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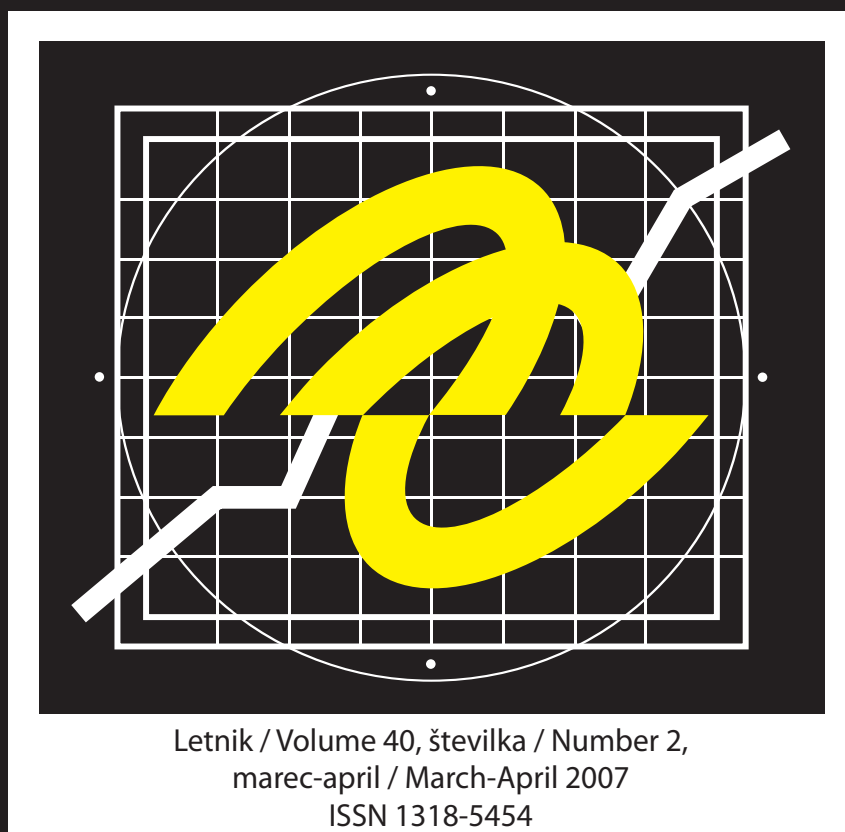
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eRegion Development

Co-editors: Jože Gričar, Paolo Inchingolo, Anton Lavrin, Otto Petrovic

REVIJA ZA MANAGEMENT, INFORMATIKO IN KADRE

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Kazalo/Content
2/2007

Jože Gričar

Innovative Cross-border eRegion Development: Possible Directions and Impact

Regional development policy has to respond to the challenges of a global, informational and networked economy. In order to achieve a regional-innovation-focused competitive advantage it is important for the region to have the ability both to access and generate knowledge, and to access to knowledge networks faster than its competitive regions. In this paper, challenges in the area of eRegion development are discussed and some eRegion development initiatives are presented. Some activities from the period 2000-2006 are elaborated on, as are current initiatives in the Central Europe eRegion. Possible suggestions and some questions are concerning about a growing need in the eRegion for innovative ways of business, government and academic collaboration as part of a continuous process.

Keywords: region, eRegion, cross-border, Central Europe, innovation, development, living lab, prototyping, information and communication technologies (ICT)

Andrej Krenker, Janez Bešter, Andrej Kos

Regional Cooperation between Universities, Research Institutions and Industry

Due to the fact that Slovenia is a small country in every aspect, we should cooperate at all levels of society in order to succeed among the global competition – to turn our smallness into an advantage. Thanks to this smallness everybody knows almost everybody else, which gave us a basis for cooperation in the past. In more recently, various mechanisms have emerged in Slovenia for encouraging more formal ways of cooperation among entities of the society, such as centres of excellence, technology centres, clusters, technology networks and technology platforms.

In Slovenia, the players in the area of Information Communication Technologies (ICT) have established a solid tradition of collaboration between companies and research and development (R&D) institutions, which is of great importance in the world where development is rapid and where it is of vital importance for R&D companies to produce new products and solutions as quickly as possible if they want to expand. Today, almost all the leading Slovenian companies in the area of ICT are members of the ICT Technology Network (ICT TN), where they can find a place for cooperation and for the successful development, production and sale of integrated and user-friendly solutions and products.

In this paper we will present ICT TN and its organisation. Special attention will be given to presentation of the four projects that members of ICT TN work on. The Centre of Excellence for Information and Communication Technologies (CE ICT), the Next Generation Network (NGN) Interoperability testing laboratory SINTESIO and the Technology Platforms (TP) are especially interesting projects because it is not just the technological aspect but also the social aspect – in the form of networking and collaboration – which is important.

Keywords: Technology Network, Technology Platforms, Centre of Excellence, Interoperability testing laboratory.

Paolo Inchingolo, Dejan Dinevski

O3-Medical Informatics Endeavor for the e-Health Region

The Open Three (O3) Consortium is promoting the adoption of Open Source in e-health on regional, European and World-wide levels. This project aims to contribute to the development of e-health through the study of Healthcare Information Systems and the contemporary proposal of new concepts, designs and solutions for the management of health data in an integrated environment of hospitals, Regional Health Information Organizations and citizens (home-care, mobile-care and ambient assisted living).

Some concrete technical solutions in the field of medical informatics are presented in this paper. The applications presented are the heart of the Radiology information system, which is open to other health institutions, thus forming a basis for the realization of e-health integration. The formation of a genuine e-health region is just one step forward.

Keyword: medical informatics, e-health, open source software, radiology information system

John R. Harrald, Theresa I. Jefferson

Supporting Critical Multi-Organization Collaboration during Response to Catastrophic Events

The past two years have shown both the power of nature and the complexity of preparing for and responding to extreme events such as earthquakes, tsunamis, hurricanes/typhoons, and floods. These events, and future catastrophic events, will require coordination and collaboration between multiple government and non government organizations across national and state borders. This collaboration will require the discipline necessary to share common processes and procedures, and the agility to improvise plans and actions as situationally required. Information technology must be used to create an eRegion, enabling the shared situational assessments and adequately supporting the collaborative, distributed decision making to produce required decisions and future action plans. The role of information technology in developing these capabilities is discussed in the context of two seismic scenarios, the US New Madrid Seismic Zone, and the Adriatic Seismic region.

Keywords: emergency response, disaster management, situational awareness, collaborative technologies, decision making, information technology

Uvodnik/ Foreword 2/2007

The co-editors of "eRegion Development", a special issue of the 2007 Journal Organizacija, express their thanks to the contributors and the reviewers. Thanks are also due to the editor of Organizacija, Professor Jože Zupančič, for his continuous support over ten years of the special March issues of Organizacija on eCommerce (1996-2005, in Slovene), and the two special issues on the eRegion (2006 and 2007, in English). We appreciate the involvement of the Journal Organizacija in creating awareness of the relevance of "e" in the emerging Central European eRegion and in stimulating related research and publishing.

The contributions published in this issue are opening up numerous questions and proposing several answers. In addition, we are adding some questions in expectation of stimulating innovative thinking on the further development of the eRegion as a concept, development direction and an action plan. We are providing some answers to those questions, but invite everyone to consider them. These questions and some of the possible answers are as follows:

What will the major issues be in an accelerated development of the eRegion in Central Europe in next 2-3 years?

- Since May 2004, several new states in the Central European area became members of the EU, with Bulgaria and Romania joining in January 2007. Those countries represent a major geographic region that deserves consideration for possible joint research and development efforts, which may not be easy to initiate, accelerate and harmonize.
- A close collaboration between the government, private organizations and academia will be required, assuming that the new ways of working together will have to be developed.
- Considering the EU standard of living, there are still under-developed parts of the Central European Countries (CEC). There are opportunities in exploiting the open access to EU Structural resources.
- Perhaps there are needs for a visible and transparent concept of a Central European Countries' body at a governmental level, contributing to the establishment of a position within the framework of the EU. Similar to the Nordic Council of Ministers based in Copenhagen, for example.
- More intensive information sharing and collaboration in the area of the exploration of Structural funds and the improved coordination of cross-country collaboration based e.g. on INTEREG and EQUEL or EUREGA instruments.

What are "win-win" concepts for closer connectivity between the regions in the EU that are built upon strategies of common development and collaboration?

- Areas like: RTD, regional development, environment protection, security etc.
- Active and coordinated activities and participation in lobbying the relevant EU institutions.
- Coordinated support for the successful participation in all RTD programs offered by the European Commission.
- Common development programs based on bilateral or multilateral national agreements supporting bilateral and multilateral RTD projects.

What can the Central European eRegion learn from the successful ICT-based region initiatives in Western Europe and elsewhere?

- Learning from the success stories related to the structural funds projects proposals and learning from mistakes made during periods of the exploitation of structural funds.
- Combining "e" related initiatives. For example, eGovernment, eCollaboration, eLearning and similar research accelerated initiatives started in the mid 1990s and early 2000s.
- Several conceptions of metropolitan (region-wide or city-wide) networks were opened. It is important to think about what can be done with such initiatives nowadays when there are new concepts in interoperability and collaboration, such as federal architecture, SOA or MDA architectures for interaction solving on a business and ICT level as well.
- A common strategy for the "customization", localization and implementation of international standards. Such as when the Northern European Subset of the Universal Business Language (version 2.0) was established in the area of eProcurement.

Which eCollaboration applications may contribute the most to the development of the eRegion?

- For example, applications in the areas of business, logistics, health, learning, geomatics, inclusion, etc. More specifically, eCommerce and eInvoicing as well access and mobility in Health services, ePatient Records, eHealth Cards, eInsurance etc.

Which types of inter-organizational system will require the most attention in the Central European eRegion?

- Development of SMEs collaboration and networking based on the principles of the "digital business ecosystem".
- Development of Regional eMarketplaces based on eCommerce implementation, including eInvoicing and eLogistics as components of cross-border eProcurement.
- The development and implementation of a basic system dealing with regional security and safety.
- Defining the business models that seem to be the most relevant to eRegion development.

What will be the role of mobile communications in an eRegion? Is a mobile technology a way to setup the most suitable communication infrastructure for nearly all the people in a short time-period? How can the mobile technologies contribute to accelerated eRegion development? What are the most important mobile applications for an eRegion?

- Interoperability among eGovernment and ePublic systems, which will create a good opportunity for the eRegion conception to increase

the impact of these systems on community life.

- *Within a very short time, mobile technology will be a basic infrastructure for Ambient Assisted Living services in the Central European Regions as well.*
- *Relevant information services from the Regional Security and Safety System can be made more intensive by the implementation of mobile access to the services provided by these systems.*

What could be the major contributions of the universities in the eRegion?

- *Lessons learned from the contributions of ALADIN – the ALpe ADria INitiative Universities' Network.*
- *Acceleration of research and innovation in eGovernment and eBusiness areas with specific reference to eCommerce and regional security issues.*
- *The successful participation of universities and their partners in the FP7 projects of the EU (which is needed for better mutual collaboration and coordination among the ALADIN partners mainly during the period of project proposal preparation).*
- *Special attention should be paid to the small and medium-sized enterprises (SMEs).*
- *Accelerated business-government-university networking and interoperability.*

What can be the organizational structure of a cooperation model for universities and independent research labs cooperating with governments and businesses?

- *Common RTD and innovation projects.*
- *Interoperability between a variety of institutes and between the entities of a single institute contributing to satisfying the common activities and projects.*
- *The development of Living Labs, members of the European Network of Living Labs.*
- *Contributions to the creation of win-win situation opportunities and environments for universities, external business and government partners.*

Which emerging technologies may be the most relevant to the development of

the eRegion?

- *e-Infrastructures – GEANT, Galileo, the new generation of the Internet, Grid technologies, mobile technologies, RFID.*
- *Business Process Management - BPM and BPM Suits presented e.g. by OMG.*
- *The Living Lab approach as a potentially very useful framework-base for the networking of eRegions.*

Does an eRegion need a Regional Portal, or a Portal of Portals?

- *There is a foreseeable need for some kind of collection of distributed networks, which can be used through access to a Portal based on "Intelligent knowledge management" principles.*
- *Portals may be needed that allow access to relevant information or knowledge and the sharing of good practices, in the framework of supporting collaborative environments relevant for ad-hock networking or simply for discussion.*
- *The new challenges are in the improved exploitation of existing capacities and potential "distributed regional network(s)". E.g., there is a possibility of applying knowledge from GRID technology research – e.g. for modeling network performance, supporting upper level portal with GRIDS.*

Which regions in Europe should the Central European eRegion start to eCollaborate with?

- *Principles experimenting and experiencing in ALADIN – the ALpe ADria INitiative Universities' Network – in an eRegion as a network-based digital ecosystem concept may be used in consideration of expansion opportunities.*
- *Investigating practical ways to expand ALADIN communities, which are already covering a certain part of the Central European region.*
- *The fact that there are representatives of less developed regions in ALADIN, as well as those from more developed ones, creates an opportunity for knowledge-based collaboration and knowledge transfer.*
- *Collaboration with other eRegions in the EU and globally contributing to sustainable development in*

different areas of interest (areas of interest need to be clearly defined in correlation with the EU development strategies as well as national and common EU development strategies).

- *Considering that the ALADIN community is mostly intended as a university community collaborating with partners; more partners would have to be attracted to cooperate with the universities.*
- *eCollaboration with the Nordic countries' region, e.g in the areas of development in the application of eProcurement and eCommerce.*
- *SMEs and relevant public bodies have to engage more in cross-border eCollaboration.*
- *Universities do have a certain responsibility for an eRegion to exist.*

Which role should/could the ALADIN-based Central European eRegion have?

- *A collective partner in the EU projects of the FP7, Regional Territorial Cooperation (INTEREG), New Life-long Program (e.g. the new Erasmus program concept) etc., dealing with national legal and normative issues as well as European directives' proposals.*
- *General planning support for the Regional Territorial Cooperation.*
- *As a contributor to the development of an institutional model of cooperation with government organizations; the Central European Initiative, for example.*

Comments and suggestions are very welcome, as well as invitations to joint activities.

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Innovative Cross-border eRegion Development: Possible Directions and Impact

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Regional development policy has to respond to the challenges of a global, informational and networked economy. In order to achieve a regional-innovation-focused competitive advantage it is important for the region to have the ability both to access and generate knowledge, and to access to knowledge networks faster than its competitive regions. In this paper, challenges in the area of eRegion development are discussed and some eRegion development initiatives are presented. Some activities from the period 2000-2006 are elaborated on, as are current initiatives in the Central Europe eRegion. Possible suggestions and some questions are concerning about a growing need in the eRegion for innovative ways of business, government and academic collaboration as part of a continuous process.

Key words: region, eRegion, cross-border, Central Europe, innovation, development, living lab, prototyping, information and communication technologies (ICT)

Inovativni razvoj e-regije, ki sega prek državnih meja: možne usmeritve in učinki

Regionalna razvojna politika mora najti odgovor na izzive globalnega, informacijskega in mrežnega gospodarstva. Da bi dosegli regionalno inovacijsko usmerjeno konkurenčno prednost, je pomembno, da ima regija možnost tako dostopa do znanja kot tudi njegovega ustvarjanja, in sicer da lahko dostopa do mrež znanja hitreje kot njej konkurenčne regije. V tem prispevku so obravnavani izzivi na področju razvoja e-regij ter predstavljene nekatere razvojne pobude povezane z e-regijami. Obdelane so nekatere aktivnosti iz obdobja 2000-2006 kot tudi zdajšnje pobude v srednjeevropski e-regiji. Možne sugestije in nekatera vprašanja se nanašajo na rastočo potrebo v e-regijah po inovativnih načinih poslovanja, upravljanja in akademskega sodelovanja kot dela nepretrganega procesa.

Ključne besede: regija, e-regija, sodelovanje onstran meja, Srednja Evropa, inovacija, razvoj, živi laboratorij, razvoj prototipa, informacijske in komunikacijske tehnologije

1 Definitions

Although the *regional approach* is greatly stressed nowadays, there is no generally accepted definition of "region". From a geographical perspective, a *region* is a medium-scale area of land or water, smaller than the total area of interest (which could be, for example, the world, a nation, a river basin, a mountain range and so on), and larger than a specific site or location. A region can be seen as either a collection of smaller units or as one part of a larger whole (www.Wikipedia.org). According to Cooke et al. (1996), a "region" is an intellectual concept. Sotarauta and Bruun (2002) view a "region" in terms of four criteria: 1) a region must not have a determinate size, 2) it is homogeneous in terms of specific criteria, 3) it can be distinguished from bordering areas by a particular kind of association of related features and 4) it possesses some kind of internal cohesion. The borders of a region are not fixed once and for all; they can change. The emerging network society is challenging the prevailing notions of region, space and time.

For the purpose of this paper, an information and communication technology (ICT) supported region, known as the *eRegion* is of interest. From a technological perspective, an eRegion integrates the issues of regional development with the opportunities and challenges coming from the latest technologies, such as the World Wide Web. (Pfirrmann 2003). The eRegion, as a concept, denotes initiatives supported by information technology (IT) that transcend traditional borders and boundaries (eRegion Emergence and Impact 2007).

