This is our last issue for 2006 and we take the opportunity to thank our contributing authors, patrons and friends for their support throughout the year. The Holidays are on the threshold and our present to our readers is this issue of the Newsletter.

Season's Greetings and Best Wishes for 2007!

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

Plamen Nedkov

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Organization

The 1st Workshop on ICT in R&D and the fall business meeting in Bratislava, Slovakia (11 & 12 November) were undoubtedly the zenith of this year's IT STAR activity.

There were 25 WS participants, among them senior representatives of EC and national government institutions, presidents and officials of national computer societies, leading scientists and experts. More than a dozen presentations were delivered, among them 10 national reports, a keynote on Research in Europe and the role of the European Research Council and further material concerning EU projects and activities. The panel on Research and Innovation in Europe accented on some of the issues that were brought up in the national reports. The highlight was the adopted Workshop Declaration (*see page 4*).

All IT STAR representatives were overwhelmingly pleased with the WS results and decided to move forward with the series of events by organizing a *2nd Workshop on Higher Education and the IT Industry*. *Giulio Occhini* (AICA, IT) was chosen as the new IT STAR coordinator, *Niko Schlamberger* continues as past coordinator and *Plamen Nedkov* was chosen as the Chief Executive of IT STAR. The Statutes Committee was asked to review the Charter in order to incorporate the new elements in IT STAR's governance and to provide guidance with respect to the further strategic development of the Association. ∎

Letters to the Editor

[Here are some extracts from letters to the Editor with respect to the last issue.. Your comments and suggestions are most welcome. The coordinates are provided on p.1]

"The NL does not only meet my expectations but exceeds them greatly :-) Good work and I believe that our members will enjoy it at least as much as I did. Will you please prompt the publisher to send the 500 copies as our journal is to appear next week and I would like the NL to be attached to keep the tradition going."
Niko Schlamberger, President of SSI/ Slovenia

"Great thanks for having me included in your Autumn Issue of the IT STAR Newsletter. I have begun to expand the published article and will try to use it as a marketing tool for ICDL Argentina."
Cecilia Berdichevski, President, ICDL Argentina

"You have made a good newsletter!"
Jan Wibe, IFIP TC 3 Chair/ Norway

"I find it interesting as a means of keeping up with events on the other side of the world. So, please keep me on the list."
Peter Juliff/ Australia ∎

Did you know that the average employee spends at least 38 minutes per day solving their own and other people's computer problems?*

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*Source: CAP Gemini Ernst & Young study, Norway, (8th of Oct 2001)

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IT STAR Workshop on R&D in ICT

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

We, the participants of the 1st IT STAR Workshop on R&D in ICT in Central, Eastern and Southern Europe (**CESE**),

Appreciating the efforts of IT STAR, the regional ICT association of leading national computer societies to promote ICT related activities in the region and to organize this workshop,

Recognizing the potential of ICT and the importance of this event to develop synergies in the direction of the Information Society,

Agree to adopt the following

DECLARATION

1. The **CESE** countries share geographical, historical and cultural ancestry and have a past record of strong research communities and bilateral and multilateral R&D activities. Today's new geopolitical, economic and technological realities reveal new challenges and opportunities.

2. The countries as represented by their leading professional ICT societies in IT STAR are a mix of old, new, incoming and candidate EU members, and the European R&D programs and platforms offer principal directions and benchmarks. ICT is of paramount importance to further economic progress and the extent and quality of R&D in ICT will greatly determine the economic trends and societal transformation.

3. Many **CESE** countries currently enjoy remarkable economic growth but it is not clear to what extent this is due to new policies and regulations, or whether it is largely the bounce-back from the recession of the 1990-ies. In all cases, to ensure solid growth in future the region is well advised to stay abreast and compare its R&D investment and output to that of the leading EU countries, as well as to other world regions, in particular to South East Asia.

4. A stable R&D environment in ICT with appropriate regulations, financing and incentives has to be ensured to keep the best scientists at home and the leading national R&D institutions competitive and integrated within the European network of programs and institutes. Further care should be taken to foster the traditionally good university education and fundamental research, to encourage R&D in innovative SMEs and to ensure that multinationals dedicate support to R&D within their scope of operations. To this end, national governments and the European Commission, in partnership with industry and civil society, need to further refine policies and ensure favorable conditions.

5. IT STAR offers a regional forum of professional institutions, scientists, practitioners and experts willing to support initiatives, activities and projects related to the Information Society. It is developing the capacity to promote best practices and to establish regional teams of experts for national, regional and EU program activities. This 1st IT STAR Workshop, whose mission is to investigate the current state of the ICT related R&D environment in **CESE** and to draw conclusions and recommendations to facilitate policymaking within the Region and the European Union, is one such activity.

6. The participants of this workshop will assist in informing governments, opinion leaders, policy makers and the general public of this event and seek their support and collaboration. The workshop proceedings, its conclusions and recommendations will be available to all interested parties and we express our readiness to continue supporting similar IT STAR initiatives in future.

