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itp_SEC.09
27-28.11.09, Rome

Rhapsody in White

Activities of 3 international organizations – CEPIS, IFIP and IT STAR – were amalgamated during several events in 2008, leading to a new dimension of usefulness and attraction to ICT professionals and institutions.

The Winter issue offers a joint platform to probe the overlapping organizational boundaries and scope of key players in the international ICT arena. It draws the broad 2008 ICT picture, based on lessons from the World Computer Congress in Milano, NISE'08 in Godollo, the IPTS analysis of ICT R&D Expenditures, and the CEPIS position on University Education and the ICT Industry.

2008 was remarkably good to us and we take this occasion to thank our authors and patrons for their faith and support.

** Chestita Nova Godina * Sretna Nova godina * Scastny Novy Rok * Prosit Neujahr * Kenourios Chronos * Boldog Ooy Ayvet * Felice anno nuovo * Laimingu Naujuju Metu * Srekjna Nova Godina * Szczesliwego Nowego roku * An Nou Fericit * Sretna nova godina * A stastlivy Novy Rok * sreèno novo leto **

Season's greetings and all the best for 2009!

Plamen Nedkov

IT STAR representatives

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Contents

People.....	2
Letters to the Editor	2
Joke of the Issue.....	2
NISE.....	3
4 th IT STAR Workshop	4
WCC '08 - Lessons Learned	5
ECDL/CEPIS.....	8
Computer History	11
Member Societies News	12
Eurosys.....	13
IPTS: ICT R&D Expenditure.....	13
itp_SEC.09.....	16

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People



Left to right clockwise, starting upper row: Gabriele Kotsis, Past president OCG and Prof. Linz Univ, Olga Stepankova, President of CSKI, Dubravka Dukic, Ed. Director, JISA Inforeview, Elzbieta de Pavia Leite, CompTIA Policy Advisor for CEEv, Corina Pascu, EC JRC-IPTS, Madalena Sorrentino, Prof. Milano Uni, Maria Raffai, Prof. Gyor Uni, Vesna Dolnicar, Univ. of Ljubljana

The ICT profession is, unfortunately, predominantly male. Therefore, we are grateful for the thoughtful contributions and support during the IT STAR events of all female professionals, among them the ladies above, who helped IT STAR move forward. This newspaper is dedicated to support women professionals on all levels of the ICT - ladder. ■

Letters to the Editor

Extracts from emails to the Editor with respect to the last issue ... comments and suggestions are always welcome – our coordinates are on page 1.

“Is that real? ... Congratulations!”
Guilherme Collares Pereira
President - PROFIN (PT)

“Bravo”
Marijan Frkovic
IT STAR representative (HR)

Joke of the Issue

Cooperative

After the wedding ceremony, the groom carries the bride over the threshold of their new home into the anteroom and says: "sweetheart, here I would like to have my shoes shined every day, no matter whether I am at home or not".

Then, he enters the kitchen, still with the bride in his hands, and says, "... and here is the kitchen and I would like to have the breakfast and dinner every day prepared, no matter whether I am at home or not".

Then, he enters the Master bedroom and says: "Here is our sleeping room..." At that moment the bride has rallied

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Ex officio: IT STAR MS representatives (see page 1)

EDITORIAL POLICY

This Newsletter maintains a world-class standard in providing researched material on ICT and Information Society activities from the perspective of Central, Eastern and Southern Europe (CESE) within a global context. It facilitates the information and communication flow within the region and internationally by supporting a recognized platform and networking media and thus enhancing the visibility and activities of the IT STAR Association.

The stakeholders whose interests this newspaper is addressing are

- IT STAR member societies and members
- ICT professionals, practitioners and institutions across the broad range of activities related to ICTs in government, business, academia and the public sector in general
- International organizations.

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Special arrangements for the production and circulation of the Newsletter could be negotiated.

The newsletter is circulated to leading CESE ICT societies and professionals, as well as to other societies and IT professionals internationally. Everyone interested in CESE developments and working in the ICT field is welcome to contribute with original material. Proposals for articles and material for the Newsletter should be sent two months before the publication date to editor@starbus.org. ■

herself, interrupts him, and continues, ... "yes, and love will be made here every night, no matter whether you are at home or not." ■

NISE

We tell the story of three IT societies whose headquarters are on the same street: the first one labels itself as the world technical society, the second, as the continental professional society, while the third has the aspiration of being the best on the street.

The street is Central, Eastern and Southern Europe. Representatives of these three societies – IFIP, CEPIS and IT STAR – met on 8 November 2008 to debate issues related to national information society policies and experiences including ICT-Skills.

NISE '08 in Godollo near Budapest, Hungary provided a forum to key government, academic, industry and civil society representatives from 13 countries to consider a broad scope of IS issues that impact developments in the Region, Europe and the World.

8 National reports on IS developments were delivered along with many other presentations on e-Government and ICT-Skills strategies and policies.

The role of Government in providing a vision and leadership within a multi-stakeholder partnership was the focus of a general discussion.

The participants adopted the **Godollo Declaration**, included below. The Conference proceedings will be published in early 2009.

Plans are to hold the follow-up 4th IT STAR Workshop in Italy in November 2009 [see Announcement on p. 16] ■

Godollo Declaration

We, the participants of the 3rd IT STAR Workshop on National Information Society Experiences (NISE'08), held on 8 November 2008 in Godollo, Hungary,*

Appreciating IT STAR's role in promoting an open exchange of views and further collaboration related to IS policies and identifying with the mission of this particular event to investigate the current state, problems and challenges in the development and application of national information society strategies,

Understanding the responsibilities and power of professional non-governmental organizations in providing independent opinion and advice on important matters,

Have agreed to the following:

1. The principal guiding document for Information Society (IS) development in Europe is the EU policy framework "i2010 - A European Information Society for growth and employment" which underscores the positive contribution of ICT in the economy, society and personal quality of life. The European i2010 policies serve as guiding principles to EU member states

and the annual evaluations influence positively national IS developments. The availability of EU structural funds in support of national IS projects is another important aspect, especially appreciated by the new EU member states.

2. The critical importance of ICT for societal development is universally accepted. In assessing IS development, technological and macro-economic indicators as well as "softer" socially oriented indicators reflecting cultural tradition and workforce specifics need to be taken into consideration. A one-sided approach might lead to inadequate policies followed by questionable measures and investments.
3. Governments provide the regulatory framework of national IS developments and to do this efficiently need objective assessments and periodical revision of their own policies and institutions. Issues such as information ownership, information clarity, availability, accessibility, protection and processing remain the crux of governmental responsibility. Reliable and transparent information streams should be sustained to avoid information bunkers and the growth of an e-bureaucracy. The continuous ICT education and the encouragement of IT professionalism need to be high on governmental agendas.
4. Governments 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. 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 utilizing the respective strengths and resources of all stakeholders. Multi-level professional environments and standards would support the successful implementation of e-government initiatives.

The IT STAR Declarations from Bratislava (2006) and Genzano di Roma (2007) highlight the role of universities and the R&D community and the need of internationally recognized certification programs for IT professionals in IS development and we reiterate our support to the conclusions of these documents. International consultations such as the IT STAR workshop in Godollo provide excellent opportunities for sharing experience and synergies. IT STAR member societies and other affiliated organizations are invited to support the Declaration by providing further visibility within their constituencies and countries.

