Newsletter - Calibrated for Creative Communications

Vol. 4, no. 3, Autumn 2006

From the Editor

It's autumn again and we are happy to present our fall 2006 issue.

The Slovak Society for Computer Science (SSCS) will soon play host to the 1st IT STAR Workshop on R&D in ICT, a milestone event in the Association's program, and we have included an introduction by the SSCS President of the fine activities his society performs in Slovakia. There's a follow-up article on the role of ICT in Asian growth and the implications for Europe (the first was published in the Spring 2006 issue) with further findings of the research team at the Institute for Prospective Technological Studies in Seville. The NL brings to the limelight SEFBIS of Hungary as narrated by its Chairperson and takes you further afield to Argentina for a review of ICDL activities there as presented by the resourceful president of ICDL-Argentina. Back to Europe in the late 1950-ties, you will find out how Datatron 205 came to Vienna and the teething problems in getting that machine started. Then, we head on to the future with material on the mobile phone in education and algorithmic research for the 21st Century.

The names of the authors of these articles are well-recognized by the international ICT community and the issues raised transcend the CESE boundaries, which makes this newspaper truly international.

Take the Journey,

Plamen Nedkov ■

IT STAR representatives:
Austria/OCG - V. Risak, **Bulgaria**/BAS - K. Boyanov, **Croatia**/CITS - M. Frkovic, **Czech Rep.**/CSKI - J. Stuller, **Greece**/GCS - S. Katsikas, **Hungary**/NJSZT – B. Domolki, **Italy**/AICA – G. Occhini, **Lithuania**/LIKS - E. Telesius, **Macedonia**/MASIT - P. Indovski, **Romania**/ATIC – V. Baltac, **Serbia & Montenegro**/JISA – G. Dukic, **Slovakia**/SSCS- I. Privara, **Slovenia**/SSI - N. Schlamberger.

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Organization

SSCS will host IT STAR for the Association's 1st Workshop on R&D and Business meeting and the SSCS President kindly contributed the following article to present IT STAR's Slovakian member society.

Introducing the Slovak Society for Computer Science

by Prof. Branislav Rovan, President of SSCS

The Slovak Society for Computer Science (SSCS) is a professional society whose mission is to foster the advance in informatics, information technologies and their applications in Slovakia. It was established after the split of Czechoslovakia in 1993, based on the Slovak branch of the Czech and Slovak Society for Computer Science. SSCS represents the Slovak informatics community in IFIP, CEPIS and IT STAR.

Individual members of SSCS are computer professionals from both academia and industry. Institutional members include governmental institutions, educational institutions as well as IT companies. The 9 members of its Executive Committee coordinate the activities of the SSCS. Most of the SSCS activities come from its special interest groups.

Over the years the SSCS gained recognition enabling it to present the expertise and opinions of professionals and thereby influence the governmental policies in the ICT area. It played a vital role in the design of the Information Society Strategy for Slovakia. Later it provided a platform, a society taskforce, which prepared an act on electronic signature that was successfully adopted by the Parliament in 2002. More recently SSCS was in contact with the Slovak standardization officials to whom it explained and pointed out deficiencies and consequences of the 'software patents' legislation discussed at the EU level. Further activities concern norms and terminology in the ICT area. The progress in the e-government development in Slovakia is biannually presented and discussed at the INFOSEM conference co-organized by the SSCS. In 2006 it will be held on October 24-26 in Piestany.

The most visible contribution of SSCS to the development of information society in Slovakia is the introduction of ECDL. Motivating people to learn enough about the use of computers and basic application software to be able to pass internationally recognized stan-

EDITORIAL POLICY

This Newsletter aims to maintain a world-class standard in providing timely, accurate and interesting material on ICT and Information Society activities from the perspectives of Central, Eastern and Southern Europe (CESE) within a global context. It strives to facilitate the information and communication flow within the region and internationally by supporting a recognized platform and networking media and thus promoting and improving the visibility and activities of the IT STAR Association.

The entities and stakeholders whose interests this newspaper is addressing are

- IT STAR's 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 can be negotiated.

The newsletter is circulated to the 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. ■

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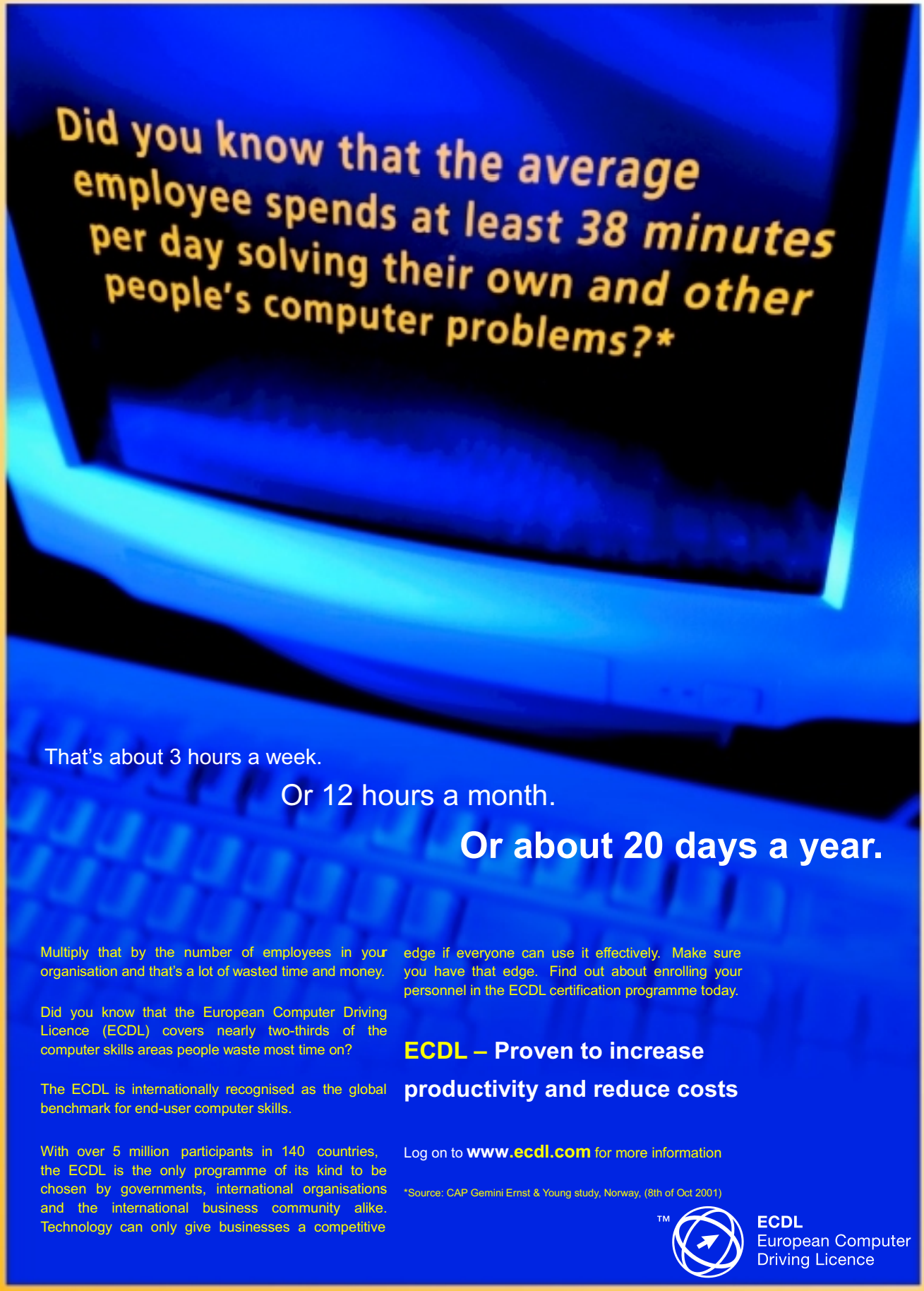