The eRegion may be viewed from a political or an academic perspective (Bavec 2006). The countries or regions within the countries that are engaged, share the coordinated design, development, promotion and application of selected ICT services or data. The counties in the eRegion may or may not be neighbors. In the latter case, the eRegion may be referred to as a *"Virtual eRegion"*, which is not exploiting the potential benefits of the "neighborhood". The fact is that people live in locations and so they perceive their space as location-based (Castells 1996, 413). The notion of places and regions is not based on a "border-oriented" administrative

view but on the networks and processes that flow within and through the region of the countries. Therefore, the space of these flows is not without location, although its structural logic is. Networks are linked up to specific places. Some of them are exchangers – communication hubs that play a coordinative role in the smooth interaction of all the elements integrated into the network. Other places are the nodes of the network. These are the locations of strategically important functions that build a series of locality-based activities and organizations around the key function in the network. As suggested by Kautonen (2006), the question is not whether regional development is national or local, but rather what kind of new interrelationships are emerging between the different actors and what the roles may be for different organizations in different contexts. The question is how development processes can be global, national and local at the same time.

From an organizational perspective, an eRegion is a totality of organizations – linked by eTechnologies – from nearby countries within a circle of 200 to 500 kilometers radius surrounding the point of observation, which depends mostly on the logistical capabilities. There are intensive flows of products, services and people in the eRegion, creating numerous business and/or government transactions and producing intensive cross-border data flows (Gričar 2004). Data flows are one of the major components of the network society, in which the movement from a space of locations to a space of flows is becoming obvious. From a very wide perspective, which may he hard to grasp, some think of a region as the territory within a circle representing up to five hours of airline flight - for example, for the Dubai Knowledge Universities seeing its region of potential students. The Emirates Airline plays a major role in the United Arab Emirates vision and actions (Gopinathan 2007).

A *cluster* may be closely related to an eRegion. A cluster is a geographically or virtually proximate group of interconnected companies and associated institutions in a particular field linked by commonalities and complementarities (Towards a Knowledge Society 2005, 3). A cluster (Porter 1998) is a geographic concentration of competing and cooperating companies, suppliers, service providers and associated institutions. Clusters usually consist of an array of linked industries and other entities important to competition, including governmental and other institutions such as universities, standard-setting agencies, think tanks, vocational training providers and trade associations.

In this paper we are focusing on the innovative eRegion. The classic definitions of *innovation* include (Wikipedia. org): the process of making improvements by introducing something new; the act of introducing something new: something newly introduced; the introduction of something new; a new idea, method or device; the successful exploitation of new ideas; change that creates a new dimension of performance. *Innovation in economics, business and government policy* means that something new happens, which must be substantially different, not a minor change. In economics, the change must increase the value, customer value or producer value. Innovations are intended to make someone better off; the whole economy

grows from the succession of many innovations. The term innovation may refer to both radical and incremental *changes* to products, processes or services. Since innovation is also considered *a major driver of the economy*, the factors that lead to innovation are also considered to be critical for policy makers. In the *organizational context*, innovation may be linked to performance and growth through improvements in efficiency, productivity, quality, competitive positioning, market share, etc. *All organizations can innovate*, including, for example hospitals, universities and local governments. While innovation typically adds value, innovation may also have a negative or destructive effect as new developments clear away or change older organizational forms and practices. Organizations that are not so effectively innovative may be destroyed by those that are.

Studies have shown that clusters stimulate innovation and growth in productivity, foster long-term business dynamics and generate new jobs and economic growth technologies, notably due to the strength of inter-firm co-operation (Clusters of Innovation 1998; ISTAG 2004; InnovateAmerica 2004; U.S. Competitiveness 2005; Aho 2006). Research, initiatives and experimental developments on both sides of the Atlantic are demonstrating a major increase of interest in innovative approaches to regional development based on exploiting the latest information and communication technologies. A *cluster approach* can be successfully implemented across a wide range of industry sectors, including both traditional and high-tech sectors. A framework was developed in the US from 1998 to 2001 to evaluate cluster development and innovative performance at the regional level (Clusters of Innovation 1998).

The *regional innovation system* approach (Kautonen 2006) has its origins in observations dealing with, for example, the geographical agglomeration of production and its effects or inter-organizational interaction and its dynamics in space. The regional innovation system approach is based on the relationships between industrial innovation and regional development. These models have had a remarkable impact on policy-making all over the world in the last ten years, also underscoring their social attraction.

The term *cross-border* refers to transactions across national borders involving at least two countries. It is assumed that national borders do make a difference in executing these transactions. This is important even to transaction between the countries of the European Union, where customs, for example, have been abolished. However, the borders in the people's minds did not vanish. Borders still mean differences in language, culture, legal regulations, procedures, trust and other aspects. From that perspective, a cross-border region differs from, for example, an inter-city region.

For the purpose of this paper, the term *innovative cross-border eRegion* is used, which refers to performance and growth through improvements to efficiency, productivity, quality, competitive positioning and market share in a cross-border environment. Cross-border refers to a group of neighboring countries. In the area of flows, companies are not the only global competitors; regions also compete globally. This means that within certain segments, regions

have to possess clear competitive advantages that they can offer to local operations, organizations and people. In an eRegion and its space of flows, capital, data and innovations move faster than ever from one place to another. In order to achieve a regional-innovation-focused competitive advantage it is important for the cross-border eRegion to have the ability to access and generate knowledge, and have access to knowledge networks faster than its competitors.

It seems that questions of why the innovative cross-border eRegion development is so relevant and timely require more attention.

2   Challenges in eRegional Development

An emerging question is how regional development policy can respond to the challenges of a global, informational and networked economy and how development processes are carried out over time, or rather, how they proceed (Sotarauta and Bruun, 2002). The globalizing economy and rapid technological progress has challenged the finding not only of new policies, but also of new ways of organizing policy-making and of managing policy processes. Therefore, we should have a more profound understanding of the ways in which various incidents, people, institutions and strategies (among other things) influence the course of development. The authors are drawing conclusions on how some Nordic city-regions have endeavored to raise their policy-making, management and innovative capacities. We are building upon their ideas in consideration of the challenges in eRegional development.

In an industrial society, the borders between nations, institutions, organizations, regions, etc. largely determined the position of regions. In a global economy, however, borders are less defined than at any time in the past. Now the positions of both organizations and regions are determined by their competencies and skills at learning and developing within a continuous process. Consequently, local initiatives and an enterprising disposition are becoming increasingly important in regional competitiveness. Regional competitiveness is defined as an ability to: connect the (urban) area and its actors to the best possible networks as firmly as possible; maintain and develop the quality of life of local residents (services, education, the environment, etc.); attract new, competitive companies to the area; create such operational prerequisites that the existing companies of the area are able to maintain and develop their competitiveness.

In order to be competitive in the longer term as a whole, regions should be able to redistribute the attracted flows within the region to enhance wealth, social equity and the quality of life of the region as a whole. It is therefore also crucially important, among other things, to tie various activities to the region. Issues such as networks and learning are thus often seen as effective ways of disseminating and creating knowledge and tying together different issues and activities for urban competitiveness. Therefore, rather than emphasizing the competitiveness of individual firms, it has become habitual to focus on the clusters. As Porter (1998) suggests, the development of internationally competitive firms depends on the clusters that are able to exploit the

resources of their home region or country. The critical competitive factors are not just based on such factors as labor costs, the availability of resources and the general macro-economic environment, but also on qualitative factors of the local environment that are intensified through clustering. The benefit of clusters is also that individual firms may come and go, but clusters as a whole continue to create employment and generate wealth, and the region thus has the chance to continue to prosper.

Regions may be important, but the state still has a role to play. The role of the region in the accumulation of knowledge is relative and those commentators who only stress the regional innovation networks and/or learning do not see the role of national policies and decisions clearly enough. These observations seem to be valid, especially from the viewpoint of small countries such as the Nordic nations (Kautonen 2006). The Finnish innovation system is national-local in character. Therefore, the question is not whether regional development is national or local, but rather what kind of new interrelationships are emerging between the different actors and what the roles of different organizations in different contexts may be. The question is how processes of development can be global, national and local at the same time.

Adapting a more interactive and process-based, but at the same time purpose-oriented, way of generating regional development policies is not only a technical question. It is very much a matter of the policy-making culture. Regional development policies are still based on a fairly well established belief in the capabilities of the policy-makers to find the correct strategies for the future through rational planning. Once development strategies have been formulated, action is assumed to follow. However, the regional development policies are often programmed descriptions of the current state, through which it is not always possible to generate enough innovative means to develop regions. Sotarauta and Hukkinen (2002, 19) are stressing that the basic argument is that, instead of only finding solutions in fairly straightforward policies, we may also find them in the communicative and more or less self-organizing processes of decision-making, policy-making, co-operation, knowledge creation, etc. For the task of balancing the current focus of policy-oriented studies and practices, the following two observations are relevant: One, the various development processes are not understood deeply enough, and thus many of the shortcomings faced in regional development policy-making are largely due to the fact that the policy-makers do not have the capacities to manage development processes efficiently. Two, there is a need to create systematic, process-based approaches for regional development policy-making and for the management of regional development activities.

However, creating an environment with a supportive business-government partnership is not an easy task, Wessner suggests (2003, 1), since business-government partnerships are not commonly understood. In the United States, partnerships are sometimes controversial and therefore an objective analysis could lead to a better understanding of the contributions and limitations of these partnerships. They relate to the drivers of cooperation among industry, the government and universities. A special focus

is needed with respect to foreign government partnerships and opportunities for international cooperation and the changing roles of government laboratories, universities and other research organizations. Properly constructed, operated, and evaluated partnerships can provide an effective means for accelerating the progress of the transfer from the technology to the market. Knowledge of "best practices" may lead to positive guidance for future public policy.

Similar messages are coming from various conferences in recent times (Reding 2006; eBaltics 2006) as well as the initiatives of the EU institution. This includes the Commission presenting a Communication on improving the transfer of knowledge between the public research base and industry across Europe, which will provide guidance on how public authorities can address the main barriers which currently exist (Putting knowledge into practice 2006). The Commission will streamline its business support and information networks. This will encourage and facilitate the uptake of new ideas and their transformation into marketable products and services, especially by SMEs. In particular it will help ensure that the Innovation Relay Centers and Euro Info Centers provide top class business services to SMEs. The European universities are also expected to improve their performance, including more and more effective contributions to the innovation process. The key to this is granting universities sufficient autonomy to develop their own strategies. Structured and strategic partnerships between business and universities need to be strengthened. This requires increased possibilities for exchanging staff, teaching, the encouragement of entrepreneurship in the university and the establishment of science parks around universities with adequate finances available to support research spin-offs. This will help bridge the cultural gap that so often separates university research from business requirements. The development of links between universities and the local civil society would also be conducive to a better uptake of innovation at the local and regional levels.

Collaboration is a prerequisite for an eRegion to be innovative and competitive (Aho 2006). The importance of collaboration was stressed by Vivien Reding (2006), saying that Europe needs to "team-up". Collaboration is a well recognized European asset because people can master it so well. Research conducted by individuals or teams of scientists in ivory towers or remote research labs is no longer the order of the day. Competition among researchers was once how science advanced while technologies were developed in the isolated labs of major corporations. Today, in the globalized, highly competitive and increasingly complex world, it is collaboration and networking between excellent teams at the top of their fields, as well as with the best equipment and facilities, which counts. It is through coordinated and concerted action that Europe will be able to maximize the benefits of European ICT research and innovation on society and the economy. Aligning the efforts at the European level is the key to staying competitive. Small and fast developing countries who are open to innovation may perhaps accept the challenge more easily. They could be described as "small countries with big footprints", given that eTechnologies are allowing relative independence from the geographic and demographic constraints that have historically affected the use and diffusion of technology (Vogel & Gričar 1998).

3   eRegion Initiatives

Several eRegion related activities are in place today. They are briefly described below. Most probably other eRegions have emerged and it is expected that more will follow. Investigating the current eRegion initiatives and analyzing their similarities and differences may be a relevant direction of future research, exploiting the opportunities of inter-eRegion eCollaboration.

The TeleRegions Network (TRN), http://www.TeleRegionsNetwork.org
The Tele Regions Network (TRN) was created by regions in Austria, Belgium, France, Germany, The Netherlands, Finland, Sweden and the UK in 1996. Its objective is to promote the development of Information Society Technologies in European Regions. This objective is expected to be realized using several means, such as: the execution of projects; with the help of industrial partners and the European Union; conferences for the dissemination of best practices; the coordinated development of an Information Society infrastructure in the regions concerned.

NeDAP - Northern eDimension Action Plan, http://www.riso.ee/en/nordic
The Northern eDimension Action Plan (NeDAP) is meant to play an important role in the follow-up of the Lisbon strategy to make the European Union the most competitive and dynamic knowledge-based society in the world by 2010, with improved social cohesion and employment. Still, some challenges are waiting to be met. A fundamental one is the construction of an open, inclusive and democratic Information Society in all parts of the region. It is also of the utmost importance to create the optimal framework conditions for investments and business development in the ICT sector, as well as in the field of research. NeDAP can also play the role of a test-case for investigating the initiation, development and evaluation of EU regional cooperation initiatives.

The Baltic Development Forum, http://www.bdforum.org/download.asp?id=704
The Baltic Development Forum is an independent non-profit networking organization with more than 2,500 representatives from large companies, governments, major cities, institutional investors, business associations and the media in the Baltic Sea Region and beyond. Its vision is to make the Baltic Sea Region the most dynamic and prosperous economic centre in Europe and the world through integration, innovation and partnerships. Its mission is to position the Baltic Sea Region on the global map by advancing growth and competitive potential through partnerships between businesses, governments and academia, as well as by developing strong ties with the rest of the world. The core activities of the Baltic Development Forum include: organizing the annual Baltic Development Forum Summit – the leading platform for cross-border, cross-sector and cross-level networking in the Baltic Sea Region; facilitating the Baltic Sea Region brand process to

build a global trademark for success by 2010; producing the State of the Region Report; influencing the Regional agenda; profiling the Baltic Sea Region in the media and within decision making at large; co-operating with partners; organizing thematic seminars and roundtables.

The Central European Initiative – CEI, http://www. CEInet.org

The Central European Initiative (CEI), established in 1989, is composed of 18 Member States: Albania, Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Hungary, Italy, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia and Ukraine. One of the CEI's objectives is to bring the countries of Central and Eastern Europe closer together and assist them in their preparation for EU membership. The organization operates through various structures: the annual meeting of the CEI Heads of Government; the annual Meeting of the Ministers of Foreign Affairs, Ministers of Economic Sectors and other ministerial or sectorial events; monthly meetings of the Committee of National Co-coordinators as well as meetings and other activities of the CEI Working Groups; the co-financing of numerous other events (conferences, workshops, training courses etc.). Among CEI activities are the CEI University Network and the CEI Science and Technology Network. The subsections include the following areas relevant to eRegion development: Interregional and Cross-Border Co-operation and Local Development; Human Resource Development and Training; Information Technology; Small and Medium Sized Enterprises; Tourism; Transport.

ALADIN – ALpe ADria INitiative Universities' Network, http://www.ALADIN-Net.eu

ALADIN was initiated after a very resounding Business and Government Executive Meeting: "Regional Cooperation in eCommerce Development" at the 14th Bled eCommerce Conference on June 25, 2001. The ALADIN Network was formally created by signing a Letter of Intent in Ljubljana, Slovenia on October 23, 2002 by the rectors or vice-rectors of: the Karl Franzens University at Graz, Austria, the University of Rijeka, Croatia; the University of Trieste, Italy; the University of Maribor, Slovenia. At the time the universities reached the following understandings: One, the universities will create an international network, at a regional level, sharing common ideas and knowledge in teaching and research activities in the field of eCommerce. Two, they will facilitate the mobility of students and professors, providing common lectures, creating virtual teams of students from different universities and having professors lecturing at different universities, in order to harmonize with global and international eCommerce activities. Three, a Steering Committee was created and each university designated two representatives. On June 5, 2005 in Bled, Slovenia, a second version of the ALADIN Letter of Intent was cosigned by four additional universities who joined the Network: the Corvinus University, Budapest, Hungary; the Technical University, Košice, Slovakia; the BW University, München, Germany; the Novi Sad Business School, Serbia. Following that, the Prague University of Economics in the Czech Republic and the Medical University of Graz, Austria, have expressed interest in joining ALADIN. Currently ten universities in nine countries are active in

ALADIN with an interest in eIntegration, particularly in eBusiness, eGeomatics, eGovernment, eHealth, eLearning, eLogistics and eCollaboration in Disaster Relief. The George Washington University in the United States is also a member of the extended eALADIN. So far, ALADIN has proved to have an impact on the activities of each of the member universities in Central Europe (Gričar et al. 2005; Bačanović and Jošanov, Doucek, Gábor, Katzy, Gričar and Kljajić, Inchingolo and Ukovich, Petrovic and Kittl 2006).

The eHealth Initiative, http://www.ehealthinitiative. org

In 2004, the eHealth Initiative and its Foundation launched a range of activities designed to provide direct technical assistance to states and regions in the United States who are interested in improving the health and healthcare of their citizens through health information technology and health information exchange. While many national policies and standards are emerging to improve health and healthcare with the help of information technology, healthcare remains local and each state or community has its own particular challenges and market characteristics. In addition, many policies still remain at the state and local level. Through the State and Regional Policy Initiative, it raises awareness of existing and emerging national public and private sector policies related to health information exchange among leaders at the state and local level.