***Albania** Gudar Beqiraj, Jorgaq Kacani, Akli Fundo, Neki Frasheri * **Austria** Thomas Geretschlaeger * **Croatia** Marijan Frkovic * **Czech Rep** Julius Stuller * **Hungary** Balint Domolki, Gabor Bodi, Gabor Peceli, Gabriela Aranyos, Istvan Alfoldi, Maria Raffai, Eors Ferentzy * **Italy** Giulio Occhini, Maddalena Sorrentino, Antonino Mazzeo * **IT STAR** Plamen Nedkov * **Lithuania** Alfredas Otas, Saulius Maskeliunas * **Netherlands** Hans Frederik * **Poland** Elzbieta de Pavia Leite, Marek Holyinski, Wojciech Kiedrowski * **Romania** Horia Gligor * **Serbia** Cedimir Milenkovic, Dusan Poznanovic * **Slovakia** Igor Privara, Pavol Tarina * **Slovenia** Niko Schlamberger * **UK** Charles Hughes

World Computer Congress 2008 in Milano



The IFIP WCC 2008 was organized by AICA, the Italian computer association, in Milan from 7 to 10 September with Giulio Occhini, AICA's CEO, as the General Chair. The Program consisted of two primary components: the co-located conferences of IFIP's TCs and WGs, coordinated by Prof. Judith Bishop, and the cross sessions and Industry oriented conferences, co-ordinated by Prof. Ivo De Lotto. Soon after the Congress an invitation was extended to the Program co-chairs to share their thoughts with respect to the main issues - research topics, tendencies and developments - that surfaced during the debates as leading, and which will likely dominate the research agenda and ICT developments in the near future. We are very pleased to offer the following articles to our readership – The Editor

Technical Sessions - Outcome

by Judith Bishop



Judith Bishop was Co-Chair of the International Program Committee of WCC '08. Judith is Professor of Computer Science at the University of Pretoria, South Africa. Her special subjects are programming languages and distributed systems.

The 20th World Congress of IFIP in Milan, Italy in September hosted a record number of 13 technical sessions. Some of these were conferences that had been running for many years, such as IFIP SEC (on security) and IFIP AI (artificial intelligence) and others were new initiatives as a result of emerging interests such as entertainment computing and computer-aided innovation. Here we highlight a cross section of the conferences and what their organizers see as the important issues for the next few years.

Professionalizing the information systems professional

High-profile computing failures, such as those that halted trading on the London Stock Exchange for most of 8 September 2008, a day that was expected to be one of the highest trading volume days of the year to date, and the 2007 crash of the Los Angeles International Airport US Customs and Boarder Protection systems stranding more than ten thousand passengers for hours, have caused many to call for higher professional standards, including the attestation of computing (CS, IT, IS, etc.) professionals. In many nations, a body exists to accredit domestic computing academic programs. Recognizing the need and interest in a more global approach, the International Federation for Information Processing (IFIP) is working to organize a meta-accrediting operation. Known as the International Professional Practice Programme (IP3), the vision is to establish an international computing profession equivalent in prestige and stature as those in such fields as law, accounting, and the medical professions.

The developments to advance the professionalism of the computing profession inspired IFIP Technical Committee 8 on Information Systems to focus its 2008 conference on professionalizing the information systems profession through research, education, and practice (ISREP). ISREP included seventeen papers and 2 keynote addresses.

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Cross- and Industry-oriented Sessions

by Ivo De Lotto

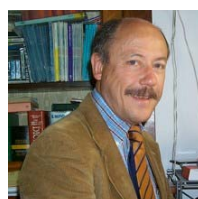


Ivo De Lotto was Co-Chair of the Congress '08 International Program Committee. Ivo is the immediate past president of AICA and Professor of Computer Science at the University of Pavia.

In this short presentation I revisit the most innovative contributions during the cross- and industry-oriented sessions. I will not be exhaustive and for this summary have chosen those which I think are more significant for industrial applications.

There were six Cross Sessions [Development Governance, ICT for Cultural Heritage, ICT for Environment, ICT for Sport and Fitness, ICT for Tourism, R&D for Textile and Fashion] and eight industry oriented conferences [e-Government, ICT Innovation in Financial Industry, ICT Professionalism and Competences, Integrated Health Care Networks, Service Science, Smart Grids, Web2.0].

Two plenary invited talks by Carlo Ghezzi and by Erol Gelenbe were delivered:



Carlo Ghezzi

Carlo Ghezzi, Politecnico of Milan, in his talk on "The challenges of open-world software" presented the ongoing development of software methodologies and technologies from the closed world to the open world.

Closed world was characterized by a boundary system fixed and immutable, a monolithic, centralized and static architecture, a phased sequential, top-down, deductive from requirements process; in the closed world there is a sharp separation between development time and run time; changes require switching from run time back to development time where software is changed and validated. In the open world instead requirements change continuously and unpredictably, functionalities depend on the context, the system must adapt accordingly, as it runs and provides services; both the components and the structure of the composition change and continuous validation is needed. To manage this dynamic process the assertion language ALBERT is presented, with very interesting results in different application fields.

(cont'd on p. 6)

Bill Olle examined the dimensions of the “impact of professionalism”: the trichotomy of practitioner, researcher, teacher; sibling professions (e.g., legal, accounting, engineering) and specialisms. In the second address, the former president of the British Computer Society, Charles Hughes, reported on IFIP IP3 developments. The vision of IP3 is to create an international computing professional, equivalent in prestige and structure to other established professions such as law and accountancy. IP3 sees the creation of a worldwide set of professional certification schemes that are recognized and trusted globally as representing the hallmark of IT professionalism. These certifications, delivered through independent, not-for-profit, national member societies will be available to qualified professionals and will be supported by development frameworks for both individuals and organizations. It was announced at the conference that the Australian Computer Society (ACS) had become the first professional body to be accredited to award the new International IT Professional (IITP) certification.

The TC 8 conference proceedings were published by Springer as *Advances in Information Systems Research, Education and Practice*, 2008, edited by D. Avison, B. Pernici, I. Ramos, D. Roode and G. Kasper.



WCC Dinner: Performance of Vivaldi's "The Four Seasons"

Integration of CAI systems in the Product Development Cycle

The 2nd IFIP Topical Session on Computer-Aided Innovation was dedicated to the Integration of CAI systems in the Product Development cycle. 35 contributions were submitted to a double blind review process and 11 accepted for the proceedings.

The program has been enriched by the Keynote speech by Prof. Noel Leon Rovira on “*The future of Computer Aided Innovation*” and by a roundtable on the following topics:

- The role of computers in Innovation-related activities (moderator: Gaetano Cascini)
- Establishing the differences between innovation, invention and optimization (Roland De Guio)
- Identifying the requirements for CAI systems (Rosario Vidal)
- How to integrate CAI systems in the Product Cycle

(Noel Leon Rovira)

- How to link CAI tools with existing PLM systems (Marco Taisch)
- How to identify and create collaboration opportunities with other IFIP WGs

The following papers were evaluated as the winners of the Best Paper Award:

G. CASCINI and M. ZINI *Measuring patent similarity by comparing inventions functional trees*

D. CAVALLUCCI, F. ROUSSELOT and C. ZANNI *Representing and selecting problems through contradictions clouds*

The presenters of the winning papers jointly agreed to leave the 750 Euro Grant offered by the IFIP TC5 Executive Committee to Sébastien Dubois, co-author and presenter of the 3rd paper: S. DUBOIS, I. RASOVSKA AND R. DE GUIO *Comparison of non-solvable problem solving principles issued from CSP and TRIZ*

Entertainment Computing

The two-day technical program of the Entertainment Computing Symposium (ECS), sponsored by IFIP TC14 and managed by Paolo Ciancarini, Ryohei Nakatsu, Matthias Rauterberg and Marco Rocchetti, provided a forum to explore the state-of-the-art of computer-based entertainment and related technologies, their design and use, and their impact on the society.

