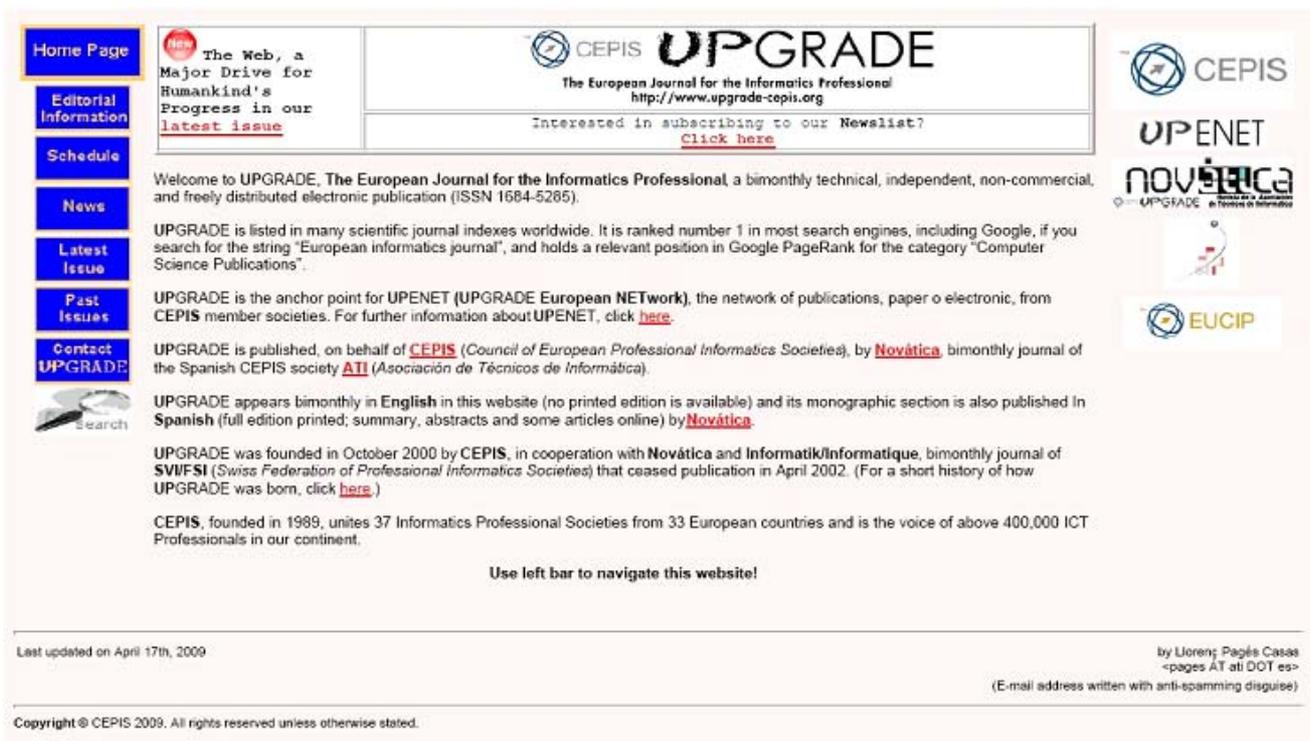


Figure 1: Home Page of the UPGRADE Website at <<http://www.upgrade-cepis.org/>> [June 11, 2009].

and still is, the design of the journal itself, which is the one originally intended for *Informatik/Informatique*, crafted by its Chief Editor.

The monograph of the first issue (see cover in Figure 2) was also published by *Informatik/Informatique* in English (some articles were in German) and by *Novática* in Spanish. It included three interesting pieces in its editorial section, worthy of mention for historical reasons: one by the Presidents of the supporting societies SVI/FSI and ATI, *Carl August Zehnder* and *Josep Molas i Bertrán*; another by the President of CEPIS, *Peter Morrogh*, and the last by *Wolffried Stucky*, Vice President of CEPIS.

It should be noted that, from a formal point of view, **UPGRADE** remained as just a pilot project for nearly three years, but in 2003, when **UPGRADE** had already earned its place as a solid presence in the worldwide arena of ICT journals, the 30th CEPIS Council Meeting held in Dublin on

April 26 approved "*that UPGRADE should be promoted from a pilot stage to a permanent CEPIS service*". A budget was allocated too, a small one affordable for CEPIS' cofers. *Wolffried Stucky's* subtle but strong leadership, plus constant dedication by the Chief Editors of *Informatik/Informatique* and *Novática* and their collaborators, helped a great deal in this context.

4 Pan-European Reach: Internationality and UPENET

As we have seen in the previous section, **UPGRADE** enjoyed a multinational, multilingual environment from its very inception. Not only was **UPGRADE** published in English as well as in Spanish by *Novática*, and in German or French by *Informatik/Informatique*, but soon, in March 2002, an Italian edition emerged as a result of the collaboration between the Italian CEPIS society ALSI

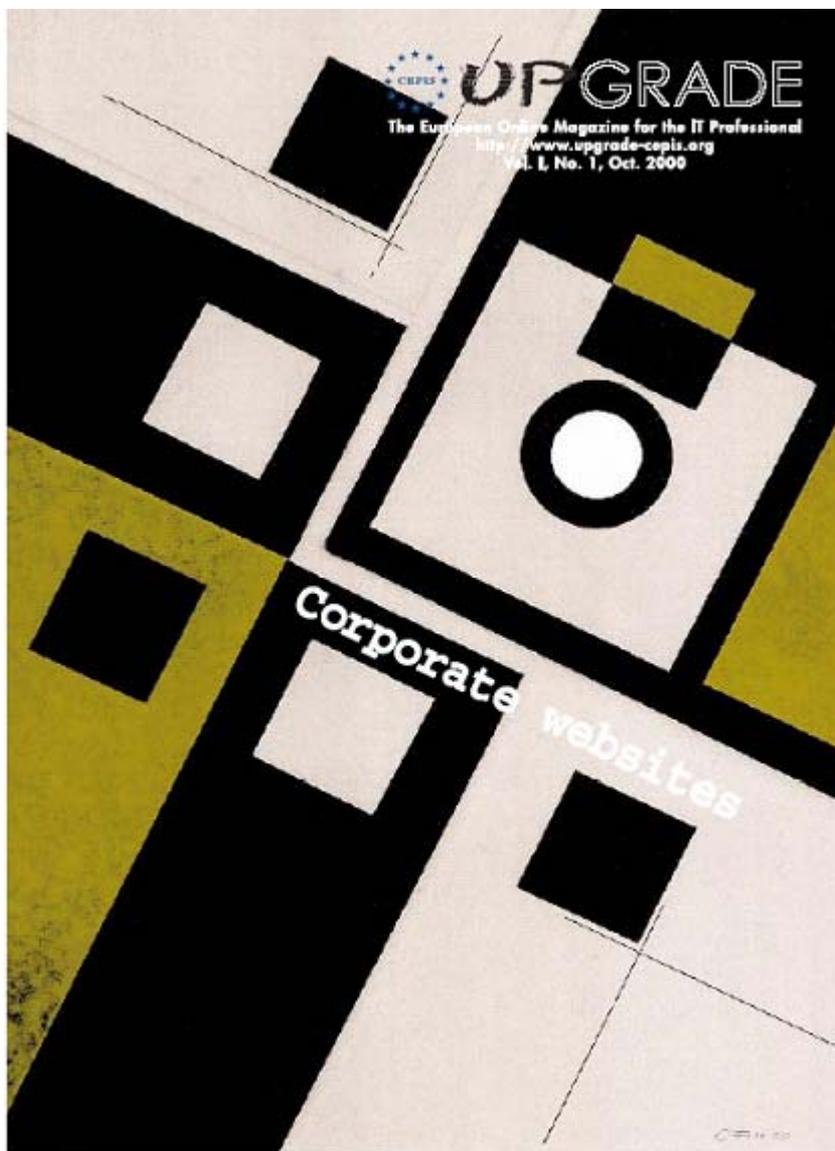


Figure 2: Cover Page of Inaugural Issue (Vol. I, issue no.1, October 2000). Author: Antonio Crespo Foix.



Figure 3: Cover Page of Vol. X, issue no.1, February 2009. Author: Concha Pérez-Arias.

(Associazione nazionale Laureati in Scienze dell'Informazione ed Informatica) and the Italian IT portal Tecnoteca. **Roberto Carniel**, its Editor, was also appointed Associate Editor of **UPGRADE**.

An important fact is that, although **UPGRADE** is edited by *Novática* and both share their monographic section, our editorial approach ensures that the mix of nationalities of guest editors of monographs and authors of articles is as balanced as possible².

Furthermore, in order to make our pan-European ap-

proach stronger, in April 2004 **UPENET** (**UPGRADE** European Network) was created as the network of publications, printed or digital, from CEPIS member societies.

With **UPGRADE** as its anchor point, the main purpose of this network is to make the wealth of knowledge and experience accumulated by CEPIS member societies' publications available to the ICT communities, mainly in Europe but also worldwide, and to foster cooperation among them.

² *Informatik/Informatique* ceased publication in April 2002, being replaced by the journal *Informatik Spektrum*, of the German society GI, as the official publication of the Swiss society SI. The Italian edition of **UPGRADE** ceased publication in 2005.

UPGRADE Milestones

| | |
|-----------------|--|
| 1999 (November) | CEPIS Product Task Force recommends creating European-wide publication |
| 2000 (April) | Pilot issue of UPGRADE, edited by the Swiss journal <i>Informatik/Informatique</i> |
| 2000 (October) | First formal issue of UPGRADE, edited by the SVI/SFI Swiss journal <i>Informatik/Informatique</i> and the ATI Spanish journal <i>Novática</i> |
| 2002 (March) | Italian online edition created by ALSI and Tecnoteca |
| 2003 (February) | UPGRADE Newlist created (nearly 2,000 subscribers as of June 2009) |
| 2003 (April) | CEPIS Council promotes UPGRADE to permanent CEPIS service |
| 2003 (June) | UPGRADE issue (Vol. IV, no. 3, June 2003) dedicated to "Open Knowledge" becomes a hit, being widely used in the European Parliament debate on software patents (this issue was translated into French, Italian and Spanish) |
| 2003 (December) | UPGRADE is shown as first entry when you search for the string "European informatics journal" in nearly every major search engine, including Google (and remains so as of June 2009) |
| 2004 (April) | UPENET, UPGRADE European Network, created (eight publications from CEPIS member societies belong to this network as of June 2009) |
| 2007 (February) | UPGRADE achieves high position in Google "Pagerank" for ICT journals worldwide |
| 2008 (August) | UPGRADE issue (Vol. IX, no. 4, August 2008) dedicated to the CEPIS project EUCIP (European Certification of Informatics Professionals) appears exceptionally in printed format (it was sponsored by the Italian society AICA and CEPIS, for the 20th IFIP World Congress, held in Milan) |

To this end UPGRADE republishes in English, in its UPENET section, articles from the syndicated publications, while they in turn can republish, in their own languages, articles published in UPGRADE or in any of the syndicated publications.

Today eight publications participate in UPENET³:

- *Informatica*, from the Slovenian society SDI (*Slovensko Društvo Informatika*).
- *Informatik-Spektrum*, published in German by Springer Verlag on behalf of the German society GI and the Swiss society SI.
- *ITNOW*, published by Oxford University Press on behalf of the British society BCS.
- *Mondo Digitale*, from the Italian society AICA (*Associazione Italiana per l'Informatica ed il Calcolo*

Automatico).

- *Novática*, from the Spanish society ATI.
- *OCG Journal*, from the Austrian society OCG (*Österreichische Computer Gesellschaft*).
- *Pliroforiki*, from the Cyprus society CCS (Cyprus Computer Society).
- *Tolvümál*, from the Icelandic society ISIP (*Skýrslutæknifélagið*).

It is worth mentioning that other publications belonging to CEPIS member societies will probably join soon.

5 The Protagonists

A lot of voluntary work is required to produce a bi-monthly independent non commercial publication like UPGRADE. This is why it is imperative to mention, in addition to the pioneers, a lot of people whose participation has been instrumental to the success of our digital journal⁴.

First of all, since quality content is the flesh and bones of a journal like ours, special thanks must be given to the

³ *Pro Dialog*, published jointly by the Polish CEPIS society PTI-PIPS (*Polskie Towarzystwo Informatyczne*) and the Poznan University of Technology, Institute of Computing Science, was a member of UPENET since 2004 until ceasing publication in 2008. By the way, from these footnotes one could deduce that the world of ICT journals (and in general of scientific ones) is rather unstable and shaky, and in fact it is increasingly so since the boom of Internet in the mid 90s and the dramatic shift in information distribution it nurtured.

⁴ As mentioned in the foreword, the author offers his sincerest apologies if he has involuntarily forgotten some significant names, not only in this section but throughout the article as a whole.

multitude of authors from all over the world who submit their papers for review and publication, as well as to the Guest Editors of the monographs. These are recognised world-class experts in their fields of expertise and are able, through their reputation, to motivate first-rate authors to submit papers on different facets of the topic covered by the monograph, papers that they peer-review and approve.