The New Silk Road, TRACECA – TRAnsport Corridor Europe Caucuses Asia, http://www.traceca-org. org/default.php?l=en

The TRACECA corridor is a renowned and high-profile alternative transport system steadily improving and developing. It is a restoration of the "Historic Silk Road". Nowadays, as that old thoroughfare falls into disrepair and oblivion, regions along it are also suffering. They are falling victim to poverty, isolation and even terrorism. TRACECA was established in 1993 during a conference in Brussels, originally by 8 Nations but now covering 13: Armenia, Azerbaijan, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Romania, Turkey, Turkmenistan, Ukraine, Uzbekistan and Tajikistan. They are aiming to improve trade and transport along the Europe-Caucasus-Asia Corridor. At the beginning, the TRACECA institutional structures were financed by the European Union, though financing has been taken over step by step by the member states since 2004. While TRACECA holds the potential for great improvements in continental trade, little has so far come out of the project.

The Virtual Silk Highway - the 'SILK Project', http:// www.SilkProject.org/project.htm

This project originated as a NATO funded network infrastructure project. The Silk project plan was approved in November 2001. The project has evolved since then into a broad initiative aiming at creating sustainable National Research and Education Network organizations in three Southern Caucasus and five Central Asian countries (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan). Along with the NATO Science Division and the academic communities in each of the eight countries, partners such as CISCO, DESY, GEANT, the SOROS Foundation, UNDP, the State Department of the USA, the World Bank, University

College London and the University of Groningen are also coordinating the efforts to accomplish this goal.

The eSilk & eAmber Road Regions Think Tank: Business & Government Executives & Professors Commitment To Making A Difference, http://www.BledConference.org/eAmber&eSilkRoad

The eSilk & eAmber Road Regions Think Tank was initiated by a panel at the Bled eConference (Vogel et al. 2002) and through a follow-up paper (Vogel et al. 2003). The re-establishment of business and government relations between the nodes of the Silk and Amber Roads aiming towards the creation of the eSilk & eAmber Roads presents both challenges and opportunities (Pinder et al. 2005; Vogel and Gričar 2006; Pinder et al. 2006). Although the challenges are many, the potential rewards are also great. Common opportunities are based around the Internet to provide the chance to regain our awareness of these regions and the goods and services that a renaissance of the Silk and Amber Roads can provide. The Think Tank's objectives are to: establish contact with like-minded people (researchers, administrators, policy makers and advisers, businessmen, and other stakeholders); raise awareness among such people of contemporary issues related to "e"; begin building a network of institutional links and researchers for further collaboration in joint activities; obtain first hand experience with existing applications of eCommerce in the Region; establish an indication of the level of awareness of eCommerce issues and opportunities in the Silk & Amber Road regions; identify opportunities for continued collaborative research into both the problems and possibilities for expanding eCommerce in the region; stimulate inter-university cooperation in the area of eCollaboration along the eSilk & eAmber Roads; suggest an agenda for future collaborative research and development activities intended to further the aims of the meeting.

Towards a Knowledge Society - the Nordic Experience, http://europa.eu.int/comm/regional_policy/sources/docconf/gothenburg/index.cfm

The Ministerial Conference "Towards a Knowledge Society - the Nordic Experience" (Gothenburg, Sweden, November 14-15, 2005) and its Conference Declaration have provided strong messages about the urgently needed inter-region eCollaboration. Over the last two decades, economic development in the Nordic countries, especially Finland and Sweden, has been driven by strong public-private partnerships involving larger firms working with governments (both national and local), research centers and universities and clusters of smaller firms operating in specific fields of technology (notably ICT). This 'triple-helix' model has been essential in strengthening the Nordic competitiveness based on the creation and diffusion of knowledge. The conference has provided suggestions on how the evolution towards knowledge-based economies can be fostered and funded and how sustainable cross-border cooperation can be enhanced. In this context, representatives from the new EU Member States need to examine to what extent the Nordic experience can be transferred or adapted to their specific circumstances and how the EU Structural Funds can assist the development of ICT. Slovenia's delegation has expressed interest in

eCollaboration with the countries of the Nordic Region (Bešter 2005; Gričar 2005b).

4 The Central European eRegion

The idea of eRegional development in Central Europe was presented by the Slovenian Delegation of the Information Technologies Society (IST) Committee, Directorate-General Information Society, at the meeting in Brussels on September 20, 2000. The meeting was chaired by Dr. Rosalie Zobel of the European Commission. The delegation proposed that a cross-border regional development exploiting eTechnologies may be very relevant to the development of the countries preparing for European Union membership. In November 2000, the Department for International Cooperation, Ministry of Education, Science, and Sport, Republic of Slovenia, sponsored a meeting in Ljubljana based on that idea. In this meeting, a survey on issues was initiated on cross-border eCommerce as perceived by the executives of selected organizations in Slovenia. The results of the survey (Bračun and Gricar, 2001) triggered two workshops preparing for regional development projects envisioned as the "Organizational prototype of cross-border Business-to-Business and Business-to-Government eCommerce in Central Europe". In March 2001, the workshop was sponsored by the Research and Development Division, Ministry of Education in Budapest, Hungary. In May 2001, the workshop was sponsored by the Intereuropa and ATNET companies in Koper, Slovenia.

The workshops have lead to an "Executive Sellers & Buyers Meeting: Regional Cooperation in eCommerce Development", a component of the 14th Bled eCommerce Conference in June 2001 (http://eCenter.FOV.uni-Mb.si/Proceedings). The purpose of the meeting was to bring together business and government executives involved in cross-border transactions, as well as the facilitation and simplification of business process. The eTechnology providers and academics were also involved. The objectives of the meeting were: to encourage top executives to conduct business electronically; to motivate the use of the latest eTechnologies; to prepare proposals for joint cross-border eCommerce projects in the region of the neighboring countries. The meeting was the first in a series of business & government executive meetings on cross-border eCommerce development, which have taken place in Slovenia twice a year since than (in June and November). They have played a visible role in cross-border eRegion awareness and creating action.

In March 2002, the Electronic Commerce Center of the University of Maribor, Faculty of Organizational Sciences & the Government Center for Informatics, Republic of Slovenia, sponsored a Workshop on "Building A Mega-Portal For Regional Economic Development" (Boyson and Gričar 2002; Gričar 2002). Over 40 participants have attended, representing businesses, governments and universities in Slovenia and the neighboring countries of Austria, Croatia, Italy and Germany. Involved were the researchers of the University of Rijeka, Croatia; the University of Graz, Austria; the University of Trieste, Italy and the University of Maribor, Slovenia, all interested in the development of

cross-border regional eCommerce. They became a core group of ALADIN – the ALpe ADria INitiative Universities' Network. It has been confirmed in the discussion at the workshop that the Mega Portal concept is important to the region since both the Pan-European transport Corridor No 5 (Lisbon, Portugal to Kiev, Ukraine) & No 10 (Hamburg, Germany to Istanbul, Turkey & Thessaloniki, Greece) crossing in this region. There is also significant sea traffic to/from Central Europe through the North Adriatic ports of Koper in Slovenia, Trieste and Venice in Italy, and Rijeka in Croatia to/from the Middle East, Asia and Australia.

The universities proved to be very helpful in opening up related contact in their respective countries. In recent years, ALADIN – the ALpe ADria INitiative Universities' Network – has become involved in the following annual events:

■ The International Workshop on the LivingLabs in the Innovative Cross-border eRegion, http://eCenter.FOV. Uni-Mb.si/eLivingLabWorkshop (each November since 2004).

■ The Merkur Day 2007, Undergraduate and Graduate Students eConference, http://eCenter.FOV.Uni-Mb.si/MerkurDay (each November since 1999).

■ Business & Government Executive Meeting on the Innovative Cross-border eRegion, http://www. bledconference.org/ExecutiveMeeting (each June and November since 2002).

■ eUniversity Forum: eIntegration Challenges for Rectors & Deans: Cross-border Cooperation in the Innovative eRegion, http://www.BledConference.org/ eUniversityForum (each June since 2003).

■ Bled eConference, http://www.BledConference.org (each June since 1988).

The eBSN – European e-Business Support Network for SMEs, E-business, ICT industry and services, Enterprise and Industry Directorate-General, European Commission – is supportive of the eRegion approach (Preparing 2006). Currently, several eRegion (cross-border) initiatives are in progress in Central Europe.

In Austria, the Ministry of Economic Affairs and Labor, in cooperation with the Chamber of Commerce (ICT Security 2005), has launched an initiative for standardizing a common eInvoicing (e-billing) interface. A second call is opened for Cooperation in Innovation and Research with Central and Eastern Europe (CIRCE 2006). "eSchwechat" is a concept that gives Schwechat, a town at the edge of the Vienna Airport, a specific profile as an "Information Society City" (Fazekas and Koch 2006). The Austrian government is sponsoring a conference on networking and cooperation across borders (eGovernment in Austria 2007) with a target audience of representatives of governments and governmental organizations from countries in Central and Eastern Europe and Central Asia.

In Slovenia there are two initiatives in progress: One, a project initiative for eInvoicing in the eRegion involving companies, banks, government agencies, municipalities, development agencies, universities and technology providers (eInvoicing 2005). Two, a project initiative for the interoperability of information systems for organizations involved in major disaster relief in the eRegion (Safe and Secure eRegion 2006, Information Systems Interoperability

2006). Both initiatives were reported at several conferences and workshops (Gričar 2005a, Gričar 2005b, Gričar 2006).

The eInvoicing initiative is in line with the development in the Nordic countries (Helsinki Manifesto 2006). The Finnish Presidency has given priority to the need to strengthen the European global competition and innovation in the framework of a revitalized Lisbon strategy, the i2010 policy and the European Programme for Competitiveness and Innovation (CIP) through essential structural reforms and the more efficient use of information and communication technology (ICT). , a list of the proposed twelve most supported measures to boost European competitiveness and innovativeness is very relevant to the development of the eRegion. In particular the following measures:

No 1. The implementation of a European Network of Living Labs, a user-centric platform for products and services in the co-creation processes.

No 2. Reap the benefits of re-using banking infrastructure: realize eInvoicing with interoperable standards.

No 9. Intensify the integration of the retail banking market with the full and prompt implementation of the Payments Services Directive (realize a single market in payments) and the integration of the key financial market infrastructure (Target2-Securities).

No 10. The implementation of a Europe-wide compatible eInvoicing system with common standards and definitions.

The interoperability issues of information systems of the organizations involved in a major disaster relief effort are challenges of the regions (Harrald 2004). The recent and proposed expansion of the European Union dramatically increases the geographical area and economic domain that will join the evolution towards openness, integration, harmonization and sustainable economic growth. This evolution will not occur, however, if emerging risks are not identified and managed. These emerging risks include natural disasters (which is increased by the admission or consideration of countries in higher risk areas), terrorism, supply chain security, financial security, cyber-security, corruption, technological hazards, safety of transportation and others. It is, however, also very important to have related eSolutions ready in the case of a major disaster in any country in the region. The countries in Central Europe are prone to natural disasters such as flooding, earthquakes and fires, as well as road, rail and tunnel accidents. Additionally, all regions are prone to man-made disasters and terrorism. In order to be more effective at handling major disasters, the eRegional approach is a must since disasters do not recognize geographical or political borders (Memorandum 2005). From a wider perspective of the security picture, the EU's interests in the region are even broader. Cornell et al. (2006) are discussing a range of developments over the past few years that have attracted increasing attention to the emergence of the Wider Black Sea Region as a new hub of European security.

As indicated in the Helsinki Manifesto (2006), the Living Labs may be considered a vehicle for an accelerated innovative development in the area of Collaborative Working Environments (CWE) and enabling technologies (Cornwell and Salmelin 2006; Salmelin and Gričar 2006; European Network of Living Labs 2006). In order to achieve

the expected results, the following recommendations may have to be considered (van Bemmelen and Fusco 2006): supporting sectorial collaborative application research involving innovation centers with practical experimentation and field trials; supporting the mobility of researchers as an immediate benefit of working environment virtualization; creating synergies of experiences across different sector Living Labs; ensuring wider access to results; addressing interdisciplinary issues; developing virtual centers of excellence in various CWE topics; measuring the performances achieved; assessing the maturity for a large scale CWE initiative.

The development of the eRegion is strategically important for Slovenia. Accepting the messages of the ministerial declaration of the Gothenburg Conference (Towards a Knowledge Society 2005), and considering the level of information and communication technologies and eSolutions implemented in Slovenia, the possibilities are great for an accelerated development of intensified links with the neighboring countries. As stressed by the Minister of Economy of Slovenia (Vizjak 2006), the development of the eRegion is beneficial for Slovenia's development. Slovenia can provide a tangible example of e-cooperation to the countries situated in a certain geographical area of the European Union in order to increase the competitiveness of each of the countries participating and the eRegion as a whole. The eRegions will contribute to the implementation of the Lisbon Strategy and so the cooperation between research units, laboratories, organizers, companies and governmental organizations is therefore indispensable.

5   Suggestions

Since the eRegion is a relatively new concept, it is difficult to come up with a firm set of conclusions. Rather we would like to provide some suggestions that may indicate directions for further research, development and action.

A cross-border eRegion covering the neighboring countries may be an important area for observation, research, development and action. Based on the results achieved, the region of the Nordic countries deserves serious attention. Opening up possible contacts with businesses, government agencies and universities in the Nordic region may be useful for countries of any region, including Central Europe. The Nordic experience is just too good to be kept a secret.

Considering the nature of experimenting (prototyping and proving concepts) in an area of rapid environmental changes and technological opportunities, all parties involved will have to work together more closely. Business, government, and academic representatives will be continuously looking for the new ways for eCollaboration. They will be experimenting with how to work in an accelerated mode and in an increasingly complex environment. Living Labs may prove to be a convenient common working environment.

Perhaps eRegion development may be considered as a model for the creation of desirable, convenient and beneficial environments for all parties involved: business, government and academic. It could be recommendable to consider the creation of a country-wide Living Lab in order to experiment with cross-border inter-organizational systems within an interdisciplinary environment. A small and fast developing country open to innovation may perhaps accept the challenge more easily.

It would be necessary to define and elaborate on the eRegion catalysts, a list of the critical factors for success. For example, a standard of living foundation, government structure, societal openness, culture, the level of education, entrepreneurial spirit, common history, trust, common language, access to technology and more.

The current environment of 27 countries in the European Union is providing wonderful eCollaboration opportunities for organizations of all types in all the member states. In the EU countries in the Amber Road regions, for example, improved interrelated business and government standards may lead to accelerated development. In the eSilk Road regions on the other hand, countries in which these standards would not apply so soon, a lower rate of development may be expected. However, the experience and good practice gained in the counties of the eAmber Road regions may help those in the regions of the eSilk Road.

Once created, the eRegions may be e-connected to each other. Their mode of operation (best practice) may perhaps be copied to other parts of the world. Perhaps we will see some EU countries that are good not only at a cross-border innovative eRegion development but also at innovative ways of exporting innovative cross-border eSolutions.

Several questions remain. Which components, solutions or operations that are successful in one eRegion could be copied, which just followed and which are not applicable at all in another eRegion? Can some guidelines for successful inspiration be defined and generalized for improved understanding of the potential of the eRegion as a concept and a practice? How relevant are the outstanding business, government and academic leaders in the increase of awareness, in policy making or the implementation of solutions? How can the success of an eRegion be measured? What are the impacts of information and communication technologies on eRegion development? To what extend is an eRegion's environment more favorable to the development of innovative information and communication technologies, compared to a region where no particular attention is paid to "e"? Can the countries in regions facing tensions, conflicts and closeness gain benefits if helped in, or pushed into, eRegion development?

References

Aho, E. (chair) (2006). Creating an Innovative Europe. Report of the Independent Expert Group on R&D and Innovation, appointed following the Hampton Court Summit. Luxembourg: Office for Official Publications of the European Communities, January 2006, available from: ec.europa.eu/invest-in-research/pdf/download_en/aho_report.pdf

Bavec, C. (2006). Policy Vision of eRegion – the Case of EU and non-EU Countries. *Organizacija, 39*(3): 209-212.

Bačanović, D & Jošanov, B. (2006). Contributions of ALADIN to eRegion Development: The Novi Sad Business School Perspective, Department for Informatics. *Organizacija, 39*(3): 205-206.

Bešter, J. (2005). Slovenia – An ICT Innovation Platform. Panel presentation at the Ministerial Conference "Towards a Knowledge Society - the Nordic Experience", Gothenburg, Sweden, 14-15 November, 2005, available from: ec.europa.eu/regional_policy/sources/docconf/gothenburg/present/monict_bester.pdf

Boyson, S. & Gričar, J. (2002). Selected Topics for Discussion Between Country Representatives (unpublished document). Presented at a Workshop "Building A Mega-Portal For Regional Economic Development". Sponsored by the Electronic Commerce Center of the University of Maribor, Faculty of Organizational Sciences, Slovenia & Government Center for Informatics, Republic of Slovenia, March 4, 2002.

Bračun, F. and Gričar, J. (editors). (2001). Organizational Prototype of Cross Border Business-to-Business and Business-to-Government Electronic Commerce. Kranj: Center of Electronic Commerce, Faculty of Organizational Sciences, University of Maribor, May 2001.

Castells, M. (1996). *The rise of the Network Society - The Information Age: Economy, Society and Culture*. Blackwell Publishers.

