MAGIC MOMENTS

It's about Magic – the Star and the Magi, Santa Claus and his elves and reindeer, the tales of Brothers Grimm, … some say it's the best time of the Year!

We had some magical moments earlier this year with the 10th Anniversary of IT STAR. AICA, our Italian member society, celebrated its 50th Anniversary and other members also had occasions to rejoice.

An important event was the joint IPTS – IT STAR International conference on ICT Research and Innovation in Eastern European EU Member States, organized in Budapest on 11 November. The Winter Issue contains an article with a synthesis of the debate and some policy recommendations. Two other articles based on conference presentations are also included.

A Euro-wide phenomenon is the loss of interest in the study of technical disciplines. We thought it would be useful to look into the related issues and with this in mind invited Dr. Schagen of the HBO-I to share with our readers the Dutch experience in attracting young people to the World of ICT.

There is more in this Issue, including a MultiCulti report on some of the finest bridges over the Danube. Take the Journey!

Season's Greetings and Best Wishes for 2012,

Plamen Nedkov

IT STAR representatives

Austria/OCG-E. Mühlvenzl, **Bulgaria**/BAS-K. Boyanov, **Croatia**/CITA-M. Frkovic, **Cyprus**/CCS-P. Masouras, **Czech Rep.**/CSKI-J. Stuller, **Greece**/GCS-S. Katsikas, **Hungary**/NJSZT-B. Domolki, **Italy**/AICA-G. Occhini, **Lithuania**/LIKS-E. Telešius, **Macedonia**/MASIT-P. Indovski, **Poland**/PIPS-M. Holynski, **Romania**/ATIC-V. Baltac, **Serbia**/JISA-D. Dukic, **Slovakia**/SSCS-I. Privara, **Slovenia**/SSI-N. Schlamberger

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Editor

ICT Research and Innovation Challenges in Eastern European Member States of the EU

Marc Bogdanowicz and Plamen Nedkov

Marc is Principal Scientific Officer at the Institute for Prospective Technological Sciences (IPTS, JPC-EC) and is currently managing the "Information Society and Growth" research activities of the IS Unit.

Plamen is Chief Executive of IT STAR and Editor of the IT STAR Newsletter. He served as Organizer and General Chair of the IPTS - IT STAR R&D conference in Budapest.

The IPTS – IT STAR International Conference on ICT Research and Innovation Challenges in Eastern European Member States (*EEMS*) was held on 11 November 2011 in Budapest, Hungary with a mission to confront such facts as the very low ICT public and business expenditures in ICT R&D in EEMS in relation to their GDP, the hosting of rather low value added activities and other to the testimony of the stakeholders from academia, industry and policy so as to validate the observations, interpret their possible meaning and opt for actions that might favorably influence the future.

The program was based on well-known speakers in the region and internationally, who discussed such issues as ICT R&D policies, performance, financing, success stories and setbacks, competitiveness, multi-stakeholder partnership, participation in international programs and other from the perspectives of Academia, Industry and Government. In addition to the regular program, consultations and talks were organized on such topics as the European Certification for Informatics Professionals (EUCIP) and its alignment with the European e-Competence Framework (e-CF) and other activities of the CEN Workshop on ICT Skills, the EIT ICT Labs, the activities of IPTS, DG-INFSO, IT STAR and other.

Fifty-five participants from 12 countries and several international organizations attended this unique forum. The participation was representative of a wide mix of stakeholders including national and international policy makers, industry, universities and R&D institutes, professional ICT societies, experts on innovation and ICT, representatives of the media and other.

The Institute for Prospective Technological Studies (IPTS)

of the European Commission has been publishing data on ICT R&D on an annual basis since 2005 and its latest report of 2011 indicates again the weakness and possible decline of the ICT industry and its R&D in several EEMS. Therefore, the conference aimed at answering the following questions:

- What are the state and the dynamics of the ICT industry and its R&D in Eastern and Central Eastern European countries?
- What are the factors that might explain those dynamics?
- What are the potential solutions that would improve the observed dynamics, and which might be directly or indirectly influenced by national or European policies?

A worrying but expected diagnosis

The somewhat pessimistic diagnosis of the IPTS (PREDICT data) about the ECE ICT industry and its inventive capacity (R&D and Innovation) is rather shared among local experts. Several speakers described and explained the historical trajectory of this industry in their respective countries leading to the current weak situation. National characteristics confirmed also some differentiation among countries, in particular for the expected "least worrying" cases of Poland, Hungary, Czech Republic, etc.

Still, it was underlined that such diagnosis, and the traditional statistics used to analyze such situations usually miss various aspects and developments worth mentioning for a deeper analysis: the existence of sufficient S&T infrastructures and plans for their further development, the often positive legacies of the educational system, the dynamic patterns of open innovation (such as urban labs) as well as the inventive activities in smaller companies, kept invisible in the current data gathering[1].

Still, the ICT industry calls for reinventing itself in EEMS. Such situation might favor a useful "creative destruction", under conditions that the necessary competences for such process are not dried out – a pessimistic diagnosis shared by some of the experts.

Usual suspects

Some traditional debates occurred, simply underlining the still existing divergent views about the roles of public and private research, fundamental and applied research, knowledge triangle and business environments, national and European bureaucratic procedures, etc.

More importantly, the clearly differentiated worlds and vocabularies referring to R&D versus Innovation indicated that those two activities, while often associated, seem to develop on rather different grounds, at different speeds, with different objectives, in different contexts.

Open issues

Probably the four main disputable issues that were most illustrated and debated are the following:

- How to address the issue of globalization and its consequences: the rising competition with BRIC countries, the rising demand in Asia, the relocation of production, R&D centers and even clusters, the European responses such as the ICT KIC of the EIT, the ERA and FP cross-border participation efforts, the shape and future of the European "third ICT innovative wave" such as in the automotive activity with its global supply chain. The urgent importance of looking beyond the borders of one's own country and industrial/institutional activity was underlined by many examples.

- The current dynamics of Innovation are not anymore those of the past. The contrast between past institutional science and technology settings, including those of European R&D funding, and the experience of innovative practitioners in Europe or in the USA show that such differentiated patterns call for differentiated responses, both in every day's practice (in companies, universities, financial institutions) but also in policy making (R&D funding, review of business environment regulations, etc.).

- The availability of specialized competences and skills remains a major issue and is seen as to worsen in the future being the current educational demand (for Humanities) but also the demographic and outward migration trends. Beyond this educational problem, strong calls have been made for training people in new roles and competences, such as those of IT integrators that would cumulate strong IT and organizational management capacities. Also, with the evolution of scientific work, multidisciplinary and multilingual competences are seen as a must.

- The need of a stronger dialogue between academia, industry and government in formulating strategies, policies and national action plans for socio-economic development within a European and Global setting. Several speakers emphasized that the process of priority setting often lacks the input and the vision of all stakeholders in the field.

In these debates – Globalization, Innovation, Competences, Strategies – the issues addressed when debating ICT industries' future and that of R&D, were organized further around 2 axes:

- What is specific to Eastern and Central Eastern European contexts (the historical legacy), and what are common problems shared by all European countries and beyond?

- What enters specifically the activities of R&D, defined as the scientific search for new knowledge, and those of Innovation, rather seen as the activities aiming at capturing the market value of (a set of) inventions.

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1 It was commented that the current taxation schemes rather favor R&D declaration – and return capture - by large companies only. Along similar lines, the patenting system was criticized as untrustworthy in some countries together with its analysis.