The presentations addressed a broad range of technological, managerial, and design issues, and some described newly introduced techniques and future applications. In fact, the spectrum of papers presented at ECS covered topics from system modeling and simulation to physics, professional gaming products, multimedia visualization, artificial intelligence, robotics, plus others designed to provide a wide range of topics. Special recognition goes to each of the contributing authors and to the reviewers for their dedication and effort.

We had twelve presentations and two invited speakers: Jason Chown of Sony Computer Entertainment Europe, and Nicholas Gaume of Mimesis Republic, a French company producing video games. Both are prominent figures in the industry of entertainment computing, and talked about the nature of video games and the future of online entertainment.

Knowledge Management in Action

The Knowledge Management In Action (KMIA) conference collected a number of presentations that constituted an interesting mix of themes and triggered lively discussions on the nature and role of Knowledge Management when it is put to work within organizations. The introductory invited talk by Marleen Huysman titled “Sense and non-sense of Knowledge Management”, gave an overview of the topic: it focused on the evolution of Knowledge Management highlighting its positive and negative aspects and challenged the development of adequate supportive technologies. The subsequent sessions dealt with Knowledge Management from various perspectives and

application domains: conceptual insights and tools, regional development, service industries, engineering and health care.

The presentations reported real experiences and empirical investigations. Altogether they showed that Knowledge Management is a pervasive topic that starts bringing some positive outcome when it is managed with a particular attention to the needs of the organization and its members, although these needs are not always the same. At the same time, they showed that the adoption of organizational and technological solutions is far from being unproblematic and easily portable from one setting to the other. Knowledge Management requires further research effort to identify strategies, technologies and success factors that can drive its introduction in real organizations. This motivated the participants and the organizers to commit for the organization of new events oriented to the KMIA's aims and to strengthen and develop a research community that shares a common perspective on this very challenging topic.

History of Computing and Education

The Third Conference on History of Computing and Education (HCE3) was a successful mixture of various topics surrounding the computing history theme. The conference attracted eight full papers, two short papers, and two posters. The papers represent twelve countries from five continents. Papers included historical topics on areas such as computer curriculum in Australian schools, computer applications in Polish power plants, the Olivetti Elea computer, Cuban experiences in computing education, computing education in Spain, competitive intelligence, the virtual museum of Siberia, ICT from an Indian perspective, computing in Sri Lanka, choices in first programming languages, and literacy education using Japanese programming. Much talk emanated about IFIP's 50th anniversary celebration, where history will play an important role. ■

(cont'd from p. 4)



Erol Gelenbe

Erol Gelenbe, Imperial College, London, in his talk on "Auctions in cognitive networks" addressed the issue of auctions on Internet. The world's economy is increasingly automated and dependent on Internet services. We need to better understand

how, on one hand automated transactions can take place and what factors will affect the resulting levels of economic performance, on the other hand in what way the Internet itself must be organized so as to offer the best service to economic transaction. The talk presented innovative economic transaction models of auctions with automated bidders and sellers, where the bidders arrival time to auctions and the time it takes the seller to make a decision are modeled as random processes and a metrics is given to estimate the seller income as a function of some critical parameters that characterize the choices and actions of the bidder and seller. The influence of network performance failures, such as packet delays, delays in

communicating decisions or information, losses of information and network attacks, is presented as a major problem and smart "cognitive" networks are suggested as a possible solution.

I now focus briefly on some of the cross sessions so as to draw attention to the main innovations as presented.

The session on "ICT for cultural heritage", run by Paolo Paolini, HOC-LAB, Politecnico of Milan, had as invited speakers Nancy Proctor, Smithsonian American Art Museum, Peter Samis, San Francisco Modern Art Museum, and as invited "discussant" Stefano De Caro, General Director for the Archeological Heritage, Italian Ministry for Cultural Heritage, and Maria Pia Guermandi, Institute for Cultural Heritage of the Emilia Romagna Region.

The extraordinary innovativeness of the session lies in two main factors:

- The "clash of cultures": modern art and archaeology were gathered around the same table. They were asked to discuss the possible use of "mobile technology" (from mobile PC's, to phones, iphones, ipod, etc.) within their realm. There was agreement about that the (near) future - accessing cultural heritage information will be on the mobile devices (not on computers, as we know now).
- Emphasis on (subjective) interpretation rather than on (objective) information. There was a (surprising) consensus on this aspect: if "subjectivity" is the key gateway to access contemporary culture, it is more surprising for archaeology, as maintained by De Caro. Otherwise, "it is like being invited to a banquet" as Proctor pointed out, "but without being given forks, spoons and knives: we may eat the finger food, but the main courses are out of reach for us".

A wide array of mobile-based projects (from Politecnico of Milan and from worldwide institutions) was displayed and discussed at the meeting. The discussion with audience, at the end of each session, made a specific additional point: a mobile device is perfectly apt for conveying *emotions* around one object, rather than delivering a (catalogue like) set of organized and intensive information. And at the end interpretation and emotion are culture in the highest possible meaning.

The Session on ICT for Sport and Fitness, run by Remo Lombardi of Pavia University, presented several significant technological innovations: one of them is associated with the measurement of biomechanical parameters for an athlete. In particular, a HW/SW system was described, equipped with wireless sensors, on-line data gathering and off-line data processing and visualization; the results obtained measuring the athlete's lower limbs accelerations and vibrations during sport performances were widely discussed. Tests were made during football matches both on natural and artificial turfs, during races on tracks with different surfaces and descents with snowboards on different types of snow. The main present industrial applications are related to design and implementation of soccer shoes and artificial turf materials, of athletics tracks and of new ski and snowboard equipment.

The Session on “R&D for textile and fashion”, run by Guido Bottini, Sistema Moda Italia, Milan discussed incoming innovations in this very special field of application, of great economic interest. The attention has been focused mainly on the European wearIT@work project for a new technology empowering mobile workers. Beside the four application domains of maintenance, production, healthcare and emergency response, further domains like cultural heritage, a rural living lab for the prevention of environmental disasters and eInclusion are first extensions to new application domains. All seven wearIT@work solutions are based on the Open Wearable Computing Platform (OWCP) and the Open Wearable Computing Framework (OWCF). The basis of exploitation in wearIT@work are the specific value chain and simple but important rules for implementing the wearIT@work corporate model for doing business. The adoption of these rules creates a learning cycle that let each single initiative take advantage of benefits coming from the partnership and, on the other hand, contributes to enhance the value of the organization. One of these solutions was tested at a small company dealing with aircraft maintenance, which offered the possibility of implementing the application in a real working environment and performing experiments with real users wearing a maintenance jacket with integrated wearable technologies. Specifically customized interfaces were tested for input modalities: speech navigation, hand-mouse and data-glove (gesture device). As output modalities plain text, image (photo), video and audio were tested. Input and output tests were performed with ten maintenance operators through a mock-up that was created with an implementation tool for wearable systems.

The maintenance jacket with integrated wearable technologies is an example of a product ready to be marketed. The evaluations with end-users in the aircraft maintenance domain with its demand on structured information and extensive documentation show that 50% of the time workers spent to catch up print outs and document on paper tasks performed. This shows the business benefit of the technology.

The industry oriented conference on “e-Government”, run by Antonino Mazzeo, University of Naples, has largely dealt with the issue of automation of processes in public administration and technical and cultural problems related to them.