CIRCE – Cooperation in Innovation and Research with Central and Eastern Europe. 2nd Call for Proposals in CIRCE, December 6th 2006, available from: http://www.aso.zsi.at/de/all/aktuelles/2151.html .

Clusters of Innovation, an initiative of the Council on Competitiveness, Washington DC, available from: http://www.compete.org/nri/clusters_innovation.asp .

Cooke, P., Boekholt P., Schall, N. & Schienstock, G. (1996). Regional Innovation Systems: Concepts, Analysis and Typology. Paper prepared for EU-RESTPOR conference Global Comparison of Regional RTD and Innovation Strategies, 1996.

Cornell, S. E., Jonsson, A., Nilsson, N., & Häggström, P. (2006). The Wider Black Sea Region: An Emerging Hub in European Security. Central Asia-Caucasus Institute & Silk Road Studies Program – A Joint Transatlantic Research and Policy Center. Johns Hopkins University, United States & Uppsala University, Sweden, December 2006, available from: http://www.SilkRoadStudies.org .

Cornwell, D., & Salmelin, B. (editors) (2006). Collaboration@Work Report 2006. European Commission, Information Society and Media Directorate General, New Working Environments Unit, available from: ec.europa.eu/information_society/newsroom/cf/newsbytheme.cfm?displayType=news&tpa_id=101.

Doucek, P. (2006). Contributions of ALADIN to eRegion Development: The University of Economics – Prague Perspective. *Organizacija, 39*(3): 206-207.

eBaltics - Building Effective Partnership Networks: The 10th International Conference "Information Technologies and Telecommunications in the Baltic Sea and CEE Region". Baltic IT&T 2006 Forum. Rīga, Latvia, April 5-7, 2006, available from http://www.ebaltics.com/QuickPlace/forum2006/Main.nsf?OpenDatabase.

eGovernment in Austria - Networking and Cooperation across borders. Conference sponsored by the Austrian Federal Chancellery in Vienna, Austria on January 30, 2007.

eInvoicing in the eRegion: Slovenia's Project Initiative, November 2005, available from: http://www.eLivingLab.org/Invoicing .

eRegion Emergence and Impact, Call for Papers. *Electronic Markets* (2007). *The International Journal*, **17**(4), http://www.ElectronicMarkets.org.

European Network of Living Labs places people at the very centre of product development and innovation. The European Network of Living Labs Launch under the Finnish EU Presidency, Helsinki, November 20, 2006, available from: http://www.vnk.fi/ajankohtaista/tiedotteet/tiedote/en.jsp?toid=5299&c=0&moid=149663&oid=175010 .

Fazekas, H. & Koch, G. (2006). Contribution from the City of Schwechat to an Innovative Cross-border eRegion. The Merkur Day 2006, 8th Undergraduate and Graduate Students eConference & the 14th Business & Government Executive Meeting on the Innovative Cross-border eRegion, November 10, 2006, available from: http://ecom.fov.uni-mb.si/MerkurDay/Papers/Koch.doc.

Fratianni, M. (editor). (2006). Regional Economic Integration, Research in Global Strategic Management, Elsevier.

Gábor, A. (2006). The ALADIN initiative is a framework for the strategic renewal of Corvinus University Budapest. *Organizacija, 39*(3): 201.

Gričar, J. (2002). Importance of Regional Cross-border eCommerce Development. In: Vukovič, Goran (editor) Management and European Union. Kranj: Moderna Organizacija, 2002, 18-25.

Gričar, J. (2004). Presentation at the Meeting of the Commercial Counsellors on Cross-border eRegion Development. Sponsored by The Ministry of Foreign Affairs, Republic of Slovenia & The University of Maribor, March 9, 2004, available from: http://www.elivinglab.org/safe/CommercialCounsellors.doc.

Gričar, J. (2005a). eRegion development by 2010: eGovernment policy proposed by Slovenia. A panel presentation. eGovernment Policy Stakeholders Meeting, 21 September 2005, Brussels, Final report, available from: ec.europa.eu/

idabc/en/document/5304/254.

Gričar, J. (2005b). ICT in the eGovernment: Do we need more? Panel presentation at the Ministerial Conference "Towards a Knowledge Society - the Nordic Experience", Gothenburg, Sweden, 14-15 November, 2005, available from: http://ec.europa.eu/regional_policy/sources/docconf/gothenburg/program.cfm.

Gričar, J. (2006). LivingLabs in eRegion Contributing to International e-Participation and Local Democracy: a panel presentation at International e-Participation and Local Democracy Symposium "Promoting Social Inclusion via eParticipation", Budapest, Hungary 26-28 July 2006, available from: https://www.1888932-2946.ws/edemocracy/E-DocumentManager/gallery/Budapest_Documents/JozeGricarBudapest.pdf

Gričar, J., Pucihar, A. & Lenart, G. (2005). Active Learning Model for Teaching B2B E-Marketplaces. *Journal of Information Systems Education*, **16**(1): 103-108, available from: http://www.jise.appstate.edu/Contents/Contents-16-1.htm.

Gričar, J. & Kljajić, M. (2006). Contributions of ALADIN to eRegion Development: The Faculty of Organizational Sciences, University of Maribor Perspective, *Organizacija*, **39**(3): 202-203.

Harrald, J. R. (2004). Ensuring a Safe and Secure eRegion: A Proposed "Living Laboratory" Experiment. Outline. December 22, 2004, available from: http://www.elivinglab.org/safe/DisasterReliefEvents.htm .

ICT Security, e-Invoicing and e-Payment Activities in European Enterprises. Special Report. eBusinessW@tch, September 2005, available from: www.ebusiness-watch.org/resources/documents/TR04_Sec-Payments_2005_web.pdf .

Inchingolo, P. & Ukovich, W. (2006). Contributions of ALADIN to eRegion Development. The Perspective of the University of Trieste. *Organizacija*, **39**(3): 207-208.

Information Systems Interoperability of Organizations Involved in a Major Disaster Relief in the eRegion: Slovenia's Project Initiative, February 2006, available from: http://www.eLivingLab.org/Safe .

InnovateAmerica – National Innovation Initiative Report: Thriving in a world of challenge and change. (2004). Washington DC: Council on Competitiveness, December 15, 2004, available from: http://www.compete.org/nii/interim.asp.

ISTAG – Information Society (2006). Technologies Advisory Board Reports. Information Society Directorate-General, September 2004, available from: http://www.cordis.lu/ist/istag.htm.

Katzy, B. R. Contributions of ALADIN to eRegion Development: Research and Innovation in a Regional "Living Laboratory". *Organizacija*, **39**(3): 203-205.

Kautonen, M. (2006). The Regional Innovation System Bottom-up: A Finnish Perspective, Tampere University Press.

Ketels, C. & Sölvell, Ö. (2006). The Baltic Sea Region – Top of Europe in Global Competition. State of the Region Report. Copenhagen/Helsinki: Baltic Development Forum, October 2006, available from: publish.capteco.com/bdf/summit_2006/website/State_of_the_Region_Report_06.pdf .

Memorandum of Safe and Secure eRegion. Ljubljana, Slovenia, June 2005, available from: http://www.elivinglab.org/safe/memorandum.htm.

Petrovic, O. & Kittl, C. (2006). Contributions of ALADIN to eRegion Development: The University of Graz Perspective. *Organizacija,* **39**(3): 201-202.

Pinder, A., Chianjian, J., Vogel D. R. & Gričar, J. (Co-chairs): eAmber & eSilk Road Regions Meeting: Business and Government Executives & Professors' Commitment to Making a Difference. 18th Bled eConference "eIntegration in Action", Bled, Slovenia, June 6 - 8, 2005. Proceedings,

Business Volume, 1-3, available from: http://eCenter.FOV.uni-Mb.si/Proceedings.

Pinder, A., Herweijer, I., Vogel D. R. & Gričar, J. (Co-chairs): eSilk & eAmber Road Regions Meeting: eParticipation, Social Inclusion, Democratic Engagement: The Next Big eAgenda. 19th Bled eConference "eValues", Bled, Slovenia, June 5 - 7, 2006. Business Volume, 1-3, available from: http://eCenter.FOV.uni-Mb.si/Proceedings.

Pfirrmann, M. (2003). eRegion - supporting regional development through a collaborative world wide web based information portal. 39th ISoCaRP Congress 2003, available from: www.kas.de/upload/dokumente/megacities/eRegion.pdf.

Porter, M. E. (1998). *The competitive advantage of nations.* London: Macmillan, 1998.

Preparing for a Cross-border eInvoicing: Experiences and Future Challenges. Panel chaired by Costantin Andropoulos. 19th Bled eConference "eValues", Bled, Slovenia, June 5-7, 2006, available from: http://www.BledConference.org .

Putting knowledge into practice: A broad-based innovation strategy for the EU. Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions. COM(2006) 502 final. Commission ff the European Communities, Brussels, 13.9.2006, available from: http://www.europe-innova.org/exportedcontent/docs/6/6206/en/EN%20502%20-%20original.doc.

Reding, V. (2006). FP7: A new framework for competition, innovation and growth. IST 2006 - Strategies for Leadership. Helsinki, Finland, 21 November, 2006, available from: europa.eu.int/information_society/istevent/2006 .

Safe and Secure eRegion LivingLab Workshop. (2005). Sponsored by: eCommerce Center, Faculty of Organizational Sciences, University of Maribor & Directorate for Information Society, Ministry of Higher Education, Science, and Technology, Republic of Slovenia, in cooperation with ALADIN – ALpe ADria INitiative Universities Network. Ljubljana, Slovenia, April 22, 2005, available from: http://ecenter.fov.uni-mb.si/SafeSecureRegion/index.htm .

Salmelin, B. & Gričar, J. (2006). Challenges for Developing Knowledge-intensive Services and Businesses Through Diversity of Living Labs: a panel presentation at the European Network of Living Labs Launch - a Step Towards an European Innovation System. EU Presidency Conference, Helsinki, 20 November 2006.

Sotarauta, M. & Bruun, H. (2002) (editors). Nordic Perspectives on Process-Based Regional Development Policy. Stockholm: Nordregio, 2002, available from: http://www.nordregio.se.

Sotarauta, M. & Hukkinen, J. (1988). Nordic Perspectives on Process-Based Regional Development Policy. Stockholm: Nordregio, 2002, available from: http://www.nordregio.se/r0203.htm. In: Kautonen, M. and Schienstock, Regional Innovation System in Tampere Region, Finland. Final Regional Report to the DGXII of the European Commission (TSER Programme). Cardiff: Centre for Advanced Studies in the Social Sciences, University of Wales.

The Helsinki Manifesto - We have to move fast before it is too late. (2006). European Network of Living Labs - a Step Towards an European Innovation System. EU Presidency Conference, Helsinki, 20 November 2006.

Towards a Knowledge Society - the Nordic Experience. Conference Declaration. Ministerial Conference, Gothenburg, Sweden, November 14-15, 2005, available from: europa.eu.int/information_society/activities/gothenburg_conference/doc/pdf/scope.pdf.

U.S. Competitiveness: The Innovation Challenge (2006). National Summit on S&T, Innovation, and Manufacturing, 6 December

2005, available from: http://www.ieeeusa.org/policy/issues/innovation.

Wessner, C. W. (editor) (2003). Government – Industry Partnership for the Development of New Technologies. Washington DC, The National Academies Press, 2003.

Van Bemmelen, J. & Fusco, L. (2006). A coordinated programme including objectives and procedures. Report on raising public participation and awareness. BrainBridges IST-015982 (D4.4, Ver 1.3), December 2006, available from: www.cdt.ltu.se/main.php/BrainBridges_coordinated_programme_D4.4_ver_1.3.pdf?fileitem=4620308.

Vizjak, A. (2006). Slovenia in the eRegion: Exploiting eValues for the Economy Growth. Opening speech. 19th Bled eConference "eValues", June 5 - 7, 2006, Bled, Slovenia, available from: http://ecenter.fov.uni-mb.si/ecomframes.nsf/pages/bled2006 .

Vogel, D. (Chair): The New Silk Road. Panelists: Gotschlich, G., Gričar, J., Harris, R., Shakirov, N. & Turban, E. (2002). 15th Bled Electronic Commerce Conference "eReality: Constructing the eEconomy", Bled, Slovenia, June 17 - 19, 2002. Proceedings, Business Volume, 94-95, available from: http://ecom.fov.uni-mb.si/ECOMFrames.nsf/pages/bled2002 .

Vogel, D. & Gricar, J. (1998). (Guest Editors). A Global Perspective on Electronic Commerce. *International Journal of Electronic Commerce*, **2**(3):3-4.

Vogel, D. R. & Gričar, J. (2006). eSilk & eAmber Road Regions Meeting: Business & Government Executives & Professors Commitment To Making A Difference. In: Gričar, Jože (editor): E-Region in e-Europe, *Organizacija*, 39(3): 214-215.

Vogel, D. R., Gričar, J., Harris, R. & Sorrentino, M. (2003). eTransformation of the Silk Road: Rejuvenating a Historical Trade Network. In: Wigand, Rolf T.; Gričar, J., Pucihar, A. & Kramberger, T. (editors), Conference Proceedings. Sixteenth Bled eCommerce Conference: eTransformation, Bled, Slovenia, June 9-11, 2003. Kranj: Moderna organizacija, pp. 393-404.

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Regional Cooperation between Universities, Research Institutions and Industry

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Due to the fact that Slovenia is a small country in every aspect, we should cooperate at all levels of society in order to succeed among the global competition – to turn our smallness into an advantage. Thanks to this smallness everybody knows almost everybody else, which gave us a basis for cooperation in the past. In more recently, various mechanisms have emerged in Slovenia for encouraging more formal ways of cooperation among entities of the society, such as centres of excellence, technology centres, clusters, technology networks and technology platforms.

In Slovenia, the players in the area of Information Communication Technologies (ICT) have established a solid tradition of collaboration between companies and research and development (R&D) institutions, which is of great importance in the world where development is rapid and where it is of vital importance for R&D companies to produce new products and solutions as quickly as possible if they want to expand. Today, almost all the leading Slovenian companies in the area of ICT are members of the ICT Technology Network (ICT TN), where they can find a place for cooperation and for the successful development, production and sale of integrated and user-friendly solutions and products.

In this paper we will present ICT TN and its organisation. Special attention will be given to presentation of the four projects that members of ICT TN work on. The Centre of Excellence for Information and Communication Technologies (CE ICT), the Next Generation Network (NGN) Interoperability testing laboratory SINTESIO and the Technology Platforms (TP) are especially interesting projects because it is not just the technological aspect but also the social aspect – in the form of networking and collaboration – which is important.

Keywords: Technology Network, Technology Platforms, Centre of Excellence, Interoperability testing laboratory.

Regionalno sodelovanje med univerzami, raziskovalnimi institucijami in industrijo

Glede na to da je Slovenija v vseh pogledih majhna dežela, bi morali razviti sodelovanje na vseh družbenih ravneh, če hočemo uspeti v globalni konkurenci – le tako bi našo majhnost spremenili v konkurenčno prednost. Zaradi te majhnosti se skorajda vsi medsebojno poznamo, kar je bilo v preteklosti temelj za sodelovanje. Nedavno tega so se v Sloveniji pojavili različni mehanizmi za spodbujanje bolj formalnih načinov sodelovanja med družbenimi subjekti, kot so centri odličnosti, tehnološka središča, grozdi, tehnološke mreže in tehnološke platforme.

V Sloveniji so akterji na področju informacijskih in komunikacijskih tehnologij vzpostavili trdno tradicijo sodelovanja med podjetji in institucijami za raziskave in razvoj, kar je velikega pomena v svetu, kjer se odvija hiter razvoj in kjer je za razvojna in raziskovalna podjetja življenjskega pomena, da kar se da hitro izdelujejo nove izdelke in rešitve, če se hočejo širiti. Danes so skorajda vsa vodilna slovenska podjetja na področju informacijskih in komunikacijskih tehnologij člani informacijske in komunikacijske tehnološke mreže, kjer lahko najdejo prostor za sodelovanje in uspešen razvoj, proizvodnjo in prodajo integriranih in kupcu prijaznih rešitev in izdelkov.

V tem prispevku bomo predstavili informacijsko in komunikacijsko tehnološko mrežo in njeno organiziranost. Posebno pozornost smo namenili predstavitvi štirih projektov, na katerih delajo člani informacijske in komunikacijske tehnološke mreže. Središče za odličnost informacijskih in komunikacijskih tehnologij, naslednja generacija mrež, skupna uporabnost testnega laboratorija SINTESIO in pa tehnološke platforme so še posebej zanimivi projekti, kajti pri njih ni pomemben le tehnološki vidik, pač pa tudi družbeni, ki se kaže v obliki mrežnih povezav in sodelovanja.

Ključne besede: tehnološka mreža, tehnološke platforme, središče za odličnost, skupna uporabnost testnega laboratorija.