Factors contributing to the dynamics

From the debates, some focus points emerged as those elements which come with their positive and negative contributions to the dynamics of the industry, its R&D and the Innovation capacity in EEMS:

- The role of the so-called bottom-up initiatives of individuals, micro-companies and SMEs in an open innovation context
- The role of multinational companies, and hence all debates around the attractiveness for such companies and reciprocally about the economic and knowledge spillovers they can generate, and the conditions thereof
- The role of educational institutions in fostering new competences but also new collaborative behaviors outside the narrow limits of their institutions
- The role of national research centers in generating new knowledge
- Last but not least, the role of the European Union and national/regional governments and organizations in addressing adequately the above, or any other facet of the issues related to the industry.

In all of the above, it also appears to be the responsibility of those individuals representing the EEMS to position correctly the problems and solutions at international and national levels as to actively support the development of the industry and its inventive activities in the East of Europe. And this, it has been underlined, needs to be led by country representatives with new and adequate knowledge and attitudes concerning the current evolution of the global context of the ICT industry and of Science and Technology.

Policy recommendations

The debate leads hence to the following general policy recommendations, the first four being rather specifically designed for the EEMS:

- It is highly advisable to improve the share of experts of EEMS in the advisory, evaluation and other bodies that participate directly or indirectly to the assessment, vision building and instrumental management of ICT-related policies at European and/or multilateral levels. This recommendation refers to such bodies as ISTAG (DG INFSO Advisory group), the experts' evaluation of national and international publicly funded projects, existing or planned prospective exercises, etc. Likewise, their participation in other multilateral analysis and evaluation groups (for research, for education, for structural funds expenditures, etc) should be favored. From the conference, it also is highlighted that it is important to reach out for experts that would have an outstanding trajectory in highly innovative activities as to avoid an excessive influence of legacy contexts.
- Promoting regional consultations and projects within an EU context are recommendable, as the research and innovation challenges appear similar for most of the

EEMS, and this could play a favorable role in pooling resources and experience in areas of common interest.

- Fostering the attractiveness of EEMS at macro-regional, national and regional levels for large multinational companies, foreign or domestic, and the accompanying (foreign) direct investments, while working out, if necessary with those companies, the factors and conditions that would favor mutually beneficial spillovers at regional and national level. Such process should be thought within a global re-thinking towards trustworthy institutional settings, reliable and skilled human resources, knowledge building strategies, extended suppliers' chains, fair access to market, etc.
- Rethinking, if possible within a dialogue with the local private sector, the role and potential of private and public education institutions, mainly at post secondary level, taking, where relevant, advantage of the current bent to humanities by combining it clearly with technical skills. Also, introducing more opportunities for early mobility, access to working contexts, project-oriented multidisciplinary activities, etc. is seen as beneficiary and strongly adapted to the new context of the industry.
- Separating and probably contrasting public support activities for R&D and for Innovation by concentrating more effort on business conditions favoring fast innovative initiatives, but it is clearly stated that much can be done outside any funding framework: enhancing innovation-related networking is one possible path.

Final words

The visibility of the conference and its agenda and documents exceeded by far the actual attendance. The conference website was appreciated by many. In addition to the website, Information releases were distributed widely, articles were published and printed and the conference was introduced at the "Global ICT industry: changing landscape? - The future of European ICT R&D" conference, organized in Brussels on 19-20 October by the European Commission's Institute for Prospective Technological Studies (IPTS). The provided visibility to R&D activities in the EEMS is important. Within the respective Eastern European member states, there is a need for stable communication between academia, industry and governance concerning research and innovation, and within the European Union, a stronger information flow concerning R&D in the EEMS would be beneficial so that policy and decision makers could more proactively involve and tap into the EEMS potential in the field.

We trust the conference has contributed to this end and that the valuable connections that were made during the conference will result in stronger partnership within the Region and the European Union.

The full set of conference materials is posted at http://eems.starbus.org. ∎

ICT Research and Innovation in Slovakia

Branislav Rovan

Branislav is President of the Slovak Society for Computer Science and professor at the Department of Computer Science, Comenius University.

INTRODUCTION

The General Situation in R&D and Innovations

*I*n the distant past (in Czechoslovakia) all R&D was government funded through the Academy of Sciences, Universities and Industry Research Institutes. The Research – Development – Innovation path was institutionalized by having basic research mainly at the academy and universities, applied research mainly at the universities of technology and some industry research institutes and innovation and development mainly at the industry research institutes (even some large factories). The cooperation was financially motivated. The main problem was time, especially to take the innovation to production.

In the recent past (in Slovakia) we have witnessed disappearance of most industry research institutes. The government support for R&D has been decreasing. Some EU funding became available and Slovakia, being an associate and ascending country, could benefit from the EU policy encouraging partners from Central and Eastern Europe. Inexperience and, to some extent, lack of contacts did not allow to fully utilize the potential. The economy was in bad shape, especially after the split of Czechoslovakia, and R&D was not considered a priority. Private financing was practically nonexistent. The 'wild' privatisation did not bring 'caring owners' but rather ruthless short term profit takers. The multinationals, gradually taking over, did not find investment in research profitable and they mostly concentrated on assembly lines and sales. To the worst, the well meant effort to increase quality of R&D via scientometric criteria maneuvered the universities of technology from applied research to publications (often of questionable quality but fulfilling the formal criteria). The Research – Development – Innovation path was broken. The situation in the Czech Republic has been much better. The generous support ofbuilding up large research centers, the size of grants for projects 5-10 times bigger than in Slovakia, the ability to pay from the grants PhD students and supplementary wages for researchers resulted in build up of strong research centers and brain gain instead of brain drain.

At present the situation is still bleak. The government funding keeps decreasing and the EU funds are more difficult to reach after Slovakia became an EU member. There are some signs of private research funding increase (somewhat slowed down by the current recession). For example, ESET, the Slovak company with worldwide operation in antivirus software NOD, is beginning to seek cooperation with universities in research. HP is opening its cloud computing center in Bratislava which should again result in research needs. The Czech Republic appears more attractive as a destination for research centers of multinational companies. Besides, years of better support for research materialize in better success rate in the EU funding of research.

The Situation in R&D and Innovations in ICT

Apart from the general situation in R&D and Innovations, there are some ICT specifics.

In the distant past the whole ICT area was crippled by the government policy of declaring cybernetics (and thereby computers as its 'product') an undesirable bourgeois pseudo science. This set back the computers and components manufacturing 10-15 years back and the situation was even worse in software. This distance to the Western development was kept constant or even increasing by another bad political decision – betting on reverse engineering. The only area that was considered 'harmless' and therefore allowed to thrive was theory. The theoretical computer science in (Czecho)Slovakia managed to keep pace with the developments in the Western countries as witnessed, e.g., by the result of Szelepcsényi in 1986 which was later awarded the ACM and EATCS Gödel Prize.

In the recent past the theory area was hit by the brain drain. This was not only due to the border opening but especially due to many emerging IT companies desperate for well educated personnel. They could easily attract researchers from universities and academy institutes suffering by very low salaries. Local IT companies were mostly of the 'box shifting' kind with no interest in research. IT was well represented in the EU Framework Programs and the policy of including partners from C&E Europe helped the research teams to integrate into project consortia. Still this was not common.

At present we are witnessing shrinking of IT research teams. The brain drain continues and it is moving already to the PhD studies level with many of the best students seeking PhD and subsequently employment abroad. Some positive signs of private funding improvement mentioned above were taken from the ICT area. The EU funding is becoming more difficult to reach mainly due to the fact that many years of under-financing and brain drain decreased the competitiveness of Slovak research teams.