Inside the **UPGRADE** production cycle, we have to extend our deep gratitude to: **Roberto Carniel**, Editor of the Italian edition and former Associate Editor of **UPGRADE**; **Zakaria Maamar** and **Soraya Kouadri Mostéfaoui**, Associate Editors responsible for the former Mosaic section; **Antonio Crespo-Foix** and **Concha Arias-Pérez**, the Spanish artists responsible for our original and attractive cover artwork (see Figures 2 and 3); the person in charge of the composition of our journal, **Jorge Llácer-Gil de Ramales** (who was preceded in this vital job by **Pascale Schürmann**); not to mention the current members of the Editorial Team (**Llorenç Pagés-Casas**, **Fiona Fanning** and **Francisco-Javier Cantais-Sánchez**), as well as our volunteer English-language editors and our professional translator, **Steve Turpin**, who together ensure the linguistic correctness of everything we publish. We cannot praise them all enough for their decisive and valuable collaboration.

Thanks are also due to the courage and foresight of the CEPIS governing bodies for their commitment to an open, independent, quality publication and to ATI for having determinedly undertaken the implementation of the project (some names which come to mind are **Nello Scarabottolo**, **Jukko Ruissalo**, **Francisco López-Crespo** or **Fernando Piera**, who, among many others in a list too long to be included, have strongly supported **UPGRADE**). The Swiss society SI (*Schweizer Informatik Gesellschaft*) deserves grateful mention too for having provided occasional financial support.

6 Epilogue

A lot of things have happened to the founding fathers since 2000: **François Louis Nicolet** retired in 2003, although he remained as an Associate Editor until 2006, the year in which **Rafael Fernández Calvo** resigned as Chief Editor, but has continued as an Associate Editor; he was succeeded by the current Chief Editor, **Llorenç Pagés-Casas**; in 2003 **Wolffried Stucky** was substituted at the helm of CEPIS by **Jukko Ruissalo** ... but it looks like the engine is well enough conceived and tuned and has therefore kept going on at a steady rhythm regardless of the personnel involved.

This explains how our digital free access journal is moving towards completing its first decade and has consolidated as a publication service that, as primarily intended, has given CEPIS very positive visibility in the ICT communities worldwide in the professional, academic and Public Administration fields. Present in many relevant international indexes and widely referenced, **UPGRADE** has become to a very satisfactory extent "The European Journal for the Informatics Professional", as its motto reads and its promoters envisaged⁵.

Of course, a handful of mistakes have been made along the way and there is still a lot of room for improvement but, on the one hand, (IRONY ON) it might be considered somehow inconvenient to mention mistakes in a commemorative article like this one (IRONY OFF), and, on the other hand, any details about future developments must be mandatorily left to the current Chief Editor, my friend and colleague **Llorenç Pagés-Casas**.

⁵ **UPGRADE** is shown as first hit when you search for the string "European informatics journal" in most major search engines, including Google.

1991: Making the Knowledge Work

Francisco López-Crespo

Council of European Professional Informatics Societies (CEPIS) Chairman Francisco López-Crespo (1991) describes the infancy of CEPIS, its legal registration, the formation of an Executive Committee, and the formulation of "The Way Ahead".

Keywords: CEPIS Bulletin, Registration, Seville Council, Working Groups.

1 CEPIS Council in Seville

My term as CEPIS Chairman started in 1991 following the approval of my appointment by the Sixth Meeting of the CEPIS Council, held in Seville (Spain) on April 26 (see Figure 1) and hosted by the *Federación Española de Sociedades Informáticas* (FESI, the Spanish Federation of Informatics Societies), then a Spanish CEPIS member¹. Indeed, I had been deeply involved in CEPIS business since the very first meeting in 1988 in London (United Kingdom).

It is a pleasure to recognize the support I received from Mr. Gavin Kirkpatrick (British Computer Society, BCS), Ms. Peta Walmisley (CEPIS Secretary), and Mr. Aage Melbye (Past Chairman).

In 1991, CEPIS had 19 member societies from 16 different countries. There were four task forces: Professional issues, Legal issues (renamed Computer Misuse after the Seville meeting), Technical issues, and Social issues.

2 CEPIS Becomes a Legal Entity

CEPIS reached a crucial landmark in Seville when the 16 founding members of CEPIS formally and unanimously adopted the "*Articles of Association and Constitution of CEPIS*".

My term was mainly occupied with the transition of CEPIS from an *ad hoc* status to a transparent, well-recognized organization managed by public regulations and by-laws. I had the opportunity to realize that the CEPIS Constitution was perceived by European institutions as a positive step for European informatics professionals to build a coordinated European voice.

From the very beginning, CEPIS wished to avoid having superfluous superstructures. According to the founders' vision, activities were to be carried out mainly via support from member society channels and, in all cases, the activities CEPIS was willing to support were to have a sound business plan. Furthermore, CEPIS activities were to be complementary to other international bodies, e.g. the International Federation for Information Processing (IFIP), and

¹ FESI was a federation of societies that included ATI, the current CEPIS member.

Author

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focus on European initiatives and policies. These same criteria were applied in CEPIS' new constitutional era.

3 Fulfilment of the Mandates from the Seville Council

There were three main mandates given to me as Chairman:

- To decide, in conjunction with the Chief Executives Working party, upon the country in which CEPIS was to be legally registered. After studying the various options, The Netherlands was selected.

- To appoint a committee to fill the posts of Treasurer, Secretary, and Vice Presidents. That was done and then approved by the Seventh Council.

- To submit the CEPIS paper "*The Way Ahead*" to the European Commission (EC) and to improve cooperation. This important document was prepared by Gavin Kirkpatrick and approved by the CEPIS Council.

After the formal submission of the paper on May 15,



Figure 1: Attendees of the Sixth Meeting of CEPIS Council, Seville, April 26, 1991.

1991, I met Mr. Joan Majó, Counsellor at the European Economic Community (EEC) Directorate General (DG) XIII (Information Society & Media) on July 10. It was an open discussion, after which potential areas appeared for CEPIS to participate in EEC initiatives, as well as the means to partially finance them. Following that meeting, EEC officials and CEPIS representatives continued working together. On September 17, 1991, a large meeting was held between EEC officials and CEPIS; at this meeting CEPIS consolidated existing contacts and made new ones in fields such as providing expert support for European policies, participation in European forums, and financial support.

The European Informatics Skills Structure (EISS), in 1992 is a good example of a fruitful EEC-CEPIS cooperation. The EISS included a Professional Code of Conduct, as envisaged in the CEPIS Constitution.

4 Other Outcomes from the Seville Council Meeting

The Hungarian informatics society was accepted as a full member of CEPIS and Mr. Maurice Elzas was elected as President Elect. The request to consider personal mem-

bership of CEPIS was deemed inappropriate at the moment; CEPIS's constitution establishes only an indirect democracy of European informatics professionals. It was at this time that a request was made to adopt e-mail for CEPIS communications.

During this time, the CEPIS Council also began to produce the CEPIS bulletin under the coordination of Mr. Julián Marcelo (ATI). This CEPIS bulletin was reprinted in some member societies' journals, and, in my personal view, may be seen as a precursor to UPGRADE.

5 Making the Knowledge Work

At that time, member societies had more than three hundred working groups in many fields of informatics and its social impact. They were isolated from country to country and, as a result, missed out on the potential of working together. In my view, CEPIS needed to facilitate ways to make knowledge flow and encourage cooperation between member society working groups.

Mr. Giorgio Sacerdoti (AICA, the Italian Association for IT and Automatic Calculation) initiated the task of studying how the various working groups could collaborate more

effectively. This resulted in a recommendation for a bottom-up approach - that is, improving coordination through practical activity and setting up a repository of working group descriptions and goals. This initiative was warmly welcomed by high-level officials within the EEC.

6 The Way Forward

Although my term as CEPIS Chairman ended at the Seventh CEPIS Council, my subsequent dedication to the CEPIS Executive Committee as a Past Chairman was greater than was initially expected, given the large amount of work required in setting up the newly constituted CEPIS under very strict economic constraints. I was very much in line with the spirit of creating civil society networks as a way of building "the Europe of the citizens". CEPIS was (and still is) the European network of informatics professionals, which aims to improve innovation and participation in the emergence of the Network Society. This is to a large extent, but not exclusively, thanks to informatics professionals.

In fulfilling its mission, CEPIS should, as part of its social responsibility, balance policy with providing services of common interest to member societies, for example professional certification. I believe the latter is much more visible nowadays.

Much more can be done to further increase the visibility and value of CEPIS, bearing in mind that less than half of the member societies' Websites display the CEPIS logo, including many CEPIS founders. The visibility of UPGRADE and UPEnet is an encouraging Internet reality.

Nowadays informatics forms part of our general culture; no field of knowledge can progress without Informatics. We are part of an impressive symbiosis between once isolated fields of knowledge that have since merged, because nothing can be done without Informatics. It is essential that we maintain our dialogue and cooperation with social institutions and professionals from virtually all disciplines. But I am not entirely sure that the voice of the informatics professional is being heard in the world built by our discipline. In my view, the twenty year old CEPIS can reinvent itself to become an even stronger and more effective voice for the European informatics professional of the 21st Century.

1992-1993: No Task Will Be Avoided merely because it is Impossible!

Maurice S. Elzas

Past President of the Council of European Professional Informatics Societies (CEPIS), Maurice S. Elzas (1992-1993) discusses the exciting Dynamite Delors¹ Commission in which CEPIS participated in European Information and Communication Technologies (ICT) strategy, and gives us a behind-the-scenes glimpse of the friendships and adventures at CEPIS Council meetings.

Keywords : Dynamite Delors, European ICT Strategy, Uniform Informatics Curriculum.

I am really pleased and honoured to be asked by the Executive Committee of CEPIS to write a short contribution to this anniversary edition of **UPGRADE**. As can be read in Peta Walmisley's excellent short history of our Council, our origins hail back to a chance meeting of European Informatics Societies Chief Executive Officers (CEOs) in Brazil at the end of the eighties.

At the initial meeting in London, on invitation by the British Computer Society (BCS), we (the participants) enthusiastically agreed on the way forward: by creating some kind of federation of European informatics professional societies, in order to benefit our membership, create lasting bonds of cooperation, and form a channel of truly professional opinion towards the European Commission (EC) and the European Parliament.

Notwithstanding this rationale, the success of this kind of venture more often than not depends on the personal "chemistry" between the participants, and I must say that our "concoction" was apparently the right formula. Soon we all became good friends, looking forward to every next meeting for the opportunity to work together again.

That is not to say that our group always operated without any friction. This was the case in the early days when countries tended to jockey for a better position among peers. In particular, the tension between the "believers" from the continent and the "sceptics" from the British Isles could be clearly felt in general European negotiations as well as in CEPIS. Nevertheless, we were friends for life (not only us, of course, but especially the societies we represented).

Then, as now, our main concern was how CEPIS could be of value to the membership of our societies and the European Union at the same time.

I personally felt it was a great privilege and honour to be elected as the first formal president of CEPIS in Seville (Spain) in 1991.

These were exciting times as Jacques Delors' (called Dynamite Delors by some) European Commission started producing more and more reports and regulations that in-

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fluenced the core of our products and profession. We simply could not stand aside and let it all happen.

A number of well-received reports originated from our group and, later on, we set up an Advisory Panel (which I was asked to moderate) to provide CEPIS and Europe with inputs for a successful European ICT strategy. We were extremely happy to enlist the help of luminaries such as Philippe Dreyfus (French founder and board member of Cap-Gemini-Sogetti and "inventor" of the word *informatique* that later became "our" *informatics*), Nigel Horn (senior partner of KPMG, United Kingdom), Leo Groosman (former director of Philips Computer Industry, The Netherlands) and Albrecht Blaser (former director of IBM Research Deutschland, Germany). The venture culminated in a European ICT Strategy Workshop in Amsterdam (The Netherlands) in 1994 that provided sound advice to the EC on the way forward.

Looking back: I must admit that our (CEPIS) strategic impact has been less than we expected. But I cannot help be proud of some other CEPIS achievements (mainly realized by my successors) such as the European Computer Driving Licence (ECDL) and the European Certification of Informatics Professionals (EUCIP).

Our profession has changed mightily since the early nineties: the general acceptance of personal computers (PCs), the World Wide Web, and countless digital gadgets

¹ Jacques Delors, 8th President of the European Commission. <http://en.wikipedia.org/wiki/Jacques_Delors>.

has created the illusion that most (educated) Europeans see themselves as computer experts, more aware of the daily digital needs than the members of our societies who, alas far too often, are unfairly regarded as "mainly nerds".

If we engage in some soul searching we must, however, admit that parts of our profession have not matured enough yet. While in the early nineties we were forced to consider about 80% of our major business IT projects to have failed in some way, we see today that this figure has been reduced to about 60%. Still far too high, but a sizeable improvement due to increased awareness amongst our professionals. We will never reach 0%, but let us go forward and bring down this figure bit by bit and we will turn into respected craftsmen rather than "nerds".

Might this not give rise, within CEPIS, to the creation of a Uniform Informatics Curriculum for the whole of Europe?

I also believe that a lot of good work can still be done by CEPIS in the area of Intellectual Property Rights, funding possibilities of IT start-ups and ICT research, and, last but not least, Ethical guidelines for the ICT professional.