1   Introduction

Many good and even excellent ideas never come to realisation. Every product, every technology and every concrete result was started as just an idea in the head of an individual. Although ideas do not represent anything concrete, they can be the beginning of something big, important and special. In the past several years, the end solutions, products and services in the area of ICT have become so complex that is nearly impossible for individual developers to realise them on their own. The developers have to cooperate with each other in order to create a product out of the original ideas and to meet the needs for freedom of choice for the end-users, more quality products and services, disabling locking-in for individual solutions and technologies, better surveillance of investments,
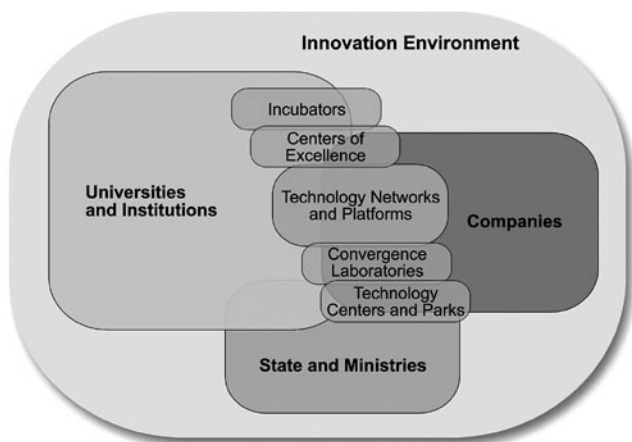
Figure 1: Innovative Environment

ensuring wider usage of the technology, easier market entry and growth, sharing knowledge, reducing time-to-market and lowering the business risk for developing new and innovative products and services.

Therefore in 2003 almost 40 companies, universities and their members, public and other research institutions and other legal entities decided to establish the ICT TN which provides an opportunity to realise ideas and enable success. Since 2005 ICT TN has been operating as a consortium of members who have expressed interest in cooperating on the realisation of common development strategies and the achievement of consortium goals. The aim of the consortium is to ensure efficient mechanisms for the support of joint technology development projects and the establishment of an integrated environment for innovation in the field of ICT. ICT TN presents the innovative environment as shown in Figure 1.

2 The ICT Technology Network

Upon the establishment of the ICT TN, its member companies and institutions set some key common goals: to develop new technologies, services and content for achieving greater added value, to develop an environment of innovation and development, to gather new knowledge for the companies within the network and to positively influence other commercial and non-commercial sectors. The consortium achieves its goals through several organisational bodies, e.g. the General Assembly, the Project Council, the Executive Manager and the Project Office (http://ict-slovenia.net, 2006).

Among all the similar associations of companies, universities and research institutes in Slovenia, ICT TN has achieved the highest critical mass of knowledge, capital, added value, export and influence across the economic competitiveness of Slovenia as a whole. It unites 47 members who generated income of €1.8 billion in 2005 and, with their prevailingly complex technological products, have achieved a more than 20% share of export. In total, the network members employed 13,500 people of which almost 9,000 were in companies. The development potential of the

network is best reflected in the more than 1,000 researchers employed in its member companies and institutions (ICT Technology Network (2006)).

During the 2003-2006 period the partners realised several activities and projects with a total value of about € 6.15 million within this network. The partners provided 47% of funds for the financing of those projects from their own resources while 53% came from public resources acquired from the state budget and EU funds. The projects and activities of the ICT TN mainly have a technological impact on society, though some of them also have an important social impact. The projects and activities fall into the following types:

- Centre of Excellence for ICT (CE ICT);
- NGN Interoperability Testing Laboratory - SINTESIO;
- Technology platforms (TP);
- e-Region.

2.1 The Centre of Excellence for ICT

The Centres of Excellence (CE) are high quality multidisciplinary groups of researchers from academia and industry that represents the critical mass of knowledge and a proper research infrastructure for the breakthrough to the peak of global science and/or integration into the international network of excellence (http://www.mvzt. gov.si/index.php?id=962, 2006). The critical mass of experts and knowledge is oriented towards joint integrated projects from partners with real market possibilities. CEs were developed and implemented in cooperation with the Slovenian Ministry of Higher Education and Technology. The Slovenian government also supported the CEs with a total of almost €1.3 million over a period of two years with the possibility of receiving more funds for another two years.

The CE ICT was established in 2004 on the initiative of ICT TN with the aim of achieving combined excellence in technical, applicative, innovative, developmental and research areas in the wider multi-disciplinarian area of ICT. CE ICT unites 26 partners with 16 research teams and over 120 researchers. In the 2004-2006 period they carried out six R&D projects with a total value of €1.9 million (http://www.ltfe.org, 2006).

The result of the first project, *"Technologies for the Education and Development of Innovation Environments",* was the development of technologies enabling new convergent e-services and new e-content within the broadband information infrastructure and a multi-media centre as a part of the ICT Technology Network innovation environment.

The evaluation environment was established for the appraisal of the efficiency of automatic speech recognition systems. The speech synthesiser, a system for the recognition of user gestures and a software application for the semi-automatic determination of parameters for x-ray photographs were developed in the second project *"Voice and Image Technologies within ICT".*

In the third project, *"Managing the process of development and information technologies in developing solutions for e-business",* the AMD (Agile Methodology

Development) method and the AMT (Agile Methodology Toolset) support tools for the recovery, formalisation, adaptation and constant upgrading of the methodology for developing information solutions.

The fourth project, *"Protocols and Integration of Services in NGN Convergence Systems"*, established an environment for testing and development for the NGN systems (call servers, application servers, the media and signalling gateway and terminal equipment). Analyses and studies were carried out and NGN services were developed (the "Personal Communication Portal", "CSTA-Parlay X Gateway" and "Outlook Add-on for Click-to-Dial").

The results of the fifth project, *"Wireless Communication Platforms"*, include the design of the modem part of the WiMAX base station, simulation of WiMAX radio signal propagation and the calculation of radio signal coverage, the possibility for the application of adaptive ("smart") antenna systems and studies of the ecological aspects of radiation affecting living organisms.

In the sixth project, *"Verification of the Correct Functioning of Communication Systems"*, the verification of the correct functioning and reliability of software for telecommunications system was carried out for the formation of the IUA protocol model, which is a part of the SI2000 V6 switching system.

2.2 SINTESIO

SINTESIO is an open, non-profit NGN interoperability testing laboratory approved by the European Telecommunications Standards Institute (ETSI) and established by industrial partners, standardisation bodies and the university. The aim of the testing laboratory is the preparation, organisation and realisation of testing the conformance, interworking and interoperability of NGN and IMS standards.

The idea to set up the permanent open NGN interoperability test site (SINTESIO) was born in 2004 and it was realised through cooperation with Iskratel, the Faculty of Electrical Engineering and the Slovenian Institute for Standardisation. When the basic concepts were developed, the idea was introduced to ETSI in 2005, which strongly supported the idea and gave it its endorsement. ETSI, especially TISPAN and Work Group Six (WG6), also actively joined in the preparation of further concepts concerning setting up the interoperability testing laboratory.

The activities of SINTESIO are based on the open, neutral and professional provision of services with the support of high-level technology and a sustainable infrastructure. It includes the organisation and realisation of projects and events such as interoperability testing, seminars and workshops for the successful promotion and support of open standards, interoperability and the application of ICT products, applications and services (http://sintesio.org, 2006).

The laboratory significantly contributes to the continuous development of network platforms, sites for interoperability tests and methodologies. The importance of this contribution is significant due to the fact that interoperability in the area of ICT presents one of the most important conditions for the successful development of the information society. Interoperability brings positive effects to the ICT industry – especially in the area of the small and medium enterprises that dominate Europe. It also enables easier market entry and growth, information and investments, and improved sharing of knowledge; it reduces the time-to-market and lowers the business risk for developing new innovative products and services (INFRACOM 2005).

2.3 Technology Platforms

TP is a development policy mechanism introduced by the EU where the challenges of individual fields meet and the strategic advantages and opportunities of individual areas of technology are determined. In the field of R&D, they encourage target-oriented investments and thus promote a more efficient approach to innovation as well as the co-ordination of activities within European and national research programmes. TPs also support the continuous development of appropriate know-how related to individual technological areas and to the use of new technologies. The initiative of the economy is emphasised in TP. Their open structure means that in order to be efficient they have to engage all the key factors of the economy, institutions, universities, public institutes and the state, as well as promoting partnership with other sectors, thus also forming the basis for a political dialogue. Following the example of the European TPs, Slovenian TPs also unite the participants in the formation of common strategic programmes. Together with the Chamber of Commerce and Industry of Slovenia, members of the ICT TN have established three TPs that cover the ICT area.

The eMobility TP covers the area of mobile and wireless technologies and services. Although one of the basic tasks of the TP is the formation of guidelines for R&D in this field, the activities of eMobility TP, in accordance with its mission, cover other fields as well. Its long-term activities encompass education and training as well as the promotion of the field of mobile technologies and services in Slovenia.

The Slovenian TP for software and services (NESSI), linked with the European NESSI platform, presents an open point for the pooling of knowledge, strategies and potentials for the faster development of this internationally competitive and penetrating sector. It encourages improved connectivity, the global accessibility of e-services and the faster introduction of research findings and new technologies into business and private life.

The basic aim of the media in the e-networks TP (NEM) is to encourage the development and introduction of advanced audio-visual and multimedia broadband services and applications for the benefit of the users. The NEM is focused on an innovative mix of various media forms, content and interactive models delivered seamlessly over technologically transparent networks to improve quality, enjoyment and life, reduce physical distance and eliminate the digital divide. NEM presents the convergence of existing and new technologies, content and manners of interaction, including broadband and mobile networks as well as new forms of media.

2.4 The eRegion

From geographic perspective, the eRegion is an area of some 200-500 kilometres distance around the point of observation in which business, government organisations and individuals extensively use ICT for doing business and supporting everyday activities (ICT – Powered eRegion, 2005). The formation and function of these eRegions enables handling and dealing with many of the contemporary challenges that Europe is facing. The implementation of the goals of the Lisbon Declaration and the policies of the EU TP stimulates different forms of regional partnership. ICT-driven solutions in particular enhance cross-border partnership and foster cross-regional cooperation among geographic neighbours. In the case of Slovenia, the eRegion expands around the wider circle of the crossroads of the fifth and tenth European mobility corridors in Ljubljana, Figure 2.

Combining the important geographic location with an excellent level of ICT development, Slovenia has the advantage of being a centre-point in a trans-national eRegion. Renowned companies, institutes, research facilities, faculties, test centres and laboratories are equally dispersed across the Slovenian territory and can easily connect and cooperate with similar centres across national borders. Such bilateral and multilateral international projects can significantly contribute to the extensive use of ICT and can increase the percentage of technology inclusion among the population.

The trends of merging and converging enable different economic branches to cooperate and intermingle thus forming a unique technological opportunity that is not to be missed. These trends of development and research characteristics coincide with the European political evolution and the expansion of the EU, which has removed obstacles and provided the conditions for successful international cooperation and projects. In this respect, the eRegion can assume the role of an "ICT Innovation Platform" and a "Living Lab" for the intelligent and safe circulation of people, knowledge, services and goods. A living lab is where scientific knowledge, cutting edge research and technological excellence meet the real environment and the working market.

Throughout its history, Slovenia and its ICT sector has proven capable of setting high goals and successfully implementing them. Thus, it is expected to play the leading role in the establishment of the eRegion. The ICT TN and its members are ready and highly motivated. We seek broad partnership and large scale support to target logistical, organisational, interoperable, regulatory and, last but not least, political issues.

3 Conclusion

The ICT TN is a group of diverse partners that complement each other in a way that strengthens the ability to transfer technologies and to master new ones, as well as the development of new technologies in priority R&D areas. The ICT TN mainly contributes to the realisation of goals such as the more efficient transfer of knowledge into the products, services and processes with high added value and an accelerated process of setting up new technological enterprises; improved collaboration between carriers of knowledge (universities, R&D and education institutions) and industry and increased investments into application R&D in the priority areas of technological research. The achievement of these goals through projects such as CE ICT, SINTESIO, TP and the eRegion will enable the rise of Slovenian global competitiveness and a faster BGP growth.

4 Literature

ICT – Powered eRegion (2005), ICT Technology Network brochure.

ICT Technology Network (2006), ICT Technology Network brochure.

INFRACOM (2005) Interoperability Framework for Converged Multi-services network, Project proposal documentation.

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O3-Medical Informatics Endeavor for the eHealth Region

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The Open Three (O3) Consortium is promoting the adoption of Open Source in e-health on regional, European and World-wide levels. This project aims to contribute to the development of e-health through the study of Healthcare Information Systems and the contemporary proposal of new concepts, designs and solutions for the management of health data in an integrated environment of hospitals, Regional Health Information Organizations and citizens (home-care, mobile-care and ambient assisted living).
Some concrete technical solutions in the field of medical informatics are presented in this paper. The applications presented are the heart of the Radiology information system, which is open to other health institutions, thus forming a basis for the realization of e-health integration. The formation of a genuine e-health region is just one step forward.

Keyword: medical informatics, e-health, open source software, radiology information system

O3 – prizadevanja na področju medicinske informatike za e-zdravstveno regijo

Konzorcij Odprti trije (O3) si prizadeva za sprejetje odprtega vira v e-zdravstvu na regionalnem, evropskem in svetovnem nivoju. Projekt si prizadeva prispevati k razvoju e-zdravstva s pomočjo preučevanja informacijskega sistema zdravstvenega varstva ter sodobnih predlogov novih zasnov, načrtov in rešitev za upravljanje z zdravstvenimi podatki v integriranem okolju bolnišnic, regionalnih organizacijah zdravstvene informatike in pri državljanih (v domači negi, mobilni negi in v primeru bivanja z asistenco v okolju).
V prispevku so prikazane nekatere konkretne tehnične rešitve na področju medicinske informatike. Prikazane aplikacije so bistvo radiološkega informacijskega sistema, ki je odprt drugim zdravstvenim institucijam in tako predstavlja temelj za realizacijo e-zdravstvene integracije. Tako je oblikovanje prave e-zdravstvene regije oddaljeno le še za korak.

Ključne besede: medicinska informatika, e-zdravje, odprtokodni sistemi, radiološki informacijski sistemi, radiološki informacijski sistem

1   Introduction

The applications presented in this paper have a rich history of development and implementation, which will be briefly presented. Additionally, a general description of the systems and standards necessary for the understanding of the paper is given in this introduction.

The Radiology Information System (RIS) is composed of several subsystems and their integration is often very complex technical issue. The most important of the subsystems is the Picture Archiving and Communication System (PACS), which identifies a manager and archiver of the images running on dedicated hardware which is forced to some extent to be proprietary, expensive and largely unscalable, despite the use of standards such as DICOM (Digital Imaging and Communications in Medicine),.

Still, although the usage of PACSs has increased considerably in the last five years, one of the main issues to consider today is the integration between it and the RIS (Radiology Information System), which was one of main aims of the DICOM and Health Level Seven (HL7 2007)

supporters. This issue should be considered a transitional step towards the realization of a new generation of hospital information systems based on the integration of distinct elements, as opposed to the development of monolithically-built software with the features of both systems but lacking of the fundamental upgradeability characteristics and real e-health integration.

The way to reach this goal is to integrate systems based not on data typology, as used in previous years, but on the role they assume in the information workflow. The Higher Education in Clinical Engineering (HECE) Program and the Health Telematics Laboratory (HTL) of the Bioengineering and ICT Group at DEEI, University of Trieste have been working on these themes for a long time (since 1991). This paper describes and explains the main results obtained in the last four years.

The recent strategies and results of HTL in this field have been significantly influenced by the last two EuroPACS meetings, held in Oulu (Finland) in 2002 and in Trieste (Italy) in 2004. The presentation of the new trends of the DPACS (Data and Picture Archiving and Communication

System) project at the University of Trieste (21), as in the concluding lecture of the EuroPACS meeting in Oulu in 2002, introduced the DPACS advances in fostering the e-health integration within the enlarged Europe and the combined hospital-territory-citizen environment. The recognized importance of these strategies for the future of Europe led the EuroPACS Society to entrust HECE with the organization of the 2004 EuroPACS meeting in Trieste, which focused on these themes. The successful "EuroPACS-MIR 2004 in the enlarged Europe" meeting in September 2004 (Inchingolo and Pozzi, 2004), with more than 400 participants from 47 Countries, witnessed deep discussion on issues of organization, standards and interoperability in all contexts, ranging from single departments up to transnational integration.

The real problems with managing the administrative and clinical workflows in any complex situation, including hospital-territory-citizen integration and multi-lingual management, have also been deeply discussed and experimented with through a living-lab that has been built-up in the conference exhibition area, which connects most of the exhibited PACS and RIS systems as well as some hospitals in Italy and in the surrounding countries. The specific problems related to transitional and developing countries have been also addressed.

The discussions in all the conference sessions, especially the ones on interoperability (Bourka et al. 2003, Al Safadi et al. 1998, Chronaki and Chiaurgi 2005) in the one-day workshop that was part of the world-wide IHE (Integrating the Healthcare Enterprise) project, generated strong results and guidelines for future work. Firstly, the "Is there a need for a transnational IHE committee in Central and Eastern Europe?" round table, which concluded the IHE Workshop, closed with the commitment to HECE of creating a transnational IHE committee for Central and Eastern Europe, dealing with technical, harmonization and law-oriented activities in 22 Central and Eastern European Countries.

Secondly, the same round table and most of the IHE workshop sessions underlined that the adoption of open standards and open source solutions is becoming an essential path to facilitate the rapid integration of health systems in Europe and worldwide, fostering this process in both transitional and developing Countries (Drury and Dhalman, 2005). In fact, well supported open source solutions is the only way to ensure the worldwide adoption of manager/archiver and cross-enterprise document sharing systems for medical data and images; furthermore, open source promotes the expandability and modularity of solutions, thus allowing collaboration between developers (Rosset et al. 2006, Hacklander et al. 2005, Lindahl et al. 2005, Kalra et al. 2005 and several others). Finally, open-source assures stability in the usage of the products, with the user – the health-care system in the general sense – able to use it with long-term continuity and also to improve, update, modify and integrate it as much as necessary for his scopes, even if the developer or vendor disappears from the market.