As a consequence of the above mentioned facts, Slovakia ranks at the bottom of all statistics related to R&D and Innovations available in EU and OECD (percent of GDP going to research funding, ...). This than correlates well with the success rate in EU project proposal funding.

MAIN INHIBITORS

In this Section we shall discuss main inhibitors of research

and innovation success, some of which are not specific for Slovakia.

Research

Research is not a priority of the government despite the fact that for decades governments have declared the importance of research and innovations. Regardless the orientation (right or left) the governments have failed to materialize their declarations and promises. Even worse, as mentioned above, the financing of R&D keeps decreasing. One can only speculate about the reasons. One possible explanation of this phenomenon is the fact, the the 'utility function' of politicians optimizes for the best result in the next elections. Investment in R&D and education is a long term investment and therefore does not fit the immediate goals of politicians. Another feasible explanation relates to the often cited problem of corruption in Slovakia and some other E-12 countries. One can much easier see opportunities for corruption in large expensive projects (buildings, roads, equipment, software for e-government, etc.) than in research and innovation projects.

Decades of low government funding resulted in decreased competitiveness of research teams. For reasons beyond understanding the government funding of research motivating joint projects by several institutions in Slovakia (thereby stimulating cooperation and creation of stronger competitive teams) initiated about ten years ago was dropped.

EU Policies make it more difficult for Slovak research teams to participate. After Slovakia became an EU member, the 'incentive' projects encouraging established teams in E-15 to take on board teams from E-12 disappeared. Moreover, the evaluation criteria are more closely looking at justification of having a particular team as part of the project consortium. Combined with the dwindling size of the Slovak research teams it made it more sensible for the EU-15 projects to reach for best individuals and hire them instead of risking the inclusion of a whole team. This hidden incentive for brain drain is made even stronger by the fact, that according to the EC rules, Slovak experts get paid better being part of a team in an EU-15 country than being part of a team in Slovakia.

Multinational IT companies keep most of their research at home for reasons one may guess but I prefer not to speculate on them. The multinationals get the largest proportion of the ICT related revenue generated in Slovakia. This means that a large part of resources that would normally be used for R&D is spent in other areas (or outside Slovakia). Fortunately we do see change in this area in some EU-12 countries (e.g., Hungary and the Czech Republic, incidentally both are countries where governments pay real attention to R&D) and there are positive signs this may also happen in Slovakia.

Local IT companies lack funds and can still live without research using tried-out technology and processes. There are some exceptions which can usually be traced to some excellent university graduates who after stabilizing small companies they established returned to their 'hobby' of thinking and looking for better solutions. So far this does not lead to financing teams of researchers and research cooperation with the universities (cooperation on development is a rare exception).

Administrative complexity of research funds (both EU and local) is discouraging participation, especially of those who already tried it. It started by the procedures in Brussels, but local grant providers were quick learners. It is becoming almost a necessity to have a professional company, knowing the 'right formulations', to assist in writing up a proposal, keeping track of and reporting on finances, etc. It is unlikely this administrative burden can be significantly reduced before the European administrations approach – everyone is automatically expected to be a criminal unless proven otherwise – could lean more towards the American – everyone is automatically expected to be trustworthy unless proven otherwise. The administrative burden and auditing exercises should be commensurate with the size of the grant.

Support structure for FP7 projects is neglected and apparently not considered important. It moved from the the Ministry of Education, Science, Research and Sport of the Slovak Republic to the Slovak Research and Development Agency and back again all since the beginning of the FP7. For example, there were already two NCPs for the Ideas Program and there has been none since January 1st of 2011.

Innovations

The pool of knowledge in IT is drying out. This is not specific to Slovakia. Breakthrough innovations need breakthrough research results. We seem to be happy with 'cosmetic' improvements at present. And here I consider constructing a processor twice as fast as the best so far among the 'cosmetic' improvements. We need qualitative change. For example, we are still living with the definition of the notion of information by Shannon which is over half a century old and which was introduced as an abstraction allowing to study problems related to the transmission of information. At present we do much more with information than just transmitting it. Do we have a theory allowing us to handle the information overflow we are experiencing? Most of the ICT areas could benefit from a breakthrough in understanding and insight.

Broken Research - Application - Innovation path. The traditional role of Universities of Technology - applied research – was replaced by publications due to the new evaluation criteria for universities. As usual, good intentions (increasing the quality) marked the path to hell. This only underlines the importance of the choice of the evaluation criteria. Traditionally universities of technology served as a bridge connecting the basic research to the needs of industry through their ability to understand both ends. Quality here was demonstrated by the ability to understand the current basic research results and their potential and at the same time the needs of the industry. They gradually moved away from understanding the needs of the industry and closer to 'publishable results'.

Most companies lack 'Innovation departments', i.e., people capable of understanding new research results and communicating 'pressing issues' back to research. It is rare to see at a research conference a person from industry understanding to some extent what is going on, communicating with the researchers and 'fishing' for useable things.

Most companies lack courage to leave the tried out path. The bigger the company the more difficult it is to change the processes used. This applies especially to software companies where it takes considerable time before the new research results make it to practical use.

CAN WE SUCCEED?

Let us Assume Ideal Conditions (via some miracle). These could include sufficient financing of research and innovations, research to innovations pyramid functioning, industry eager to change, government having real interest in research, etc. Would this mean a research and innovation heaven? Perhaps yes. The problem is that miracles normally do not happen and we would need to imitate them.

How Long Would It Take to Imitate the Miracles? It is important (and hopefully awakening) to realize that to imitate some of the miracles may take a long time even with the best effort and intentions. The *money miracle* is the easiest to carry out. Especially small countries like Slovakia can multiply the budget for research and innovation in the next budget year by slightly delaying some of the other items (e.g., delaying few kilometers of the highways). The *government miracle* is clearly easy to perform by sudden change of attitude. The *pyramid miracle* will take at least 20 years with the best efforts. To rebuild the pyramid of interconnected layers from basic research through applied research to innovations and implementation in industry will take time. It will have to start from basic and secondary schools. Besides informatics, which is of main interest to this grouping of informatics societies, it is important to bring back the emphasis on mathematics. Once compulsory part of the baccalaureate it has become just an elective and less than 15% of secondary school students take this exam. It is an alarming situation especially for the engineering faculties of the universities of technology. Incentives should provide for revival of communication between the basic and applied research teams via joint seminars and conferences. Similarly there should be communication between the applied research and industry and incentives for industry to take part in this communication. Companies receive incentives from the government to build factories and assembly lines in Slovakia. There should be incentives for cooperating in the research to innovation pyramid. The companies tend to wait for results coming on a silver plate and then they complain that what is served is not as tasty as expected. It takes time to populate the layers of the pyramid and to come up with evaluation criteria that would support its functioning. The *industry miracle* is most difficult to imagine. I can see the only thing that could make industry thirsty for change – reincarnation of quality. I do not think industry can/will go for this change by itself. Producing a lot of cheap (indeed both inexpensive and cheap) goods has become a norm. It

would take years of education to make consumers realize that it is from many points of view better to go for less but of a good quality (perhaps two generations?).

Changes at Meta Level are Needed to Make-Up for Miracles. This means, we need to reconsider the substance of research and innovation. I find three items to be of highest importance.