■

The **IT STAR Workshop** in Bratislava had the Mission to "*investigate the current state of the ICT related R&D environment in Central, Eastern and Southern Europe so as to draw conclusions and recommendations to facilitate policymaking within the Region and the European Union*".

To fulfill this mission, the program of the Workshop started with overview papers on research policies of the European Union and the special situation of new Member states and Candidate countries. This was complemented by a series of detailed national reports, outlining the R&D landscape of the countries with specific emphasis on R&D in information and communication technologies. These reports were presented in the context of the general situation of information society development and included information on important topical orientations and major players in the R&D scene. Most of the reports provided factual information and appraisals of the national R&D policies and practices.

The lively discussions following the presentations, and also during the panel on ICT Research and Innovation in Europe, showed that there is a need for further dialog between ICT specialists as there are many common problems specific to the countries of the Region. IT STAR is in a "unique" position to provide an appropriate forum for such discussions, since its member societies, being professional organizations, represent alternative opinions and views that could usefully complement the official positions of the countries.

So as to give a flavor of the debate to the readers of this newspaper, we include below short extracts and summaries from the Bratislava reports [the full reports, as well as other WS documents, are available at www.itstar.eu]. Preparations are underway to publish the Workshop proceedings with the conference documents, under special arrangement with the Austrian Computer Society.   ■

AUSTRIA
*[Presentation delivered by **Gabriele Kotsis**, President of OCG]*

On ICT R&D in Austria
The specific situation of ICT R&D in Austria can be characterized as follows: Austria is comparable concerning the status and structure of its ICT research to other countries of similar size - there are many, individually recognized "Players", i.e. academic computer science researchers and institutes with partly international profile. But as a whole, the country is not suffi-

Bratislava landmark - Narodné Divadlo

ciently recognized from an international R&D point. There are only a few areas where Austria plays an important role on the international research market. An indicator for this is Austria's successful/not successful participation in EU funding programs (FP6).

On the role of IT STAR
IT STAR is considered to be a valuable platform for supporting such cooperation from an organizational point of view, acting as a communication vehicle for establishing further contacts, but also for promoting the visibility of research results. Austria, because of its geographical position but also due to its history, can play an important integrating role in such initiatives. In fact, several R&D programs and initiatives aim at enhancing the collaboration between Austria and other central and southeastern countries.   ■

BULGARIA
*[Presentation delivered by **Kiril Boyanov**, Director, Institute for Parallel Processing, BAS]*

On financing R&D
The development of science and scientific research is not yet well financed by the State. Only 0,4 - 0,5% of the Gross National Product are dedicated to scientific research, which is extremely insufficient. The financing of universities and the Bulgarian Academy of Sciences is central (by the State). Part of the State funds for Science is given to the National Fund for Scientific Research, which operates on a project basis.

Significant financing for scientific research comes from projects of the EU framework programs. Bulgaria has participated very well in them. The total amount of the contractual financing of the Bulgarian participants in FP6 is 10 230 365,78 EUR.   ■

HUNGARY

*[Presentation delivered by **Peter Hanak**, Vice President, John v. Neumann Computer Society*

On emerging areas of ICT R&D

There are several emerging areas that will definitely be important in future, need further scientific investigation, and are expected to offer excellent business opportunities, also to Hungarian ICT companies. These important emerging areas include:

- Embedded systems, intelligent sensors and transducers,
- Ambient intelligence and its applications, especially in healthcare and transport,
- Semantic web, intelligent agents,
- IT security,
- Model-based software engineering,
- Service oriented architectures,
- Wireless and mobile communication,
- Grids and other networked computing systems.

Most of these topics are also priority areas of the 7th RTD Framework Program of the European Union, and suggested fields in planned multilateral European co-operation programs parallel to the Framework Program.

LITHUANIA

*[Presentation delivered by **Saulius Maskeliūnas**, Institute of Mathematics and Informatics]*

Socioeconomic changes in CEE have clearly positive impact on the ICT R&D community - availability of EU structural funds, participation in FP6 projects, the "push" of the Lisbon strategy - and strengthen the Lithuanian ICT R&D capacity.

Lithuania is undergoing moderate but stable growth of the main national indicators of the R&D system. Total national expenses for R&D have increased from 0.66% of GDP in 2002 to 0.76% of GDP in 2004. (Overall expenditure on R&D in 2004: 63,1 % - from governmental sources; 19,9 % - from business; 10,7 % - from foreign investments; 6 % - from higher education; 0,3 % - from private non-commercial enterprises). In

the business sector, expenses for R&D have increased from 0.11 to 0.16% of GDP respectively. New acceleration for the growth of the national R&D system is provided by the implementation program of the National Lisbon Strategy approved at the end of 2005, including a range of instruments stimulating R&D at the national level.