HECE, together with HTL and OSL (Open Source Laboratory) at DEEI, started in 2005, heading in both these directions. In relation to the second one, the Trieste

Figure. 1: The three domains of O3

group presented the new open-source version of their DPACS-2004 project (Inchingolo et al. 2004) together with a universal workstation named HDW2 (Miniussi et al. 2004) and the group from the Radiology Department of Padova presented the new open-source version of their Raynux /MARiS project (Saccavini, 2004)). They decided to fuse and integrate their projects and efforts and hence the Open Three (O3) Consortium Project www.o3consortium.eu was begun (Inchingolo et al. 2006). At this point the Faculty of Medicine of the University of Maribor, which is participating in the development and implementation, also joined the O3 Consortium. The installation of the O3 system is constructed and being tested at the Maribor hospital (2000 beds).

O3 deals with the three domains of the tomorrow's e-health, in the frame of the European e-health programs: hospital, territory and home-care / mobile-care / ambient assisted living (AAL).

2 Development and Implementation

2.1 Premises

The research work on PACSs at the University of Trieste, carried out by HECE and HTL, started in 1991 after a CommView AT&T Philips multi-site PACS system was installed at Trieste's Cattinara and Maggiore Hospitals in 1988. This was the first European installation of a commercial PACS system in a hospital enterprise and also the first installation in Europe of two PACS systems connected together over a metropolitan area network. The HTL work aimed to overcome the limitations of the Commview PACS System and to open the proprietary installation system by developing versatile open source tools (essentially gateways and client workstations) for LAN, MAN and WAN communications with the PACS (Diminich et al. 1993). In this way, it has been possible to distribute images throughout the hospital departments and surgery rooms of the three hospitals and to the bioengineering and medical physics research centres of Trieste, with some connections also going overseas to the National Institutes of Health at Bethesda, MD (USA), which also stimulated the growth of the Informative Trieste System. In 1994, the first PACS browsing interface was developed, allowing virtually worldwide image distribution without needing dedicated client software (Diminich et al. 1995).

However, as the research, the results and the clinical experimentation proceeded, it became clear that an impassable limit had been reached, due to the intrinsic limitations of the Commview PACS System itself. For this reason, a project was started on a totally new system named DPACS (Data and Picture Archiving and Communication System) in 1995 (Fioravanti et al. 1996).

The goal of DPACS was "the development of an open, scalable, cheap and universal system with the accompanying tools to store, exchange and retrieve all the health information of each citizen at hospital, metropolitan, regional, national and European levels, thus offering an integrated virtual health card for the European Citizens". A preliminary version of DPACS was tested in 1996-1997 at the Cattinara Hospital (Fioravanti et al. 1997).

By 1998 the DPACS system was routinely managing all radiological images (CT, MRI, DR, US, etc.) as well as in conjunction with the stereo-tactic neurosurgery, thus completely supplanting the old AT&T Commview PACS system. Some mono-dimensional signals such as ECGs were also integrated into the system.

Over the years, DPACS has been enriched with anatomo-pathology, anaesthesia and reanimation, the clinical chemistry laboratory and others; furthermore, its application has been progressively expanded to cover the newly emerging necessities of future health care and assistance to the citizens of the world, based on telemedicine-driven home-care, personal-care and ambient assisted living.

Consequently, some new needs have been pointed out and covered in new developments of the project, such as:

■ to have a multi-lingual approach to both client and server managing interfaces and to the presentation of medical content;
■ to have a simple data & image display client interface, automatically updatable and highly portable from PC, MAC or LINUX workstations to palms or a cellular-based communicators;
■ to be able to connect with a wide variety of communication systems, both fixed and mobile);
■ to offer a highly modular data & image manager/archiver, independent of the platform (UNIX/LINUX, WINDOWS, MAC) and of the selected data-base;
■ to improve the interoperability of both the server and the client system components between them and with all the other information system components in the hospital and in the health enterprise);
■ to have an efficient and effective tool to "create" the integrated virtual clinical record in the hospital as well as at home or when a citizen is travelling.

2.2 The New Strategic Choices of the DPACS Project and the Creation of the World-Wide Open Three (O3) Consortium

As reported above, the conclusions of the EuroPACS-MIR in the Enlarged Europe Meeting in Trieste addressed solutions for these new needs with the creation of the Open Three (O3) Consortium.

The main characteristics of the O3 open-source products are their multi-language support, their high scalability and modularity, their use of Java and Web technologies at any level, their support of any platform, their high level of security and safety management, their support of various types of data-bases and application contexts, their treatment of any type of medical information, i.e., images, data and signals, and their interoperability through full compliance with the "Integrating the Healthcare Enterprise" (IHE) world project, achieved by building up O3 as a collection of "bricks" representing the IHE "Actors", connecting each through the implementation of a wide set of IHE Integration profiles.

The choice of Open Source as O3's leading solution for the future of e-health anticipates a common trend in the industrialized and political world, recently evidenced by the position assumed by the Department of Health & Human Services and the Department of Defense of the United States at the Open Source Strategy for Multi-Centre Image Management Workshop, held in March 6-9, 2006 at Las Vegas (USA). It was evidenced also by the decision announced by the world's biggest industries at the OSDL Joint Initiatives Face to Face Meeting Review – Health Care Information Exchange, held in May, 10-12, 2006 at Sophia-Antipolis (France), as well as by the European Union in the Riga Declaration, signed during the Intergovernmental Meeting of the European Commission "ICT for an Inclusive Society", held in June 11-13, 2006 at Riga (Latvia).

The first set of O3 products cover all the requirements of image management in Radiology and in Nuclear Medicine at both intra- and inter-Enterprise levels. The most important are:

■ O3-DPACS, the new version of DPACS enriched with many new features, e.g., the XDS (Cross-Enterprise Clinical Document Sharing) and the XDS-I (Cross-Enterprise Document Sharing for Imaging) profiles, which allow images and data be exchanged very easily within any environment;
■ O3-RWS with O3-MIRC and O3-3D, a revolutionary radiological workstation, including 3D support, management of and access to MIRC (Medical Images Resource Center) data and structured reporting;
■ O3-MARIS, a "super" RIS offering many new integration features and MIRC support;
■ O3-XDS, one of the first XDS document repositories and registries;
■ O3-PDA, a first step towards opening up to home-care and mobile-care;
■ O3-TEBAM, allowing accurate electrical reconstruction of the brain in 3D in the case of pathologies
■ O3-VMOD, a virtual modality allowing the simulation and pre-programming of any integration with real modalities.

These O3 products have been tested successfully at the IHE 2005 Connectathon in Amsterdam and at the IHE 2006 Connectathon in Barcelona, achieving compliance with 19 IHE actors and 15 IHE profiles, having passed more than 300 tests with most of the European market brands.

From the organizational point of view, the O3 Community is built through all the institutions having an agreement with HECE: in particular those belonging to the ABIC-BME (Adriatic Balcanic Ionian Cooperation in
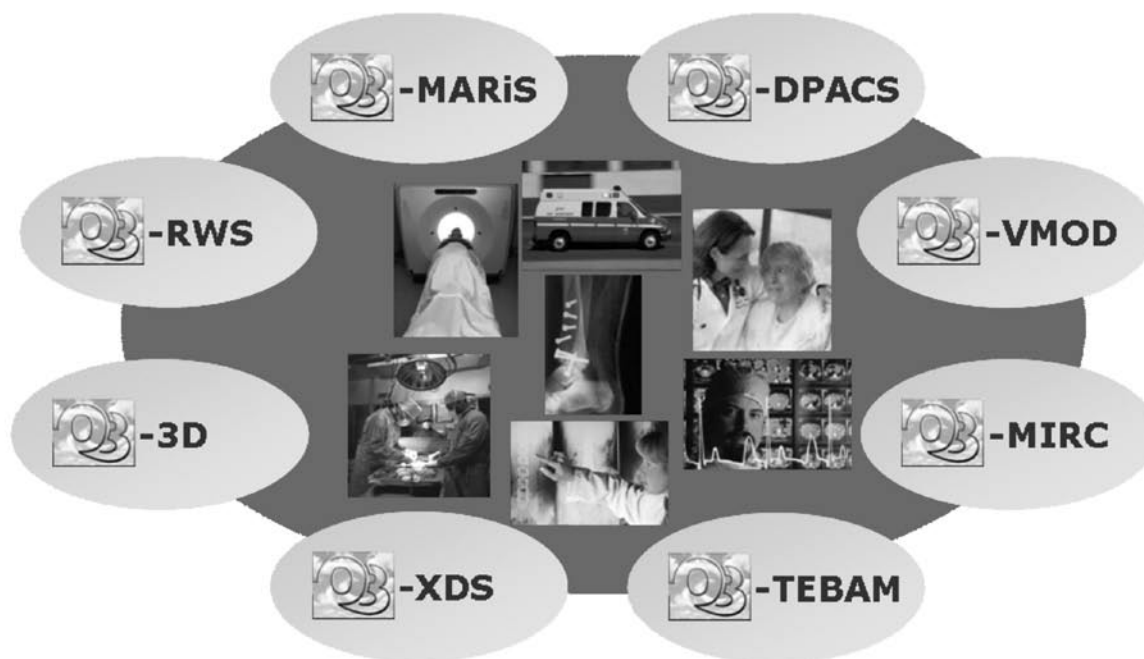
Figure 2: The main O3 products for the Domain of Radiology

Biomedical Engineering) and ALADIN (Alpe Adria Initiative Universities Network) international networks, and –about the approximately 60 healthcare institutions, industrial enterprises and governmental agencies with a bilateral agreement active with HECE. In the O3 Community, an O3 Users' Community and an O3 Developers' Community are designated. Every member of the O3 Community can in principle request to participate in both communities.

The Developers' community was started under the responsibility and administration of HECE, with the Universities of Trieste and Padova in Italy and the University of Maribor in Slovenia as the main contributors, but it grew and acquired many other European and US contributions from universities, research centers and from industries. It provides the active members of the Users' Community with all the necessary project design, site analysis, implementation, logging, authoring, bug solving, and high-level 7/7-24/24 full-risk service. Additionally, training is highly important to the HECE, starting with the preparation of clinical engineering professionals at three different levels, offering both traditional and e-learning courses with particular skills in Clinical Informatics, Health Telematics, E-health integration standards and IHE-based interoperability, as well as providing specific courses and training on-site.

Furthermore, selected radiologists from the Active Users' Community – where O3 is running (in Italy, from Trieste, Padova, Pisa and Siena and in Slovenia from Maribor) – constitute a Medical Advisor Committee, which gives very precious feedback to the O3 Developers' Community.

The growing cooperation of O3 with large industries in the O3 Community is another very interesting aspect, and it is focused especially on the integration with the surrounding territory and home-care.

Two important examples are reported.

The latest developments of Ultrasound Technology and the introduction of High End Compact machines will be at the centre of the cooperation with GE Healthcare, focused on "integration". The challenge is to improve solutions for moving Health Services from the Hospital to the Patients, with regard to some social groups such as the elderly, children and disabled patients. Compact Ultrasound, with their innovative capabilities to receive and transmit the patient's complete data and exams to a remote location for real time consultation, could help to overcome territorial or physical restraints, providing high quality health services at the patient's site, ranging from prevention to treatment.

The development of a Cardiologic Information System (CIS), able to integrate "the patient", either at home, when mobile or in the hospital, with all the types of cardiologic information collected from him/her and with the goal to coordinate the integration with all his/her other clinical data, will be at the centre of a cooperation with Agfa Healthcare.

In the following two paragraphs some details are given of two of the O3 products – a server (O3-DPACS) and a client (O3-RWS) – underlying some of the key properties of the O3 solutions in a real integrative multi-lingual environment.

2.3 The O3-DPACS Open-Source Image-Data Manager/Archiver

O3-DPACS is a Java J2EE (Java 2 Enterprise Edition) application. It has been realized as a modular collection of services, as summarized in Fig. 3 (Inchingolo et all. 2006). As communication protocols, DICOM is used mainly for clinical data, signals and images and HL7 (Health Level 7) for administrative data.
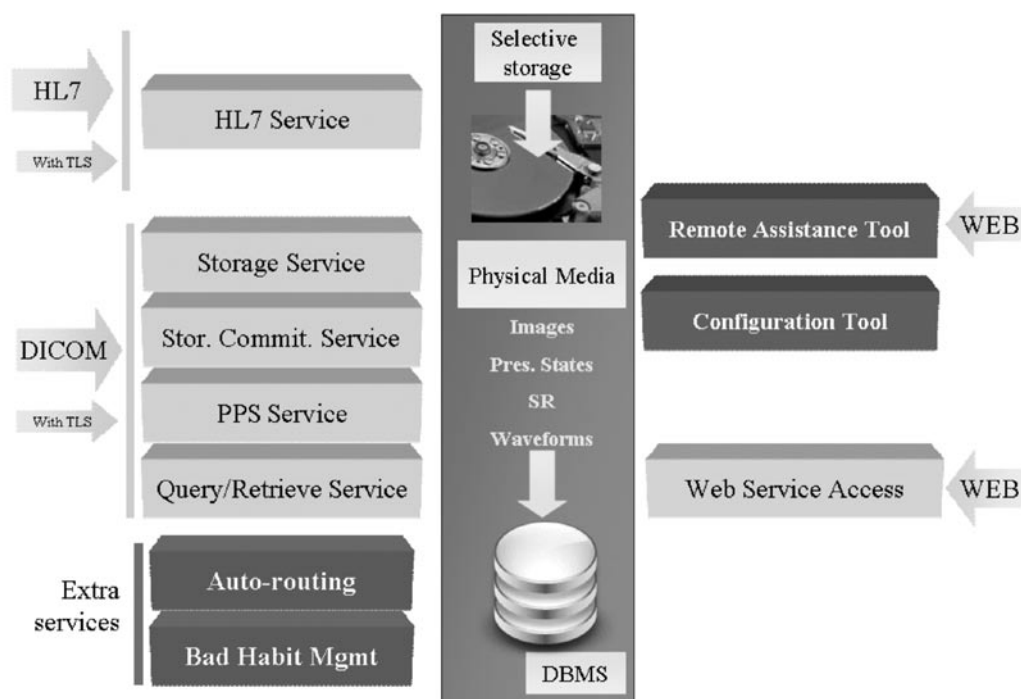
Figure 3: The modular structure of O3-DPACS (Inchingolo et al. 2006)

On the left column of Fig. 3, the DICOM and HL7 communication modules connect the external world with the modules of the services:

- Storage: to store DICOM objects. The server allows the storage of: 1) images (as with all the PACS systems), 2) data, such as reports, in the form of DICOM Structured Reports and Presentation States, and 3) waveforms, such as ECG, EMG, EEG etc., as DICOM waveform data;
- Query/Retrieval of DICOM Objects: to execute query and retrieval of the stored objects via the DICOM protocol;
- The Modality Procedure Performed Step: to receive messages about the completion status of exams exam and link them with the stored data;
- DICOM Storage Commitment: to verify that data is properly stored and to confirm this to modalities;
- HL7 message interpretation: to manage administrative data, such as identifying information exchanges, or checking for the re-alignment of inconsistent patient information, i.e., due to a first-aid procedure.

In addition, the following IHE-based services have also been implemented:

- Evidence Documents, for optimal management within the radiological workflow of all added objects created in referral steps (report, notes and graphic objects);
- Key Image Notes, to create notes on the details of some images to make them more recognizable, as well as to apply and visualize them in a simple and intuitive way;
- Workflow Reporting, to allow any step in the complex referral procedure to be monitored and organized so as to guarantee maximum simplicity and transparency, which are fundamental requisites for obtaining a complete, accurate and error-free diagnosis.
- Cross-Enterprise Document Sharing for Imaging, which allows the retrieval of original health enterprise clinical images from outside at any time.
- Audit Trail Node Authentication, which manages security in all the communications between the heterogeneous systems.

2.4 The RWS Image-Data Display

The RWS Workstation has the functionality of a display manager with many additional services and it fully supports authentication. Three different authentication systems are provided: smart card authentication, a basic username/password authentication and a network authentication. This last provides a fully-traceable sub-system for the management of the usage of RWS.

Its object-oriented design offers a common base for essential services for the correct management of different types of data for different types of source: it is possible to open medical files both from a remote image/data manager (from a PACS) or from the local disk; the file can contain images, signals or pure SR (Structured Reporting) data.

Once the clinical data is taken by one of the different sources, such as a PACS, a DICOMDIR (a unique and mandatory DICOM file within a file set that contains the SOP Class Media Storage Directory) or a local disk, it can be viewed using one of the appropriate viewers:

- Image Viewer (also for multi-slice images);
- DICOM Structured Reporting (SR) viewer;
- Waveform Viewer.

It is also possible to use these types of data with other modules:

- Print Module, allowing DICOM and non-DICOM

print procedures;

- Study Move Module, letting the user move the selected data to from one PACS server to another;
- Patient CD module, providing a simple way to burn data onto removable devices, like CDs or DVDs, as well as creating an html tree model with all the images in jpeg format.

The DICOM SR is used both to present numerical data such as those related to the Clinical Chemistry Laboratory, and to offer a new type of presentation for medical reports, based on structuring the report contents. This approach has been initiated with radiological reports and is under test and evaluation by an international multi-centric group of radiologists.