First we shall need to *reconsider the INTENTION of innovation*. I find 'Improving Life' more appealing than 'Helping EU Economy' or 'Increasing Profit'. While I understand the interest of companies in increasing their profits, I completely fail to understand why should governments, representing citizens, use profit of companies as 'the' criterion of success. I am convinced, that Steve Jobs' motivation for his user interfaces and gadgets was to make ICT easier to use by people and thereby usable to make their life better. The profits for Apple came in as a natural consequence.

Second, *reconsider oversimplified success CRITERIA*. Using 'Profit' as THE success criterion is convenient but treacherous. Criteria based on few simple parameters that can be checked by a person with limited experience (and often not having education in the particular field) by simply going over a form with checkboxes should raise worries. It was not accidental that old tribal societies paid extreme attention to the advice of seniors who could use experience and analogy to help the tribe avoid disasters. Imagine that there would have been a criterion saying that a tribe member is better if he kills more animals of certain kind. This would have inevitably led to overkilling and perhaps extinction of animals important for the tribe. Are we sure that the criteria we use are not leading to the extinction of research and technology?

Third, *reinvent QUALITY*. We seem to live in a 'cheap economy' era. My thirty years old refrigerator still works without interruption (well, I moved three times) to my full satisfaction. It is likely to consume a bit more energy than the new ones do. But, within the last five years we had to buy two refrigerators for my mother-in-law because it was almost as expensive to repair the first one when it broke than to buy a new one (what about the energy used to produce and to dispose off the broken refrigerator?). Cheap 'disposable' things are becoming a norm. Unfortunately, growing used to cheap goods makes us more tolerant to cheap services, cheap education, cheap ... To bring back quality will be a process taking many years. It will require educating generation(s) which have become used to cheap 'throwaway' goods and low quality services. It will also require to redefine the success criteria for economy, where it is easy to measure growth but difficult to measure increase in quality.

These (+ more) changes at the meta level should lead to better education, better understanding, and teams capable of moving from innovation as an improvement to real INNOVATION. I am strongly convinced that it is worth to embark on this road. ∎

# ICT R&D Challenges for the Western Balkans

Diana Šimić

Diana Šimić is a professor of information and communication sciences at the University of Zagreb, Faculty of Organisation and Informatics. She has held positions of assistant minister for information technology at the Ministry of Science and Technology in 2002-2004, and deputy state secretary at the Central State Administrative Office for e-Croatia in 2004-2008. Diana is a member of the eSEE Initiative working group since 2002, and its Chair since 2007.

Introduction

Since 2000 South East European countries (Figure 1) have been cooperating within the framework of the eSouthEast Europe or eSEE Initiative. The Initiative was formally established in 2002 under the umbrella of the Stability Pact by signing of the eSEE Agenda at the ministerial conference in Belgrade. Following the successful implementation of the eSEE Agenda and the Regional Cooperation Council's (RCC) succeeding of the Stability Pact, the eSEE Initiative was reaffirmed at the ministerial level by the signature of eSEE Agenda Plus [1] in Sarajevo in 2007. While the eSEE Agenda aimed at creating legal and institutional framework for the development of information society in Southeast Europe, the eSEE Agenda Plus widened the scope of activities defining a large list of ambitious objectives aiming to establish a strong regional market for electronic communication services, to create information society infrastructure in the public sector, to encourage development of rich digital content and innovative services and to promote eInclusion, eParticipation and eDemocracy.

Figure 1 *eSEE Initiative and the neighbouring countries. [2]*
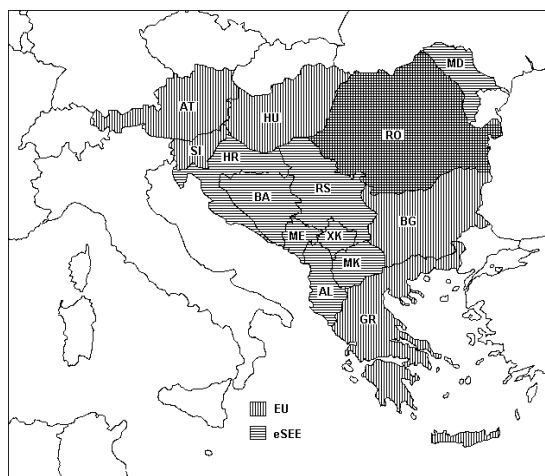
One of the priority areas of the eSEE Agenda Plus is „Innovation and Investment in ICT Research and Education". Within this priority the eSEE Initiative members have agreed to invest into computers and access to internet in schools, development and implementation of curricula for ICT skills, improve vocational training in ICTs, build national academic and research network infrastructure, provide regional interconnection, fund regional and local ICT research, monitor and track intellectual capacity in IT industry. Other priority areas also contain objectives related to ICT research like benchmarking, internet safety and data protection, interoperability, eID management, e-Business, partnership between academia and industry etc.

All eSEE Initiative members, except Moldova and Kosovo (under UNSCR 1244/99), have signed the Stability and Association Agreements with the European Union and are eligible for participation in FP7 – The Seventh Framework Programme for Research and Technological Development. Croatia has finalized the negotiations for membership, FYR Macedonia and Montenegro are candidates for accession, and Albania and Serbia have requested the EU membership. Developed ICT infrastructure, strong ICT sector and ICT research capacity are prerequisites for the development of information society and for closing the gap between Southeast Europe and the developed western countries. Even though EU partnership and eligibility for participation in EU funded research have created new opportunities for ICT research, the South East European countries are still struggling with difficulties in seizing these opportunities. RCC's Strategy and Work Programme for 2011-2013 recognizes that „...lack of adequate research and technology development in South East Europe has also shaped the structure of the industry and its outputs with regional exports being dominated by commodities" [3; p 11]. RCC Work Programme includes among other priorities to pursue „... the establishment of the Information Society by promoting implementation of the Electronic South East Europe Initiative (eSEE) Agenda Plus as defined by the Ministerial Conference in Sarajevo in October 2007." [3, p 12] and to establish „...a network of regional ICT research institutions and explore ways of building their capacities and closer linkages with the private sector" [3; Annex I].

This article provides an overview of the progress in implementation of the eSEE Agenda Plus and of country rankings in World Economic Forum Network Readiness [5-14] and Global Competitiveness reports. It discusses these results in view of priorities and challenges for regional ICT research identified through FP7 projects aiming to increase the participation of South East European countries in European ICT research.

Implementation of eSEE Agenda Plus

The eSEE Initiative secretariat, hosted by the UNDP Sarajevo since 2002 has developed an instrument for monitoring the progress in implementation of the eSEE Agenda and eSEE Agenda Plus. According to the report of September 2011 [4] Internet penetration in households in the region ranges from 31% in Bosnia and Herzegovina to 55% in Croatia. Broadband penetration is still very low in Kosovo (6,8%), but is increasing all over the region and has reached the level of 40% in Montenegro, and 37% in Macedonia (FYR). All countries have established at least the basic benchmarking of availability of eGovernment ser-

vices. Most elementary and high schools are connected to the internet and equipped with computer labs with number of pupils per computer ranging from 32 in Albania down to 1,5 in Macedonia. However, Albania, Bosnia and Herzegovina, and Kosovo still have to establish their academic and research networks. Countries do not track funding of ICT research, research professionals or intellectual capacity in IT industry, which are obligations foreseen in the eSEE Agenda Plus. On the other hand, some countries have introduced favourable tax schemes for the IT sector (Moldova and Romania), and have reduced tax rates for computer equipment (Macedonia, Montenegro and Serbia). In the majority of the countries there are also activities for stimulating business incubators, techno-parks and business start-up centres. While overall eSEE Initiative countries do show a remarkable progress, most are still missing the ambitious deadlines set in the eSEE Agenda Plus. This is reflected in countries' performance in global rankings.