In June 2005, the Government approved a "Strategy of Information Society Development in Lithuania" which formulates the most important goals for ensuring the IS development. A corresponding "Program of Information Society Development in Lithuania, 2006-2008" was approved in 2006. The Lithuanian ICT R&D activities are concentrated in universities, state research institutes, leading ICT companies, and state research establishments. Lithuania's ICT businesses and the Government have initiated a program of investment in R&D seeking to achieve by 2008 that 2.5-3 % of the State budget funds are allocated to R&D projects and an enlargement of the related scope of work. ∎

MACEDONIA

*[Presentation delivered by **Ljubislav Lazarevic**, MASIT Deputy President]*

On the links between Academia and Industry

There is consensus that it is very important to improve the quality of higher education. Academia should prepare students for the demands of the ICT industry. Companies should add structured value-added internships and on the job training. The ICT industry must assist in designing the ICT curricula. ∎

POLAND

*[Presentation delivered by **Andrzej Skulimowski**, President of IPBF]*

Poland as the largest EU NMS with 38,2 M inhabitants and a huge IST market potential attracts the interests of investors and traders as well as market research companies and international institutions. With the anticipated GDP growth of 5.2% in 2006 and continuous inflow of FDI and a massive rise of exports to the EU,

Poland outperformed earlier expectations and made optimistic long-term economic development scenarios more realistic. However, the overall positive economic climate is accompanied by potentially negative processes, such as migrations of young educated people (over 1.2 M since 2004) and persisting unemployment of the passive and less educated adults. Nevertheless, the IST development has fostered rapid improvement of such attributes of the IS as the Internet access, e-government services, e-learning and Polish content growth on the web.

The paper includes a description of the current Polish IS, based on the data available until the summer of 2006. It provides a survey of new trends, processes, and phenomena focussing on aspects and activities of the Information Society in Poland, which are of special interest to IT STAR (organizational structure and funding schemes for IST-related R&D, topics of emphasis of ICT research groups and IT-related education structure). ∎

ROMANIA
*[Presentation delivered by **Vasile Baltac**, ATIC President]*

Romania is on the eve of EU accession. It is the second largest country in Central and Eastern Europe and its membership will have an important impact in South Eastern Europe. Its rate of growth of GDP is remarkable during the last 5 years, the economy showing healthy trends. IT in Romania has deep roots in the past. Now, the Romanian ICT best assets are Human Resources and a quickly developing market.

On R&D capacity
The R&D capacity of Romania has been decreasing gradually after 1989 and Romania has a very weak position compared to other EU countries in terms of innovative capacity. Both public and business R&D expenditure are low. ICT R&D are in many respects a reflection of the general R&D pattern: low public & business funding and poor collaboration of the ICT SMEs, but are distinctive in several areas: Innovation in the software field is higher than statistics show. Unfortunately, there are no powerful channels to market the innovation capacity of Romanian ICT R&D in SMEs and its potential for EU ICT R&D. On the other hand, the level of ICT education is high and many ICT multinationals have opened R&D centers in Romania, mostly in software & ICT applications. The main driving force for ICT R&D is the country's progress in developing ICT infrastructure, both public and business.

On the role of IT STAR
IT STAR is a regional cooperation of professional associations from both developed and transition countries. It could play a role in bringing together experiences and knowledge to set up a pool of Regional ICT R&D. ∎

SERBIA
*[Presentation delivered by **Zoran Puric**, JISA Vice President]*

On the main obstacle in R&D
S&T policy documents and programs are practically set up without evaluation procedures and professional expertise. As the Ministry for Science and Environmental Protection (MSEP) is the only funding authority, and program implementation and selection procedures are fully integrated in MSEP, the R&D community is fully dependent on MSEP. Therefore, the scientific community is behaving opportunistically in a sense that it is sensitive only to proposals in R&D policy, which are directed to change the present situation and the inherited position. The difficult economic situation in the country leads the R&D community to try to preserve financing from MSEP as there are no other funding sources. As all initiatives to push technology transfer and the development of commercial utilisable R&D are only in a process of being set-up, or even have been discontinued, the R&D system practically remains separated from the Economy and the Society. This constitutes the main obstacle for the R&D system in Serbia. ∎

SLOVAKIA
*[Presentation delivered by **Branislav Rovan**, SSCS President]*

On main players and key areas
The research capacity in ICT has decreased during the last 15 years, mainly due to the Brain drain. Many researchers went abroad and/or to IT companies. Only five of the Slovak universities have R&D in ICT (Comenius University and Slovak University of Technology in Bratislava, Safarik University and University

of Technology in Kosice, and University of Zilina). At the Slovak Academy of Sciences there is only one institute – Institute of Infomatics – having R&D in ICT. There are several smaller institutions with some ICT related R&D (mostly closer to the D than to the R).