RWS supports many add-on modules. One of the most acclaimed modules is O3-3D, an open-source module for the three-dimensional reconstruction and manipulation of images. Another add-on module is O3-TEBAM, which actually performs the 3D reconstruction of electrical brain activity using an 8-16 CPU computing system. A third one is O3-MIRC, which allows the connection of RWS with any Medical Imaging Resource Centre (MIRC) site, allowing the radiologist or other medical specialists or teachers to retrieve MIRC images in order to compare them with images under examination or for teaching purposes.

O3-RWS is fully internationalized for use even in a multi-lingual hospital or territorial body, and therefore allowing the efficient exchange of images and reports between hospitals of different countries with their own language and character set in each country. This is particularly important in multi-lingual regions and countries, such as Friuli Venezia Giulia in Italy or in Switzerland, which both have four official languages: Italian, German and Ladin/Friulian, plus Slovenian in the first case and French in the second.

3   Conclusions and Future Plans in the Region

Thanks to the practical experimentation in the solutions described above, the experience of a 15-years study on the integration of health systems using ICT technologies, from the hospital department to the single citizen in the e-health context of the future information-based society, has shown that some key methodological and organizational elements are extremely relevant to the success of the e-health integration process.

From the point of view of the organization of our cooperative work with other user and developer centers, the initiative of the Open Three (O3) Consortium (O3, 2007) has proved its real efficiency and efficacy in the last months. All the O3 sub-systems are developed in the mode of compatibility and can be adjusted to any scale including the national and the international. O3 is completely developed as Open Source and with Java and Web technologies

Figure 4: An example of multiple image visualization on the O3-RWS workstation
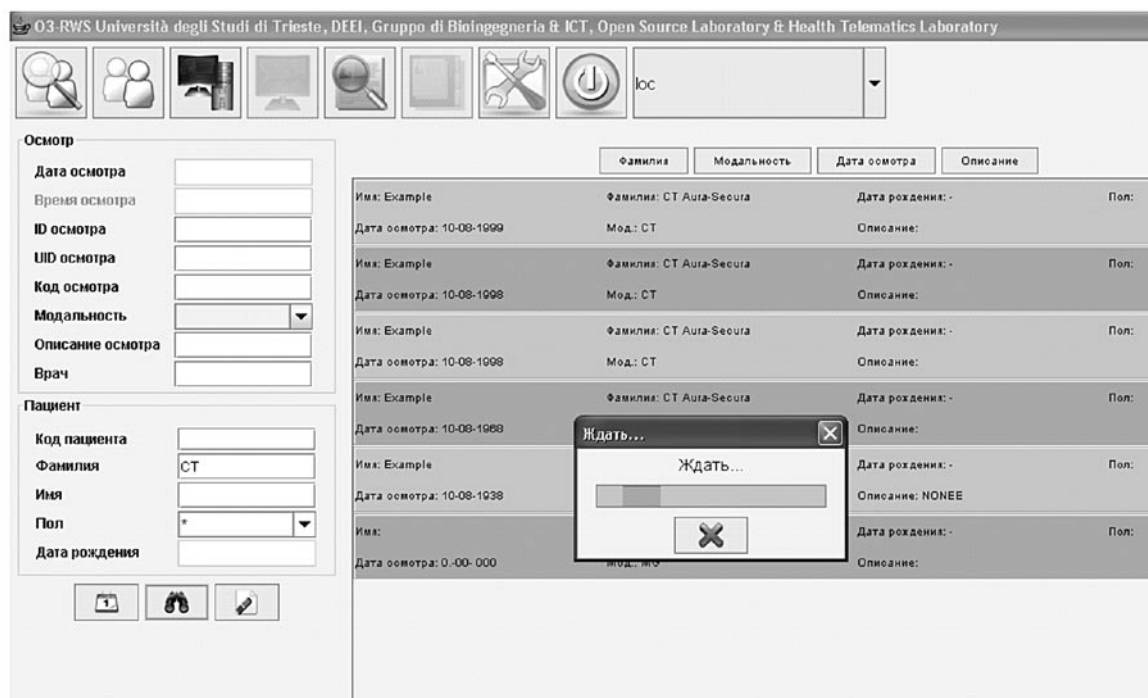
Figure 5: An example of a Russian language version (using Cyrillic characters) of the RWS Workstation

to facilitate its re-use and portability, fostering a wide distribution in Italy and abroad. It is independent of database, OS, HW and language and 100% compliant with the IHE world-wide interoperability initiative.

As far as the implementation of the O3 system is concerned, there are several concrete initiatives happening at this moment. The Faculty of Medicine, University of Maribor, joined the O3 Consortium to participate in the development process and support the Slovenian health institutions in its implementation. The Maribor hospital first installed O3 in January 2007 and is now testing it for potential full implementation. Talks with other Slovenian, Austrian and Croatian health institutions are also underway. The parallel initiative of the e-learning program in Medicine is also being born as a consequence of cooperation under O3.

The choice of Open Source as the leading solution for the future of e-health anticipates a common trend in the industrialized and political world, recently evidenced by the position assumed by the Department of Health & Human Services and the Department of Defence of Unites States at the Open Source Strategy for Multi-Centre Image Management Workshop, held in March 6-9, 2006 at Las Vegas (USA), as well as by the decision announced by the world's biggest industries at the OSDL Joint Initiatives Face to Face Meeting Review – the Health Care Information Exchange, held in May, 10-12, 2006 at Sophia-Antipolis (France) – and finally by the European Union in the Riga Declaration signed during the Intergovernmental Meeting of the European Commission "ICT for an Inclusive Society", held in June 11-13, 2006 at Riga (Latvia). It is interesting to emphasize that O3-DPACS and the O3 Consortium have been presented by invitation at all these three events.

In conclusion, the O3 Consortium seems to represent a significant contribution that will really support the increase of e-health integration, not only in the local region, but also across Europe and the world.

With respect to our Alpe-Adria Region, O3 is demonstrating relevant actions in cross-border eRegion Development that improve the way people work together, live together and grow together, without frontiers. It links vital processes in the moving and integration of information thanks to an e-integration approach, such as that started four years ago with our ALADIN – the Alpe Adria Initiative Universities' Network, www.aladin-net.eu – one of the first citizen-centric initiatives in Europe.

Literature

AlSafadi, Y., Lord, W.P.& Mankovich, N.J. (1998). PACS/Information systems interoperability using enterprise communication framework. *IEEE Trans Inf Tech Biomed* **2**(2):42-47.

Bourka, A., Polemi, D. & Koutsouris, D. (2003). Interoperability among healthcare organizations acting as certification authorities. *IEEE Trans Inf Tech Biomed*; **7**(4):364:377.

Chronaki C.E. & Chiarugi F. (2005). Interoperability as a quality label for portable & wearable health monitoring systems. *Stud Health Technol Inform*, **117**:108-116.

Diminich, M., Inchingolo, P., Magliacca, F. & Martinolli, N. (1993). Versatile and open tools for LAN, MAN and WAN communications with PACS. In: Computational Biomedicine. Editors: Held, K.D., Brebbia, C.A., Ciskowski, R.D.& Power H., Computational Mechanics Publications, Southampton, 1993, pp. 309-316.

Diminich, M., Inchingolo, P., Martinolli, N., Dalla Palma, L., Giribona, P., Pozzi, R.& Stacul, F. (1995). ARIS: an Autonomous Remote Image Station offering both local and remote IMACS/RIS resources in an open environment. In:

Proceed 3rd Europ Conf Eng Med, 1995, p. 241.

Drury, P.& Dahlman, B.(2005). Open source approaches to health information systems in Kenya. *World Hosp Health Serv* **41**(3): 36-39.

Fioravanti, F., Inchingolo, P., Valenzin, G. & Dalla Palma, L. (1997). The DPACS Project at the University of Trieste. *Med Informat*, **22**(4):301-314.

Fioravanti, F., Inchingolo, P., Valenzin, G., Dalla Palma, L. & Vallon, R. (1996). The DPACS Project at the University of Trieste: architecture and working environment. In: *Proceed 14th Internat EuroPACS Meeeting. Creta, Greece, 1996.*

Giribona, P., Bravar, D., Stacul, F.,& Ukovich, W. (1992) PACS experiences in Trieste. *Int J Biomed Comput* **30**(3-4):285-293.

Hacklander, T., Martin, J. & Kleber, K. (2005) Informatics in radiology (infoRAD): an open source framework for modification and communication of DICOM objects. *Radiographics*, **25**(6):1709-1721.

HDW2, HTL Dicom Workstation project, HTL, DEEI, University of Trieste. Available from: http://www.bioing.units.it/PRG/HTL2, 1.1.2007

HL-7 - Health Level 7., available from: http://www.hl7.org, 1.1.2007

IHE – Integrating the Health Care Enterprise. Available from: http://www.ihe.net, 1.1.2007

Inchingolo, P., Beltrame, M., Bosazzi, P., Cicuta, D., Faustini, G., Mininel, S., Poli, A. & Vatta, F. (2006). O3-DPACS Open-Source Image-Data Manager/Archiver and HDW2 Image-Data Display: an IHE-compliant project pushing the e-health integration in the world, *Computerized Medical Imaging and Graphics*, Elsevier Science **30**: 391-406

Inchingolo, P., Bosazzi, P., Cicuta, D., Faustini, G., Barbaro, A., Miniussi, E. & Vittor, A. (2004). DPACS-2004 becomes a java-based open-source modular system. In: EuroPACS-MIR 2004 in the Enlarged Europe. Editors: P. Inchingolo, R. Pozzi Mucelli, EUT, Trieste, 2004, ISBN: 88-8303-150-4, pp. 271-276.

Inchingolo, P. & Pozzi Mucelli, R. (eds) (2004). EuroPACS-MIR 2004 in the Enlarged Europe. EUT, Trieste, 2004, ISBN: 88-8303-150-4. Also available from: http://www.tbs.units.it/europacs2004.

ISCELS, Interreg IIIA "Italian Slovenian Cooperative E-learning Space", available from: http://is.aacels.eu, 1.1.2007

Kalra, D., Beale, T. & Heard, S. (2005). The openEHR Foundation. *Stud Health Technol Inform*, **115**:153-173.

Lindahl, F. & Torgersson, O. (2005). mGen - An Open Source Framework for Generating Clinical Documents. *Stud Health Technol Inform*, **116**:107-112.

Miniussi, E., Bosazzi, P., Inchingolo, P., Masè, M. & Vittor, A. (2004). HDW2: a powerful and customization-friendly java-based Dicom Workstation. In: EuroPACS-MIR 2004 in the Enlarged Europe. Editors: P. Inchingolo, R. Pozzi Mucelli, EUT, Trieste, 2004, ISBN: 88-8303-150-4, pp. 215-218.

O3 - Open Three Consortium, available from: http://www.o3consortium.eu, 1.1.2007

Rosset, A., Spadola, L., Pysher, L. & Ratib, O. (2006). Informatics in radiology (infoRAD): navigating the fifth dimension: innovative interface for multidimensional multimodality image navigation. *Radiographics*, **26**(1):299-308.

Saccavini, C. (2004). The MARIS Project: open-source approach to IHE radiological workflow software. In: EuroPACS-MIR 2004 in the Enlarged Europe. Editors: P. Inchingolo, R. Pozzi Mucelli, EUT, Trieste, 2004, ISBN: 88-8303-150-4, pp. 285-287.

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Supporting Critical Multi-Organization Collaboration during Response to Catastrophic Events

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The past two years have shown both the power of nature and the complexity of preparing for and responding to extreme events such as earthquakes, tsunamis, hurricanes/typhoons, and floods. These events, and future catastrophic events, will require coordination and collaboration between multiple government and non government organizations across national and state borders. This collaboration will require the discipline necessary to share common processes and procedures, and the agility to improvise plans and actions as situationally required. Information technology must be used to create an eRegion, enabling the shared situational assessments and adequately supporting the collaborative, distributed decision making to produce required decisions and future action plans. The role of information technology in developing these capabilities is discussed in the context of two seismic scenarios, the US New Madrid Seismic Zone, and the Adriatic Seismic region.

Keywords: emergency response, disaster management, situational awareness, collaborative technologies, decision making, information technology

Podpora kritičnemu multi-organizacijskemu sodelovanju v primeru odziva na katastrofične dogodke

Zadnji dve leti smo bili priča tako môči narave kot tudi zapletenosti priprav na odziv in tudi samemu odzivu na nekatere ekstremne dogodke kot so potresi, cunamiji, orkani/tajfuni in poplave. Ti in pa bodoči katastrofalni dogodki bodo zahtevali usklajevanje in sodelovanje med mnogimi vladnimi in nevladnimi organizacijami prek nacionalnih in državnih mejá. To sodelovanje bo zahtevalo disciplino, ki je potrebna pri delitvi skupnih postopkov in procedur in pa prožnost pri improviziranju načrtov in ukrepov z oziron na situacijo. Za vzpostavitev e-regije se mora uporabiti informacijska tehnologija, s čimer bi se omogočilo skupno ocenjevanje situacije in ustrezna podpora medsebojnemu sodelovanju in porazdelitvi pri sprejemanju odločitev, kar naj bi pripeljalo do ustreznih odločitev in bodočim akcijskim načrtom. Vloga informacijske tehnologije pri razvoju teh zmožnosti je obravnavana v kontekstu dveh potresnih scenarijev, v ameriški potresni coni New Madrid in v jadranski potresni regiji.

Ključne besede: odziv v primeru naravne nesreče, katastrofični menedžment, situacijska osveščenost, tehnologije za sodelovanje, sprejemanje odločitev, informacijska tehnologija.

1   Introduction

Extreme events such as the December 26, 2004 earthquake and tsunami and the August 2005 Hurricane Katrina impact large geographical areas, often these areas controlled by multiple national and local governments. The response to extreme events requires information sharing and coordination between hundreds of government and non government organizations. The multi-jurisdictional, cross-border collaboration will require the creation of a virtual eRegion. In earlier papers, the authors have described the organizational agility and discipline critical to successful response to extreme events (Harrald, 2006), and the information technology necessary to support the situational awareness, interoperability, and collaborative decision making necessary to support this agility and discipline. (Jefferson and Harrald, 2007).

Discipline may be defined as the organizational structure, doctrine, procedures, and processes necessary to mobilize, organize, command, and control large multi-organizational response efforts. Agility, on the other hand, is the improvisation, adaptability, and creativity that are critical to coordination, collaboration, communication and successful problem solving. Discipline is the ability to operate, while agility provides interoperability. It is necessary to recognize that interoperability can not exist without the ability to operate. Over the last thirty years, the professional emergency management community has been working hard to increase the level of discipline in response systems in most areas of the world, most notably the United States. At the same time, social scientists have observed that the key to success in responding to and recovering from extreme events has been the ability to be agile-- to recognize and manage. Discipline and agility imply opposing information
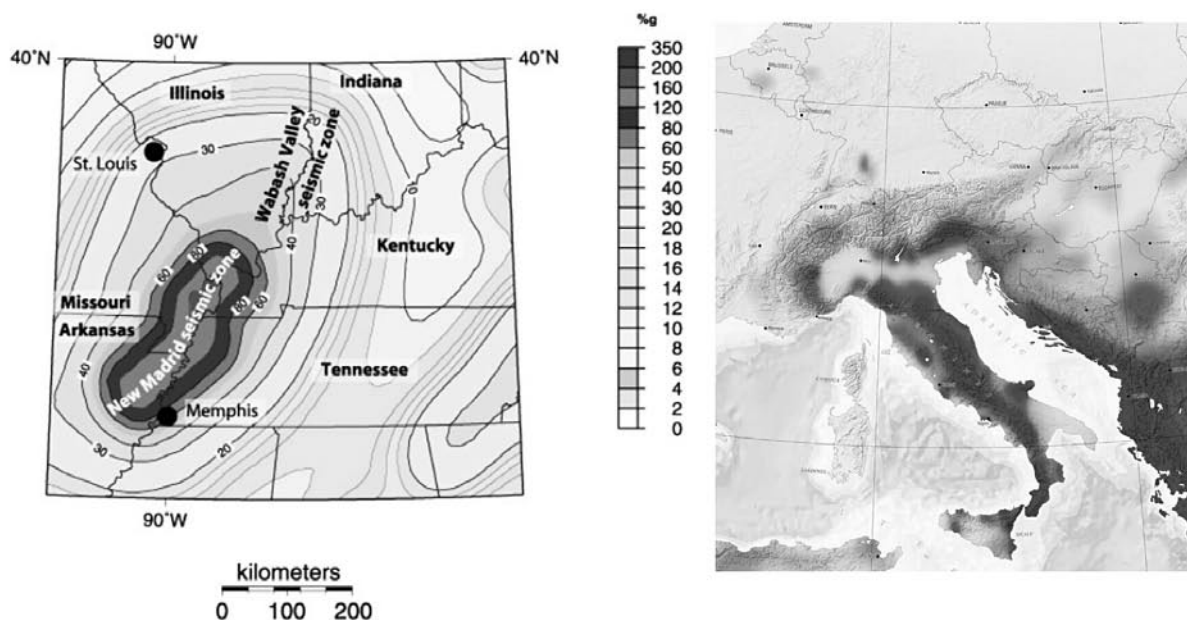
Figure 1: Comparison of the New Madrid and Adriatic Multi Jurisdictional Seismic Regions

management requirements. Discipline infers the support of rigid structures, pre-designated decision makers, and defined decision processes. This is a military command and control model. Agility implies the ability to support improvised decision making--decision makers outside of the formal organization, confronted with unanticipated circumstances and problems for which existing tactics and resources are inadequate.