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dardized tests helps to increase the general level of computer literacy. The program started in 2004. By mid 2006 over 50 test centers were accredited. Out of over nine thousand participants almost two thousand already received the certificate. Many government institutions are using ECDL as a benchmark for assessing computer skills of their employees and effectiveness of the training courses. A number of secondary schools are providing preparatory courses for their students so that they can pass the tests and obtain the ECDL certificate.

SSCS is responsible for the Slovak Olympiad in Informatics, a competition for secondary school students organized in cooperation with the Ministry of Education. It is organized in all regions of Slovakia and the top students take part in the International Olympiad in Informatics. Slovak students usually rank among the best in the world. SSCS supports also other competitions for students and children. Scholarships to support participation of university students and young professionals at conferences are also awarded by SSCS each year.

SSCS organizes international conferences. Together with the Czech Society for Computer Science it organizes SOFSEM (every third year in Slovakia) – a high standard conference bringing together participants from academia and industry. It is usually organized in cooperation with a university or research institute and supported by IT companies (www.sofsem.sk). SOFSEM 2007 will be held in Harachov, Czech Republic on January 20 - 26, 2007. Its unique format attracted almost 300 submissions. The 34th SOFSEM 2008 will be held in Slovakia again. SSCS organizes every three years MFCS - one of the top European conferences in theoretical computer science (www.mfcs.sk) and the first annual computer graphics conference in Central Europe SCCG (www.sccg.sk). The 31st MFCS 2005 was held in Stara Lesna in High Tatras, Slovakia in August. It attracted 174 submissions from 25 countries out of which a program committee accepted 62 for presentation. Numerous other international conferences and workshops traveling to different countries of the world were organized by SSCS and some are planned for the future. On a more applied side SSCS co-organizes an annual conference DATAKON that is held in Czech and Slovak languages and attracts a large community of participants from industry and academia in the area of information systems.

SSCS is serving the IT scientific community also by co-publishing the journal Computing and Informatics (www.cai.sk). The journal was established in 1982 and the international editorial board keeps high standard of the papers published. Submissions to this journal come from all parts of the world. Original research papers from IT STAR countries are especially encouraged.

SSCS organized IFIP and IT STAR events in the past. It is honored to welcome the participants of the 1st IT STAR Workshop on R&D in Information and Communication Technology on November 11, 2006 in Bratislava. ■

1st IT STAR Workshop on R&D in Information and Communication Technology November 11, 2006, Bratislava

Preparations for the Workshop are going well with confirmed participation from Albania, Austria, Bulgaria, Czech Rep., Hungary, Italy, Lithuania, Macedonia, Poland, Romania, Serbia/Montenegro, Slovakia and Slovenia.

Country reports are scheduled to be ready in draft form by the end of September. These reports are intended to examine

- The impact of socioeconomic changes in CEE on the ICT R&D community;
- Driving forces, problems, success stories and setbacks;
- EU integration processes, current positive economic trends in the Region and their effect on R&D in ICTs;
- The role of ICT related R&D institutions in the techno-economic development of the Information Society - existing relations between the R&D establishment and government, the private sector and civil society organizations;
- What is done and what could be better done for a stronger impact of ICT R&D on societal development.

The proceedings will be published as a post-conference book. A preparatory meeting will be held in Bratislava on October 1 so as to finalize the program and local arrangements.

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Letters to the Editor

[We publish some extracts from letters to the Editor with regard to the last issue of the NL. Your comments and suggestions are most welcome. The coordinates are given on p. 1]

"A lot of information there...will take a few days to read but I am sure it is very good!"

Alison Matthews, ECDL/IE

"The Summer Issue looks impressive, congratulations! As a matter of fact, the Newsletter as a whole [is impressive]."

Corina Pascu, IPTS/RO ■

Joke of the Issue

Are we communicating?
A man spoke frantically into the phone, "My wife is pregnant and her contractions are only two minutes apart!"

"Is this her first child?" asked the Doctor.

"No!" the man shouted, "This is her husband!"

[Visit www.starbus.org/jokes for the best anecdotes on the Internet!] ■

The Advent of the Information Society

Algorithmic Research for the 21st Century

by Giorgio Ausiello and Luigi Laura

Giorgio Ausiello is professor of Computer Engineering at the University of Roma 'La Sapienza'. He is Editor in Chief of the Journal Theoretical Computer Science - Series A (Algorithms, automata, complexity and games) and President of the European Association for Theoretical Computer Science. In 1997 he was elected to the Informatics Section of 'Academia Europaea'. His research interests include optimization, approximation and on-line and dynamic algorithms.