Slovakia has a long history of research in theoretical computer science. In recent years, research teams in other areas were established (computer graphics, artificial intelligence, security, software engineering). The tradition of hardware design was interrupted but microelectronics and chip-design are revitalized. One can also recognize the strength in the telecommunications area and industrial informatics. Grid computing and the semantic web are also in the newly added areas of competence.

On main problems
R&D is neglected and under-financed for too many years. This led to a reduction in the number of researchers and brought many teams to critical numbers. The new instruments put in place in 2002 promised improvement but, unfortunately, were not fully implemented. In fact, the Research Programs were practically stopped in 2004 and no new projects could be opened. Many administrative changes resulted in the interruption/delay of the flow of finances to research teams. Plans of the new government to improve the situation by increasing the R&D spending to 0.8% by 2010 (including public, private and EU funding) do not give much hope. An additional problem is the lack of interest of local industry in research. Multinational companies tend to have the research done in their home countries. There is some hope, however, that with the economy on the increase, R&D funding in absolute numbers may increase.

On the role of IT STAR
The potential of IT STAR may be in facilitating cooperation and thus concentration of capacities in particular areas. This may lead to stronger teams with a better chance to succeed in solving problems and getting grants. ∎

SLOVENIA
*[Presentation delivered by **Niko Schlamberger**, SSI President]*

On strategy and major target areas of the Information Society
- Usage of ICT
- Recognition and formation of new market potential
- Creating and environment for knowledge-intense economic activities

- Creating digital culture content and preservation of cultural heritage and language
- Deployment of electronic services
- Improving access to the services of IS for all
- Reducing the digital divide by including citizens and groups with special needs ∎

European Science Policy: Challenges and Expectations

by Norbert Kroo

Prof. Kroo is Vice President of the Hungarian Academy of Sciences and member of the European Research Council

Knowledge, and first of all scientific knowledge, has a growing significance globally. The same applies to Europe. Therefore, research and development are the key to competitiveness and the creation of (high-tech) jobs. An increased research potential is needed with a large number of new research positions, proper research infrastructure and institutional system.

Europe has great traditions in science with Galileo, Kepler, Newton, Maxwell, Einstein and many others on the list, and Europe has been the cradle of modern science. After the Second World War, the center shifted to the US, while Europe remained with several weak points, even at present. There is weak cooperation along strategic priorities. Research is fragmented; there is a lack of finances for training, mobility and research infrastructure. The scientific – technological cohesion is weak, the volume of excellent research is low and there are only a small number of excellent research teams. There has been low attention on basic research on the European level.

The successive Framework Programs have tried to improve this situation with modest success. The European Research Area (ERA) concept is promising sizeable results by harmonizing national research efforts, developing proper infrastructure, supporting higher mobility of scientists and recognizing excellence in research.

The 7th Framework Program (2007-2013) contains some promising new instruments to achieve the goal to improve European competitiveness by strengthening its research base. The basic philosophy is to develop in harmony the knowledge triangle, research and technol-

ogy, education and training and innovation. There is an increased emphasis on research with higher spending, less bureaucracy, better use of existing capacities and a more efficient utilization of scientific results in products, processes and services.

The Program consists of four specific programs (cooperation, ideas, people and capacities) and nine priority-themes for cooperation (health, food, agriculture, biotechnology, ICT, nano-science and technology, new materials and technologies, energy, environment and climatic changes).

One of the new key instruments to realize the ERA concept is the Ideas Program of frontier research with a newly created European Research Council (ERC) to spearhead it. A Scientific Council leads the ERC with 22 members elected from the European scientific elite. By raising the competition for grants to a European level, it is expected that several of the European shortcomings could be mended.

The Council will promote scientific excellence in all areas of science (natural and life sciences, social sciences and humanities) by competitive funding. It will support group research but individuals with minimal bureaucracy. An early stage independent investigator scheme and an established investigator grant scheme will run in parallel with the first call for young scientists. High risk and multidisciplinary research is prioritized.

The European Research Council, created by the Union and its heads of states, is accountable to the EC and is funded mainly through the EU budget (~ 7.5 billion Euro in FP7). The Scientific Council is the autonomous decision-making body of ERC helped by 20 topical panels in selecting the best scientists and projects to be financed.

The mission of the Scientific Council is to decide on scientific strategy, monitor and control quality and performance and establish a communication strategy both for the scientific community and society at large.

It is expected that the Ideas Program will encourage and support the best talents, the best ideas in frontier research and will improve the status and visibility of the European research leaders. It will have a dynamic structural effect on the European research system, will nurture European science- based industry and stimulate investments in the knowledge-base, both from public and private sources.

In my opinion the existence of the ERC and its Ideas Program is one of the most significant steps in European science policy and, if properly run, will contribute significantly to an improved European competitiveness.