Antonino Mazzeo

Knowledge management has become a challenging issue for almost all the e-government-based applications. E-Gov processes, in fact, are usually characterized by a huge quantity of paper documents, which need to be properly managed, stored and distributed. It is widely agreed that a Semantic-based dematerialization process will greatly enhance systems and application procedures designed for e-Gov activity. The dematerialization process implies the application of syntactic-semantic methodologies in order to automatically transform the unstructured or sometimes semi-structured document into formally structured records, suitable for

machine treatment. An interesting project on the representation and knowledge management for e-Gov documents has been discussed: the new information system for the management of the whole flow of digital documents, allows in particular: *i)* automatic information extraction from digital documents; *ii)* retrieval; *iii)* semantic interpretation of the relevant information presented in the document, *iv)* storing and *v)* long term preservation.

The procedures used are based on both linguistic and statistical approaches for the early processing of the submitted input document, together with semantic functions for retrieval and interpretation purposes. The textual processing methods make use of a knowledge domain, codified by several levels of ontologies, in order to provide the identification and extraction of relevant words in the text, representing the instances of the concept of interest. Such concepts are needed to automatically infer knowledge from data, thus simplifying the information extraction, retrieval and indexing tasks.

Three main kind of ontologies are defined: *(i)* lexical ontology, that contains lexicalized concepts commonly used in the Italian and English language, *(ii)* structural ontology, that codifies the modality in which the information are graphically disposed on the e-Gov documents; and *(iii)* domain ontology, containing the significant and specific concepts and the relations for the interest domain, suitable for the e-Gov activity.

The whole processing procedure includes: *(i)* text extraction, where the plain text is extracted from the source file; *(ii)* structural analysis, where the textual macro-structures are identified for text sections recognition; *(iii)* lexical analysis, where each text element is associated with a grammatical category (verb, noun, adjective etc.) and a syntactic role (subject, predicate, complement, etc.); *(iv)* semantic analysis where, proper concepts are associated with discovered entities and relations among them, by means of structural, legal domain, and lexical ontologies. Such procedures make a proper semantic annotation that is codified by RDF triple.



Giulio Occhini

The WCC 2008 track on “ICT Professionalism and Competences”, run by Giulio Occhini, was a 2½-day conference that showed how topical this subject is all over the world. A pleasant discussion has taken place about different approaches to ICT professionalism, but all the speeches presented stressed the importance of an international dimension of the issues, and the timeliness of new standards in this domain.

The opening speech by Mr. Schlamberger, CEPIS President, was an open invitation, a call to collaboration between the main stakeholders, and in fact the closing act was the unanimous approval of the “WCC 2008 Declaration on ICT Professionalism and Competences”.

Prof. Seidmann, from the University of Central Arkansas, explained the role of IEEE Computer Society, the Association for Computing Machinery

(cont'd on p. 10)



CEPIS Position paper on University Education and the ICT Industry

Information and Communications Technologies (ICT) have a distinct and unique role to play in the overall advancement of Europe in its efforts to ensure economic and social success. Much of Europe's progress is based on the large-scale deployment of technologies, a highly sophisticated workforce and on providing computer training to enable all users to fully exploit what technologies offer.

Europe is under pressure from both the American and Asian continents. Recent developments in Eastern Europe hardly compensate for the impact of new sources of ICT manpower in Asia and South America. Europe needs to invest in ICT and it is up to European industry and universities to provide leadership. Industry produces technologies and applications, but the competencies to use these technologies and creating professionals that possess these competencies are key elements of future progress.

European universities play the primary role of producing the professionals with the knowledge, skills and competencies needed by the ICT industry. Their role in this respect is vital and should continually be strengthened. Yet despite a significant quantitative and qualitative offering by European universities, the demand for professionals increases constantly and exceeds their offerings. Estimating supply and demand levels in 2010 and 2015, CEPIS believes that Europe could face shortages of up to 70,000 ICT practitioners per year¹.

CEPIS notes that in both industry and university communities, divergent opinions exist between the output of formal educational institutions and the needs industry for ICT professionals. This divorce is considered by some to be at the origin of the scarcity of ICT professionals in many ICT specialties. Other opinions take into account the fact that too few young people in developed countries want to study engineering subjects to supply the needs of the industry. However the educational background of an ICT professional must be multidisciplinary - to address student needs, and highly specialised - to address industry needs - a disparity that is hard reconcile.

Co-operation between European universities and the ICT industry is very important and is of mutual interest to both parties as well as to public authorities, whose active engagement is essential.

Main findings

University-industry co-operation: Universities and industry do not co-operate at a sufficient level. European universities must effectively compete with universities in the US and around the world. This can be achieved by increased co-operation with the ICT industry and by working in partnership with the relevant authorities.

Changing world: Universities operate in a changing world. There is a growing trend towards part-time studies, in particular for computer-related studies.

Basic and applied research: Several universities have the tendency to favour theoretical research and leave applied research to industry. This seems to be the current state of the differences between what European universities offer and what the ICT industry needs in the work force. The research activity in universities, both theoretical and applied, is the most important pillar sustaining teaching and bringing educators close to current industrial practice. The European R&D framework programmes have largely succeeded in bringing universities and industry together in funding research that is useful to both. Speeding up the application of the research, characteristic to ICT high innovation rate, is seemingly benefiting the industry and forcing the universities to industry-like timeframes.

Mobility: Mobility of people between universities and ICT industry is beneficial and could promote greater innovation if encouraged by a supporting framework.

Entrepreneurship in ICT: Universities are one of the main sources of entrepreneurs. European universities could better contribute to the increase of the SME sector in ICT, firstly by giving their students a scientific and technical background to allow them to innovate, and secondly by preparing them with the managerial skills they need to run a small enterprise. Universities are also the catalysts of entrepreneurship through technology parks established in universities. The development of such entrepreneurial centres around universities merits encouragement from governments and the EU as they frequently become incubators for many new ICT companies.

Scarcity of ICT Skills: Universities are prudent about the qualitative aspects of ICT skills needed, but they are also pushed by the market to adapt and provide solutions for the increasing scarcity of ICT professionals within the market. The different approaches of universities and

¹ E-Skills in Europe: Matching Supply to Demand'. CEPIS, 2007

industry to the skills required in graduates only increases the gap between what universities offer and what industry needs. Reconciling these divergent tendencies for reducing the gap between the demands of industry and the ICT graduate skills that universities offer is difficult or impossible to achieve. It is probably better that universities offer a market-driven wide variety of types of graduates and that industry takes these graduates and adds appropriate training and development to suit their needs. Universities aim to produce well-qualified scientists and engineers with a strong scientific background. Normally this is what industry would need. However, large ICT companies ask for a solid scientific background as they have resources to further train their staff. Smaller ICT companies prefer specialised ready-to-work ICT graduates who provide return without incurring additional training expenses.

It is impossible to reconcile these two opposing requirements to provide ICT graduates who are both flexible and immediately usable. Every university has to decide what kind of professional they want to offer to industry and adapt their curricula to best fit to that requirement within the type of profession chosen. Internships or industrial placements are considered essential, as they can either be integrated into degree courses or completed in addition to the course.

Certifications: The ICT industry has developed a full series of vendor certifications. Universities have a natural tendency, for a variety of reasons, to keep away from vendor oriented industry certifications. A more general certification based less on company-specific competencies and more on general professional competence could build a university-industry bridge.

Curricula: Curricula are what differentiate universities and define the level of professionalism of the future graduate. Today's curricula are seen by many in industry as not being adaptive enough to the new trends in ICT industry. The Bologna process, currently being implemented across Europe may solve this problem. Yet in some EU countries, the new Bologna type scheme (3+2+3) does not yet produce the best results in ICT specialisations. The European tendency to move toward three-year bachelor degree programmes, may be appropriate for the humanities, but is problematic for engineering, including computing. The Bologna process could incorporate updated curricula for ICT graduates that take into account the best interests of both European universities and industry. Curricula can then be systematically revisited to ensure the best harmonisation of graduate skills with market demands in Europe.