In the invitation for this contribution, I was asked to provide CEPIS pictures from the past. Unfortunately, like a true IT professional, the only things I can find must be on disc, and at the time of my presidency we did not have digital cameras yet...

Nevertheless I hold vivid memories of CEPIS events in my mind, and it might be an idea to share them with you.

I have been in Munich (Germany) several times on CEPIS missions during my presidency, and on each occasion we were invited to a splendid operatic performance. I will never forget the quality and the splendour of Mozart's Magic Flute or the moving performance of Gershwin's Porgy and Bess.

I am sure Wolter Koops (the CEO of NGI at that time) will never forget our return trip from the Council Meeting in Munich. We had an appointment immediately after lunch in Amsterdam and left Munich at 8 am. Luckily I had had rally driving experience in my youth!

The picture I have in my mind of our Council meeting in Tampere (Finland), in May 1992 is the one of ourselves: Very Important Persons (VIPs) stark naked in the sauna together. There is nothing like it to enhance tolerance and co-operation!

Finally, dear Niels Hoeg who insisted that we call to him first and let him recommend the route before starting on our trip through Norway. Many roads were still covered with snow and ice in May 1995 and he wanted to make absolutely sure we were safe. That also is how CEPIS also works, at the human level.

I have also been asked to mention what I have done since CEPIS. Well, a lot of consultancy and academic work. I am an emeritus now, but still go to my university office once a week. I also tend to busy myself with charitable causes, for which I had too little time during my professional life.

I endeavour to stay active in ICT (I learned Linux recently, having installed Ubuntu on one of my machines). My main professional achievement of the last couple of

years, however, is a control system through which I can control almost everything in our holiday cottage remotely from my laptop. Most hardware and software has been self-made. According to my wife it is the most practical thing I have done in my professional life.

All in all I still tend to live by the motto that hung in the cabin of our sailing boat:

"No task will be avoided merely because it is impossible!"

With my very best wishes for a growing and lasting CEPIS.

1993-1995: Finding the Way Forward

Jaakko Kivinen

Past President of the Council of European Professional Informatics Societies (CEPIS), Jaakko Kivinen (1993-1995) describes the various CEPIS activities with European stakeholders, his concerns for a young CEPIS, and explains how the European Computer Driving Licence (ECDL) was introduced.

Keywords: Council of European Commission, European Software and Systems Initiative, FIPA, Finnish Information Processing Association, ICT Strategy Round Table, IFIP, World Computer Congress.

1 Revealing the Secret

It was a rainy day in Milan (Italy) in 1992 when the CEPIS Council was due to elect the second President of CEPIS. I was surprised when some members came and asked me to be a candidate for the presidency. I didn't have the support of the FIPA, or my employer Neste, or my wife Hilikka, and Finland was not even a European Union (EU) member at that time. However, after a short consideration I said that I was available if needed. The Council meeting voted twice but the result was the same each time: 6 votes for the two candidates and one blank ballot paper. The blank ballot paper was mine and the election was finally decided by drawing lots and, by chance, I became the second CEPIS president.

2 Cooperation with the EU

CEPIS is a non-profit organization with the following mission statement: "*To provide a coordinated European voice that is able to represent to European Institutions the views of European informatics professionals on major issues*". In line with this mission statement, cooperation with the Council of European Commission (CEC) and the Directorates was active. CEPIS participated regularly in Information and Communication Technologies (ICT) Round Table meetings and was involved in the European Software and Systems Initiative (ESSI), New Business Networks, European IT Forum, etc. CEPIS also successfully organized the ICT Strategy Round Table workshop in Amsterdam (The Netherlands) in 1994. However for non-EU countries the relevance of the mission was not so evident.

3 Concerns and Disappointments

We received substantial financial support for our projects from the European Commission (EC). However our basic income came from our members, many of them struggling with financial problems. My main worry was how IT professionals would benefit from CEPIS and how our member organizations would get real value for their money. In 1993 there were 15 member countries in CEPIS and the aim was to recruit at least Sweden, Portugal, Belgium, and Estonia,

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but only Sweden joined CEPIS during my presidency. In 1995 we faced the challenge of organizing our first conference (CEPIS'95) in Paris (France). Unfortunately we were not successful enough in the organization process and we had to cancel the conference.

4 Successes

The Computer Driving Licence (CDL) concept was developed in Finland between 1988 and 1992. When I presented the idea of a computer driving licence to the CEPIS Advisory Panel they were very sceptical. However, the CEPIS Executive Committee saw the potential of CDL and accepted the idea, and Nils Hoeg from Norway was brave enough to take the lead in the "User Training" Task Force. The European Commission also considered that CDL fitted in well with a number of EC policies and in particular with the priorities of the Information Society. CEPIS and FIPA then started to negotiate on how intellectual property rights could be transferred to CEPIS. I couldn't participate personally in the negotiations but tried to make sure that an agreement was reached. That was the start of the ECDL, and the future was ensured by the creation of the ECDL Foundation.

5 IFIP Affiliate Membership

CEPIS members are usually also members of the International Federation for Information Processing (IFIP), and a statement of understanding was drawn up between IFIP

and CEPIS to clarify the roles of both organizations. There was still however a need to improve and secure communication between IFIP and CEPIS. After lengthy negotiations, CEPIS decided to apply for affiliate membership of IFIP, and IFIP General Assembly (GA) unanimously approved this level of membership in 1994. Based on this I had the honour as CEPIS President of speaking and promoting CEPIS in the opening session of the 13th World Computer Congress (IFIP Congress '94) in Hamburg (Germany).

6 Culture and Business

During the CEPIS Executive meeting in Helsinki (Finland) at the end of July 1995 we visited Nokia, then a promising medium size company starting to focus on mobile phones. In Finland we are very proud of Nokia being now the market leader in this business. It was also a great pleasure to have the members of the Executive visiting my home in the evening. There were many good singers among us and it was fun to sing together the songs from various member countries. We are IT professionals from different countries and cultures but we are also Europeans and we work together. I think singing, like mobile phones, can work towards "connecting people".

7 CEPIS now

In 1995 CEPIS started to use electronic communications, set up a page on the World Wide Web, and established an e-mail distribution list. Looking now at the nice CEPIS Website I can see changes, development, and growth. New names, a different office site, many more members and an improved mission and goals. I am especially amazed how my favourite ECDL has developed. I can hardly believe that it covers 146 countries, is available in 38 languages, and that President Barroso¹ received the 9 millionth ECDL Skills Card. It is a great pleasure to congratulate CEPIS on becoming 20 years young, together with all those people who have made it happen.

8 Personal Benefits

My years in CEPIS were very challenging and I am grateful for the opportunity to learn new things and to work hard in order to do my duty. On the other hand it was rewarding to make friends with many interesting and talented people. I would like to give special thanks to CEPIS secretary Peta Walmisley for her remarkable help and support. In the mornings before the meetings in different cities in Europe I often had a long walk around and I constantly used to remind myself: "I am European". Therefore I was very satisfied that in 1995, during my presidency, Finland joined the EU.

¹ José Manuel Durão Barroso, 11th President of the European Commission. <http://en.wikipedia.org/wiki/Durao_Barroso>.

1995-1997: ECDL Take-off Years

Giulio Occhini

Past President of the Council of European Professional Informatics Societies (CEPIS), Giulio Occhini (1995-1997) describes the continued development of the European Computer Driving Licence (ECDL) and relations with the European Commission (EC) during his term.

Keywords: Barroso, ECDL, EEC, European Commission, Digital Literacy, Information Society.

It came as an absolute and unexpected surprise to me when Jaakko Kivinen, the then CEPIS President, informed me that I had been elected by the Council as his successor.

In the middle of the 90s I worked for a United States computer firm and I did not usually charge the company for the costs of my CEPIS involvement. On the other hand, AICA, the Italian Computer Society which I represented in CEPIS, was in no position to subsidize me, so, I funded my CEPIS missions out of my own pocket.

I therefore decided, on balance, not to attend the Council which elected me, because I thought that most of the time would be dedicated to ballots and, in my opinion, I was only marginally involved. I had actually agreed to my candidature going forward mainly to please my friends at AFCET, the French Computer Society which no longer exists.

The above comments explain why I was elected *in absentia* and why, at the start of my presidency, I tried to classify all the issues handled by CEPIS and to involve my colleagues in the management of such issues. The first meeting I remember was a little messy but the discussion was highly productive in terms of planning and carrying out the future work.

In this respect, I'd like to take the opportunity to express my gratitude to Peta Walmisley, CEPIS's Secretary, who was a great help to me throughout all my term.

The key challenge faced by CEPIS at that time was the start-up of the ECDL project, brilliantly lead by Nils Hoeg from Norway and Dudley Dolan from Ireland.

The Syllabus and the Question Test Base (QTB) were in good shape but I quickly realized that what we really needed for the project to take off was an explicit endorsement by European Institutions.

As CEPIS President, I asked for a meeting with the Director General of the European Economic Community (EEC) Industry Directorate General (DG) III, Mr. Stefano Micossi, and he very kindly accepted. So, we met on a sunny Saturday morning in September 1995, at his office in Brussels (Belgium).

There were two messages that I stressed to the many EEC officers attending the meeting:

1) That any European initiative towards the Informa-

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Giulio Occhini graduated in Physics from the University of Milan (Italy), and began his career at the National Research Council (CNR) where he was involved in pioneering work on finite element methods to solve fluidodynamics problems. During the 1960s, several reports co-authored by Giulio on this topic were published internationally. During his career at CNR, Giulio had the opportunity to exploit the capabilities of the first digital computers available in Italy at that time, and this was his passport into the Information Technologies (IT) industry. Since then, he has held technical and managerial positions in several areas (Engineering, Product Planning, Application Development and Marketing) and in various companies (Olivetti, General Electric and Honeywell). Giulio also maintains close relationships with the academic world. He served as Professor of Information Systems at the University of Pavia (Italy), and still cooperates with the Business School of Milan (Bocconi University) and the Research Consortium of Milan Polytechnic (MIP). In AICA (the Italian Computer Association), Giulio has served as head of the Milan branch, and National President from 1989-1991 and 2001-2003. He is currently Chief Executive Officer (CEO) for AICA. In CEPIS, Giulio acted as President during the mid 90s, the period during which the ECDL program was finalized and introduced in Europe. Giulio is also member of the ECDL Foundation Board and has authored (and co-authored) many technical papers and several books on Informatics, its applications, and its impact on economy. <g.occhini@aicanet.it>.

tion Society should provide, as a prerequisite for success, an adequate level of digital literacy of European citizens.

2) That ECDL was potentially a reliable programme mainly because it was backed by the most important European Computer Societies gathered together in CEPIS.

The result of the discussion was extremely positive and a few days later I received a formal letter from Mr. Micossi confirming the EEC's interest in the ECDL proposal and assigning his delegate, Mr. Catinat, to the task of coordinating the EEC-CEPIS collaboration for raising funds.

This was exactly what we needed to start the fire.

In the CEPIS archives there is still a picture of the signing of the 1st EEC contract, with myself and the two project leaders.

Looking back on those old times, I have to admit that the European Institutions demonstrated, on that occasion, a

remarkable long-term vision which the current President of the European Commission, Mr. Barroso¹, proudly recalled recently when he was awarded the 9 millionth ECDL Skills Card.

I can recall other episodes of my CEPIS term, but in retrospect the ECDL programme start-up was certainly the most relevant, considering the consequences.

In conclusion, to be the CEPIS President in that critical period was for me a really challenging and exciting experience. My wish, in the 20th anniversary year of its foundation, is that CEPIS soon gets another opportunity to again take a leading role in raising the informatics knowledge of European citizens.

This time, in my opinion, IT professionalism in Europe should be the issue.

¹ José Manuel Durão Barroso, 11th President of the European Commission. <http://en.wikipedia.org/wiki/Durao_Barroso>.

1997-1999: ECDL is Launched. Now what?

Roger Johnson

Past President of the Council of European Professional Informatics Societies (CEPIS), Roger Johnson (1997-1999) outlines the development of a sustainable model for the European Computer Driving Licence (ECDL), the creation of CEPIS Secretariat and the emergence of the European Certification of Informatics Professionals (EUCIP).

Keywords: BCS, Business Model, COMPIC, Computer Driving Licence, ECDL Foundation, EPIC, EUCIP, IFIP, VDE.

A very happy 20th birthday! My memories of CEPIS go back to the very beginning. I did not formally attend the initial meeting in London but, as a British Computer Society (BCS) Vice-President, I was invited to lunch to meet the representatives who had assembled. That was to be the first meeting with many colleagues from all over Europe with whom I would have the pleasure to work over the next decade. Several years later, I became one of the BCS's representatives to the CEPIS Council and in due course colleagues were generous enough to elect me as a Vice-President and ultimately CEPIS President.

The early 1990s were a fascinating period as the idea emerged of adopting the Computer Driving Licence from Finland and making it into a Europe-wide project. However we faced a huge mountain to climb not only in developing the ECDL product but in defining an appropriate business model. Looking back I am sure much more time was spent creating the product but I believe that more critical to its ultimate success was devising its franchise model. None of us were entrepreneurs, just a mixture of IT professionals and academics.