Regional Network Readiness

The World Economic Forum and INSEAD have been monitoring the global network readiness since 2002. The aim of the Network readiness index (NRI) is to measure the "… degree of preparedness of a nation or community to participate in and benefit from ICT developments" [5] Figure 2 presents the relative position of eSEE and neighbouring countries in the global Network Readiness Index ranking during the last decade [5-14]. Each country line represents the proportion of countries ranking below it in the given year. Thus, Austria ranks steadily among the top 20% of the countries, and Bosnia and Herzegovina remains among the bottom 30%. The positive trend seen until 2009 [2] has continued for Macedonia and Albania, but levelled off for Montenegro, without jeopardizing its leading position in the region. Overall, with the exception of Croatia and Montenegro, the region remains firmly within the lower half of the ranking.
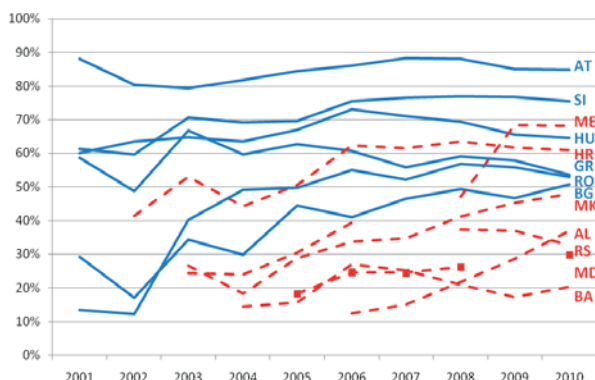
ICT Research in South East Europe

Figure 2 *World Economic Forum Network Readiness Index – Position in the ranking of the selected countries. Percentage represents proportion of all countries ranking below each country for the referent year. Solid blue lines represent EU member states, and dashed red lines eSEE Initiative members. Based on data from [5-14]*

There is a lack of statistical data on ICT research funding in the region. Generally, countries do not track ICT research
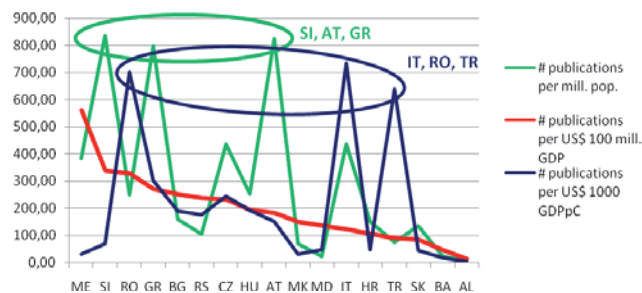

Figure 3 *Number of publications referenced in ACM's Digital Library published since 2010 with authors' affiliation in the region. Countries are compared according to number of publications relative to number of inhabitants, GDP, and GDP per capita.*

funding or human capacity. ACM Digital Library (http://dl.acm.org/) enables searching a wide range of ICT related research journals and conference proceedings that is not restricted only to ACM published resources. In order to assess the ICT research output in the region, a search for papers whose authors' institution address is in the region was performed in the ACM Digital Library. Figure 3 shows number of papers published since 2000 relative to country population, GDP and GDP per capita. When comparing number of publication per million inhabitants, Slovenia, Austria and Greece leave the other countries far below, as expected. However, looking at the number of publications relative to country GDP per capita brings Italy, Romania and Turkey to the forefront, with Czech Republic and Italy following closely. On the other hand, number of publications relative to GDP brings Montenegro to the front, with Slovenia, Romania, Greece, Bulgaria, Serbia etc ... trailing. We may argue that the Western Balkan countries actually show higher research output when controlled for the level of funding than the more developed nations. Still, lack of funding is not the only or the most important factor influencing ICT research in Western Balkans.

The European Commission has funded several projects within the FP6 and FP7 Programmes aiming to increase participation of Western Balkan scientists in the European Research Area. Some of the projects aimed to establish regional research priorities and increase awareness and capacity for participation in Framework Programmes (e.g. SCORE or WBC-INCO.NET). Others aimed more specifically at ICT research area (e.g. wins-ict.eu and ICT-WEB-PROMS). WBC-INCO.NET supports the „Steering Platform on Research for the Western Balkans", that was recognized by the RCC as „highly useful tool for exchange of ideas and experiences among the EU member states and Western Balkan countries in the areas of science and technology" [3; p 37]. ICT WEB-PROMS' final report [15] identifies the following specific barriers for participation of Western Balkans researchers in EU ICT research:

- Complex rules and mechanisms of FP7
- Difficult and cumbersome process of proposal writing
- Heavy bureaucracy and difficult project administration
- Lack of capacity for implementing precise working and project management rules
- Inability to match the co-funding requirements

- Lack of English proficiency
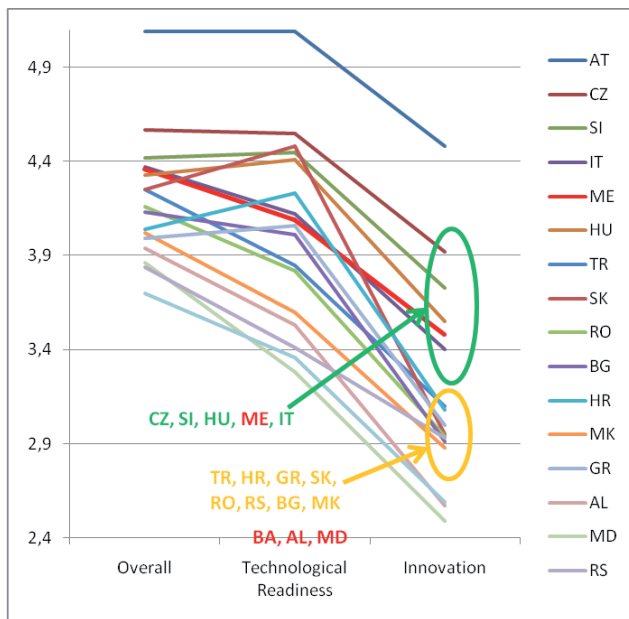- Lack of institutional strategy to foster research and innovation

Figure 4 *Country profiles regarding the global competitiveness score, and scores on the 9th (Technological Readiness) and 12th (Innovation) pillars. Based on data from [16].*

- Lack of specific priorities for national funding leading to spreading of the scarce resources
- Weak research orientation in the IT industry
- Lack of cooperation between industry and academia

Furthermore, EU researchers are unwilling to accept Western Balkans institutions as partners, and it is even difficult to mobilize the Western Balkan Diaspora to network with local stakeholders.

SCORE and wins-ict.eu projects have initiated regional discussions on ICT research priorities. They have found a stable consensus on regional ICT research priorities:

- ICTs for Enterprises and e-Business
- ICTs for Learning and e-Learning
- ICTs for Government and e-Government
- Software Engineering
- Knowledge Technologies
- Digital Content and Digital Libraries

These priorities are reasonably well aligned with the EU ICT research priorities, and do not represent additional barrier to participation in European Research Area.

Regional Competitiveness

The Global Competitiveness Report prepared annually by the World Economic Forum recognizes the importance of ICT infrastructure, innovation and research for the national competitiveness. ICT infrastructure is among the factors defining the 9th pillar (Technological Readiness) and research and innovation capacity contribute to the 12th pillar (Innovation).