Continuous education: The ICT industry is particularly appropriate for lifelong learning. Continuous education

with short cycles is a necessity in ICT. On the one hand, people who graduated 10-15 years ago received an education based on technologies that are now obsolete. Universities should be encouraged to offer master courses to students or graduates of other disciplines as a conversion course. On the other hand, the lack of skills brings an important number of non-ICT university graduates into the ICT field, mostly in emerging countries. Universities could play a major role in the ICT education of people who have already worked in the industry for years or are undergoing professional re-conversion.

Basic ICT Skills: Providing training in basic skills for ICT and e-business is not the task of universities, but that of secondary education. The majority of people lacking in digital literacy skills are at an age where going back to secondary school is impossible. Universities can bring a notable contribution to the dissemination of basic ICT skills, if all non-ICT graduates in Europe could gain these basic skills. Secondary schools should refocus their education programmes around these enabling technologies and redesign new partnerships with industry and public services for the dynamic preparation of the right skills in a permanently changing environment. Universities can do much to assist in curricular design, pedagogy and also defining and explaining the core body of knowledge for other branches of education.

e-Business Skills: E-business skills are not generally covered by university curricula because they require a deep context knowledge comes from on-the-job experience and is frequently offered by IT vendors as a consultancy service. This is a category of professionals most appreciated by the market and it is also the most inclined to the certification approach.

Role of Governments: Governments and the European Union can dramatically change university-industry relations by providing focused incentives, mainly derived from their funding schemes. A focus on ICT skills is a high-priority action for national governments and the European Union. New European Member States represent an important reservoir of ICT skills with proven competencies and competitiveness. European Union could pay special attention to the ICT development needs of these countries, by implementing special programmes for ICT infrastructural development and ICT basic skills dissemination.

This position paper is the result of the activity of the CEPIS Task Force on Education as set by 94th Execom, chaired by Dr. Vasile Baltac, Vice-President. The full paper is available at: <https://www.cepis.org/index.jsp?b=0-636&pID=641&nID=825>

(ACM) and the Canadian Information Processing Society (CIPS) in the emergence of Software Engineering Professionalism in the USA and Canada.

Later on, Prof. Garbajosa, from the Universidad Politécnica de Madrid, gave a preview of the ISO/IEC 24773 standard (which was then published in October 2008) on Software engineering – Certification of software engineering professionals – Comparison framework.

The first day also included speeches on the issues of ICT professionalism in various other countries and contexts:

- Mr. Mukaiyama (Information-Technology Promotion Agency) explained how IT professionals are qualified in Japan, and how other far-eastern countries recognize such qualifications;
- Mr. Thompson (British Computer Society) presented the UK perspective and the concepts underpinning IFIP's IP3 initiative;
- Mr. Pistarini (IBM) explained how career development is managed at IBM, whilst Mr. Steszgal (PIN-SME) discussed the issues of ICT micro-enterprises in Europe;
- Mr. Gentili (CNIPA) and Mr. Scquizzato presented the Italian approach to e-skills policies through the sharing of the European EUCIP model;
- A special session focused on ICT in emerging countries, with contributions from India (Cav. Mathivanan), China (Prof. Xu), Africa (Prof. De Roche), Iraq (Mr. Grassi and Mr. Osman);
- Prof. Baltac (ATIC, Romania) sent a contribution about the relationship between European Universities and the ICT industry.

The central part of the Conference was then dedicated to a deeper analysis of two top interesting initiatives, namely:

1. The EUCIP model for classifying and certifying ICT professional competences, proposed by various CEPIS Member Societies and coordinated by the ECDL Foundation (Mr. Mockler);
2. The IP3 (International Professional Practice Partnership), presented by IFIP's Task Force (chaired by Mr. Hughes); just for curiosity, one of the speakers (Mr. Hart, ACS) came from Australia, so all continents were actually represented.

The final part of the Conference hosted two more contributions and a synthesis session:

- A speech on the importance of managerial skills (by Mr. Curley, Intel);
- A report on CEN/ISSS European standardization activities in the ICT skills domain (by Mr. McMullen and Mr. O'Sullivan);
- The closing panel chaired by Mr. Bellini (AICA, who coordinated the whole Conference) plus the Presidents of CEPIS (Mr. Schlamberger) and IFIP (Mr. von Solms).

As a result of the closing panel, the afore mentioned WCC

2008 Declaration was presented, debated, slightly amended, and adopted by the delegates, some of which formally signed it.

The industry oriented conference on “Service Science, Management & Engineering (SSME), better known as Services Science”, run by Gianmario Motta of Pavia University, dealt with this emerging discipline that has the aim of innovating processes and services for individuals and corporations within private and government service organizations. Actually services are a dominant share of current economies and account over 75% of the GNP in developed countries. SSME domains, as illustrated in the July 2006 issue of Communications of ACM, include, respectively, the science, management and engineering of services. The value added of Service Science is the integration between different disciplines.

Universities are starting to offer Majors on Service Science. They include American universities as Carnegie Mellon (US) and El Salvador (Central America), European University as Helsinki Polytechnic (Finland) and Pavia (Italy), Asian Universities as Peking (China) and Singapore Universities. The service engineer is an architect who is able to design systems services by integrating existing systems and developing new ones. IT is a key technology, but the key ability is the integration of business services design with the design of IT processes that implement the service. Universities papers have addressed the problem of designing effective business processes. Here are some key points:

- Papazoglou (Tilburg University, The Netherlands) has presented a framework COSO to assure the compliance of business process to regulations, as HIPAA, Basel II, Sarbanes-Oxley. The framework implies a more “human-centric” approach to compliance-driven service development, re-use and customization of compliant process fragments, formal verification of the compliance properties of composed services, and, finally monitoring facilities for tracking and validating compliance concerns at run-time.
- The value aware design process discussed by Xu (Harbin Institute of Technology, China) provides target users, after drafting innovative ideas on services, a systematic approach to define services, focusing on “how to be aware of values (both customers and providers) as far as possible” and “how to improve service system’s capability to deliver values to each party”.
- ABE method (Motta, University of Pavia, Italy) is an innovative methodology to design top down domain focused databases, that supports enterprise information integration through an hyper schema and/or an analysis of the alignment of actual data bases versus normative information requirements. The method is founded on the concept of a general business information entity that is specialized and decomposed.
- If business process schemas are stored in a knowledge base and mapped to the corporate IT systems, development process can be shortened in the very critical analysis of feasibility (Germani, BIP, Milano).

- Finally Pernici (Politecnico di Milano, Italy) has proposed a service-oriented approach and the inter-connection among the different levels are discussed to design green information systems.

Case studies of corporations show that user and customer centered design of services and business processes is successful and efficient:

- Murphy (IBM, US) gave the state of the art of SSME as seen by IBM that is certainly one of the founders and promoters.
- The Italian branch of British Telecom (14th Telco in the world) reported its experience with an approach (HIGO) to define business process based on balancing performances of diverse and potentially conflicting classes of business processes stakeholders - managers, workers, customers - and reported the approach was both successful and efficient. This shows that participative and systemic approach can compete with 6-Sigma like analysis.
- A similar successful experience is the customer service of IVECO (a very large truck manufacturer) that is designed on maximizing performances to the customer.
- Unicredit (8th largest bank in the world) also showed an IT service assurance process designed for the customer that can be a highly competitive factor. The case study is really significant given the huge size of IT (over 5,000 staff)
- Telecom Italia (10th largest Telco in the world) reported its design with its SOA 2.0 initiative that combines the design of business services with the design of IT services by a wide use of advanced SOA technologies. ■

Computer History

First Real Computers in Slovenia

by Franci Pivec



Franci Pivec is head of the History of Computing Section of the Slovenian Society Informatika. Franci works at the Institute of Information Science in Maribor and is a member of IFIP TC9 on Relationship between Computers and Society.