In the bi-monthly Executive Committee meetings we grappled with the problem of trying to launch a Europe-wide project which was seriously undercapitalised. We had some financial support from the European Commission but little other finance. So in the autumn of 1995 we faced a hard choice of whether to raise capital by charging a large entry fee for the ECDL national licences or a royalty on each Skills Card sold. The dilemma was that a large licence fee could deter societies from signing up while a royalty system would provide little of the essential capital to launch the project.

Looking back a crucial moment came at the IFIP General Assembly held in September 1995 in Calgary (Canada) attended by Dudley Dolan and me. One lunchtime we headed off to a burger bar in the Olympic Ice Hockey stadium to talk over ECDL. A fellow BCS member had earlier told me that 1% of a large amount is still a significant sum while 100% of nothing is nothing. With that in my mind I convinced Dudley that the way forward was a royalty on the Skills Cards sold. At the next CEPIS Executive Com-

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Roger Johnson has been a career academic computer scientist after a short period writing software for a major United Kingdom (UK) software house. He is Dean of the Faculty of Social Science at Birkbeck College, London University (UK). He has a Doctorate in Philosophy (PhD) in Computer Science from London University. His current research interests are in the history of computing and also Information Technologies (IT) professionalism. Roger was CEPIS President from 1997-99 having served as a Vice-President throughout most of the 1990s. He had previously served as President of the British Computer Society in 1992/3 where he has served in a wide variety of roles over the years. He is currently the Honorary Secretary of the International Federation for Information Processing (IFIP) and an active participant in its International Professional Practice Programme (IP3). <rgj@dcs.bbk.ac.uk>.

mittee our joint suggestion prevailed although combined with a small licence fee. The latter proved a wise addition since, although only some thousands of Euros in smaller countries, a licence holder who could not afford the initial fee clearly lacked the capital to invest in promoting the business.

From this decision the vital franchise model rapidly emerged with each stakeholder suitably rewarded: CEPIS, ECDL Board (later Foundation), Member Societies and training providers. It is my firm conviction that any other model would have failed.

With the additional income from ECDL, CEPIS's ambitions started to grow and Council decided that it needed to increase the size of the Secretariat provided until then by the highly efficient and enthusiastic Peta Walmisley. However, the BCS told us that it could not provide more space in its cramped London office. Consequently Council examined the options of moving to Brussels (Belgium), Vienna (Austria) or Frankfurt (Germany). After negotiations, a very generous agreement was reached to house the Secretariat with the Association for Electrical, Electronic & Information Technologies (VDE) in Frankfurt, including for the first time a full time Chief Executive Officer (CEO).

In the later 1990s it was clear that the huge success of ECDL needed to be put on a proper commercial basis. Thus began the negotiations which led to the creation of the ECDL Foundation in Dublin (Ireland). With Peter Morrogh, I

helped negotiate the creation of the ECDL Foundation and duly signed the agreements transferring CEPIS's management responsibilities to the Foundation.

The other spin-off of ECDL arose as a result of CEPIS seeking to further increase its income. We held regularly briefings with the European Commission and in preparing for one in 1998 I remembered a former boss who had trained as an IBM salesman and had always said presentations should end leaving customers with some blue sky! So without consultation with colleagues I added a slide at the close of presentation asking the Commission if they would consider supporting an IT qualification for new entrants to the profession. The response was that they thought they could but doubted if we could get agreement on a syllabus! The slide was headed, accurately but unimaginatively, "COMPIC" (Certificate of Minimum Professional Informatics Competence). We rapidly held two invited workshops in Windsor (UK) during which it was renamed EPIC (European Professional Informatics Certificate) and the now familiar three part structure of what we know today as EUCIP emerged but the rest of that story lies with my successors following my retirement from CEPIS in 2000.

CEPIS allowed me to meet many fascinating people and to spend Sunday mornings exploring many of Europe's cities, great and small. Thank you for the unforgettable opportunity to mix business with pleasure.

I send my congratulations to the CEPIS community on celebrating its 20th birthday and look forward to hearing of your continued success in advancing the key message of the importance of professional informatics in promoting the wellbeing of all European citizens.

1999-2001: Unity in Diversity

Peter Morrogh

Past President of the Council of European Professional Informatics Societies (CEPIS), Peter Morrogh (1999-2001) discusses the diversity of CEPIS members, their commonalities and their disparities and how this has been reflected in the strategic development of CEPIS.

Keywords: CEO Forums, Diversity, E-Commerce, EPIC, EUCIP, IT Certification Organisation for Europe.

1 CEPIS Basics

The character of CEPIS is dictated by its member societies, which vary in terms of size, organisation (the bigger societies have substantial support staff, whilst the some of the smaller ones are very dependent on voluntary efforts), financial resources and reasons for joining CEPIS (in recent years, the desire to participate in the European Computer Driving Licence, ECDL, has encouraged CEPIS membership). They also differ in their approach to "professionalism": some are strict about admitting people to their different grades of membership; others are a community of, associated with or interested in, informatics.

Regardless of the differences that exist between the CEPIS member societies, the attendees at CEPIS meetings have their own diverse interests and backgrounds. Some member societies send their Chief Executive Officers (CEOs) and others a voluntary representative, some being practising Information Technologies (IT) professionals (like myself) and others academics.

The diversity of societies and their representatives is a challenge for all CEPIS Presidents, Executives and CEOs. Not only is CEPIS dealing with a variety of commercial entities, it also must reflect the interests of the individuals who participate in CEPIS meetings and special interest groups. To make matters a little more complex, there is also a constantly changing population of society representation.

As the CEPIS organisation is never in contact with the individual members of CEPIS societies, most subscription-paying IT professionals across Europe can hardly be aware of the potential benefits that CEPIS might bring. This creates a very necessary tension between CEPIS and member societies, who quite rightly demand that CEPIS should be "relevant" (ignoring, for the time being, the relevance provided by the ECDL). "Relevant" and "added value" were words that were used frequently during my time as President. Those of us who ran CEPIS at the time wanted to ensure that, recognising the range of societies' and participants' interests, CEPIS must be more than a travelling "talking shop". I doubt if these debates have ended. In my own case, I valued the inevitable disagreements and constant challenges.

It was clear in 1999 that CEPIS needed to find ways that

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benefited member societies, regardless of their outlook and interests. The ECDL is an obvious "common denominator" that runs across all CEPIS societies. But beyond the ECDL (and partly because the ECDL took up so much time), more thought needed to be put into CEPIS strategy.

To this end, CEPIS organised a meeting in Copenhagen (Denmark) in early 2000. It is interesting to look back at the output of this meeting, as it resonates with where CEPIS is today. Seven main strategic developments were identified:

- CEPIS to strive to become the IT Certification Organisation for Europe. It is worth noting that even if it was not within the power of CEPIS to pursue this ambition during 1999 to 2001, it was anticipated that there could be synergetic interests and future scope for cooperation between CEPIS and the ECDL Foundation.

- The European Certification of Informatics Professionals (EUCIP, previously called EPIC, the European Professional Informatics Certificate). This reached a pilot status in 2001.

- E-Commerce task force.

- E-mail/Web. CEPIS saw the opportunity to share access to special interest groups, calendars of events etc. across Europe. There was also some discussion about being able to call on experts in different countries when CEPIS desired to develop a "position" on a particular topic.

- **UPGRADE**. This was an enormous effort by a few individuals in Spain, Switzerland and Germany and it is a credit to those individuals, and their successors, that it continues to thrive.

- Informatics Journal.
- Seminars and road shows.

Some of the above survive today; others were probably aspirational and have happily disappeared.

There was also recognition in CEPIS, using an idea that I unashamedly took from the ECDL Foundation, that there needed to be meetings of member society CEOs. When one looked at the excellent work that had been done by the Scandinavian societies, the British Computer Society (BCS) and others in Europe, it was clear that some societies had developed new "lines of business" and were to a greater or lesser extent successful in obtaining industry support. The purpose of the "CEO Forums" was to enable greater sharing of information, between the people who actually ran the computer societies, so that successful initiatives in one marketplace could be re-utilised and re-packaged in another. We were careful not to extend the sharing of information into "harmonisation" (a word that carries mixed feelings and cynicism for many people), when different societies had similar, but different, "home grown" products, that had gained national acceptance.

2 CEPIS CEO

Prior to my time as President, and for a time after my election to the position of President, Peta Walmisley of BCS provided a fantastic and professional service to CEPIS. However, it became clear that with the level of activities increasing, CEPIS needed a more permanent solution. To this end, we recruited the first CEPIS CEO, Peter Bumann, based in Frankfurt (Germany). This was an important development, as there were always many financial, operational and organisational activities that needed to be arranged, quite apart from making sure the increasing communications needs of CEPIS and member societies were dealt with.

3 ECDL

For the Presidents that preceded me, and those that have come afterwards, there can be no doubt that the ECDL has been the most important CEPIS-initiated development. Not only has the ECDL fulfilled a much-needed market requirement for IT literacy, but it has also provided both member societies and CEPIS with sources of funds.

When the ECDL was set up, it needed sufficient independence, in order to take decisions in a timely fashion, without having to obtain CEPIS approval at every turn. If the ECDL had not been given its own organisation structure and board of directors, it is unlikely that it could ever have succeeded, in the way it has. Also, it benefited from having a number of enthusiasts to get it up and running. But, from a CEPIS perspective, it was also important that the "child of CEPIS" should remain within the CEPIS fold. Considerable time and effort during my time as President went into trying to ensure that the balance between the two organisations and their interests reflected the long-term interests of CEPIS and the CEPIS member societies. This was unfinished business when I ceased being President.

4 Conclusion

Being CEPIS President is partly about continuity between one's predecessor and successor. Developments by one President must be picked up by the next. In my case, I got guidance and support from my predecessor Roger Johnson, my successor Wolffried Stucky, the CEPIS Executive, the CEO and CEPIS member societies.

In hindsight, the main feature of the whole time that I participated in CEPIS (I was one of those who attended the preliminary "launch" meeting in London, United Kingdom, in 1988) was the amazing diversity of people who participated and their generosity when there were the inevitable misunderstandings. I miss the passionate debates and the challenges that are a feature of CEPIS meetings. But... I have regained my weekends and evenings!

2001-2003: Some Steps Forward in Europe

Wolffried Stucky

Past President of the Council of European Professional Informatics Societies (CEPIS), Wolffried Stucky (2001-2003) provides insight into CEPIS's expanding sphere of activities with the European Commission and various other European groups such as the European Centre for the Development of Vocational Training (CEDEFOP) and the European Committee for Standardization (CEN).

Keywords: Career Space, CEDEFOP, CEN Workshop on ICT Skills and Curricula, Commission, DG Enterprise, EPICS, eTEN, European e-Skills Forum (ESF), European Professionals Informatics Competence Services, Harmonise.

In my presidency, from November 2001 to November 2003, discussions about **UPGRADE** and the European Computer Driving Licence (ECDL) continued: how strongly should **UPGRADE** be supported by CEPIS, and what would be the right relationship between the two families "CEPIS member societies as CEPIS members" and "CEPIS member societies as owners of the ECDL Foundation". In **UPGRADE** you will see another contribution to this issue, and you can read more from my predecessors and my successor on the development of the ECDL Foundation and the relationship of the above-mentioned families. And there will probably be a further contribution in one of the upcoming issues of **UPGRADE**.

The rest of the time in my presidency, and also some of the time in the two years following, while acting as Past President on behalf of the then President Jouko Ruissalo, was devoted to activities in Brussels (Belgium), bringing CEPIS nearer to the Commission and a number of other organizations. European development in the field of e-Skills was always one of CEPIS's high priority activities (cf. ECDL and the European Professional Informatics Certificate (EPIC), see the contribution of my pre-predecessor Roger), and over the four-year period 2001-2005, CEPIS was involved in various activities in the field of e-Skills.

One central and important initiative to mention is **Career Space**. Career Space was a consortium of a dozen or so major Information and Communications Technologies (ICT) companies: British Telecom, Cisco Systems, IBM Europe, Intel, Microsoft Europe, Nokia, Nortel Networks, Philips Semiconductors, Siemens AG, Telefónica and Thales, plus the European Information, Communications and Consumer Electronics Industry Technology Association (EICTA). Career Space's activities focused on ICT practitioner skills.

Career Space's mission was to provide information and suggestions about the needs of the ICT sector and the ways in which the skills gap might be narrowed. Information was intended to help universities to design and tailor their ICT curricula to the needs of industry. Career Space worked in close partnership with the European Commission, and was

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supported by a number of European organizations such as the European standardization body for the information society (CEN/ISSS), the Convention of National Societies of Electrical Engineers of Europe (EUREL), etc. and over twenty universities and technical institutions across Europe. CEPIS was a member of Career Space's Steering Committee and some working groups from June 2002 on.

Between April and December 2003 the **CEN Workshop on ICT Skills and Curricula**, proposed by CEPIS jointly with CEDEFOP and the ICT industry, represented by the Career Space consortium, in an open consensus process validated the ICT profiles and ICT Curriculum development guidelines published by Career Space and CEDEFOP in 2001 and 2002. As a result CEN Workshop Agreement (CWA) 14925 and CWA 15005 were published. I acted for CEPIS as chair of the CEN/ISSS Workshop on ICT Skills in its first phase (2002-2004) and co-chair of the second phase (2004-2006). During the period from February to

November 2005 the Workshop worked towards an ICT Skills (Meta/Reference) Framework. As a result CWA 15515 was published.