Figure 4 presents regional country profiles according to the global competitiveness index and the two component pillars. Austria obviously stands apart from the rest of the region. While global competitiveness score does not generate any distinctive clustering among the countries, the Innovation component shows a clear clustering. Montenegro joins the higher scoring EU member states Czech Republic, Slovenia, Hungary and Italy. Turkey, Croatia, Serbia and FYR Macedonia cluster with Greece, Slovakia, Romania and Bulgaria. Bosnia and Herzegovina, Albania and Moldova form the last, distinct, low scoring cluster. The Technological Readiness also shows distinct clusters, with Slovakia in the upper, and Italy and Montenegro in the middle cluster. Serbia and FYR Macedonia remain in the bottom cluster for this component.

Conclusion

South East European countries are slowly catching up with "new" EU member states, and even some "old" ones in Innovation capacity and Technological Readiness. Montenegro shows remarkable progress in all areas, while Macedonia and Albania show a steady positive trend in network readiness over the last four years. The implementation of the eSEE Agenda Plus and RCC regional strategy, as well as projects supported by the EU through FP7 and IPA programmes have contributed to speeding up this process.

Still, there is a need for continuous actions at all levels. At the EU level, there is a need for continuing support through existing and new projects funded under FP7 and IPA, and expected simplification of instruments and rules under the new EU research programme [17]. At the regional level, there is a need to continue building harmonized regional information society infrastructure through the RCC and eSEE Initiative activities on developing, implementing and monitoring regional information society policy. At the national level there is a need to increase ICT research funding and establish co-funding schemes for supporting participation in EU and other internationally funded research projects, to develop more focused and EU and regionally aligned research policies, and to foster networking among research institutions and with the ICT sector. At the level of research institutions, ICT sector, and individual researchers there is a need to build competences for project management (including English language fluency) and increase networking with potential research partners.

The processes of change have been initiated in the region, and results are slowly showing. The speed of progress varies among the countries and over time, but the trend is positive. The EU perspective and regional cooperation have contributed significantly to these processes, and remain important driving forces of this change.

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The ICT-Mindsets Model – Attracting Young People to the World of ICT

Jan Dirk Schagen

Jan Dirk was Head of computer science, The Hague University of Applied Science, for the period 2001 – 2009. He is Research coordinator, Academy of Computer Science & Media, since 2009. He is a Board member of HBO-I. The HBO-I foundation is a cooperation of ICT programs within Higher Professional Education in the Netherlands (formerly known as "HBO-I platform").

In the Netherlands, we are faced with a declining number of ICT students in both higher vocational training and university. For many young people, nerds doing boring, monotonous work occupy the world of ICT. In order to attract more students to choose ICT, groups of young people must be addressed who might not normally choose a study in ICT. If we want to inspire more young people to choose ICT careers, we need to know what drives them. This question was the basis for the development of the ICT-Mindsets. Young people are as widely diverse as everyone else, the ICT-Mindsets model distributes them into categories according to their various norms, values and attitudes towards the world of ICT.

The ICT-Mindsets model was developed to provide insight how to interest young people in ICT subjects. This model categorizes 14 to 18-year-olds among four groups and demonstrates that there is no one definition of '*youth*'. Each of the four types is distinctive from the others, and has a different attitude towards the world of ICT. Consequently, each needs to be approached in a specific way.

The use of ICT-Mindsets model:

- Can help teachers, program directors and school heads to make ICT subjects more attractive for pupils.
- Can help to address and attract specific groups of students
- Can be used for marketing and recruitment policies.
- Can be used in brochures, information packages, e.g. promotion in general

The current image that young people have of ICT is so obvious and functional, that fewer young people choose an education or career in this field. And that is unfortunate, because ICT within companies, organizations and everyday life is no longer just about programming and software development. The world of ICT is now also digital security, game design, twittering, augmented reality and information management within companies. Even solving social and environmental problems relies partly on the shoulders of ICT. The industry is desperate looking for versatile ICT-people for the future of the Netherlands. Therefore it is time for a positive change of image, because people associate ICT currently with being a nerd and having to spend long days behind a computer.

The ICT-Mindsets model was developed on behalf of the HBO-i foundation. The model provides insight into the different drives and motivations of young people towards their careers and ICT. By applying the model and connecting to values of young people, ICT will be more attractive to a much bigger audience of young people.

What is ICT-Mindsets?

The ICT-Mindsets is a segmentation model based on the experiences and motivations of young people between 14 to 18

years. Young people in the same mindset are very similar in their ideas about the future and their motivations and interests towards ICT. The ICT-Mindsets model divides young people based on two dimensions. The first dimension is motivation towards ICT. We distinguish young people interested in the technical operation of ICT versus youth interested in the applications and end-users of ICT. In addition, the ICT-Mindsets model distinguishes between people who like to use ICT to support or improve their daily lives versus youth willing to enrich their daily lives and for whom fun applications of ICT are important. These different dimensions define four types: Functional ICT, Creative ICT, Social ICT and Career ICT. These four types require a different approach in order to make them excited about a professional future in ICT.

Four ICT-Mindset types

• Functional ICT

The functional ICT type is often seen as the typical ICT expert. This type does not need to act in the foreground and feels most at home among young people with the same (computer) language. These young people have a talent for understanding complex codes and to see through ICT issues, in order to devise new solutions. The functional ICT expert is looking for challenges on the technical level and is intrinsically motivated, he or she built his first site probably already around their tenth year of age. These youngsters can only be excited about ICT by focusing on the practical aspects of ICT: solving problems and applying new technologies so that business continues to function properly. *The central question is: what can I improve using ICT?*

• Creative ICT

The creative ICT type is, like the functional ICT type intrinsically motivated but is also particularly interested in how you use ICT to create innovative things. The creative ICT type is engaged in the design of crazy apps. He or she invents creative applications and is looking for challenges and variety in work. These youngsters can be made enthusiastic by focusing on courses such as game or web design, create new 3D applications or devise innovative cross-media concepts. The central question is: *how can I create with ICT?*

• Social ICT

The social ICT type wants to do something useful for society and contribute to the world, but often does not know in which way. For this youngster the world of ICT (still) is bland and biased and he or she has little knowledge about the possibilities of a career in ICT. Show him or her the meaningful use of ICT: how can we use ICT to improve people's lives? A project like One Laptop Per Child, where poor children have a chance of a better life through ICT is a good example to make the social ICT type enthusiastic. Or focus on the importance of ICT in healthcare, especially in the aging society. The social ICT professional of the future may well make the link between the programmer and the end-user of ICT. The central question is: *what can I do for society using ICT?*

• Career ICT

The career ICT type is looking for a job with status and security. The one-sided negative image of these young people towards a career in ICT is remarkable. ICT is more related to a helpdesk employee rather than an ICT consultant. The career ICT type is interested in the possibilities of ICT to enrich people's lives and is looking for appreciation from others. Bill Gates and the founders of YouTube are good examples for this ICT-Mindset type. The career ICT type is very definite about a future career: good pay and opportunities to grow into a management position. The central question is: *what can I achieve using ICT?*

Application of ICT-Mindsets – For whom?

The ICT-Mindsets model is intended as a tool for education, training, ICT-companies and the ICT-sector as a whole. The model can be used for example in redefining the content and the communication of training, traineeships and the job market. How do you use the model in your information brochure for future ICT students?