In 2002 in Portorož, during the founding meeting of the History of Computing Section of the Slovenian Society Informatika, Dr. Tomaž Kalin, one of the pioneers of Slovenian computing, said that in the early 1960s it had taken a long time for them to decide, which computer would best suit their needs. Nowadays, it is difficult to understand that they were choosing between British and German computers, i.e. Elliott 803 and Zuse Z23, whereas the Americans did not enter the competition at all.

Elliott 800 appeared in 1958. Elliott 803, its fully transistorised version from 1960, was manufactured in 200

pieces. Most British universities were proud to own these computers, and Slovene visitors were able to get acquainted with them there. (One of these computers is still kept at the Science Museum in London.) For domestic universities, these computers cost about GBP 30,000.

At ETH in Zurich, which is geographically much closer to Slovene researchers, computers manufactured by Zuse KG from Neukirchen had been operating continuously since 1950. Since 1958 Zuse KG had been developing the Z23 computer, which was presented on the market in 1961; most of the 98 pieces produced were bought by German universities, which were often visited by Slovenes. On the domestic market, the price amounted to DM 200,000.

The choice fell on Z23, which arrived in Ljubljana in 1962. It is evident that the decision was not based on the price but rather on the connections with ETH and German universities. Also, the influence of an academic, Dr. Anton Kuhelj, could be mentioned here who was then the Director of the Institute of Mathematics, Physics and Mechanics (Institut za matematiko, fiziko in mehaniko) and was familiar with Zuse's pre-war work in the aircraft aerodynamics research; this was associated with the development of the first computers Z1, Z2 and Z3. Anyway, the choice was not bad at all.

Z23 was a fully transistorised computer (2,700 transistors and 6,800 diodes) and its ferrite memory was capable of 256 (no K has been left out here) 40-bit words. The capacity of the magnetic drum was 8,192 words and its rotational speed was 6,000 rotations per minute. It weighed a ton and it required a 4000 watt power supply. During operation it was very loud and specialists were able to tell what it was processing by the noise it was making, similar to good car mechanics. It took more than twenty minutes to start up the drums. The Freiburg command code (native Zuse code) was used to control the computer, and ALCOR compiler was required for ALGOL programs. Herbert Grosch admits in his "computing memoirs" that this was a highly competitive computer and he adds that IBM eagerly followed the work of Zuse engineers and that John Lentz used much of their knowledge for IBM computers.



Z23

Janez Štalec, who worked with Z23 since its installation, specifies the following components: computer, memory drum, quick memory, console desk, punched tape reader and hole puncher, printer, graphomat. The computer was capable of 30 operations at fixed notch and 20 operations at sliding notch.

Simultaneously with the installation of Z23, the Computer Centre was established within the framework of the Institute of Mathematics, Physics and Mechanics in 1962. The

Computer Centre, together with the Jožef Stefan Nuclear Institute (Nuklearni inštitut Jožef Stefan), obtained a loan to purchase the computer. This was the first open-access computer centre in the then Yugoslavia. It specialised primarily in programming and the use of numerical methods. It very quickly started to participate in solving practical problems in economics, statistics, metal constructions, switchboards, agronomy, geodesy, architecture, transport networks, municipal facilities, etc.

The Slovene "Zuse" became famous outside the professional circles in 1967 when, for the first time in history, it was used to calculate the scores at the European Figure Skating Championship in Ljubljana, which was broadcast on TV worldwide. In this way it was easier for computer experts to convince the financiers to purchase more modern computers. Soon afterwards the Slovene "Zuse" sank into oblivion; some of its parts, however, are still kept by sentimental computer specialists. The whole Z23 can be seen in the Computer History Museum in Mountain View in California. ■

IT STAR

Date and place of establishment

18 April 2001, Portoroz, Slovenia

Mission

To be the leading regional information and communication technology organization in Central, Eastern and Southern Europe which promotes, assists and increases the activities of its members and encourages and promotes regional and international cooperation for the benefit of its constituency, the region and the international ICT community.

Members

[Countries and societies represented & year of accession]

- **Austria** – OCG (2001) www.ocg.at
- **Bulgaria** – BAS (2003) www.bas.bg
- **Croatia** – CITS (2002) www.hiz.hr
- **Czech Republic** – CSKI (2001) www.cski.cz
- **Greece** – GCS (2003) www.epy.gr
- **Hungary** – NJSZT (2001) www.njszt.hu
- **Italy** – AICA (2001) www.aicanet.it
- **Lithuania** – LIKS (2003) www.liko.lt
- **Macedonia** – MASIT (2003) www.masit.org.mk
- **Poland** – PIPS (2007) www.pti.org.pl
- **Romania** – ATIC (2003) www.atic.org.ro
- **Serbia** – JISA (2003) www.jisa.org.yu
- **Slovakia** – SSCS (2001) www.informatika.sk
- **Slovenia** – SSI (2001) www.drustvo-informatika.si

Coordinator: Giulio Occhini
Chief Executive: Plamen Nedkov

IT STAR Snapshot and Membership contacts at www.itstar.eu



Member Society News

Austria

Forthcoming event

1st CEE Symposium on Business Informatics in Central and Eastern Europe, 25 – 27 February 2009, Vienna
www.wi2009.at/cee

Czech Republic

Forthcoming event

SOFSEM 2009 – 35th International Conference on Current Trends in Theory and Practice of Computer Science, 24 – 30 January 2009
Hotel Arnika, Špindlerův Mlýn, Czech Republic
<http://www.sofsem.cz>

Hungary

The 40th Anniversary of the John v. Neumann Computer Society was celebrated on 7 November 2008 with a Gala Dinner at hotel Gellert in Budapest.

Serbia

JISA Award for ICT use

DISKOBOLOS is an international competition and award for the use of information and communication technologies organized by JISA, the Informatics Alliance of Serbia, and until recently intended for companies within the countries of ex-Yugoslavia.

Companies across Europe were invited to take part in the 14th DISKOBOLOS'08 edition, which is granted in several categories including production, project management, social services, finances, education, conferences, publishing, radio and TV broadcasts. The Award winning ceremony is set for 18 December at the Belgrade Continental. ■

Introducing EuroSys - The European Professional Society on Computer Systems

by *Dejan Kostic*
EuroSys Board member



EuroSys, the professional society for computer systems in Europe, was established to promote excellence in Computer Systems education, research and industry. It was formed to federate European researchers in the area to improve their impact and to provide the European perspective within the international Systems community. The Computer Systems topics include operating systems, distributed systems, real-time systems, systems aspects of databases, language runtimes, embedded systems, etc., and intersect a large number of application areas. EuroSys is approved as the European chapter of ACM SIGOPS.

Much original work in systems comes from Europe. Some of the highly original and successful recent work includes the **Linux operating system** (originated in Finland), the **World-Wide-Web** (originated at CERN in Switzerland), the **Xen virtual machine** monitor (from University of Cambridge), and the **Pastry** peer-to-peer system (from Microsoft Research in Cambridge).