In response to severe shortages of ICT practitioners at the end of the 1990s, the Commission supported industry-led initiatives and established some expert groups, with representatives from Member States and stakeholders. As a follow up to these events the **Commission (Directorate General Enterprise)**, in conjunction with CEDEFOP, established the **European e-Skills Forum (ESF)** in February 2003 as a multi-stakeholder partnership. The central aim was to implement a mechanism of cooperation and dialogue in order to develop a comprehensive strategy for improving ICT skills and training across Europe. It was composed of representatives from Member States, CEDEFOP, the Organisation for Economic Co-operation and Development (OECD), industry stakeholders, and a number of important organizations, including CEPIS. The ESF and its current follow-up activities is an important platform that stimulates multi-stakeholder partnerships in the field of e-skills in Europe. The Forum released its report "e-Skills in Europe: Towards 2010 and Beyond" in September 2004. Several initiatives and studies were launched in 2005 based on the recommendations of the Forum to prepare for the development of a long-term e-skills agenda.

In October 2004, the stakeholders met at the European e-Skills Conference in Thessaloniki (Greece). The conference was established as the e-Skills event in Europe for important stakeholders in Europe to meet. CEPIS attended this event with its experts and actively contributed to the plenary and workshops.

In early 2001, CEPIS decided to deploy a certification scheme called the **European Professionals Informatics Competence Services (EPICS)** in the European market. EPICS had been developed under the auspices of CEPIS in 2000, naturally building on the success of the ECDL project. The project drafted a business plan describing the overall business case for EPICS. The development work was commissioned by CEPIS and financed from the CEPIS budget.

In 2001, CEPIS successfully applied for funding to perform a market validation in six European pilot markets. A Europe-wide roll out was planned in detail within the scope of the EPICS project, a European project funded by the eTEN Programme (formerly called TEN: Trans European Telecommunications Networks under FP5) of the European Commission. A Business Plan and a Deployment plan for EPICS were created, planning the roll-out and deployment of EPICS as a trans-European service.

As EPICS could not be established and protected as a brand in the target market, the decision was made to rename the service as the European Certificate for Informatics Professionals (EUCIP). CEPIS's goal was to establish EUCIP as the brand for standardized qualification and certification in Europe.

Since October 2002, six CEPIS member societies had been conducting research in their national markets within the project EPICS in order to find out what conditions have

to be met for a truly pan-European certification system. These countries included Germany, Greece, Ireland, Italy, United Kingdom, and Norway. Six further countries had already expressed a strong interest in participating. The business plan recommended a "slow start scenario for EUCIP Co." and predicted a one-year delay in the original revenue projections. In year 1 of operation there is no income.

In addition, flanking initiatives supporting the roll-out and Europe-wide deployment of EUCIP were initiated and set up. These included the Harmonise project and a European study "ICT Certification in Europe" commissioned by CEDEFOP and carried out by CEPIS. The Harmonise report was published at the end of 2007¹. The final survey report "ICT Certification in Europe" was published and distributed through CEDEFOP in 2006.

These all were completed under the guidance of my successor, his successor, and so on. In the time of my presidency I was grateful for the help of my predecessor, Peter Morrogh, and my successor as President Elect, Jouko Ruissalo. I thank both of them, and I also thank all of my colleagues on the Executive Committee. It was a great honour to serve CEPIS as a president.

¹ See summary of Harmonise project in UPGRADE IX (3), June 2008. <<http://www.upgrade-cepis.org/issues/2008/3/upgrade-vol-IX-3.html#cepisnews>>.

2004-2005: Moving to the Heart of the EU

Jouko Ruissalo

Past President of the Council of European Professional Informatics Societies (CEPIS), Jouko Ruissalo (2003-2005) presents a time of change when CEPIS moved its Secretariat to Brussels (Belgium) and became increasingly involved in European Union (EU) projects such as Harmonise.

Keywords: CEDEFOP, e-Skills Certification, Executive Committee, FIPA, Harmonise, Secretariat.

During my Presidency, CEPIS showed the capability to adjust its capacity and activities to developments and changes in its environment. These necessary adjustments played an important role in the actions taken in CEPIS operations during the years 2004 and 2005.

The Executive Committee, as well as members, had long recognized that the European Union had growing interest in the Information Technologies (IT) industry and IT professional development. Several projects had been started to create a solid base for the European industry and keep Europe in a leading position in global development. As the representative of IT-professionals of Europe, CEPIS participated in these discussions.

Let me summarize some examples of CEPIS efforts and actions during my presidency:

1) Harmonise project

The Harmonise project¹ was funded by the European Commission (EC) under the umbrella of the Leonardo project and conducted by CEPIS, starting early spring 2004. Participating members were from Austria, Estonia, Germany, Italy and the United Kingdom. The goal was to survey existing certification schemes and categorize them into a common scheme.

2) E-Skills certification in Europe

CEPIS experts carried out a survey on e-Skills Certification in Europe analysing voluntary approaches to setting European level quality standards in European countries. The study was commissioned by the European Centre for the Development of Vocational Training (CEDEFOP) and the first results were presented in autumn 2004.

3) Other activities

CEPIS representatives attended several conferences, workshops and specialist meetings.

Although, CEPIS participation in the European debate during 2004 and 2005 was not very systematic and coordinated, it created a good basis for a more planned approach. It became clear that CEPIS had to find its role among the group of European influential players as this was the only way to earn its position as the representative of European IT professionals.

4) CEPIS establishes Brussels Office

Since the European political arena is located in Brus-

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sels, the Executive Committee decided to move the main CEPIS office there, in order to be closer to the European decision making "hearth". Cooperation with the Association for Electrical, Electronic & Information Technologies (VDE) in Frankfurt (Germany) had been very satisfactory, but the move was necessary. VDE helped CEPIS to find a new location and apartment. Presence in Brussels created better possibilities for CEPIS to participate in European projects. CEPIS had established its own presence in the administrative "kernel" of Europe. CEPIS first CEO Dr. Peter Bumann retired April 2005 and a new CEO and assistant were appointed to the Brussels office.

Finally, I have to say that my participation in CEPIS meetings since 1999 as representative of FIPA, my membership in Executive Committee, and my Presidency gave me an excellent opportunity to familiarize myself with EU projects and meet members from different countries. It provided me with a good background to continue as senior consultant. On top of that I made a lot of good friends in Europe, with whom I share common memories.

Today I am already retired, but I still participate in some projects.

¹ See summary of Harmonise project in UPGRADE IX (3), June 2008. <<http://www.upgrade-cepis.org/issues/2008/3/upgrade-vol-IX-3.html#cepisnews>>.

2005-2007: Building on our Collective Strengths

Geoffrey McMullen

Past President of the Council of European Professional Informatics Societies (CEPIS), Geoff McMullen (2005-2007) reflects on the successes of CEPIS as well as the challenges that led to a stronger, older and wiser CEPIS.

Keywords: BCS, CEN, e-Skills ILB, ECDL Foundation, Pan-European, Thessaloniki, VDE.

By 2002, CEPIS had achieved a number of significant successes. A complex, pan-European organisation had come into existence, and attracted members from across Europe. Strategic reviews of major obstacles to the successful adoption of Information Technology to increase the productivity of Europe and improve the region's competitive position had led to the creation of the European Computer Driving Licence (ECDL) derived from a Finnish original, and relations with the European Commission had been established.

A number of significant structural developments had also taken place. The initial secretariat arrangements provided by BCS had been superseded by the recruitment of a permanent secretary based in Frankfurt (Germany) and hosted by the Association for Electrical, Electronic & Information Technologies (VDE). The management of the ECDL had been spun off into a dedicated company (the ECDL Foundation) with its headquarters in Dublin (Ireland), and the pattern of semi-annual Council meetings, with Executive Committee meetings some six times per year, was well established. CEPIS had also begun to bid for European Commission (EC) co-funded projects, and success in this area had raised CEPIS's image with policymakers in Europe.

Certain difficulties remained, especially an overall lack of a sense of strategic direction leading to specific actions. At a practical level, EC projects are generally co-funded, so obtaining EC support of, say, 100,000 euros required a CEPIS investment in cash and kind of 100,000 euros, leading to the depletion of CEPIS capital. This problem was made worse by CEPIS's inability to develop novel sources of independent funding. Consequently, CEPIS faced the prospect of insolvency within a few years. The small secretariat that could be sustained by budgets available to CEPIS was unable to devote sufficient time to new developments, organisational development or service to members in the hope of finding solutions to these and other problems.

Between 2003 and 2006, a number of reviews were carried out by Execom for the Council of CEPIS, which led to the following conclusions:

- CEPIS and the ECDL Foundation agreed to share a secretariat, involving flexible use of suitable skilled staff from the ECDL Foundation's larger headcount

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Geoffrey McMullen has been involved in computing since 1963. He worked for 11 years on the supply side of the industry, in customer support roles for NCR, UNIVAC and CEIR, a bureau, as a systems programmer and manager of other systems programmers. He then worked for twenty years in Shell, principally in Information and Communication Technologies (ICT), but also in some general management and organisation development roles. He retired from Shell as Chief Information Officer (CIO) for the United Kingdom (UK). Subsequently, he worked in consulting and as Chairman/Chief Executive Officer (CEO) of UKERNA, a Government body operating JANET, the UK academic Internet. His interest in skills developed while he had responsibility for the Information Technologies (IT) skill pool in Shell. In pursuing that interest, he has been a vice President and later President of the British Computer Society (BCS), chair of the UK's IT National Training Organisation and chairman of a European task force on e-skills. During his time as President of CEPIS, he initiated a series of task forces on topics including professionalism and skills. He is a chartered engineer, a fellow of the BCS and a liveryman of the Information Technologists Company in the City of London. He holds an honorary doctorate of technology from the University of Wolverhampton (UK). <n.g.mcm@btinternet.com>.

- The commitment to bid for EC projects without regard to methods of meeting CEPIS's financial commitment was replaced by a commitment to undertake projects where they supported CEPIS's longer term interests and could reasonably be funded

- Task forces were established to pursue work on professionalism and other topics of common interest to member societies in order to develop a strategic plan for CEPIS.

CEPIS routine attendance at the biennial EC e-skills conference in Thessaloniki (Greece), CEPIS continued chairing of the European Committee for Standardization (CEN) e-Skills workshop and our membership of the European IT Leadership Board are proof of our acceptance in the European scene. These plans were implemented between 2006 and 2008, at the end of which period CEPIS was on a more robust footing, organisationally, financially, and in terms of member commitment.

CEPIS – Remaining Relevant for the Next 20 Years

Vasile Baltac, President Elect CEPIS

The rapid, unparalleled development of technologies has challenged IT professionals in a way that no other profession has encountered. The future of the ICT industry will continue to make no less challenging demand on our IT professionals. CEPIS, as their European representative body has to respond to these challenges, the author outlines what these challenges are likely to be and how CEPIS can put its experience to use in addressing them.

Keywords: Certification, Dissemination of Basic Skills, Education, E-Learning, End-Users, Entrepreneurs, Higher Education Institutions, IT Industry, Lifelong Learning, Professionalism, Research, Second Generation Digital Divide, Universities.

20 years is a long time in Information Technology (IT). The Web was invented just two decades ago and many of the Internet's features today were not even thought of then. This rapid, unparalleled technological development has challenged IT professionals in a way that no other profession has encountered. The Council of European Professional Informatics Societies (CEPIS), as the European representative of national professional bodies, has had the mission of coping with these developments. New professions have had to be included and professionalism, a major CEPIS preoccupation, has been defined and re-defined as we have seen extreme European diversification that allows for everything, but simplification.

Information technology has become a day to day tool for a significant number of people. 20 years ago, what we today call the Internet was used by some thousands of people, whereas now more than 1.5 billion people (more than 23% of the world's population), use IT, mostly in networks. CEPIS responded to this phenomenal increase in the use of technology by defining and launching the European Computer Driving Licence (ECDL), the most recognised European tool for certification of the basic skills needed to use IT. We are now approaching the issue of the 10 millionth ECDL Skills Card; a figure that demonstrates the adoption of the concept not only in Europe, but also on other continents.

While the European Certification of Informatics Professionals (EUCIP) has not yet met all expectations, it is still a CEPIS project with high potential aimed at helping IT professionals with a vendor neutral certification.