Luigi Laura is lecturer of Algorithms and Data Structures at the same university where he received a PhD in Computer Engineering in 2003. His research interests include the design and analysis of on-line and external memory algorithms.

1. Introduction

If we look retrospectively at the research field of algorithms we notice that, until recently, it has been dominated by two main directions. On one side stood the need to solve either in an exact or, most likely, in an approximate way, computationally hard problems. For such problems the driving force to the discovery of new algorithmic techniques was the need to cope with complexity either by finding general approximation techniques or by pinpointing classes of subproblems for which the exact solution could be achieved in polynomial time. On the other side we had the need to provide very efficient algorithms for relatively simple problems that appeared very frequently in information management (think for example of sorting, searching, query answering in databases etc.).

The development of computer technologies in the last fifteen years has completely changed the picture and subverted all paradigms that we were used to. While the big open problems related to computational complexity (the P versus NP question, above all) are still dominating the background of the field, the new scenarios of information technology have made efficiency of algorithms the critical factor for most applications and has enormously increased the pressure for new algorithmic techniques.

The main reasons for such revolution are the integration of all computer systems into a unique, huge Internet based system and the globalizing power of the web. Other events that have increased the need for efficient algorithms are: i) the development of massive network systems (P2P networks, ad hoc networks, sensor networks, social networks, etc.); ii) the growing role of applications in which massive data sets have to be stored, analyzed and processed (bioinformatics, earth monitoring, etc.); iii) the need to manage dynamically evolving data (maintenance of connectivity in networks in presence of failures, on line resource management, etc.)

As a consequence it is not hard to foresee that the following research directions will play a major role, in the first decades of the 21st century.

- Coping with web information
Nowadays modern search engines have to collect, index and retrieve billions of webpages. Any of these tasks poses several challenges, which are emphasized by the dynamic nature of the web: not only it grows dramatically, but also it changes frequently, and search engines need constantly to explore new pages as well as visit again the old ones. Furthermore, due to economic interests, websites want to be ranked as high as possible, and they try to "fool" search engines that need to revise continuously their rank criteria. Last aspect to be considered, due to the huge number of queries per second in popular search engines, is the need of a large scale replicated hardware able to answer quickly to all these queries; and algorithmic techniques to guarantee fast data update and fault tolerance.

- Coping with very large data sets
The need to explore very large networks and to determine their properties requires the ability to handle graphs with hundreds of millions of vertices and billions of edges. The management of such very large graphs in secondary memory is therefore one of the big challenges for algorithmic research. At the same time, in the case of massive networks, even algorithms with low degree polynomial running times are too expensive. The study of linear or even sublinear processing times comes therefore as another main research direction. Linear time and possibly sublinear memory algorithms are also required to process very long streams of data in multimedia applications.

- Coping with dynamic and on line data
In several applications (think of routing problems, scheduling, resource allocation, investment strategies etc.) data is not static but evolve in a somewhat unpre-

dictable way and we have to maintain it in such a way that we do not have to recompute from scratch the solution of a problem at any input change but we can just rearrange it with a limited cost. At the same time we want to define strategies for problem solution that, while not being optimal, anyhow are "competitive", that is do not lose too much, with respect to an off line algorithm that, ahead of time, is aware of the whole sequence of changes in the input data.

2. Algorithms for the web: Exploring and managing huge networks.

A study made by Cyvellance in July 2000 reports that the size of the Web, at that date, was approximately 2 billion webpages. Today Google alone indexes about 10 billion, and the rate of growth is estimated around 10 million webpages per day. In such scenario web search has to develop techniques and tools to scale as the Web grows.

A search engine is made up essentially by three distinct components: i) the *crawler*, also known as spider (or robot), that is in charge of exploring the Web and collecting new and updated pages, that will be stored by the engine; ii) the *indexer*, that builds the *inverted index*, that is the main data structure used by the engine to store and retrieve web pages; 3) a *query handler*, that answers user queries by returning ordered results. It is easy to see that the very dynamic growth of the web forces, for any of these three components, a constant development of techniques and tools to handle this massive amount of data.

The *crawler*, as we said before, is a program that explores the web and collects webpages. Due to the size of the web, it is impossible that a single process could accomplish this task, and therefore the natural strategy is to use parallel crawlers. In designing a parallel crawler several issues arise: i) it is possible that two different crawlers download the same page, and this should be avoided to increase the effectiveness of the crawling; ii) crawlers need to understand how the "important" pages can be chosen; iii) crawlers need to communicate among each other to fulfill their tasks; iv) crawlers have to visit again known pages to be up to date (here the goal is to guess how often a page changes, in order to minimize the bandwidth); v) many websites have a certain number of "mirrors", and it is useless to crawl them since they do not add any information. All the above problems represent great challenges for algorithmic research in the design of crawlers.

The *indexer* of a modern search engine has to index, store and efficiently retrieve billions of webpages. The inverted index contains, for each word, a list of all the documents including it. As we have seen, Google today indexes about 10 billion pages; the average size of a page is about 7 kilobytes, considering only HTML code. An inverted index structure needs more or less the same amount of space as the original document collection, this means that Google stores more than 50 TB of data that is accessed repeatedly and change often (as the webpages). Furthermore this data must be replicated over several servers in order to answer a huge number of queries per second, and this entails fault tolerance problems. Today the main challenge is the design of a data structure able to compress the space as much as possible without penalizing the look-up time. The classical reference for search engine data structures is the original paper of Brin and Page [BP98]; an overview of algorithmic challenges in modern search engines is in [He04].

The *query handler* returns ranked documents to user queries. The *ranking* algorithm is the core of this part and from its effectiveness it depends the results of the whole search engine. We distinguish between query-dependent and query-independent ranking: in the former the documents rank varies from query to query; in the latter the actual query does not matter, the ranking is computed offline and documents including the keywords from the query are returned ordered according to their "precomputed" rank. While query-dependent ranking seems more effective, the amount of queries per second that a search engine has to face make query-independent ranking the only feasible choice. The huge difference between classical information retrieval and web information retrieval is due to the link structure of the web, and the ranking algorithms that exploit it: the first and most successful are Kleinberg's HITS [Kl98] and PageRank, introduced by Page and Brin [PB98], that is the ranking algorithm used by Google. The idea underlying these approaches is that "good" pages are pointed by "good" pages; thus, in an iterative fashion, weights propagate from page to page following the link structure until the whole process converges.