Despite this large body of excellent work, the center of gravity of systems research and development is in the US, and systems work has little recognition in Europe. Publication impact is disappointing. There are many reasons for this situation, but one is surely the disorganization of our community. EuroSys aims to increase the visibility and quality of systems research in Europe, and to provide forums for researchers and practitioners to meet and communicate.

EuroSys, the European Systems Conference, is a series of Systems conferences located in Europe. It welcomes submissions and attendance from all over the world. EuroSys unifies different areas of Computer Systems, otherwise spread over multiple conferences. EuroSys solicits submissions on all aspects of computer systems, and especially those that cross the divide between areas. Approximately 170 participants from academia and industry attended the inaugural conference in 2006, while 200 participants registered in 2007 and 2008.

In 2007, EuroSys organized a **SOSP Shadow PC**, an educational experience for young systems researchers. The shadow PC wrote real reviews of the real submissions to SOSP 2007, in parallel with the real PC, and held an actual paper selection meeting. The Shadow PC compared results with the real PC and discussed the writing and reviewing process.

In 2006 and 2007, EuroSys organized an Authoring Workshop. These workshops had a goal of helping European papers get accepted at major Systems conferences. Work-

shops included an intensive online paper preparation period, followed by a full-day, hands-on physical meeting co-located with the EuroSys conference. Students discussed ways of presenting their PhD work, and received feedback from peers and experts in the field. Throughout the preparation period, a shepherd was assigned to work with each group of authors. In 2005 and 2008, EuroSys organized a Doctoral Workshop with many similar goals as the Authoring Workshop.

For more information on EuroSys please visit www.eurosys.org. ■

Institute for Prospective Technological Studies

JRC - IPTS makes data on European ICT R&D expenditures available

by *Marc Bogdanowicz*

Data on European ICT R&D expenditures has been presented at the INFSO ICT Annual Conference in Lyon by the IPTS, one of the 7 European Research Institutes of the European Commission. The data, presented in a freshly published JRC Reference Report issued on 25 November provides the first comprehensive overview of the available data in Europe. It also offers international benchmarking with the US, national data for 25 of the European Member States and ICT sub-sector figures. The report is the first one of an announced series that will be published on an annual basis and freely available on the IPTS web-site. (<http://ipts.jrc.ec.europa.eu/publications/index.cfm>).

The next edition, already due by March 2009, promises further investigation in time series and trends, Asian countries and patent analysis.

The 2008 report sets out the main findings of a study on Business Expenditure on Research and Development (BERD) in the EU Information and Communication Technology (ICT) sector. The study was conducted between 2006 and 2007, and was led by the Joint Research Centre's Institute for Prospective Technological Studies¹ on behalf of, and in close collaboration with, DG INFSO Directorate C.

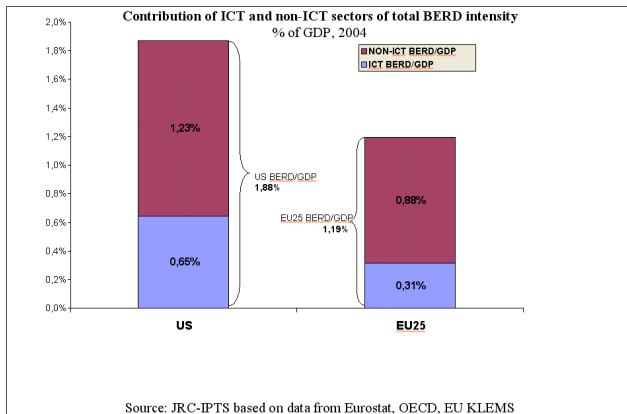
Some findings: benchmarking EU vs. US

The ICT business sector (i.e. ICT manufacturing and the provision of ICT services) is the largest R&D investing sector in Europe, ahead of the automotive and pharmaceutical industries.² It spends €32.8 billion on R&D in the EU, contributing just above 26% of all business R&D investments of all economic sectors combined.

¹ The Institute for Prospective Technological Studies (IPTS) is one of the seven research institutes of the European Commission's Joint Research Centre (JRC).

² This report covers the period up to 2004, the latest year for which official data was either available from ESTAT, OECD or Member States at the time of writing, or for which it was possible to estimate data with a reasonable degree of confidence.

Even so, the EU ICT business sector spends only about half as much on R&D as the US, not only in absolute amounts, but also as share of GDP: whilst the US invests 0.65% of its GDP in ICT BERD, the EU spends only 0.31%. Indeed, the ICT sector alone is responsible for as much of the economy-wide BERD investment gap between the EU (1.19% of GDP) and the US (1.88% of GDP) as all other sectors combined. Moreover, during the period 1999-2004, growth rates were generally higher in the US than in the EU, so the ICT business sector R&D investment gap is not closing.



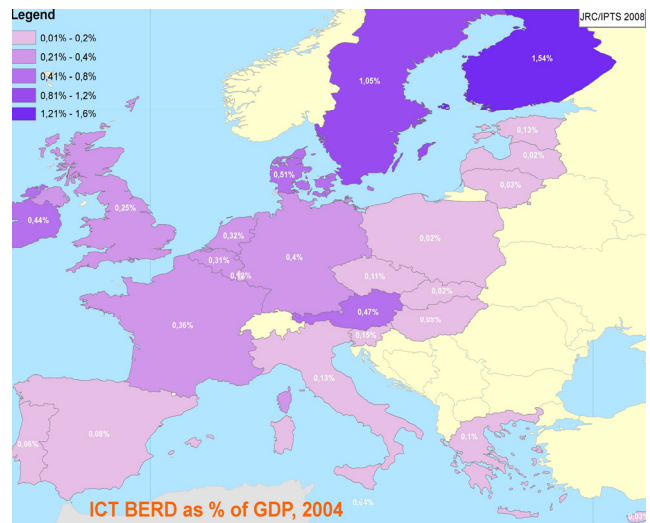
This ICT business sector R&D gap reflects two aspects: 36% of the gap are accounted for by the fact that the ICT business sector is a smaller part of the economy in the EU than in the US, and 64% are accounted for by a lower BERD intensity (business R&D/value added) of the ICT sector in the EU. The lower R&D intensity of the sector is, in turn, primarily due to two sub-sectors: Computer Services and Software on the one hand, and Electronic Measurement Instruments on the other hand.

R&D in ICT by Member State

Among EU Member States, Finland (1.54% of GDP) and Sweden (1.05% of GDP) host the highest R&D effort in the ICT sector, relative to the size of their economies. In general, Northern Member States show higher ICT sector R&D intensities than Southern Member States. The West-

ern Member States show a much higher intensity than the EU10, which display very low absolute levels by contributing only 0.8% of the EU total ICT Business Expenditure on R&D (BERD).

The following map shows business expenditure on ICT R&D divided by GDP in the EU Member States.



R&D in ICT by sub-sector

R&D intensities (BERD divided by Value Added) are highest in Telecom Equipment, followed by IT Components, Electronic Measurement Instruments, IT Equipment, and finally by Multimedia Equipment. The two services sectors, Telecom Services and Computer Services and Software have much lower R&D intensities. However, more than a third of the ICT sector's value added is created in these services sectors, hence the absolute amounts of R&D in these sub-sectors is above several of the manufacturing sub-sectors.

Regarding development over time, it is noteworthy that most of the growth in business R&D is taking place in Computer Services and Software and, albeit more slowly, in the Electronic Measurement Instruments sub-sector.