CEPIS represents professionals from both academia and the IT industry. This is the main reason why CEPIS set up a task force to examine the relationship between them. The task force found that universities and industry do not yet cooperate at a sufficiently close level. The changing world influences universities making them operate in an environ-

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Vasile Baltac is a well-known Information and Communication Technologies (ICT) personality in Romania. He started his long career in information technology in 1961 as a computer pioneer and continued his studies in the '60s at Cambridge (United Kingdom) with Sir Maurice V. Wilkes, Fellow of the Royal Society (FRS) and of the Royal Academy of Engineering (FREng). Back in Romania he contributed to the development of the Romanian computer industry coordinating national projects leading to the creation of mainframes, minicomputers, and software engineering. Dr. Baltac went on to become a top manager of nationwide IT related research and manufacturing organisations. Dr. Baltac is currently President of ATIC (the ICT Association of Romania), university professor at the prestigious National School of Public Administration and Political Studies, a member of the Institute of Electrical and Electronics Engineers (IEEE) and of other professional societies. He has initiated successful national projects in e-Government, IT skills dissemination (European/International Computer Driving Licences, ECDL/ICDL) and is involved in IT-policy projects within the European Union, UNIDO, World Bank, etc. Since 2006 he has served as Vice-Chairman of WITSA (World Information Technology and Services Alliances) in charge with Eastern Europe and from 2006-2008 he served as Vice-President of CEPIS. Since November 2008 he has been President Elect of CEPIS. He is listed in various Who's Who, received the Romanian Academy Award and the National Order For Merit of Romania. He has published books and papers on computers, information technology and society, the history of computers, etc. Recently he discussed the digital divide, social issues of IT, e-Readiness and technology foresight at important conferences in Romania, France, Malaysia, Germany, Hungary and Italy. Prof. Baltac is active in community social projects as member of the Rotary Club "Old Court" Bucharest (Romania). <baltac@cepis.org>.

ment where there is a trend towards part-time studies, in particular for computer-related subjects. While several universities favour theoretical research and leave applied research to industry, the research activity in universities, both theoretical and applied, is the most important pillar for sustaining teaching and bringing educators close to current industrial practice. CEPIS believes that speeding up the application of research, to match the high innovation rate in

ICT seems to benefit industry but forces universities into industry-like timeframes.

One of CEPIS's findings was the present scarcity of ICT skills in Europe. While universities are mostly prudent about the qualitative aspects of ICT skills needed, they are also pushed by the market to adapt and provide solutions for the increasing scarcity of ICT professionals. The different approaches of universities and industry to realising the skills required in graduates only increases the gap between what universities offer and what industry needs. Reconciling these divergent approaches for reducing the gap between the skills demanded by industry and the ICT skills offered by university graduates is difficult and may be impossible to achieve.

The present and future of the ICT industry present challenges for professionals. CEPIS as their European representative body has to be able to cope with these challenges. Continuous advances in information systems technologies and applications require us to reconsider the skills needed by tomorrow's ICT professionals. Probably most important is to recognise that building an Information Society (and further a Knowledge Society) needs a new type of professional, with new skills as yet unknown. A recent poll by ATIC shows that the IT industry in Romania (probably indicative of similar situations in other European countries), lacks system analysts and architects, database administrators, application services and security experts, product applications, services and sales skills and Chief Executive/Technical/Information Officers (CEOs/CTOs/CIOs).

The next advances in the industry will cover a wide variety of areas from Web 2.0 and 3.0 to Service-Oriented Architectures, grid-computing, Enterprise 2, Internet Protocol Television (IPTV), etc. There will be dramatic changes in the world of media, news and publishing, further impact by search technologies and a deeper integration into our environment paralleled by a proliferation of new levels of high speed connections. At the same time there will be a rise in privacy concerns (and institutions are slow to change). Already some people question the need for so many Internet Protocol (IP) addresses to be interconnected and the stability of huge databases. A new wave of worries about the environment has reached our industry shores and Green IT has become a preoccupation.

One matter of great importance is the capability to keep applications growing at the same pace as micro-electronics. It has been stated that delays between successive radical breakthroughs in computer science decrease exponentially, i.e. each new one comes roughly twice as fast as the previous one. Integrated circuitry seems to conform to this law. Killer applications, however, appear at a much slower speed.

While we have several accelerating factors that bring ever shorter cycles of innovation, e.g. new hardware technologies, broadband advances, search engine capabilities, e-Content growth and availability, open source software, e-Education impact, we are confronted with decelerating factors such as limitations of present technologies, increasing complexity, information overload, slowing down of hard-

ware by software, and compatibility issues to name just a few. At the same time the future of the industry is threatened by vulnerability problems, the increasing volatility of information storage, intellectual property protection issues, the need for perennial standards for media, etc.

All these will bring new challenges for ICT professionals. Consequently, CEPIS has to adapt itself to this very dynamic environment. CEPIS will be confronted with several issues, not new, but with a stronger impact than before:

- Professionalism in the new even more dynamic environment.
- Education issues for professionals.
- Education issues for ICT users.

Professionalism has to be enhanced by certification. The ICT industry has developed a full series of vendor certifications. A more general certification based less on company-specific competencies and more on general professional standards could build a university-industry bridge. CEPIS has great potential in terms of creating the vendor neutral schemes needed by industry.

Education of professionals will increasingly be based on higher education institutions. These institutions, as the recent CEPIS report on Universities and Industry shows, aim to produce well-qualified scientists and engineers with a strong scientific background. In practice, most large ICT companies ask for a solid scientific background as they have the resources to further train their staff. Smaller ICT companies prefer specialised "ready-to-work" ICT graduates who provide a quick return on investment without incurring the expense of additional training. It is impossible to reconcile these two opposing requirements to provide ICT graduates who are both flexible and immediately usable. Each university has to decide which kind of professional it wants to offer to industry and adapt its curricula to best fit that requirement within the type of profession chosen.

The ICT industry is fed by **entrepreneurs**. CEPIS can work with the European universities to better contribute to the increase of Small and Medium Enterprises (SMEs) in the ICT sector; firstly by giving their students a scientific and technical background that allows them to be innovative and secondly by equipping them with the managerial skills they will need to run a small enterprise.

ICT is particularly appropriate for **lifelong learning**. Continuous education with short cycles is a necessity. The shortage of ICT skills brings an important number of non-ICT university graduates into the ICT field, mostly in developing countries. CEPIS could play a better role in the ICT education of those people who have already worked in the industry for years or are undergoing professional cross-/re-training. In addition, new advances in e-Learning technologies allow and favour distance learning, enabling universities to play a more important role in the post-graduate training of ICT professionals. E-Business skills are not generally covered by university curricula because they require the deep context knowledge that comes from on-the-job experience. Instead such skills training are frequently offered by IT vendors as a consultancy service. This is the

category of professionals most sought after by the market and is also the category most likely to seek professional certifications.

CEPIS is well known as a promoter of the **dissemination of basic skills** in the use of ICT. With the rapid rise in ICT users (already exceeding 1.5 billion people), the ECDL programme becomes even more important in assuring the quality of these skills. ECDL will further increase awareness of the need for basic skills. The digital divide is still evident in many respects in Europe and CEPIS will further support efforts for the e-Inclusion of large categories of people. Through ICDL, the ECDL Foundation contributes to achieving these goals on other continents.

On the other hand, we may notice the signs of what I would call a "**Second Generation Digital Divide**". People acquire only the simplest tools needed to use ICT and are far from using the new ICT tools and applications, most of which can deliver a notable increase in productivity and quality of work, e.g. via collaboration or cloud computing. It will be a major challenge for the ECDL programme to cover the new basic tools of the Internet and the general use of ICT.

The 20th anniversary is a moment for CEPIS to reflect on its own capability as an organisation. I am sure that the Council and Execom will take into account the experience gained during the first 20 years to further enhance CEPIS.

Some of the CEPIS areas of development we may pursue next:

1) Increase in Membership: Our constitution states that a professional association from a country member of the Council of Europe may become a member of CEPIS. At present, the Council of Europe has 47 member states. Our council represents 36 member societies in only 33 countries across Europe, leaving enough room for further CEPIS enlargement.

2) Performance Improvement: CEPIS has acted on behalf of member societies and will continue to do so. However, a more prominent leading role in major projects would be welcome.

3) New Strategy: A new strategy is needed for a changing world. This strategy will be the result of the input of the member societies and will reflect the new European ICT environment.

4) Enhanced Recognition: CEPIS is a recognised voice of ICT professionals, but a more dedicated contribution to European decisions on Information Society could be sought.

5) Digital Literacy: CEPIS will continue to be the main body to propose, through the ECDL Foundation, a certifying programme with periodic enhancements to reflect new developments in the ICT industry.

6) Higher Education Institutions: CEPIS can act as a pan-European mediator between universities and industry in a multi-stakeholder partnership. CEPIS can review the current content of curricula for ICT studies to ensure a positive impact on the future of the ICT industry by providing graduates with the proper theoretical background and practical training.

7) e-Learning: CEPIS will support e-learning as a methodology for continuing professional development and considers that universities can be encouraged to offer master or other post-graduate conversion courses to non-ICT graduates.

8) Better visibility: An improved newsletter, Website, statements, position papers, UPGRADE/UPENET, conferences and awards will contribute to the increased visibility of CEPIS among professionals in Europe.

9) Cooperation. There are many European bodies representing ICT businesses and professionals. CEPIS has to strengthen cooperation with them and become a central point in this network. Special attention will be given to regional alliances of member societies.

10) Constitution. 20 years of existence has proved that the current constitution is the right basic document for our Council. Some modification will be needed to adapt to the forthcoming new strategy and to improve governance.

As has already been said above, IT 20 years is a quite long period of time in computing. Generations of hardware, software, and applications have been developed by ICT professionals. Their professional background has been radically altered and this trend will continue.

CEPIS has done a lot to accomplish its mission goals:

- To be the main network of European IT Professionals.

- To become established as the leading independent European IT Certification Organisation.

- To raise the profile and promote the views of the European Informatics Societies and Informatics Professionals to the European Commission and European Institutions.

- To promote the development of the Information Society through digital literacy, skills, education & research and professionalism.

To keep achieving all of these goals, CEPIS has challenging years ahead.



ICT for Education

The Social and Cognitive Dimensions of Computer-Supported Cooperative Learning

Andriani Piki

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Computer-Supported Collaborative Learning (CSCL) is a research area that studies how Information and Communication Technologies (ICT) can support collaborative learning activities among students. The aim of this article is to synthesise the available literature and the recent trends in contemporary CSCL scholarship, whilst identifying the debates that make it such a fast-changing area. The social and cognitive dimensions are crucial for understanding how effective collaborative learning can promote self-motivation, critical thinking and development. In this context, both the strengths and challenges of CSCL systems are examined and suggestions for dealing with the latter are discussed.

Keywords: Benefits, Challenges, Computer-Supported Collaborative Learning, CSCL, Sociocognitive Aspects, Technical Facets.

1 Introduction

Unquestionably the arrival of the Internet, and other collaborative technologies, has presented appealing opportunities for interactive and flexible learning. People that transcend time, space, and cultural boundaries can communicate, work and learn together effectively through innovative applications and tools [1]. Despite the immense research efforts however, in many situations students still appear unmotivated to learn. Even more surprising is the fact that in the last decade the same challenges resurface and hinder Computer-Mediated Communication (CMC) regardless of the vast technological progress, the faster internet connections and the higher bandwidth available.

One explanation for this is the fact that most studies in the field of CSCL focus mainly on the technical aspects,

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whereas research related to the students' learning experience and the academics' teaching insights lags behind. This presents a genuine need for evaluating the current collaborative technologies and considering the socio-cognitive aspects in conjunction with the technical facets of collaborative learning. This article explores the successes and challenges of CSCL systems in this context. Finally, ways for overcoming the challenges and capitalising the benefits of CSCL are discussed.

2 Strengths of Computer-Supported Cooperative Learning

Beyond enhancing classroom-based learning, technology has also

been increasingly employed to support distant education, virtual lectures, and life-long learning. Even though the technologies behind video-conferencing, net-meetings, shared online applications, forums and intranets have been around for the last 20 years or so [2] it is only recently they were fully commercialised allowing educational institutions to purchase them and realise their full potential. Nevertheless, CSCL systems are not typically designed to replace academics or conventional teaching style; they are rather designed to supplement it [3].

CSCL systems are tailored for use by multiple learners working in the same workspace or across networked

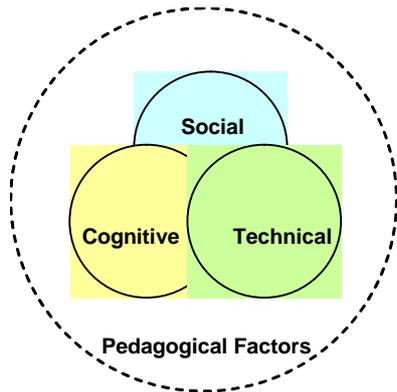


Figure 1: The Social, Cognitive and Technical Dimensions of CSCL.

machines. Computer-supported learning environments can provide enduring and empowering benefits for learning, the most profound of which is flexibility [3], [4]. At the social level CSCL systems can support sharing ideas and brain-storming activities between group members, enable co-construction of knowledge, and increase group participation and involvement. Most importantly, CSCL creates more opportunities for socialisation and expands communication between students. Moreover, students can participate in online forums and discussions, watch recorded lectures remotely, or even take part in real-time virtual classrooms (where the lecturer may be in a different university or at a different country). This flexibility can create an engaging learning experience [5], [6], [7].

At the cognitive level, collaborative projects can motivate students to constantly learn from each other and develop their critical thinking [8]. It is also argued that CSCL systems facilitate knowledge acquisition and comprehension [8], [9]. When students are left to learn at their own pace and with their own mechanisms they find it easier to concentrate rather than following the lecturer's mentality during a lecture. In addition, with the use of interactive online workshops learning can be more interesting and instructive [4], [10].