Recently, the link structure of the Web (also called the Webgraph [Kl99]) has been the subject of many studies. Despite being the sum of uncoordinated and heterogeneous works, the Webgraph exhibits a well-defined structure, characterized by several properties, including power laws distributions of in- and out-degrees [KKR+99], small world phenomena, a bow-tie shape, self-similarity. There are many motivations to study and model the static structure of the Webgraph but the future big challenge will be to understand its dynamic nature [DLM04].

Another emerging aspect to consider is the problem of "spamming" in search engines: an e-commerce site ranked higher than competitor ones is likely to sell more; therefore content providers do whatever possible to push their rank higher; this is known as "spamming a search engine". The new challenge is to develop a theoretical framework in which we can analyze and compare algorithms, and then design resilient ranking algorithms. More information can be found in [AIR05].

3. Managing massive data and data streams

Modern computers have a hierarchical memory architecture that includes cpu registers, one or more levels of cache, main memory, buffers and secondary memory;

but traditional algorithm design assumes only one level of memory. For many problems the amount of data to be processed is far too massive to fit in main memory, and therefore it must be stored in secondary memory. Consider, for example, the input to be a sample of the Webgraph; we want to perform a depth first search (dfs) on it. From a theoretical point of view it is a "solved" problem, but if we implement the usual algorithms and try to run them over massive graphs in secondary memory, it emerges that I/O performances become a bottleneck: cpu remains idle most of the time and the head of the harddisk jumps repeatedly from one place to another, trying to serve the requests. The solution is to design algorithms that are aware of the underlying memory hierarchy. The *Parallel Disk Model* (PDM) is a widely used framework proposed by Vitter and Shriver [VS94]; the performance of an algorithm is measured against four parameters: the number of items to be processed, the ones that can fit, respectively, in main memory and in one block of data transferred from disk, and the number of parallel disks. The algorithms designed to be aware of memory hierarchy are called *external-memory* algorithms. At the moment, despite several algorithms have been proposed and studied under this model, there are many open challenges.

In PDM only two levels of memory constitute the memory system; while this simplification is attractive for the sake of the analysis, it could lead to inaccurately estimate the performance of algorithms on real computing systems, which contain multilevel memory hierarchies. Algorithms for the ideal-cache machine do not have to be aware of the properties of the memory. In other words, they can be *cache-oblivious*. When a cache-oblivious algorithm is implemented in a machine with a multilevel memory hierarchy, it optimizes transfers between adjacent memory levels. Many cache-oblivious algorithms have been presented which achieve the same asymptotic costs of their PDM counterparts although in [BF03] it is shown that, in some cases, cache-oblivious algorithms cannot be as good as cache-aware ones.

Secondary memory performances improve dramatically if we read the whole data sequentially. This, together with the possibility to model data streams from networks, motivated the *Data Stream Model* proposed by Henzinger et al. [HRR98]. Here the focus is on two parameters: the number of *passes* P over the input data and the *workspace* S required in main memory. This model is simple to handle and the results can provide useful insights on the nature of the problems: for example problems that require a large amount of space in one-pass can be solved within small space in two-passes. Also in this computational model many open problems are from graph applications.

So far we considered problems where it is possible to store the input data (and see it more than once); although it may sound surprising it is not always feasible to store the input data. In many applications (meteorology, astronomic surveys; communication networks) data arrives as a stream and we can see it only once. Just to give some numerical examples today in the USA there are more than 3 billion telephone calls and 30 billion emails per day. How can we deal with such applications? A theoretical framework has been proposed by Gilbert et al. [GMM01]. More details can be found in the survey of Muthukrishnan [Mu03].

4. Solving problems on line: The cost of not knowing the future.

A problem is *on-line* whenever its solution is the result of a sequence of decisions, and each decision has to be taken with an only partial knowledge of the input. More precisely, the overall input to the problem is not completely known to the algorithm since the beginning; rather, it is presented piecewise in a sequence of steps. An *on-line algorithm* has to take each decision only on the basis of the portion of input that was revealed so far.

Typical situations in which we have to make on-line decisions occur in scheduling, where we have to assign machines to jobs which arrive over time, in computer storage allocation, such as paging, where, in case a page fault occurs, we have to decide which page to evict from main memory, in vehicle routing, where we have to route a server to serve requests efficiently, without knowing which requests will be presented in the future, in financial management, where we have to make decisions on transactions without knowing the future behavior of the market.

The standard way to assess the quality of the solution provided by an on-line algorithm is to compare the cost (or profit, in the case of a maximization problem) of the algorithm with the optimum cost (profit) that could be achieved if one knew the request sequence in advance. The ratio between the former and the latter is called *competitive ratio* and its analysis is called *competitive analysis*. Despite its intuitive character the precise meaning of the competitive ratio is not perfectly clear, although such concept is inspired by the concept of approximation ratio that is usually adopted for evaluating approximation algorithms [ACG+99]. In fact, for on-line problems, the notion of the optimum is more elusive. For example, does the optimum know the whole input instance, or is it subject to the same restrictions as the on-line algorithm? Moreover, do we have to impose a restriction on the running time of the on-line algorithm or is it allowed to run for an exponential time?

The design of algorithms for solving on-line problems has been addressed for the first time in the 60's in connection to resource management in multitasking and multiprocessing systems. Classical problems in this context are the problem of scheduling jobs on parallel processors [Gr66, Gr69], the dynamic storage allocation problem [Ul71, GGU72], and the paging problem [Be66, De68]. Another problem whose on-line version has been studied in such early times is bin-packing [Jo74]. Despite such early results, it was not until the mid 80's that the formal study of this type of problems

and the first specific analysis techniques were developed through the seminal work of Sleator and Tarjan on the list updating and the paging problems [ST85]. The extensive study of on line problems has considerably increased in the 90's when new problems have been addressed (e. g. financial problems, call admission and routing in communication networks, load balancing in computer systems [BE98, FW98]).

Recently another broad class of on line problems has been addressed, consisting of on line variants of the *traveling salesman problem (TSP)*. The TSP is a well known, extensively studied optimization problem. In the on line version of TSP we consider that the salesman does not know the locations he has to visit in advance and they are revealed over time. The aim of the salesman is to serve such requests, while remaining competitive with respect to a colleague that knows all the locations in advance and can serve them optimally.