Key figures for the ICT sub-sectors (€ billion 2004)

ICT sub-sector	Value Added	Trade balance 2005	BERD	BERD VA (2004)	/BERD average yearly growth 2000-04
IT Equipment	12,1	-40,8	2,3	18,8%	-1,5%
IT Components	17,4	-7,5	4,4	25,2%	
Telecom Equipment	19,9	-5,3	8,5	42,5%	-1,2% (for the 3 sectors)
Multimedia Equipment	8,1	-2,5	0,9	11,6%	
El. Measurement Instruments	25,7	6,3*	5,4	21,4%	5,5%*
Telecom Services	176	-0,7	3,0	1,7%	-1,0%
Computer Services, Software	185	6,3	7,1	3,8%	12,9%
Total ICT	444**	-44,3*	31,6**	7,1%	2,4%**

Notes: * Includes the whole ISIC category "Measurement Instruments" ** Only includes the ISIC sub-categories "Electronic Measurement instruments", and "Telecom services". BERD is therefore slightly lower than the € 32,8 billion stated before, and BERD/VA slightly higher.

Source: JRC-IPTS based on EUROSTAT, OECD ANBERD, national statistics, EU-KLEMS and company annual reports.

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The IT Equipment is the sub-sector where the Western Member States' industry is least competitive, at least on the price-sensitive and still growing mass market. This sub-sector has also been strongly hit by relocation. EU R&D intensity in IT Equipment stands at around 19% of value added, but this figure hides a wide variation between EU Member States. R&D intensity in the Western Member States has been growing since 1999 and seems to have reached a higher plateau in the last years while most of the R&D in the Eastern Member States comes from foreign direct investment from third countries

With an R&D intensity at 25,2%, the IT components industry is characterised by a very high research intensity, which to date has allowed European industry to compete successfully. In other words, thanks to strong R&D efforts, European products have escaped the price competition of the mass market and competed instead on innovation and quality.

The Telecom equipment sector is Europe's traditional ICT strength. This sub-sector is also the most R&D intensive of all ICT sub-sectors. However, after reaching its peak in competitiveness due to the runaway success of the GSM standard, since 2000 its position has been eroded, following the crash of the dotcom bubble. Not only has value-added decreased considerably from 2000 to 2004, R&D went down even further, resulting in a decreasing R&D intensity.

The multimedia sector is in quite a different situation. Some European producers are relatively strong in the premium segments, but this strength is overshadowed by the weakness in the mass market. Moreover, R&D by European companies has actually been shrinking rapidly for several years while non-European countries continue to increase their research.

The Electronic Measurement Instruments sub-sector is often overlooked among the ICT manufacturing sectors. However it stands out by being the only one in which EU industry has a consistent trade surplus. Much production, research and design is on demand by customers, and competitiveness advantages obtained by R&D investments are more important than lower production costs.

The R&D intensity of the Telecommunication Services is low, at around 1.7% of value added (BERD/VA) and 0.9% of turnover (BERD/turnover), and it has been declining in recent years. Still, from an international perspective, Telecom Services R&D in Europe remains rather strong, with more than half the world's expenditures and this share is increasing.

The Computer Services and Software sub-sector is the main ICT R&D growth engine in Europe; in fact most of the BERD growth in the EU in recent years is due to this sub-sector. It can be divided into two main parts: (1) the development and production of software, and (2) the provision of computer services (often labelled IT services), where the former is very R&D intensive and the latter less so. The differences in R&D intensity and total BERD between Western Member States and Eastern Member States are not as large as for the rest of the ICT-sector. In combination with rapid growth rates, this fact suggests that software R&D could be a vehicle to establish more significant

R&D capability in these countries and in the EU as a whole.

* * * * *

The present report underlines the importance of the ICT sector, responsible for 26% of business R&D investment in Europe, for the overall level of EU R&D investment, for the success of the Lisbon agenda and, ultimately, for the competitiveness of European industry. It also shows that the EU will not be able to match the US share of ICT RD investment (standing at 35% of total US BERD) unless it significantly increases the R&D effort in its ICT sector. In this context, the fact that the largest part of the EU/US gap is due to the sub-sector with the fastest-growing BERD on both sides of the Atlantic, i.e. Computer Services and Software, is rather worrying since it implies that the gap is more likely to widen than to close.

A significant part of the ICT BERD gap is due to the smaller overall size of the ICT sector in the EU. Furthermore, most of the gap is accounted for by a lower BERD intensity (business R&D/value added) of the ICT sector. A positive view is that the structure of the European economy, with a large number of major manufacturers in many different industries but with a comparatively small specialised ICT-producing sector, might make us underestimate Europe's position in ICT R&D. As R&D research outside the registered ICT sector is not recorded within existing internationally agreed methodologies, the "embedded" ICT R&D might be much more important in Europe than elsewhere, resulting in a statistical undervaluation of Europe's ICT capacity. This will be further investigated by IPTS.

In the meantime, the aim of increasing EU ICT BERD to US levels cannot be only a matter of encouraging existing ICT (or even non-ICT) companies in Europe to spend more on ICT R&D. Addressing the ICT BERD gap implies fostering sufficiently attractive conditions for the establishment, growth and international development of R&D-intensive ICT activities in Europe. This, in turn, needs a wider approach than just research policy. It should also include consideration of labour and product market regulations, education, tax and infrastructure policy, etc. It is only by addressing all of these aspects together, that the economic environment for ICT companies can be improved to the point where more become large, international, R&D-intensive players. ■





1st ANNOUNCEMENT AND CALL FOR CONTRIBUTIONS

4th IT STAR Workshop on

Skills, Education, Certification: the Multi-stakeholder Partnership *itp_SEC.09*
27 – 28 November 2009
Rome, Italy

Host Society: Associazione Italiana per l'Informatica ed il Calcolo Automatico - **AICA**

Conference venue: Villa Aurelia (www.villaaurelia.net)

Mission: *To investigate the current state, problems and challenges with respect to ICT skills, professional education and certification in order to identify best practices and key issues of common interest and facilitate policymaking within the Region and the European Union.*

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P. Indovski, Macedonian Assoc. for Computer Techn.

S. Katsikas, Greek Computer Society
S. Maskeliunas, Lithuanian Computer Society
P. Nedkov, IT STAR
G. Occhini, Italian Computer Association
I. Privara, Slovak Society for Computer Science
N. Schlamberger, Slovenian Society INFORMATIKA
J. Stuller, Czech Society f. Cybernetics & Informatics

Program

Some of the issues to be addressed include current EU and national SEC policies and strategies, stakeholders and relationships, certification programs, ICT professionalism, the Bologna process - progress and setbacks.

The two-day event based on **keynotes, national reports, presentations and panels** will gather senior representatives of academia, government, industry and international organizations. **Representatives of all stakeholders from the region and internationally** wishing to share their experience and views are offered the possibility to submit proposals for topics and papers.

Abstracts of max. 500 words as presentation proposals should be submitted to Plamen Nedkov <nedkov@utanet.at> by 10 March. Confirmations of acceptance will be made by 10 April and the full presentations (max. 6,000 words) would be expected by 1 October.

The program will build upon the findings of the previous three IT STAR workshops on R&D in ICT (Bratislava 2006), Universities and the ICT Industry (Genzano di Roma 2007) and National IS Experiences (Godollo 2008) - information and proceedings are available at www.itstar.eu.

Each IT STAR member society is invited to designate 2 participants (including eventual speakers) whose local costs for the event will be covered by the hosts. For all other participants a registration fee will apply. Further details will be announced.

Organizing and Program Co-chairs

Giulio Occhini <g.occhini@aicenet.it> (local arrangements, program)
Plamen Nedkov <nedkov@utanet.at> (international coordination, program)

Further IT STAR information is available at <http://www.itstar.eu>