Many scholars argue that computer-supported collaboration between students may provide additional benefits compared to traditional, face-to-face collaboration. Recent studies show that ICT-mediated education is

more informative than traditional learning practices. This is reasonable because CSCL systems offer easier access to information and learning materials and can provide real-time feedback on problem-solving activities. Another benefit from the technical point of view is the fact that the students' familiarity with technology increases when they use such systems as part of their learning activities [4], [11]. Lastly, CSCL may provide a more expansive world to explore than traditional lectures. This promotes creativity and imagination which is essential for effective learning practices. All the above can increase the students' academic achievement and, in turn, boost their self-esteem.

The discussion, however, should not be focused on whether computer-supported learning is better than traditional, non technology-mediated learning; rather it should be on how we can best combine the benefits of both in order to achieve a truly beneficial learning experience. Traditional pedagogy and computer-supported learning can and should complement each other. The following figure shows the interconnections between social, cognitive and technological aspects of computer-supported collaborative learning.

3 Challenges of Computer-Supported Cooperative Learning

The increased availability of advanced educational systems, alongside the fact they have become more user-friendly and cost-effective, has transformed the ways people choose to communicate, learn and work with each other. Despite this progress however some problems have not been diminished. According to the literature this has both social and cognitive implications in addition to the more obvious technological ones. All these issues must be considered when evaluating a CSCL system.

From the social point of view, students often appear uninterested to use the technology firstly and most prominently due to lack of trust or incentives [2], [4], [11]. Secondly, group members often come from diverse backgrounds and have different cultural values and communication norms. This

hinders the process of developing mutual understanding and building a common ground [12], [13]. Thirdly, students may find it hard to engage in spontaneous written communication which makes social interaction even more challenging. Social loafing, free-riding, groupthink and group shifts are also some of the social factors that obstruct collaboration performance [2]. Such negative behaviours are commonplace in collaborative learning, especially when technology is involved. Another challenge is that the use of technology often puts pressure on students to respond or participate to a group discussion within tight timeframes. This makes students with less technical experience feel they are in an inferior position which may eventually result in increased competition among students. Social interaction is an area which has attracted great research interest in an attempt to investigate why these issues are so persistent and how they can be dealt with [14], [15], [16].

The students' behavioural and perceptual characteristics, that is, how they make sense of their learning experience, comprise another crucial issue which needs further investigation. Therefore, in addition to the social aspects, it is important to explore and understand the cognitive and behavioural elements involved in CSCL. First of all, different individuals are likely to have conflicting ideas or may formulate false or unclear expectations from the system. Secondly, the high complexity of the learning tasks often creates a huge gap between the ways different individuals interpret the requirements [17]. More effort will hence be required from the students in order to successfully collaborate under these circumstances. This creates anxiety and stress which can negatively impact the student's learning experience. In effect, it can potentially lead to the technology's rejection by the students.

Finally, one of the prevalent concerns from a technical point of view is the lack of appropriate training [5]. Even with the best technologies at hand if students are not adequately trained how to use the system then the team performance and the learning outcome

| |
|--|
| Limited social interaction [2], [10], [11] |
| <ul style="list-style-type: none"> ▪ Combine the benefits of face-to-face and computer-mediated communication. ▪ Provide the right incentives and train team members to effectively use the technology. |
| Lack of trust [1], [2], [11] |
| <ul style="list-style-type: none"> ▪ Meet face-to-face when possible or at least once at the beginning of the group project. ▪ Agree on individual roles and set clear responsibilities. ▪ Ensure members share the same end-goals and establish common ground as early as possible. |
| Lack of motivation to collaborate [2], [20] |
| <ul style="list-style-type: none"> ▪ Provide the right training and explain the key functionalities of the CSCL system. ▪ Create a collaborative spirit, instigate commitment and build consensus within the team. ▪ Encourage new ideas and reward successful efforts. |
| Lack of common ground and unclear expectations [1], [2], [19] |
| <ul style="list-style-type: none"> ▪ Ensure that members share the same information and encourage knowledge sharing within the group. ▪ Set clear responsibilities and establish successful administration and coordination from academics. ▪ Have at least one face-to-face meeting and, where possible, use video-conferencing. ▪ Follow a structured communication approach such as dialogue structuring. |
| Anxiety and lack of motivation to use the technology [2] |
| <ul style="list-style-type: none"> ▪ Adjust the technology to different work patterns and customise it according to individual needs. ▪ Choose the most appropriate CSCL systems and applications for the tasks at hand. ▪ Promote the right attitude towards using the technology, provide incentives and appropriate training. ▪ Set clear responsibilities and follow well-defined learning processes. |
| Technology limitations [11], [21] |
| <ul style="list-style-type: none"> ▪ Acquire high bandwidth depending on the number of users and the task at hand. ▪ Purchase user-friendly groupware with adaptable, customisable functionalities. ▪ Offer continuous software maintenance and technical support to users (both students and academics). ▪ Upgrade to the latest version of software and ensure everyone uses the same or compatible versions. ▪ Find the right technology-task fit. |

Table 1: Suggestions for resolving the challenges of CSCL

will significantly suffer [11]. Another concern has to do with selecting the right tools and applications for a specific learning activity. Furthermore, some learning activities require richer media than others and different students in the group may feel comfortable with different types of communication (audio, video or text-based). Hence there is also the issue of finding the right ‘task-technology’ fit [18]. Other challenges include technology limitations such as software failures, delays, and slow access times [1], [19]. These limitations constitute the most common factors that create user frustration. In spite of the advances in mobile communications and networks users still complain about the quality of communication over audio and video conferencing. In particular, figuring out who is speaking, what someone is referring to or where they are pointing at, adjusting the volume and focusing the camera to the speaker are some of the most frequent technical problems of distant communication.

These problems result mostly due to the fact that technology is not regularly upgraded [2]. Since user needs are constantly changing and users are becoming more demanding, ergonomic issues such as the reliability, usability and usefulness of the applications used need to be constantly re-evaluated and improved.

4 Suggestions for Resolving the Challenges

Table 1 provides some suggestions for resolving the challenges discussed above.

5 Discussion and Summary

The quality of education is increasingly improved through the use of advanced technologies that support knowledge creation, communication and collaboration between learners. As a consequence, various CSCL systems that make use of these novel technologies have surfaced [5], [6], [7], [10]. This has resulted in a new paradigm

for education which has shifted from ‘learning by watching’ to ‘learning by doing’. This new paradigm combines individual exploration with team learning for a more comprehensive educational experience. In order to seize the potential of these technological innovations, however, explicit attention to learner guidance and support is necessary [22]. Therefore, both the provision of a number of enabling tools and the development of fruitful collaboration patterns are required.

With respect to educational practices institutions must provide the right context including appropriate technical, pedagogical and social support. Appropriate collaboration guidelines should be developed to help students interact effectively in computer-supported collaborative learning activities. Additionally, system analysts and designers need to take into account the requirements and expectations of all user categories (students, academics, administrators, etc). They also need to create systems that are equally useful

(offer the right functionalities) and usable (easy to use) [24]. Most importantly, these factors should be addressed in conjunction to one another.

There is a genuine need to understand how the introduction of a CSCL system will change the education or work practices that are currently in place and what the impact of this might be. Hence the focus should be on identifying the desired relationships between people, tools, and tasks. Successful adoption of CSCL systems also requires ongoing evaluations and adjustments, not just initial adoption. This entails a multi-level evaluation of CSCL systems regarding the extent to which they enhance educational practices at each level (technical, social and cognitive). By identifying the problems that learners experience cognitively with CSCL systems, teachers and designers can be directed to consider more holistic interactions that are important to guide understanding within both socially and technologically rich contexts [22]. Future research should address these issues.

The available literature on collaborative learning is mainly theoretical and there are limited empirical data, mostly due to the novelty of these technologies [8], [11], [20]. Nevertheless, the fact that advanced CSCL systems are now installed in real-life educational settings presents appealing opportunities for future empirical and field studies. Studying everyday natural settings as opposed to laboratory experimental environments allows researchers to 'see the world through the eyes of the participants' and gain an in-depth understanding of why they behave as they do, what mechanisms they use to compensate for the lack of face-to-face interaction and, in essence, what makes them behave differently in technology-mediated learning activities [23]. Accordingly, when exploring such collaborative settings it is essential to adopt an exploratory, interpretive approach which collectively focuses on the behavioural characteristics of the users.

This article synthesises and critically analyses the literature on collaborative technologies and discusses the implications for their adoption in an

educational environment. In particular, the opportunities as well as the constraints posed by ICT are considered. In addition, a list of guidelines for addressing these challenges is provided. These issues are explored from different viewpoints in order to understand how the technical, social and cognitive dimensions of collaborative environments can be better managed in order to stimulate a truly effective learning experience.

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Internet

The New WCAG 2.0 Accessibility Guidelines: Changes and Recommendations to Be Implemented

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In several countries Web accessibility is a legal requirement for governmental websites and in major enterprises. The new accessibility guidelines published by the World Wide Web Consortium in December 2008, WCAG 2.0 are slightly biased towards validation, are more permissive with third-party (including prosumer) content, and explicitly include non-W3C technologies such as Flash or PDF. Different types of content such as browsing, multimedia content, text or forms should be reviewed in the light of the new success criteria and general techniques published in WCAG 2.0 guidelines. Usable accessibility means understanding the philosophy of the guidelines rather than its details, and should be based on a user-centred design. To help with the details, webmasters have a number of tools at their disposal, capable of making validations and reminding them of applicable guidelines.

Keywords: Accessibility, WCAG, WAI.

1 Introduction

Web accessibility is a matter of growing importance now that the Web has become an essential channel for publications (blogs, scientific articles, reports, and books), communication (the press, radio and television have a growing presence on the Internet), for corporate image and business, for interacting with governmental bodies, for education, and even for entertainment and social relations. The Web has also become a key channel for sharing information within organizations and performing collaborative tasks.

The information society has opened the door to improved information and communication, but it can also create new digital divides. Aware of this, the World Wide Web Consortium has for a long time been working to promote accessibility in this medium, and governments, especially in the USA and the European Union, have been very active in regulating this aspect. The World Wide Web Consortium's Web Accessibility Initiative (WAI), created in 1991, promotes best practices for accessibility and publishes a number of guidelines for authoring tools (such as CMS, blogs, or editors like

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Dreamweaver), for browsers (Internet Explorer, Mozilla Firefox, Safari...), and for Web content (HTML, videos...). The latter type of guidelines, the Web Content Accessibility Guidelines (WCAG), are the best known, since they have been incorporated into various countries' legislations as mandatory standards. The 2.0 version of these guidelines was eventually published (after 9 years of debate) on De-

cember 11, 2008 [1] and will be the development standard for websites being built today.

Legislation in several countries obliges the websites of public administrations and major service enterprises of general interest to meet WCAG standards, and in some countries this obligation extends to their intranets, so as to ensure the availability of accessible work places.

In this article we will be commenting on the most significant changes incorporated in version 2.0 of the standards, focusing on level A and level AA criteria, as they are the ones most commonly included in legislation of this nature.

2 General Differences between WCAG 2.0 and WCAG 1.0

The most significant difference between WCAG 2.0 and WCAG 1.0 is its orientation. WCAG 2.0 has been designed as a validation tool for information policy managers. The validation checkpoints of WCAG 1.0 have become success criteria in WCAG 2.0 so that an accurate assessment can be made of whether or not a site is compliant. This has led to a much more normative text which is not so easy to read. In order to remedy this, the new WCAG comes with a great deal of pedagogical material, such as guides to help users understand each point, general techniques to aid compliance, and examples of best practices.

This new version also includes more guidelines for other types of disabilities such as low vision, limited movement... It should also be noted, in particular with reference to principle 4, that the guidelines are applicable to any tool that might appear in the future. Standardization and validation have also become more important as a way of guaranteeing versatility.

The organization of the guidelines has also changed significantly. WCAG is now organized around four principles (perceivable, operable, understandable, and robust), which break down into three levels of guidelines: level A (maximum priority), level AA (medium priority), and level AAA (minimum priority). Each priority level has its own success criteria. This new arrangement aims to place a greater emphasis on the principles underlying the guidelines, on their philosophy, and on moving accessibility more towards usability. As in version 1.0, the guidelines are accompanied by a glossary to define the main concepts, together with some recommendations regarding how to make a conformance claim.

With regard to conformance claims, the purpose of the guidelines

has also changed in order to keep pace with how the Web has evolved. The "page" concept is beginning to lose its focus and for transactional websites the minimum unit of validation is now the "complete transaction" (for example: registration, purchase and payment). The guidelines provide a certain margin of compliance for content uncontrolled by the webmaster: advertising inserts and user-supplied content can be declared non-accessible (statement of partial conformance) or may be validated in a period of two business days (conformance claim based on best knowledge). Finally, a very significant change regarding the object to be validated is that in WCAG 2.0 the exclusive use of W3C technologies is no longer required.

This has opened the door to the validation of PDF documents and Flash videos, two of the most ubiquitous technologies on the Web, which up to now had not been properly taken into consideration by the guidelines.

3 New Features of the WCAG 2.0 Guidelines

We will now look at the new features of the latest version 2.0 of WCAG [2] for each element of a typical web page.

3.1 At the Head

There must be meaningful title for each page (success criterion 2.4.2, level A; general technique G88) [3].

The language of the page must be indicated (success criterion 3.1.1, level A) and, as for version 1.0, any language changes within the page should also be indicated (success criterion 3.1.2, level AA).