The *on line TSP* has been introduced in [AFL+94, AFL+01]. Subsequently a large variety of vehicle routing problems have been formulated in the same on-line scenario. In the more general case (on line dial-a-ride problem [AK00, FS01]), a server with a given capacity (a taxi or a postal courier) has to serve requests, each request being a source and destination pair for the delivery of a person or a parcel, with the aim of minimizing the completion time or other objective functions.

Despite the successful results of research in recent years, from a practical point of view we may notice a limitation of the approach based on competitive analysis. In particular, several on-line heuristics behave more efficiently in practice with respect to the performance determined by competitive analysis. In fact competitive analysis is overly pessimistic because the worst case situations may arise on a small subset of instances, that seldom appear in practice. Besides real instances might follow a probability distribution that favors specific on-line heuristic, while this feature is not kept into account by competitive analysis. Paging is a problem for which such a discrepancy exists. Research efforts to overcome such limitations and to increase the practical impact of on line algorithms will be extended in the future years.

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Focusing on China Growth and Innovation Strategy

by Annaflavia Bianchi

Annaflavia is a senior research fellow at the EC DG JRC-IPTS Institute for Prospective Technological Studies (ICT Unit) in Seville. This article is a continuation of the material she contributed to the Spring 2006 issue of the IT STAR NL on the role of ICT in Asian growth and the implications for Europe.

Asia growth attracts our attention, in search for ways to face the vastness of the threat and for the potential of joint growth opportunity.

Some countries like S. Korea show a determined path toward the knowledge economy, with remarkable results in terms of the diffusion of a high quality broadband infrastructure and with a clear commitment in enhancing the education level of the country (in the 2006 OECD ranking on education, S. Korea jumped to third position).

Other countries like India, still benefiting from cheaper labour cost also of quite highly qualified level, are widening their contribution to the value system by getting involved in higher value-added service activities and in generating new products related or based on the services themselves.

China shows a growing commitment towards enhancing its innovation capabilities. Recent official speeches stressed concepts such as "innovation", "sustainable development" and "a resource-saving, environment-friendly society", as well as "harmonisation". Chinese leaders are planning the future years of growth of an "innovation-based economy." The Paul Krugman's 1990s critique of East Asia's export-based economies is now top in the policy agenda in China. How to run away from the "embarrassing" situation described by the Minister of Commerce of having to export 800 million shirts to pay for a single imported aeroplane? How to increase the quantity of value out of the production activity which will stay in China? Indigenous, self-driven innovation, not depending on foreign technology, although still in co-operation with others, with the aim of both decreasing the payment of standard royalties, but primarily of increasing the Chinese value added to Chinese production. Only 1/5 of the value of products processed in China, like a DVD, stay in China. China gets money only from labour.

In order to pursue this goal, the following actions are already identified: increase and select the investment in economic activities; change Chinese institutions: from planned economy to market economy; recognise that talents need a position, a professional career, money; smooth the conditions to start a new company, in terms of administration, land, money access, especially in the main cities.

This strategy is seen as essential for enhancing the innovation of the country, and the consequent development will be good for China and also for developing countries, which will appreciate cheaper good products. The goal is to create an "innovation economy" within 15 years, through the invention of proprietary technologies and an increase in the State R&D spending, which is now 1.3% of GDP and should reach 2% in 2020.

In March 2006, China launched its Eleventh five-year plan for economic and social development for 2006-2010. Some key measures aim at helping to spread wealth and to improve the lives of 800 million rural people. China will aim for growth in gross domestic product (GDP) of about 8% this year and an average growth of around 7.5%during the next five years.
The new economic growth road chosen in China has at its centre a medium and long-term S&T strategy - the long term one is 2006-2020.

The main areas identified are the following:

1. the government should develop S&T for persons, environment, water, natural resources
2. indigenous innovation capacity should be stimulated/promoted in industry, equipment, information, etc.
3. develop biology industry to invest in and promote bio-technologies, products for health, agriculture, food.
4. develop new materials
5. develop marine technology to get to more efficient ways to extract oil from the ocean (12K km of coast)
6. education and training of talents, get the Chinese students who study abroad to come back and build companies. Talent lack is a threat to develop new technologies.

A first range of actions accompanying the general innovation aim is:

- now <1.3% of GDP in R&D. Increase the money devoted to research, to reach 2% of GDP in 2020
- lower the taxes for enterprises which invest in R&D
- government will encourage risk investment, to develop and support ideas on technology. Young people can get risk investment from government or banks.

- encourage areas of investment in research. In the existing 53 high-tech national parks, and in the more than 100 ones at provincial level to promote quality of the research and to attract new high-tech enterprises in the existing parks
- strengthen international co-operation, develop big projects like e.g. Galileo. A project for example could build on the 3000 year-old Chinese medicine, doing research on the mechanisms and co-operating with scientists abroad.

And for the information industry, where does China wish to get in 2020?

Integrated Circuits: Now more than 80% of the ones which get into Chinese products come from abroad. China wants to develop its own microchip production.
Software: Chinese researchers can design office sw, linux is encouraged.

International standards/patents on info industry: The goal is to have in China 50% of Chinese patents. Now less than 30% are invented in China. In some sectors like information industry or machines Chinese patents are 1%.

Key technologies to focus on are: Key applications, Software technology, Mobility, Digital TV, Next Generation Networks, RFID, Industry: electronic components, machine electronic products, Security.

The Information Society is of course an issue in this framework. Priorities of the 15-year Informatisation Plan, though to be detailed and substantiated, are:

1. Economy informatisation
2. ecommerce and eGov
3. advanced culture
4. infrastructure, informatisation and social IS
5. enhancement of citizens "quality", i.e. skills and attitude towards informatisation

Which strategy for Europe in this context?
In the short term, Europe needs to prepare cooping [PN - do you mean coping?] with stronger partners and competitors in China.