■

The Advent of the Information Society

Some Research Directions in Wireless Sensor Networking

by Augusto Casaca, Inesc-Id, Portugal

Prof. Augusto Casaca graduated in Electrical Engineering at the Instituto Superior Técnico, Lisboa, Portugal. He got his Ph.D degree in Computer Science at the University of Manchester, UK. Presently he is Full Professor at the Instituto Superior Técnico and Leader of the Research Group on "Network Architecture" at Inesc-Id, Lisboa. He was Chairman of IFIP Technical Committee 6 (Communication Systems) from 1998 to 2004 and is a Senior Member of IEEE.

The science of networking has known an explosion of activity during the last decade. Since the Internet became ubiquitous, new solutions concerning the Internet network architecture, quality of service and access methods have been developed and offered to users. Research in networking is probably more intense than ever and new directions of activity are being looked upon. One of these areas has to do with the vision of Ambient Intelligence.

The vision of Ambient Intelligence requires the deployment of new technologies and the implementation of new networking concepts. The idea of Ambient Intelligence means that a large set of devices will collect and process data from many different sources to control processes and to interact with humans. When Ambient Intelligence becomes a reality we will be in presence of the so-called "disappearing network", i.e. humans will no longer have special procedures to interact with the network but this interaction will be done naturally in an "always best connected" environment, in which the network will be invisible from the user's perspective. This concept does not evolve directly from the Internet, but all the devices that will collect the data will be organized in special networks, which will gateway to the Internet to achieve a global communication.

The key components for the implementation of Ambient Intelligence are Wireless Sensor Networks (WSN). Ambient Intelligence requires ubiquitous computing and through the wide dissemination of WSN in different environments the right capabilities for its realization will be provided. Since a number of years WSN

are being used for many different applications, but it is foreseen that a surge of deployment will occur in the coming years, which will naturally result from the solution of pending networking problems for this type of devices. Disaster relief, homeland security, precision agriculture, fire control, vehicle guidance and intelligent building are only some examples of the applications in which WSN can be used. Considering the whole potential of applications and the wide number of developments still needed for the efficient deployment and extraction of significant computing results, research in WSN technology, architectures and protocols is a substantial challenge for the years to come. [1]

In this article we will only concentrate in the research challenges directly related to wireless sensor networking, i.e. architectures and protocols. Although further developments in sensor technology, namely at the level of miniaturization and battery power, are key for the success of WSN, the sensor technology itself is out of the scope of this article.

The interaction of a WSN with its environment is represented in figure 1.

The WSN consists of a large number of nodes, which, depending on the application, can be in the order of hundreds or thousands. These nodes are the sources of information. A WSN can have also one or more sink nodes, which receive the information from the other nodes. The sink is a special type of node which allows access to the network from the outside. In the figure there is a sink connected to a gateway to interact with an external network. This external network connects to a control center, which has a human-machine interface for main interaction of the users with the WSN. In the figure a second sink is also represented, which allows a user to access information from the WSN through a reader. A reader is a portable device, e.g. a PDA or a laptop, which can connect to the sink node at any time and extract information on the fly. The number of sink nodes in a WSN should not be too high, as the increase in its number results into more complexity for the network architecture.
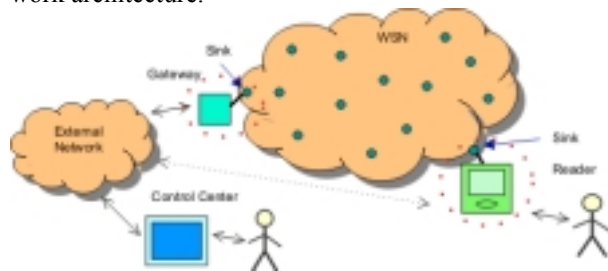

Figure 1. Interaction of a Wireless Sensor Network with its environment

The architecture of a WSN must take into consideration a set of challenges, among them the type of service provided and its quality, the tolerance to faults, the network lifetime and scalability, the programmability of the nodes and the maintainability of the network. Some of the research done for ad hoc networks is a

good basis for WSN, but we should not forget that in many aspects WSN have more complex characteristics than ad hoc networks, namely on the interaction with the environment, on scalability requirements and on energy consumption. Therefore, specific solutions are required for WSN. [2]

Having in view the specific aspects of WSN, there are several research challenges in the architectural area. Good examples of areas requiring further research are the use of in-network processing and data aggregation in the network, the conception and evaluation of protocols for the different network layers, namely the Medium Access Control (MAC), Data Link, Network and Transport layers, and the use of a data-centric approach instead of addressing individual nodes in the network. Although the complete set of research areas in WSN go well beyond these themes, in the following we will limit our analysis to them.