3.2 In the Body

Menu and navigation. Navigation has gained importance in WCAG 2.0; there is a complete guideline (2.4) dedicated to it. The site should be keyboard navigable (using the tab key) and users should be prevented from getting trapped on a page object (as used to happen with previous versions of Flash, for example) (success criterion 2.1.2 level A, general technique G21). It should be possible to jump directly to the content, without having to use

navigation bars (success criterion 2.4.1 level A, general technique G123), and also to bypass groups of related links. A site map (success criterion 2.4.5 level AA, general technique G63) or a table of contents (general technique G64) should be provided. The sections should be organized and properly labelled with headings and markup (success criteria 1.3.1, and 2.4.6 level AA, general technique G130).

Video and audio. For previously recorded material, a text alternative (captions) should be provided (success criterion 1.2.4 level AA). In any case it must be possible to stop it, control its volume... (success criterion 1.4.2 level A). Guideline 2.2 provides for the possibility of adjusting the timing.

Content. Visual presentation of text should have a high text to background contrast ratio (4.5:1 for normal text and 3:1 for large print) (success criterion 1.4.3, level AA, general techniques G18 and G145). Links should be visually highlighted when they receive focus (success criterion 2.4.7 level AA, general technique G149). When mentioning an element or an action we should not base our description on its appearance (colour, shape, sound) to avoid discriminating against those with sensory disabilities (success criterion 1.3.3). Non-text elements, as in version 1.0, should be provided with text alternatives; this version of the guidelines defines the elements to be provided with alternatives more precisely. For example, CAPTCHA¹ tests have been included. These tests, consisting of a question that can only be answered by a human and not a machine, are commonly found in forms to prevent robots filling them in (guideline 1.1, general techniques G143 and G144). Content readability, due to the difficulty of validating it, is now addressed at level AAA, although the guidelines recommend compliance.

Forms. Both the XHTML language and browsers have improved a great deal in terms of form semantics. With

¹ Acronym for "Completely Automated Public Turing test to tell Computers and Humans Apart"

a more participative Web, forms represent a fundamental part of interaction. For this reason a large number of guidelines mention forms: to prevent an option in a form from changing the form's content without prior warning (success criteria 3.2.2 level A; and success criterion 3.3.2 level A), to prevent anyone from inputting erroneous data in a box (success criteria 3.3.1 and 3.3.2 of level A, and 3.3.3 of level AA, general technique G83), to make the required data clear (success criterion 2.4.6 level AA, 3.3.2 level A, general technique G131), and to allow the user to select enough time to fill in the data or check the desired options (success criterion 2.2.1 level A, general technique G133). The creation of forms for launching Rich Internet Applications (RIAs), only obliquely mentioned in success criterion 4.1.2 level A, will be given more importance in the new WAI-ARIA guidelines.

Another set of guidelines promoted by the Web Accessibility Initiative (WAI) is the aforementioned WAI-ARIA (Accessibility of Rich Internet Applications) guidelines, which complement WCAG and are especially intended for websites using AJAX (Asynchronous Javascript and XML) or other Web interactive technologies. These guidelines are currently published as a Working Draft but, once accepted as a W3C Recommendation, they will be of great importance since it is becoming increasingly more common to use the Web as a virtual desktop.

PDF documents. The same principles affect PDF documents, so we need to mark the language of the document both as a whole and in its component parts (a difficult task in the case of Basque, Galician, and Catalan without Adobe Acrobat 9.0 Professional). We also need to ensure contrast, semantics (with tags), navigation, and the accessibility of forms.

Many of the individual guidelines that used to exist in WCAG 1.0 to address problems arising from certain technologies have disappeared; for example those relating to image maps, forms, frames, or some table-related issues, either because they are already covered in the new standards or be-

cause current browsers already support proper compliance.

4 Web Accessibility Implementation

The implementation of Web accessibility should form part of an integrated process of definition, design, maintenance and validation [4]. As we know from our experience of usability engineering, corrective actions after the event are very costly and are unsustainable over time. Website administration teams should therefore configure their site with care and, where appropriate, adapt their authoring tools, and carry out awareness and training actions for everyone involved in Web content. Ideally Web publication teams should have people with impairments on their staff, or at least access to such people on a regular basis as validators. Also simulation protocols, regular validations, and writing and design guidelines should be established for the content taking into account the accessibility criteria.

It is fairly common to find websites where a great effort has been made to conform with Web guidelines but which, due to a lack of awareness of the needs of actual users, do not meet the spirit of the guidelines. Some common examples of such shortcomings in websites that, in theory, are accessible but in practice are not usable by people with impairments are:

- Providing alternative style sheets for large print texts without taking the trouble to create a liquid or versatile layout. Visually impaired users tend to increase the size of the page by as much as five times, and the alternative style sheets provided are rarely of any use to them.

- Putting alternative captions to images which are then repeated as titles. This forces voice synthesizer users to hear the same text twice over.

- Providing only small mouse click areas, even though an alternative keyboard access is provided. Older people with impaired motor skills like to access pages with the mouse so as to be "the same as everyone else" and not use keyboard alternatives [5].

As an aid to checking the correct application of Web accessibility guide-

lines, there are a number of semi-automatic validation tools on the market. At the moment most of them only refer to WCAG version 1.0, but already updated versions of the most commonly used tools are starting to appear, some of which are listed below:

- Web Accessibility Checker <<http://www.achecker.ca/checker/index.php>>, from the Adaptive Technology Resource Centre in the University of Toronto. The most complete tool at the moment, includes WCAG 2.0 in its tests.

- WAVE <<http://wave.Webaim.org/>>, which, while it does not claim to follow WCAG guidelines strictly <<http://wave.Webaim.org/help#guidelines>>, does detect a number of accessibility issues. It includes some WCAG 2.0 tests along with other complementary ones.

- Web Accessibility Toolbar <<http://www.visionaustralia.org.au/info.aspx?page=1569#DownloadOther>>, developed by Vision Australia, brings together a number of free standards validation tools, contrast analysis tools, guidelines analysis tools... These tools allow many WCAG 2.0 tests to be performed.

- TAW <<http://www.tawdis.net/ingles.html?lang=en>>, developed by the CTIC foundation (Spain), which features a version to check the conformance of content for mobile devices (<<http://validadores.tawdis.net/mobileok/en/>>). They have just brought out a beta version for analysing WCAG 2.0.

5 In the Near Future

WCAG guidelines are only a small part of Web accessibility. To fill in the gaps, three new initiatives will shortly be playing a very important role:

- WAI-ARIA guidelines, applicable to Rich Internet Applications (basically AJAX) which provide a solution for new Web applications [6].

- WAI-AGE guidelines, which focus on the needs of older people, which are especially important given the demographic trend towards ageing populations in western societies. The work carried out up to now is limited to a compilation of existing standards and guidelines [7].

■ The new PDF/UA (Universal Accessibility) standard, which has already been approved as ISO/AWI (Approved Work Item) 14289. This standard will enable PDF documents to be validated as accessible [8].

And finally we should take into account all the new guidelines which will shortly be appearing to make our content more versatile, guidelines which will be aimed at multi-channel publication. The application of XML and the Semantic Web will be fundamental to this new roadmap, one in which mobile devices, telephones, and e-books are blazing a trail as Web querying tools.

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CEPIS Projects

Maximising the Impact of ICT Infrastructure Investment

ECDL Foundation

Prompted by the EU proposal to fund broadband infrastructure for rural areas, this new position paper from the ECDL Foundation outlines why ICT investment should be complemented by investment in skills development. The paper argues that ICT investment has limited benefits without supporting actions to develop 'skills infrastructure'. In addition, the paper provides recommendations for skills focused initiatives that will lower the barriers to accessing information and services.

Keywords: Broadband, Competitiveness, End-User Skills, e-Skills, European Economic Recovery Plan, Investment, Skills Infrastructure.

Overview

Investment in ICT infrastructure, such as broadband rollout, is a vital step to promote economic development and social integration. The recent EU proposal to fund investment in rural broadband infrastructure is an example of this. Such investment in physical infrastructure must be complemented by initiatives to develop the skills that will be needed to extract value from this investment. Training and learning programmes, including certification schemes, must be a key component of initiatives that will assist in maximising the potential offered by enhanced broadband provision in rural areas.

Why is ICT Infrastructure Investment Important?

High-speed Internet access is necessary to maximize effective use of ICT, which in turn is an explicit driver of productivity, innovation, and social inclusion. Therefore, investment such as that agreed by the European Council in March 2009¹ is important as a tool for economic development and social integration. Under this decision, the European Union will allocate approximately 1 billion euros to invest in broadband in rural areas of the Union. This initiative is part of the European Economic Recovery Plan which, in response to the current economic

crisis, aims to inject purchasing power into the European economy and to reinforce Europe's long-term competitiveness. The latest data indicate that 30% of the rural population within the European Union does not have high-speed Internet access². Businesses operating in these areas are unable to make use of the potential offered by broadband to enhance productivity, with opportunities to create employment in new or innovative product or service delivery being similarly restricted. In particular, an absence of broadband will inhibit the development of fast-growing, high-valued-added economic sectors³. Therefore, the twin policy goals of supporting appropriate regional development and maximizing the potential of the whole European economy is naturally supported by investment in broadband infrastructure. Similarly, social integration will also be supported by the provision of broadband services such as those relating to e-government or social networking; moreover these are particularly important in rural areas, where geographical isolation is an important consideration.

Why Should There be a Skills Component in ICT Infrastructure Investment?

Frequently, proposals for ICT investment focus on physical infrastructure. For example, there are three types of measures that will be eligible for support under the European Commission rural broadband proposal:

- Creation of new broadband in-

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The ECDL Foundation mission is to enable proficient use of ICT that empowers individuals, organisations and society, through the development, promotion and delivery of quality certification programmes throughout the world. Further information on ECDL Foundation is available at <<http://www.ecdl.org/>>.

rastructure.

- Upgrade of existing broadband infrastructure.
- Installation of passive broadband infrastructure, possible in tandem with other infrastructures.

These measures will deliver many of the essential components of effective broadband rollout. However, if the potential of broadband is to be fully unlocked, then *physical infrastructure* needs to be complemented with a *skills infrastructure*. It is obvious that, at the level of an individual, a tool must be combined with appropriate skills and knowledge to lead to effective appli-

¹ Brussels European Council 19/20 March 2009 Presidency Conclusions <<http://europa.eu/rapid/pressReleasesAction.do?reference=DOC/09/1&format=HTML&aged=0&language=EN&guiLanguage=en>>.

² European Commission "Commission earmarks 1bn euros for investment in broadband" MEMO/09/35.

³ M. Fornfeld, G. Delauney, and D. Elixmann, "The Impact of Broadband on Growth and Productivity" 2008: pp. 7.

cation. Without the relevant skills and knowledge, broadband may either not be used to its full potential ("We built it, they came, but couldn't use it") or indeed may not be used at all ("We built it and no-one came"). Therefore, a restricted focus on physical infrastructure is not sufficient. As the DG Information Society 2007 conference on "Bridging the Broadband Gap" identified in its conclusions, "ICT skills and digital literacy are critical to the effectiveness of any broadband strategy"⁴. It is clear that any large-scale strategic initiative on broadband must encompass a skills dimension.

What Specific Skills-Focused Initiatives Could Support Implementation?

Skills-focused initiatives complementing investment in physical ICT infrastructure could take a variety of forms. Some will focus on skills directly connected with economic development. For example, organisations and individuals, particularly in the current economic environment, are looking to move up the value chain, in particular by engaging in activities that will give them a substantial and secure economic return. ICT is one of the main facilitators of this, and effective use of these technologies is based on experience and, crucially, skills.

Other skills-focused initiatives would address social inclusion by focusing on digital literacy skills. For example, basic ICT skills that allow people to engage with e-government or e-commerce services can very easily remove existing barriers to accessing services created by rural isolation.

European and national plans should therefore contain formal and informal learning interventions such as training and certification to ensure the required ICT skills are in place to make the most of enhanced broadband infrastructure. Specific initiatives could focus on:

- Common end-user ICT skills that underpin core business activities, including e-mail and e-commerce activities;

- Specialised ICT skills that support the development of value-added activities, including Internet services and e-business activity, particularly

among small- and medium-sized enterprises;

- Basic, introductory ICT skills that assist marginalised groups, including the aged and the geographically isolated, to access essential Internet services, such as e-government and distance learning, and to engage in social networking.

When implementing these programmes, tools such as certification schemes will assist in establishing a structured approach to learning that references recognised standards. In addition, certification will provide a robust benchmark for measuring the degree of skills development attained by a specific programme – an important metric that can assist in evaluating the effectiveness of a particular initiative. This can be of particular use to policy makers who wish to ensure that they have an objective means of demonstrating efficiency and value for money associated with the disbursement of public funds.

Conclusion

Investment in ICT infrastructure, particularly the rollout of broadband, is crucial for economic and social development, but this investment must include a clear focus on skills development to ensure that the maximum potential is extracted from the infrastructure once it is put in place.

⁴ Broadband Forum. "Conference Conclusions" <www.broadbandforum.eu/index.nof?o=0&nyelvid=2&k2=146&k1=136>.