Strategy formation in three steps

The ICT-Mindsets model can be used in a number of steps:

1. **Survey & Identity:** Which ICT-Mindset types do we attract now? And which ICT-Mindsets do we have within the department or organization?
2. **Way forward & desired image:** Who do we want our specific focus? Are we going to include new ICT-Mindsets or are we focusing on just one specific ICT-Mindset type?
3. **Profit:** What should we change in our current recruitment activity and communication in order to attract a new ICT-Mindsets audience?

Practical application: Do's & Don'ts

The ICT-Mindsets model is a framework to map out your audience and better understand how young people can be addressed and inspired. You can apply the model for example when organizing an open day, for the contents of a website, a lesson about ICT in a secondary school, curricula of courses in higher education, job postings, or composition of multidisciplinary teams in an organization. Go through your program of an open day and have a critical look at the examples you use and the stories you tell. Does this address the ICT-Mindsets that you really have in mind?

Young people are not happy when they are placed in categories. Do not communicate the ICT-Mindsets directly to young people like "You're a typical creative ICT type" and think about the fact that young people are often at the interface of two types.

Three examples of the application of ICT-Mindsets:

• A major international ICT company receives every year groups of young people during an open day. A sur-

vey among the visitors shows that the group of social ICT types dislikes the program. On this basis, the program is changed and more attention is paid to a friendly atmosphere. Youngsters are now speed dating, and employees talk about projects that the company does in medical care. This shows them what you can do for society and people in general with a career in ICT.

- The school for Business Information has determined that the target career ICT type still is addressed insufficiently and a decision is made to renew the brochures. Images are more focused on status, an international career and work in teams. The text focuses more on the future: what can you do with Business Information? During the lessons there is more emphasis on entrepreneurship and on the connection with interesting companies in the region. Students set up their own company as part of the curriculum.
- The HBO-i foundation changed the contents of the imago magazine for school students (www.source-magazine.nl) on the basis of the insights of ICT-Mindsets. Each edition is thoroughly checked: does the magazine provide inspiration for the four types? This leads to a varied content. Youngsters can read about appealing careers, ICT & social media, the game industry and Internet security.

More information about the model is posted in Dutch on the website of ICT-Mindsets http://www.ictmindsets.nl/ ∎

Forthcoming IT STAR Events

6th IT STAR WS on IT Security

IT STAR's 6th WS on IT Security will be hosted by the Slovak Society for Computer Science (SSCS) on Friday, 30 March 2012 in Bratislava, Slovakia.

This conference will be a one-day event and the topics to be addressed include the following areas:

- **Strategies of Information Security** [incl. information security problems, cyber-crime, national strategies, information protection, legislation, international cooperation and other]
- **Research and Education in Information Security** [incl. knowledge and skills, security experts and their training, awareness, curricula issues, key research topics and other]
- **Miscellaneous aspects of Information Security** [best practices, standardization, major projects, EU information security directives, electronic signatures and other].

Program and Organizing Committee:
P. Nedkov, G. Occhini, I. Privara, B. Rovan

Expressions of interest to participate with a contribution to the program of this conference should be sent by 15 January 2012 to:

Plamen Nedkov nedkov@utanet.at
Igor Privara igor.privara@gmail.com

Talent in Informatics

The 24th IOI will be organized from 23 to 30 September 2012 in Lombardy, Italy by the Italian Ministry of Education and AICA – the leading Italian ICT Association, in cooperation with the regional authorities of Lombardy. The competition will take place in Montichiari (Brescia) while the national teams will be accommodated in Sirmione on lake Garda.

An international conference on Young Talent in Informatics will be held in conjunction with the competition on 26 September in Milan, in cooperation with IT STAR – the regional ICT Association in Central, Eastern and Southern Europe, whose members are leading national informatics societies, actively involved in the preparations of the national teams for IOI competitions.

The 24th IOI will be held 25 years after UNESCO's endorsement of the original proposal and this is an excellent occasion to underline UNESCO's role and activities in this field. With this in mind, the organizers have requested the official UNESCO patronage for IOI 2012 and the conference.

7th IT STAR WS eBusiness II

Following the successful organization of the first IT STAR conference on eBusiness on 12 November 2011 in Zagreb, Croatia (see Vol. 8, no.4, Winter 2010/11 of the NL) IT STAR and AICA will organize the second edition of this conference in Italy in 2013. ∎
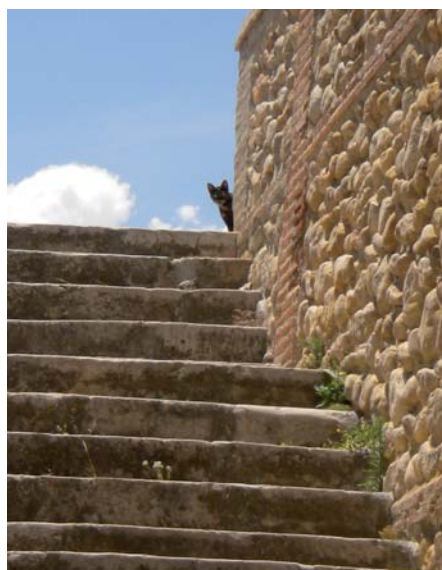
Multiculti

Bridges of Budapest

Dorothy Hayden

Budapest is such a marvelous place that I would do it injustice if I tried to describe it in one page. Instead, I chose to take you for a stroll from the Danubius Hotel Flamenco, where the recent IPTS – IT STAR conference was held, to the city center. There, we will cross a few times the Danube on some of the nicest bridges over the river.

We cross the small park in front of the hotel and turn left on Bartok Bela Street. It is a sophisticated neighborhood and as we continue we pass along the Hadik club-restaurant at no. 36, famed as an intellectual hangout. After 15 minutes we reach the Sabadsag bridge and the legendary Hotel Gellert, located here. A visit to Gellert's spa center is a unique experience.

Sabadsag Bridge

Across the newly renovated Sabadsag Bridge is the landmark Central Market Hall, which offers a delightful experience for the senses. Paprika, goose liver and Pick sausages are some of the Hungarian specialties on display. Many celebrities have left their mark here – in one of the stalls one could see a photo of Margaret Thatcher with the proud owner.

Central Market Hall
Just opposite the Market Hall starts the fashionable Vaci Street, which is a tourist trap with its fancy boutiques, restaurants and bars. We continue walking along Vaci until we reach the famous café Gerbeaud on Vorosmarty square – "A sweet place in the heart of Budapest, pampering sweets-lovers since 1858", as its promotion goes**!**

After coffee and a pear-caramel-hazelnut slice (yummy!) we push forward to Szechenyi Square, where the imposing headquarters of the Hungarian Academy of Sciences are located, and cross the river on the Szechenyi "Chain" Bridge. Some great sites are on display from here, including the Fishermen's Bastion, the steeples of St. Matthias church, the Margit Bridge, the Parliament, …

Chain Bridge

Parliament and Margit Bridge

On the Buda side of the Danube we head back towards the Elizabeth Bridge – an interesting fact is that the M-3, the first Hungarian electronic digital computer, was used in the construction of this beautiful bridge [*see article by Gyozo Kovacs in the Autumn 2008 issue, Vol.6 No. 3 of this Newsletter*].

Elizabeth Bridge

We cross again, and continue along Belgrad promenade until the Central Market Hall, where we catch a tram back to the hotel.

Et voila, we are there and I hope you enjoyed the virtual tour!

Type of organization

Regional non-governmental and non-profit professional association in the ICT field.