The sensor node capabilities are a key factor for the quality and performance of a WSN. The main capabilities of a node, which are of concern for the network architect, are related to communication, processing, storage and energy consumption. All these node aspects will be significantly improved in the coming years. However, one aspect that needs to be taken into consideration is that it consumes much more energy to transmit a bit than to process an instruction. Therefore, the attraction for in-network processing is easy to understand. Data aggregation is one of the forms of in-network processing, which is widely used in WSN. In this mechanism the data flow from the sources to a sink along a tree structure. The intermediate nodes in a tree aggregate, in some form, the data coming from upstream and it is this aggregated value that is forwarded. The appropriate definitions of the most suitable aggregation mechanisms, including the functions to be used, the formation of the tree and delay considerations on the transmission of data from the leaves to a node in the tree, are very important for the development of WSN in the near future. [3]

There are several MAC protocols proposed for WSN. These protocols are designed with the main objective of saving energy. For this purpose, collisions, overhead and listening approaches of the medium activity are important MAC aspects to optimize in order to save energy. In many situations the objective of energy saving may be traded off with the achievement of small delay and high throughput. Several MAC protocols have been proposed. Some of them focus into low duty-cycle and wake-up aspects, as it is a good policy to try to put nodes into sleep mode whenever possible with the intent of saving energy. Other MAC protocols are contention based or schedule-based. Despite the vast number of existing proposals there is not a best MAC protocol for WSN and new proposals might be expected. [4]

The data link layer has the objective of guaranteeing a reliable link between neighbor nodes in a WSN. Protocols at this layer complement MAC protocols by con-

sidering two issues not covered by MAC and that are important for the reliability of the link communication, namely error control and flow control. The right definition of the data link protocols is also concerned with energy efficiency. For instance, the mechanisms of redundancy and retransmission, which are typical of error correction, need to be optimized to save energy. The use of forward error correction and packet-size optimization might also help to save energy. Often the design of the data link layer is considered jointly with the design of the MAC and physical layers, implying a cross-layer approach for the research direction in protocol design.

The research on appropriate routing protocols is also a fundamental issue for multi-hop networks, as is the case of WSN. Different routing and forwarding mechanisms are possible depending on how the destination of a packet is identified. Unicast routing protocols have different flavors depending on how the objective of energy efficiency is addressed by the routing protocol, either on the use of the best possible path or on the use of multiple paths. There are examples of unicast protocols which use distance vector routing on top of topology control, others which maximize the time to the first node outage and, finally, others which try to maximize the number of messages that can be sent before the network runs out of energy. However, research on WSN routing protocols has the challenge of improving the performance of existing protocols and of trying to find a more unified solution. Also the techniques for broadcast and multicast operations in WSN are subject to intense research actions nowadays. Basically these techniques try to restrict the number of forwarding nodes as much as possible while guaranteeing that all the nodes (broadcast) or the addressed nodes (multicast) still receive the data.

The concept of data-centric networking is a useful alternative to be used in routing for WSN. The focus is on data instead of addressing individual nodes. It is the data that controls the interaction of the nodes in the WSN. Different approaches exist to implement this new paradigm and most of them rely on the use of publishing named data. The use of geographic routing by addressing nodes in a given region is also a novel approach for WSN whose applicability requires further study.

At the transport layer, the main concern in a WSN is reliability. However, reliability in a WSN is not only guaranteed at the transport layer, but also in other lower layers leading to the concept of cross-layer design. In this concept the design of the protocols at the different layers is done jointly, thus the reliability in a WSN may be obtained by a set of cooperating functions in different layers. The use of single path or multiple paths is also explored by the different transport protocols planned for WSN. One point of discussion is the appropriateness of TCP for WSN. This has been discussed a lot and it seems that some agreement exists that TCP is not the most appropriate protocol for WSN, namely due to its congestion-control algorithm, which

assumes that losses are due to network congestion and not to link errors. [5]

Finally, we should refer that there are at least two other issues that will have a strong impact for the wide acceptance of WSN in the future, they are the support provided for advanced applications and security. The support of applications can be helped by the use of in-network processing and suitable middleware provision. In-network processing goes beyond the simple aggregation of data by trying also to reduce the number or the length of the messages circulating in the WSN. Different algorithms are being proposed reflecting different in-network processing schemes. Security procedures for WSN have to be further improved in the future. This is one of the fields in WSN subject to strong research activities and from which new security procedures are expected to emerge in order to avoid denial-of-service situations. Some specific security aspects of WSN deal with countermeasures for the possibility of capturing nodes, of the difficulty in implementing cryptography due to energy limitations and of attacks with the aim of exhausting the energy of the nodes.

References

[1] H. Karl and A. Willig, *Protocols and Architectures for Wireless Sensor Networks*, Wiley, 2005.

[2] I.F. Akyildiz et al, *Wireless sensor networks: a survey*, Computer Networks 38 (2002), pp. 393-422, Elsevier Science B.V., 2002.

[3] A. Giridhar and P.R. Kumar, *Toward a Theory of In-Network Computation in Wireless Sensor Networks,* IEEE Communications Magazine, April 2006.