- Co-operate in education: Welcome more Asian students, students imprinting
- Co-operate in building on our expertise on services, applications and content
- Increase the dynamic interactive capabilities: produce the right goods and services on time, use the window opportunity of the current rise
- Alignment and cohesion in research policy and development strategy: Consider Asian markets requirements in our R&D

In the long term, a new modus has to be defined. Europe has to reposition itself, through competition or co-operation, or probably a mix of the two: co-opetition. ■

ICDL IN ARGENTINA

by Dr. Cecilia Berdichevsky, President of ICDL-Argentina

Argentina was the third country in the Americas that received its ICDL License, preceded by Canada, which was the first and then Bermuda, and followed by the USA, Chile and Brazil; Mexico is presently negotiating its entrance. The only successful country with respect to the number of inscriptions is, for the moment, Chile, which has government support, especially from the Ministry of Education.

ICDL in Argentina is not yet a sound success, but it has taken important steps: inquiries, letters, mails, meetings with possible candidates and so on and the incipient involvement of firms such as Microsoft, Sun and other promises favorable developments in the near future.

One of the reasons that make it so hard to penetrate quickly our market is the lack of certification culture. There is no knowledge with respect to the benefits of certification. For the moment we have succeeded with private high schools where we have our most important Test Centers. Our first and immediate target is to get as many high schools as possible and then, when we reach a critical mass, we will focus on other types of markets.

Our first graduates are pupils and teachers of an old Italian school, which is related to the Italian Embassy in Argentina and to the Italian Ministry of Foreign Affairs. One of these graduates was awarded the prize "ECDL/ICDL Impact Lives 2005" and received it in the ICDL Headquarters in Buenos Aires. At this ceremony and cocktail party representatives of different ICDL Evaluation Centers and the Executive Committee of ICDL Argentina were present.

Due to many requests received lately, information was sent out to over 500 educational institutions within the country. This information gives details and also features our Scholarship Program, which provides free of charge admittance to the Certificate benefits to teaching staff of institutions of interest and pupils selected by these institutions.

The ECDL Foundation, located in Dublin, Ireland, provides the License and has the control of the activities, accomplishments of its rules, and quality of tests of the different Licensees which integrate the community and the Test Centers of each Licensee. With that aim, the

Foundation performs Audits, and also each Licensee audits its authorized Test Centers.

One of the key features of the ICDL Certificate is the uniformity of its quality and reliability. It is not enough to have quality standards, it is also necessary to control compliance.

With great satisfaction we inform that **ICDL Argentina** has successfully passed the Audit and Quality Control tests run by the **ECDL Foundation**. On November 10 and 11, 2005, two qualified officers of the Foundation visited us -- the Quality Assurance Manager, and the Business Development Advisor. This visit involved an Audit of our headquarters and revision of the performance of some of our Evaluation Centers. The visitors had the opportunity of getting acquainted with the operation examples used ICDL Argentina and were able to attend exams taken at one of our test centers and at our Pilot Center located at USUARIA, the Informatics User Society that is presently the ICDL Licensee for Argentina. The computer system we created and use, IAAS (ICDL Argentine Administration System) was very much praised and the visitors were of the opinion that the system is as good as those used in developed countries. ■

Computer History

Datatron 205 comes to Vienna

by Dr. Walter Grafendorfer

Walter served his country and the Austrian Computer Society in many capacities – he was a senior official at the Federal Ministry for Research and Innovation and Secretary General of the OCG, which he continues to represent in several international organizations.

Prof. Sagoroff, a Bulgarian immigrant and Professor at the Institute of Statistics at the Vienna University, went at the end of the fifties to the USA and promised not to come back until he has the money for a computer. At that time the universities started the Computer Age in Austria via such institutes as the one for Statistics at the Vienna University and for Numerical Mathematics at the Vienna University of Technology, then the "Technische Hochschule". The computing centers at the universities were established only at the beginning of the seventies.

The Professor came back to Austria with a contract of sale and the financing in his pocket for a Computer "Datatron 205" from Electrodata Division of Burroughs. The selling price was 160.000 US$ but with the educational allowance of 50% the final price was 80.000. The money came mainly (or completely, I do not quite remember) from the Rockefeller Foundation, to which Sagoroff had good connections.

I, at that time a student, was chosen for the maintenance of the computer and was sent in the summer of 1960 to the Burroughs Corporation in Pasadena, California for training to operate and maintain the machine. This was a big challenge and was my first stay in a non-German speaking country. I was the only European together with Americans, one Canadian and two Brazilians in a class that lasted about four weeks. Due to my good background as Radio and Telecommunication Engineer I had no problems at all.

The machine was installed in a new building in construction, which was finished two years after the installation of the computer. So many things, such as the electric power installation, had to be made provisionally. Once, the power fuses were gone and had to be replaced, but the fuses were melted together with the holding device and the electrician tried to fix the problem with a chisel and hammer: he produced a short cut and a whole district of Vienna was without electricity.

The difference in the European and American measuring units was also a problem. The computer technician from Burroughs, John, who had to install the machine could not start his work because the electric power lines for the power supply had not been completed. He had to convert first the size of the lines into the European standard. Then, an Austrian electrician connected the power supply with the power net on one side and the computer on the other side. One must know that this machine with 1.600 tubes had enormous power consumption and the frequency had to be transformed from 50 to 60 cycles/sec with a big synchronous motor and generator connected via a toothed belt. The whole power supply was controlled by a big box with many switches, relays etc. After day and night shifts, the power supply was ready to be started. John had a final look at the wiring and said, "I think he (the electrician) did a good job, let's start". All involved persons were standing around. The motor generator set began to run with loud noise and I was chosen to switch the power via a big toggle with both hands to the computer room. Immediately a "crash, bang..." was heard and other loud noises with lightening followed, smoke and bad smell coming out of the box. A wiring error caused this disaster. We looked at each other bewildered and John said "Well, that's not my job". The turn was now on me and my colleague and during some day and night shifts we replaced all the burned and exploded relays, transformers and rectifiers, which were absolutely necessary, with ordinary parts from hobby shops. Other parts such as over voltage switches etc. were installed later on (or even never). After a few days, we could start the system again and John and I finished the installation of the computer on time so that John could go back home to the US as scheduled saying to me "I would like to have you in my team".