Date and place of establishment

18 April **2001**, Portoroz, Slovenia

Membership

Countries represented (*see next page for societies*), year of accession, representatives

- Austria (2001) V. Risak, G. Kotsis, E. Mühlvenzl
- Bulgaria (2003) K. Boyanov
- Croatia (2002) M. Frkovic, M. Glasenhart
- Cyprus (2009) P. Masouras
- Czech Republic (2001) O. Stepankova, J. Stuller
- Greece (2003) S. Katsikas
- Hungary (2001) B. Domolki
- Italy (2001) G. Occhini
- Lithuania (2003) E. Telesius
- Macedonia (2003) P. Indovski
- Poland (2007) M. Holynski
- Romania (2003) V. Baltac
- Serbia (2003) G. Dukic
- Slovakia (2001) I. Privara, B. Rovan
- Slovenia (2001) N. Schlamberger

Statutes

IT STAR Charter http://www.starbus.org/download/charter.pdf adopted on 23 October 2004 by the IT STAR Business Meeting in Prague, the Czech Republic.

Mission

"To be the leading regional information and communi-cation technology organization in Central, Eastern and Southern Europe which promotes, assists and increases the activities of its members and encourages and pro-motes regional and international cooperation for the benefit of its constituency, the region and the interna-tional ICT community."

Governance

IT STAR is governed according to the letter of its Charter by the Business Meeting of MS representatives:

2011	Portoroz, **Slovenia** (April)	
2010	Zagreb, **Croatia** (November)	
2009	Rome, **Italy** (November)	
2008	Godollo, **Hungary** (November)	
2007	Genzano di Roma, **Italy** (May)	
	Timisoara, **Romania** (October)	
2006	Ljubljana, **Slovenia** (May)	
	Bratislava, **Slovakia** (November)	
2005	Herceg Novi, **Serbia & Montenegro** (June)	
	Vienna, **Austria** (November)	
2004	Chioggia, **Italy** (May)	
	Prague, **the Czech Republic** (October)	
2003	Opatija, **Croatia** (June)	
	Budapest, **Hungary** (October)	
2002	Portoroz, **Slovenia** (April)	
	Bratislava, **Slovakia** (November)	
2001	Portoroz, **Slovenia** (April)	
	Como, **Italy** (September)	

Coordinators

2010 –	Igor Privara
2006 – 2010	Giulio Occhini
2003 – 2006	Niko Schlamberger
2001 – 2003	Plamen Nedkov (currently Chief Executive)

Major Activities

- IPTS - IT STAR Conference on R&D in EEMS - http://eems.starbus.org
- 5th IT STAR WS and publication on Electronic Business - http://starbus.org/ws5/ws5.htm
- 4th IT STAR WS and publication on Skills Education and Certification - http://starbus.org/ws4/ws4.htm
- 3rd IT STAR WS and publication on National Information Society Experiences – NISE 08 http://www.starbus.org/ws3/ws3.htm
- 2nd IT STAR WS and publication on Universities and the ICT Industry
- http://www.starbus.org/r_d_ws2/r_d_ws2.htm
- 1st IT STAR WS and publication on R&D in ICT http://www.starbus.org/r_d_ws1/r_d_ws1.htm
- IT Professional Pool Database (in progress)
- Workshop and publication on National Experiences related to the EU's 5th and 6th FP http://www.starbus.org/download/supplement.pdf
- Joint IT STAR – FISTERA Workshop on ICT and the Eastern European Dimension http://fistera.jrc.es/pages/roadshows/prague%2004/FINAL%20REPOR-Trevised.pdf
- Support to Member Society initiatives and events

Periodicals

The IT STAR Newsletter (nl.starbus.org) published quarterly.

Web-site

www.itstar.eu   ∎

IT STAR Member Societies

Austrian Computer Society – OCG Dampfschiffstrasse 4, 8. – 9. floor, A-1030 VIENNA, Austria Tel. +43 1 512 0235 Fax +43 1 512 02359 e-mail: ocg@ocg.at www.ocg.at	**Bulgarian Academy of Sciences – BAS** Institute for Parallel Processing Acad.G.Bonchev str.Bl.25A SOFIA 1113, Bulgaria Tel +359 2 8708494 Fax +359 2 8707273 e-mail: boyanov@acad.bg www.bas.bg
Croatian IT Association– CITA Ilica 191 E/II, 10000 ZAGREB, Croatia Tel. +385 1 2222 722 Fax +385 1 2222 723 e-mail: hiz@hiz.hr www.hiz.hr	**The Cyprus Computer Society – CCS** P.O.Box 27038 1641 NICOSIA, Cyprus Tel. +357 22460680 Fax +357 22767349 e-mail: info@ccs.org.cy www.ccs.org.cy
Czech Society for Cybernetics and Informatics – CSKI Pod vodarenskou vezi 2, CZ-182 07 PRAGUE 8 – Liben Czech Republic Tel. +420 266 053 901 Fax +420 286 585 789 e-mail: cski@utia.cas.cz www.cski.cz	**Greek Computer Society – GCS** Thessaloniki & Chandri 1, Moshato GR-18346 ATHENS, Greece Tel. +30 210 480 2886 Fax +30 210 480 2889 e-mail: epy@epy.gr www.epy.gr
John v. Neumann Computer Society – NJSZT P.O. Box 210, Bathori u. 16 H-1364 BUDAPEST, Hungary Tel.+36 1 472 2730 Fax +36 1 472 2739 e-mail: titkarsag@njszt.hu www.njszt.hu	**Associazione Italiana per l' Informatica ed il Calcolo Automatico – AICA** Piazzale R. Morandi, 2 I-20121 MILAN, Italy Tel. +39 02 760 14082 Fax +39 02 760 15717 e-mail: g.occhini@aicanet.it www.aicanet.it
Lithuanian Computer Society – LIKS Geležinio Vilko g. 12-113 LT-01112 VILNIUS, Lithuania Tel. +370 2 62 05 36 e-mail: liks@liks.lt www.liks.lt	**Macedonian Association for Information Technology – MASIT** Dimitrie Cupovski 13 1000 SKOPJE, Macedonia e-mail: indovski.p@gord.com.mk www.masit.org.mk
Polish Information Processing Society ul. Puławska 39/4 02-508 WARSZAWA, Poland Tel./Fax +48 22 838 47 05 e-mail: marek.holynski@gmail.com www.pti.org.pl	**Asociatia pentru Tehnologia Informatiei si Comunicatii – ATIC** Calea Floreasca Nr. 167, Sectorul 1 014459 BUCAREST, Romania Tel +402 1 233 1846 Fax +402 1 233 1877 e-mail: info@atic.org.ro www.atic.org.ro
JISA Union of ICT Societies Zmaj Jovina 4 11000 BELGRADE, Serbia Tel.+ 381 11 2620374, 2632996Fax + 381 11 2626576 e- mail: dukic@jisa.rs www.jisa.rs	**Slovak Society for Computer Science – SSCS** MFF UK, Mlynska dolina SK-842 48 BRATISLAVA, Slovak Rep. Tel. +421 2 65426635 Fax +421 2 65427041 e-mail: SSCS@dcs.fmph.uniba.sk www.informatika.sk
Slovenian Society INFORMATIKA – SSI Vozarski pot 12 SLO-1000 LJUBLJANA, Slovenia Tel. +386 123 40836 Fax +386 123 40860 e-mail: info@drustvo-informatika.si www.drustvo-informatika.si	IT STAR