[4] I. Demirkol et al, *MAC Protocols for Wireless Sensor Networks: a Survey,* IEEE Communications Magazine, April 2006.

[5] C. Wang et al, *A Survey of Transport Protocols for Wireless Sensor Networks,* IEEE Network, May/June 2006. ∎

Public e-Services: Opportunity for Leapfrogging in Eastern European Member States?

by Marc Bogdanowicz

Marc Bogdanowicz is the Action Leader of the Techno-Economic Development of European Information Societies (TEDEIS) project at the ICT unit of the European Commission's Institute for Prospective Technological Studies (JRC-IPTS) in Seville, Spain

The International Economic Forum of Krynica (Poland) has established itself over the last two decades as the most important annual gathering of politicians, executives, policy-makers and media representatives from Central and Eastern Europe. The 2006 event brought together over 2000 mid- to high-profile participants from more than 40 countries from Europe, Asia and America. The purpose of the Forum, which is organised by the Foundation Institute of Eastern Studies (Warsaw), is to foster debate on national and European development and to enhance co-operation between countries in the region. This year's event focused on "The Question of Europe's identity" (for more on this, see http://www.forum-ekonomiczne.pl/index_eng.php).

Present for the third consecutive year, the European Commission's Institute for Prospective Technological Studies of the DG Joint Research Centre[1] organised a dozen of panels debating the trajectories of "Europe towards eServices, Innovation and Growth".

Last year, after the closure of the Krynica 2005 Forum, I wrote (and wondered) in this same Newsletter[2] if seen in the perspective of two transformations - transition and accession - one could hope that the technological *installation period* in those countries since the 90-ties had been beneficial to their economies, possibly as it had been in Western Europe. The *installation period,* I was referring to, is that period defined by Professor Carlota Perez[3], when Information and Communication Technologies – the current pervasive technologies of our century - gain forces, diffuse and create a huge potential for socio-economic progress, but also when major tensions develop such as economic and social polarisation, market saturation due to the impoverishment of part of the population and dominancy of financial capital submitting production capital to its short-term interests. Such changes and such tensions are those, which are – from a historical perspective, says Professor Carlota Perez – expectable when core economies meet a "turning point" in the cycle of techno-economic transformation.

Considering that Eastern European Member States have gone through an installation period that is somewhat comparable – even if very different in nature and conditions - to the western ones, we might expect the Information and Communication Technologies to play their role of dominant technology, enabling and structuring their economies towards an Information Society during the next half of the XXI century.

This year's Krynica Forum offered some answers to those questions. What can be seen today, is that the history of Information Society take-up in the Eastern European Member States boils down to three scenarios: lagging, catching-up or leapfrogging. The optimistic prospective view is to hope these will be chronological steps executed at an accelerated pace -- from lagging behind (or rather "zero stage") to leapfrogging.

Around year 2000, most experts were agreeing on a rather pessimistic scenario for Information Society take-up in the Eastern European Member States. The constellation of the usual eight to nine necessary factors for Information Society take-up[4] was such that at best it was estimated that these countries would develop some FDI-based industrial 'hi-tech islands' in an information-starved landscape. The alternative scenario called for a major public policy push, probably at a European level.

Probably some of this happened with the successive e-Europe programmes and their counterpart plans in Eastern Europe. Also, the Enlargement process acted as an attraction for FDI and a booster for overall growth prospects, propelling technological transfer and demand in these countries.

Consequently, the period 2003-2005 was a period of accelerated catch-up in terms of Information Society indicators. While still exhibiting weaker figures, the Eastern European Member States clearly took a decisive Information Society path in terms of relative investment and expenditures, equipment, skills upgrade, etc. The demand side and its related policies played an important role in that uptake process. Simultaneously, we saw the upsurge in several Eastern European Member States (Estonia, Slovenia, Czech Republic and Hungary) of a domestic ICT industry that became traceable in their economies.

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[1] For more, see
http://www.jrc.es/home/pages/ict_unit.htm

[2] IT Star Newsletter, Vol. 3, no. 2, Winter 2005/06

[3] Author in particular of: Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages. Edward Elgar,. Cheltenham, UK. 2002.

[4] For more, see: Bogdanowicz M., Centeno C., Burgelman J.-C., 2004. Information Society Developments and Policies Towards 2010 in an Enlarged Europe: Ten Lessons from the Past and Three Challenges for the Future. European Commission, IPTS; Seville, Spain.

Today, the Eastern European Member States are no longer "ICT laggards", they are catching up in terms of implementing the Information Society, and some of the indicators show that they do better than the EU in general, and the cohesion countries (Spain, Portugal, Greece) in particular. The time might be ripe for leap-frogging – using ICT in such ways that they flourish and reap the benefits of techno-economic change induced by stimulating organisational changes and supporting innovation.