The Datatron 205 was a first generation computer with 1600 electronic tubes as active elements. Only diodes were made of semiconductors. The main storage was a magnetic drum with a capacity of 4000 words (200 words on 20 tracks) with 44 bits each and an average access time of 8 msec. The distance between the head and the surface of the drum was only a few micrometers, which was really a challenge for the maintenance. In order to speed up the processing of a program a simple trick was used: blocks of 20 consecutive instructions were stored 10 times on additional tracks and fetched from there, making the average access time for the instructions 0,8 msec which is 10 times faster. The arithmetic operations were done in a set of registers represented by flip-flops. Two electronic tubes were necessary for 1 bit. The computer was decimal oriented with 4 bits for one decimal digit (Binary Coded Decimal –BCD) resulting in 44 bits per word (10 decimal digits plus sign). Besides the arithmetic registers Burroughs had invented a special "Index Register" for programming loops and called it proudly B-Register after Burroughs. To program an inner loop within a loop the content of the B-Register had always to be stored and recalled which was time consuming both in programming and during processing. Therefore, one day I had the idea to install a second Index-Register (4 additional racks with 8 electronic tubes each) with the corresponding instructions which was possible because the whole machine was wired manually. But I underestimated the work and spent many night hours (the block time on the machine was scheduled six weeks in advance, 24 hours per day, including holidays) at the rear of the machine (many times laying on the floor) for wiring with a simple soldering iron. Finally I did it, the users were happy and I proudly called the new Index Register G-Register after my name.

In these first generation machines neither the operating systems nor programming languages existed. There was even no assembler language. All programs had to be written in machine language (a series of machine instructions). A tape reader (1000 char/sec) was used as input device and a teletype writer and a paper tape punch as output devices. If one wanted to correct (debug) or change a program it was necessary to cut the tape and cleave in the changed part.

The electronic tubes had an average living time of about 10.000 hours. With 1.600 tubes, statistically every 6 hours a tube was gone. In order to prevent interruptions during processing, preventive maintenance was very important. I developed an effective method to test the tubes: with a hammer shaft I stroke at the shafts of the racks where the tubes were mounted. Through the vibration the electrodes of weak tubes broke which was indicated normally by a lightening inside the tube followed by a short cut signal. The Datatron 205 was in use eight years, from 1960 to 1968. As far as I know, this was the only machine of this type in Europe therefore I was the only person in Europe who could maintain and repair it. We never needed support from the producer in the US, only spare parts which were not available in Europe. This was, of course, one of the most challenging and satisfying times of my life.

The Datatron was replaced in 1998 by an IBM 360 Model 44 (for scientific applications). A part of a Datatron 205 is exhibited in the Computer History Museum in Mountain View, California. ■

PC Turns 25

In August 1981 IBM introduced the IBM 5150, then priced at USD 1,565 with a memory of 16 kilobytes and using audiocassettes to load and save data. This was the prototype of the modern PC, which brought enormous changed to business, educational and leisure practices and turned into an indispensable tool for everyday activity.

In developing the IBM 5150, IBM abandoned previous practice to depend only on IBM parts. It used a microprocessor from Intel and an operating system made by Microsoft, two companies which amassed enormous wealth as the PC came to age and as new functions were added by installing new software.

Today, many of the technologies and functions that originated on the PC have their own separate platforms and the PC is one of many tools available to the user - just consider what could be done with a mobile *phone [see following article]*. Yet, the PC remains standard with some 1 billion units currently in use. ■

The Mobile Phone in Education

by Prof. Jari Multisilta

Jari is a professor of multimedia at the Tampere University of Technology, Finland. His research group, Advanced Multimedia Center (www.tut.fi/amc), does research on learning technologies, gaming, information society, and semantic web.

Today, we have more processing power in our pocket than we had on our desktops a few years ago. Mobile phones and mobile technologies make it possible to access information almost everywhere. It seems that the promises of distance learning are finally coming true: to learn without the limitations of time and place.

The reality is however complex. Mobile phones have limited screen size and restrictions on the user interface. Most phones have only the numeric keypad and

few command keys. What is the role of a mobile phone in education?

The advantages of a mobile phone can be seen especially in supporting problem-based learning. A portable mobile learning environment makes it possible to communicate in many ways. The communication may be delivered for instance as traditional phone calls, video calls, text messages (SMS), multimedia messages (MMS), on-line chat boards or off-line message boards.

Mobile phones have been used, for example, outside classrooms as an online replacement of pen and paper. Learners can write short notes or questions as SMS and send these notes to other students, teachers or a server. The data from the server can also be viewed using a mobile phone. One of the first mobile applications for learning has been in fact trivial pursuit –type questions and answers games.

Enhanced mobile phones can be programmed using Java programming language. As a result, MIDlets are small programs that include graphical user interface and real time connections over a GSM network. MIDlet technology further extends the usage of a mobile phone. MIDlets can be interfaces to databases (learners can use information from the database online), simulations (learners can simulate for example physical phenomena), mobile dictionaries for foreign language learning, or educational games.

Many phones have a web browser and some even have a Flash player. There have also been experiments to use Moodle and similar learning environments on phones. Current mobile phone screen sizes, however, make these environments quite difficult to use.

The current strength of mobile phones in education is not on providing multimedia content to the learners. The mobile technology should be seen as a tool that provides a limited access to the learning resources available from the desktop computers. Instead, its strengths are in communication and mobility that support learning processes outside the classroom. For example, location based information services seems to be a promising new area.

There are promising future applications in the use of digital cameras and video cameras of mobile phones in learning applications. Also, the possibility to provide personalized and customized content to the learners with mobile phones needs to be studied more carefully.

Member Society News

AICA (Italy)

The 2006 AICA Annual Congress held on 21-22 September at the Scientific and Didactic Center of Cesena, a department of Bologna University (www.aicanet.it - www.aica2006.criad.unibo.it) focused on a number of topics under the general theme "Digital Technologies and Competitiveness: what Research, what Professions". ■

NJSZT (Hungary)

Scientific and Educational Forum for Business Information Systems (SEFBIS – www.gikof.hu**)**

by Prof. Maria Raffai, Chair of SEFBIS

The Scientific and Educational Forum for Business Information Systems (SEFBIS; the original Hungarian abbreviation is GIKOF) is a Forum of the John von Neumann Computer Society. It was established at the end of 2000 in order to give a controlled public forum to the NJSZT members interested in business information science (BIS), to ensure publication possibilities to experienced and young specialists and to create opportunities to business and academic/educational professionals for mutually advantageous cooperation.

Mission and Strategy
SEFBIS aims to discuss and publish the newest results achieved in the field of business information science.