This is exactly the point where the debate stands. And it is not homogeneous across the Eastern European Member States, as much as they have also developed a high diversity in Information Society take-up level. While starting a few years ago from the same point, today they show diverse profiles that are reflected also in their national debates on the IS.

In particular, the articulation between the structural reforms of the Education, Pension, Health, Public services etc, and the development of eServices might serve as crucial areas for leapfrogging, or not.

For those countries, the challenge of leapfrogging by integrating ICTs as tools to support structural reforms is a key factor for adapting the innovation systems, accelerating the real transformation of the socio-economic activities and institutional settings, and ensuring future economic growth and competitiveness. But this is not unanimously seen as such, least of all by some important political actors at the national level.

We conclude from the above that EC initiatives in the areas of eServices are welcome as they often help to disentangle some of the national resistance in thinking "out-of-the box" the technological, economic and political aspects of eServices. But simultaneously more attention should be paid to existing best practices developing in particular in Eastern European Member States as they can help in a real collective learning process at the continental level.

Second, the-multi annual Observatory of IS Take-up in the Eastern European Member States and the Candidate Countries, planned for 2007 by IPTS, is expected to make a valuable contribution to the above issues, in particular if it helps in identifying best practices in public and private (economic) activities, if it improves the validity of impact assessment methods and if it focuses on domestic political awareness. ∎

Congratulations

Niko Schlamberger, President of SSI (Slovenia), was elected CEPIS President-elect during the recent CEPIS Council meeting on 18 November in Brussels. At the same meeting, *Vasile Baltac*, President of ATIC (Romania), was elected Honorary Secretary. These elections recognize their societies and countries and, last but not least, say a lot about their personal and professional standing. ∎

Joke of the Issue

The Standard Xmas CAKE RECIPE for Men

You'll need the following:

1 cup of flour, 1 cup of sugar, 4 large brown eggs, 2 cups of dried fruit, 1 teaspoon of salt, butter, lemon juice, nuts, 1 bottle of whisky

Try the whisky to check for quality. Take a large bowl. Check the whisky again. To be sure it's the highest quality, pour one level cup and drink. Repeat.

Turn on the electric mixer, beat one cup of butter in a large fluffy bowl. Add one teaspoon of sugar and beat again. Make sure the whisky is still OK.

Cry another tup. Tune up the mixer. Beat two leggs and add to the bowl and chuck in the cup of dried fruit. Mix on the turner. If the fired druit gets stuck in the beater-ers, pry it goose with a drewscriver.

Sample the whisky to check for tonsisticity. Next, sift two cups of salt or something. Who cares?

Check the whisky. Now sift the lemon juice and strain your nuts. Add one table. Spoon the sugar or something. Whatever you can find.

Grease the oven. Turn the cake tin to 350 degrees. Don't forget to beat off the turner. Throw the bowl out of the window. Check the whisky again and go to bed.

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

Type of organization

Regional non-governmental and non-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:

2007   Rome, **Italy** (May)

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

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

Major Activities

- 1st IT STAR WS 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%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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1st ANNOUNCEMENT

2nd IT STAR Workshop on

Universities and the ICT Industry (UNICTRY '07)
19 May 2007, Rome, Italy

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

Mission: *To investigate the current state, problems and challenges of the ICT-related higher education and the interplay between universities and the ICT industry in Central, Eastern and Southern Europe (CESE) so as to engineer visions for new relationships and facilitate policymaking within the Region and the European Union.*

Steering Committee

V. Baltac, Romanian Association for Information and Communication Technology
K. Boyanov, Bulgarian Academy of Sciences
B. Domolki, John v. Neumann Computer Society, HU
G. Dukic, Informatics Alliance of Serbia
M. Frkovic, Croatian Information Technology Society
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S. Katsikas, Greek Computer Society

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V. Risak, Austrian Computer Society
N. Schlamberger, Slovenian Society INFORMATIKA
J. Stuller, Czech Society for Cybernetics & Informatics
E. Telesius, Lithuanian Computer Society

Program

The one-day event based on **Keynotes, National Reports and Panels** will gather senior representatives of academia, government and industry. Among the speakers will be:

- *H.E. Prof. Blagovest Sendov*, Ambassador of Bulgaria to Japan and the Philippines, Past President of the Bulgarian Academy of Science and former Rector of Sofia University, Past President of the International Association of Universities and of IFIP
- *Dr. Bruno Lamborghini,* President of the European Information Technology Observatory (EITO), Vice-President of the Olivetti Group and Professor at the Cattolica University, Milan

IT STAR will seek the active involvement of the **European Commission.**

Leading ICT companies wishing to share their experience and views in shaping the University-Industry dialogue will be offered the possibility to participate.

The Workshop proceedings will be published.

Contacts

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IT STAR Chief Executive: Plamen Nedkov <nedkov@utanet.at>

For information on IT STAR and the Workshop please visit http://www.itstar.eu
or contact your IT STAR Member Society and its representative on the Steering Committee