Its program contains the following main topics:

- organizing research symposiums with a special section for Ph.D. students,
- preparing and publishing the SEFBIS Journal biannually with up-to-date issues in the following fields:
  - new IS/IT technologies,
  - history of information science in Hungary,
  - problems and solutions of higher education,
  - information about published books,
  - programs, meetings, symposiums, conferences.

SEFBIS organizes events, facilitates scientific research and application, publishes GIKOF and SEFBIS Journals, supports young IT talents, organizes competitions in BIS and IM and establishes and gives awards. The Executive Board (EB) consisting of one elected chair, two elected vice-chairs and at least 6 delegated representatives governs it. The representatives are from companies in the IT industry, business, administration academy, and/or higher education. The administrative work is done at the Secretariat of NJSZT. The present Chair is Maria Raffai, Professor at Szechenyi University, the Vice-Chairs are András Gábor, Head of IS Department at the Corvinus University and Peter Dobay, Professor of the Pecs Scientific University.

In the last 5 years the association organized altogether 12 Forums, 4 domestic conferences and 1 international scientific symposium, published 6 volumes of GIKOF Journal (in Hungarian) and 1 Volume of SEFBIS Journal (in English), established 2 Awards and awarded 7 professionals and Ph.D. students, established the Junior section of SEFBIS with students of Business Information Science, and formed a Consortium for Competence Based Education with members both of business and academic parties.

Conferences, International Symposia

The Board of SEFBIS is fully appreciative of the fact that the European Union is expanding and it is important to introduce a new way of thinking! After some post-socialist countries, including Hungary, joined the EU, cooperation in science and education becomes more important. The key issue in the European vision is information and information management, which constitutes also the focused theme of our conferences. We, the committed leaders of SEFBIS, take the responsibility of collaborating with professionals in realizing the Knowledge-based society and doing our best to provide Europe-wide access and interchange of information.

SEFBIS reflects the European needs and we organize conferences with the aim of discussing

- the role and impact of IS/IT in business and in society,
- the concepts, modeling techniques, methods, visualization languages supporting the IS development process,
- the solutions that satisfy customers' requirements, and ensure security and privacy
- the realization of the European Higher Education Space in the field of Business information systems (aims, programs, curricula, cooperation, new teaching materials etc.)

The idea of organizing the first international symposium in the field of BIS came up in 2004, at the national GIKOF Conference, where the participants expressed their need to bring Hungarian experts and scientists coming from other countries together. In 2005, after two successful domestic conferences, we could welcome an extended circle of professionals. This Symposium was supported by IFIP TC 8 on Information Systems. Stressing the important role of the international programs I should cite Dewald Roode, chairman of TC 8, who emphasized that only international public activity manifested by meetings, conferences and publications of a high standard can realize the international goals. It was a great honor to have foreign participants from five countries - Japan, Serbia, Holland, South Africa and Slovakia. In the hope that our International Symposium becomes known and acknowledged, we welcome all participants interested in information science and practice.

Professional Journal

The efforts to publish a professional journal in the field of business information science were formalized at the ISBIS'2005 Conference after having published already 6 volumes of the GIKOF Journal with high acknowledgment on the part of our professionals. The biannual Journal enables the authors to present their theoretical achievements and the improvements in practice as well as to discuss methods and solutions for understanding and managing information systems in the organizations. The Editorial Board accepts original works - theoretical, methodological and/or empirical contributions.

The first volume of the SEFBIS Journal was published in May 2006 with authored articles on actual topics in

- objectivity of IT Audit Assessment,
- challenges in modeling business information systems,
- solution in privacy and personal data protection at identity management domain,
- a solution for deterministic and stochastic optimal resource allocation,
- efficient ERP processes,
- decision making solutions in ICT industry,
- data warehouse supported CRM in electric energy distribution,
- eBusiness solutions with on line cases.

The volumes of the GIKOF and SEFBIS Journals are published in both traditional paper form and digitally over the Internet. Copies are distributed among libraries, research centers and universities; they are given to conference participants in order to inform the parties about the scientific and technological results and events. The Journal is an excellent possibility for the professors, assistants and researchers to let know their newest results, for the information engineers to get the business world closer to higher education and also for students to give them a chance to introduce their professional assets.

Awards

In 2004, the SEFBIS Executive Board established two Awards:

1. With the *SEFBIS Sponsoring Award* we thank and honor persons who do their best to support the activity of the Scientific and Educational Forum on Business Information Systems, who commit themselves to help the realization of the SEFBIS goals by any kind of assistance. The Sponsoring Award are given each year to a maximum of two persons.
2. With the second Award the Board stimulates Ph.D. students to publish their scientific results at conferences and also in the SEFBIS Journal. Ph.D. students need to apply for this award by sending their full paper to the Program Committee. 3 specialists understandability review every paper and presentation on the basis of scientific result, clarity, novelty, actuality and. The Award Committee evaluates the reviewers' proposals. The SEFBIS Ph.D. Award is given every year without a number limitation, but with very strict conditions.

As Epilogue

By emphasizing the importance of the SEFBIS I turn to the specialists in business information science to join our program and cooperate by discussing new ideas, solutions and research results beyond national borders and to establish new relationships and professional friends in a truly European Spirit! ■

SNAPSHOT

REGIONAL ICT ASSOCIATION IN CENTRAL, EASTERN & SOUTHERN EUROPE

Type of organization

Regional non-governmental and no-profit professional association in the ICT field.

Web-site

www.itstar.eu

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
- Bulgaria (2003) K. Boyanov
- Croatia (2002) M. Frkovic, M. Glasenhart
- 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
- Romania (2003) V. Baltac
- Serbia and Montenegro (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 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."

Governance

IT STAR is governed according to the letter of its Charter by the **Business Meeting** of MS representatives, which convenes biannually:

2006 Bratislava, **Slovakia** (November)
Ljubljana, **Slovenia** (May)

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

2003 – Niko Schlamberger
2001 – 2003 Plamen Nedkov
(IT STAR Advisor since 2003)

Major Activities

- IT Professional Pool Database (in progress)
- Establishment of an IT STAR Event Series (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 and Publication on ICT and the Eastern European Dimension http://fistera.jrc.es/pages/roadshows/prague%2004/FINAL%20REPORTrevised.pdf
- Support to Member Society initiatives and events

Periodicals

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

IT STAR Member Societies

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