Two case studies, shown in Figure 1 are used to illustrate the challenges in using information technology to enhance situational awareness and to support distributed decision making in a distributed, multi-jurisdictional environment. The first case study is derived from the Central United States New Madrid Seismic Zone catastrophic earthquake project, funded by the US FEMA. A major earthquake in this region would require the integration of the response efforts of 8 US states, four Federal regions, and several large cities such as Memphis and St. Louis. The second case study is focused on a similar seismic region surrounding the Adriatic Sea where a major earthquake could impact 4 or more countries. This scenario is the basis for a proposed living laboratory initiative to be conducted in collaboration with the ALADIN (ALpe ADria INitiative) consortium of universities. Preparedness for and response to both earthquake scenarios will require multiple jurisdictions to collaboratively share information and develop a shared situational awareness adequate for supporting resource mobilization and decision making. This will require innovative applications of technology and eventually the abandonment of physical command centers where designated people gather for face-to-face meetings and for access to information.

2 Collaborative Decision Making and Situational Awareness

Decision making is data, computationally and communications intensive, therefore it is inherently linked to information technology. Much of the recent focus in the U.S., for example, has been directed at achieving national inter-operability of voice and data communications for first responders. This focus on process and organization does not ensure that the technology will actually be useful in providing critical information to appropriate decision makers. As stated by a senior US official during the Hurricane Katrina response, "Everyone is making the point that we need information, inter-operability and communication - BUT NO ONE is articulating how it is used for decision making, how you apply it for saving lives and protecting property." We know we need information, interoperability, and communication but the challenge is using it for decision making and applying it to accomplish the main goal of saving lives and property. Technical interoperability does not address the challenge of data interoperability among organizations and the need for common terminology. Responding to extreme events requires collaboration, cooperation, and transparency by numerous organizations with different cultures and structures. These values are not embedded in the hierarchical, military model, casting doubt on the effectiveness of a military command-and-control model (Granot, 1999).

When a disaster occurs, responders must estimate the disaster's physical impacts by integrating sparse data with prior knowledge obtained through a combination of prior modelling and experience. The responders must estimate the disaster caused needs for rescue, recovery and medical support and requirements for water, food and shelter. These disaster or hazard generated demands determine the size, type, and location of response forces to be deployed. The

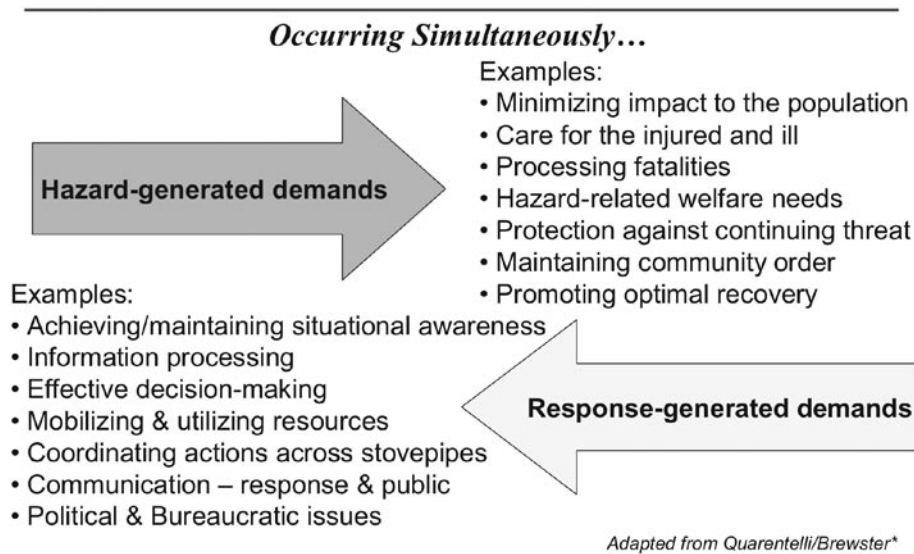## Incident Management Concepts: Categorizing "Incident Demands"

Figure 2: Hazard Generated and Response Generated Demands

creation of a response involving hundreds of organizations leads to response generated needs for the control and coordination of the massive efforts. The relationship of hazard and disaster caused demands are shown in Figure 2, based on Quarantellli (2005)

Multi government, multi organizational response coordination and collaboration is based on the assumption that shared situational awareness will be attained and maintained. The concept of shared situational awareness and common operating picture originates from an aviation safety and combat domain. Transferring these concepts to a complex, heterogeneous emergency management structure will be exceedingly difficult. When evaluating the role of shared situational awareness it must be recognized that not all actors involved in the response and mitigation to an extreme event will require the same information. When attempting to consolidate information to obtain a shared situational awareness there is a very real possibility that information that is relevant to one or more parties will be inadvertently omitted (Jefferson and Harrald, 2007).

Emergency response decision making obviously impacts future states of the system and hence future decisions. Decision making occurs in a series, one decision leads to the next. For example, if a decision is made to evacuate an area, more decisions will need to made. Where will people be evacuated too? How will they get there? What supplies will be needed? And the decisions continue. The information needed for subsequent decision will change as well as the parties included in the decision making process. Hence part of situational awareness in a distributed environment is knowing what other organizations and individual actors involved in the response are doing.. This leads to three critical attributes for agile disaster management:
■   the ability to monitor and detect changes in the environment,

■   the ability to monitor current and planned actions, and
■   the ability to customize the response to the current environment.

One way to satisfy all three attributes is through the adoption of a virtual organization built on collaboration and cooperation. "Cooperation is central to agility; people and organizational culture must adapt to foster both internal and external cooperation," (Reich, et al. 1999). However cooperation, can not be successful without the technological framework. Therefore, agility must be planned for. The agile organization required to support an emergency response effort involves the formation of a virtual "team". Each member of this team comes with their own area of expertise, organizational culture and practices, and technology-specific proficiency as well as application-specific proficiency. The technological systems that will support this virtual, agile, team need to consider the attributes of the team member during design. The system will need to combine usability from multiple perspectives with the ability to adapt to different skill levels.

The type and form of information that is presented to the team is also important. A number of factors concerning the interpretation of data need to be considered when moving decision making from (1) individuals in homogeneous groups at the same location to (2) distributed homogeneous groups and finally to (3) dispersed non-homogeneous groups.
■   The disparate semantic meaning of the data collected
■   The ability to ensure or even know data quality (particularly the timeliness and completeness components)
■   Even when given the same data, non-homogeneous decision nodes will perceive the information differently

Situational Awareness: understanding the present in order to influence the future
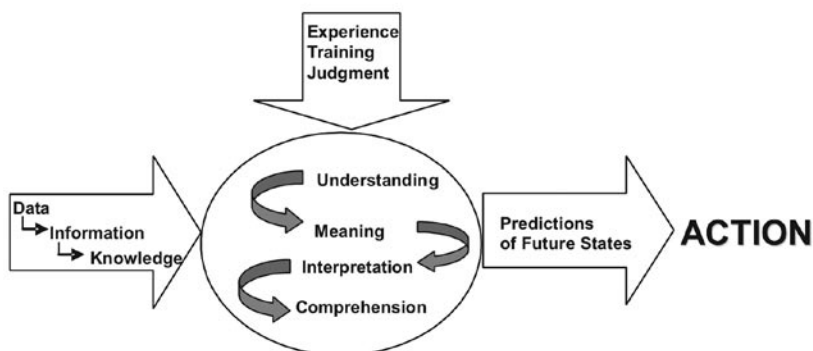

Figure 3: The Objectives of Situational Awareness

Obtaining Situational Awareness

Moving from an individual or narrowly focused operating picture to that of a common operating picture with shared situational awareness the challenges increase
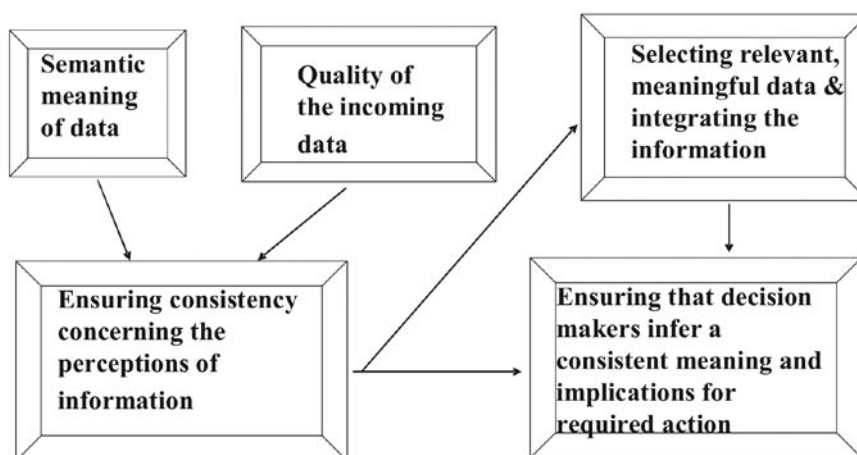

Figure 4. Requirements for Obtaining Situational Awareness

■ Even when given the same data, and similar perceptions, different nodes will imply different meaning and requirements for future action

As shown in Figure 3, adapted from (Ntuen, 2005) the objective of situation awareness is to allow collaborating decision makers to assess the current system state, using available information and their own knowledge and experience, in order to make adequate decisions during the present and to develop valid future plans. In this context, distributed situational awareness implies shared ability to understand and interpret information in addition to the ability to establish common access to information. Therefore, in areas such as the US New Madrid Seismic Zone or the Adriatic Seismic Zone, the pre-disaster establishment of the ability to gather, analyze, and display data will not ensure

shared situational awareness and collaborative decision making when an earthquake occurs. As shown if Figure 4, pre disaster investments must also be made to ensure the development of shared semantic standards, the ability to evaluate the quality of information, and the knowledge and experience of the decision makers .

Either scenario described above, the New Madrid Seismic Zone earthquake or the Adriatic Seismic Zone earthquake, would produce impacts across multiple governmental jurisdictions. The result would be a dynamically changing, situationally determined, geographically distributed group of decision makers expected to resolve issues, solve problems, and make collaborative decisions based on common information and awareness in a virtual eRegion. We believe that this

type of situation will eventually require the replacement of the concept of physical emergency operations center and command centers where designated people gather for face-to-face meetings and for access to collaborative technology with fluid virtual EOC's where decision makers use technology to access information and each other from remote locations.

Physical emergency operations centers are human resource intensive. A 20 station, 24 hour, 7 day a week EOC will absorb the full time efforts of 60 highly skilled people. The centers can become counter productive by failing to support the flow of information to emergent decision making groups, becoming information sinks and barriers to information flow when the volume of information exceeds the capacity to analyze it. Operations centers are also physical locations that are themselves vulnerable. The New York City EOC was located in building 7 of the World Trade Center and was abandoned prior to the building's collapse. The New Orleans EOC was totally disabled during Hurricane Katrina. Information technology of the past has supported information collection and analysis at pre-determined sites (EOCs), supported predetermined organizational structures, and followed pre-designed information pathways. Information technology of the future will support agile, evolving structures and will allow for distributed awareness, analysis, and decision support in a virtual eRegion.

The virtual emergency operation center (VEOC) is composed of a team of distributed experts whose task is to achieve a specific goal in a specific time. The VEOC is composed of inter-organizational teams, many of whom have extremely different backgrounds and have not previously worked together. An important aspect of this team is that their work is not done in a "project vacuum". That is to say that besides the roles and responsibilities associated with the joint team, these members tend to have numerous other roles and responsibilities associated with their "home" organization. One distinct advantage of collaborative technology is its ability to allow individuals to work together towards a common goal while also allowing them to multi-task on other important functions.

3   Testing the Concept

The George Washington University Institute for Crisis, Disaster, and Risk Management is involved in two projects that will allow the testing of the concept of using technology to support agile disaster response in multi-jurisdictional eRegions through the creation of virtual operations centers (VEOCs). The first project is the FEMA funded New Madrid Seismic Zone Catastrophic Preparedness project where the eRegion is a region of 8 states and 4 Federal regions. During the current first phase of the project, the University of Illinois Mid American Earthquake (MAE) Center and the GW ICDRM will develop improved loss estimation models and methods for estimating hazard generated and response generated needs. The second phase will facilitate multi state, multi region planning and exercising. During this stage, the concept of supporting distributed decision making groups using web based technologies will be investigated.

The concept of a VEOC will also be tested in a LivingLab experiment in Central Europe led by the University of Maribor, the George Washington University, and other Universities associated with ALADIN, ALpe ADria INitiative Universities' eNetwork. The objective of the LivingLab Safe and Secure eRegion is to develop a multi-disciplinary research and testing platform concentrating on identifying a domain of potential action from the users' point of view. The Living Lab will bring together researchers, developers, and users in a virtual environment. The goal will be to determine what information is needed and how can it be produced. Prototype solutions will be developed and tested in a simulated and real environment.

The LivingLab project will test the use of collaborative software in particular, IBM Rapid Response. The project will focus on :

- Creating and linking university centers
- Exploring how university centers can enhance connectivity between governments, private and public organizations, and the community
- Demonstrating how technology can assist in attaining and sustaining situational awareness in distributed network
- Generating scenarios and then evaluating different IT in terms of its ability to facilitate distributed decision making and communication
- A low risk failure environment (test technology, procedures, linkage)

4   Conclusions

Information technology will change disaster management as profoundly as it has changed other aspects of human endeavor. Technology will make organizational systems more agile and responsive and less tied to physical artifacts such as Emergency Operations Centers. Technology will enable individuals and organizations to improvise and to adapt and to track what other organizations and individuals are doing in complex, chaotic environments.

There are however major technological issues that must be resolved. Reliable and high quality video capabilities will be essential to ensuring the full communication required to ensure trust and understanding in an emergency. Decision support and information analysis and display tools will have to be highly mobile and distributed. All decision makers must have access to the same information. Security concerns will have to be identified and resolved. Finally, if all decision makers are directly interacting with the technology, the technology will have to be much more useable than the current generation of EOC technology. For example, Geographical Information System plots and images produced by satellites and other sensors are currently delivered by a technology group within an EOC. Will decision makers be able to create their own GIS and imagery products?

The organizational issues that must be resolved are, however, as significant as the technological ones. Organizations must become flatter, decentralized and less rigid. Leaders must trust decision makers on the scene and allow information to flow to where it is needed. The payoff for

an achieving a technology enhanced, distributed collaborative decision making environment is, however, immense. It will allow mobilization without bureaucratization, collaboration without the creation of an expensive physical overhead. It will enable tools and procedures to work in a virtual eRegion in a single nation environment such as the US, a multi-nation developed region such as Central Europe, or for the international response to a disaster in a developing region. Most of all, the development of appropriate technology will allow the agility and flexibility to respond creatively to unexpected events and situations, saving lives and minimizing human suffering.

References

Endsley, M. R. (1988). Design and evaluation for situation awareness enhancement in *Proceedings of the Human Factors Society 32nd Annual Meeting, Human Factors Society*, 24-28 Oct. 1988. Anaheim, CA: The Human Factors Society.

Federal Emergency Management Agency. 2006 Hurricane Season Concept of Operations Plan (CONOPS), Washington, DC. The Department of Homeland Security.

Granot, H. (1999). Emergency Inter-organizational Relationships. *Disaster Prevention and Management*, **8**: 21–30.

Harrald, J.R. (2006). Agility and Discipline: Critical Success Factors for Disaster Response. *Annals of the American Academy of Political and Social Science*, **604**: 256–272.

Jefferson, T. & Harrald, J.R. (2007). Shared Situation Awareness in Emergency Management Mitigation and Response, *Proceedings of the 40th Hawaii International Conference on System Sciences*, Waikoloa, HI, 3-6 jan. 2007. Computer Society Press.

Ntuen, C. A. (2005). A model of sensemaking in dynamic organizations: A review and implications for military decision making, Department of the Air Force, Washington, DC, Tech. Rep. N66020.

Quarantelli, H. (2005). Catastrophe's are Different from Disasters: Some Implications for Crisis Planning and Managing Drawn from Katrina. Disaster Research Center Working Paper, University of Delaware.

Reich Y., Konda S., Subrahmanian, E., Cunningham, D., Dutoit, A., Patrick, R., Thomas M., Westerberg, A., & the n-dim group (1999). Building Agility for Developing Agile Design Information Systems, *Research in Engineering Design*, **11**: 67-83.

Turoff, M., Chumer, M., Van De Walle, B. & Yao, X. (2004). The Design Of A Dynamic Emergency Response Management Information System (Dermis), *Journal Of Information Technology Theory And Application (JITTA)*, **5**(4): 1-36.

Websites

Projects: Situational Awareness from Multimodal Input (SAMI) The Regents of the University of California, CA, available from: http://www.itr-rescue.org/research/sami.php?PHPSESSID=135eab00577aa61c2e08bc228e526f51

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CERIS-ST, the Central Europe Road Information System for Security and Tourism
A Joint project of the Universities of Novi Sad, Trieste and Verona for Precise Data Acquisition on the Trans-national Road Network and the Extension to the ALADIN Group

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1   Project Description

A Road Information system is strategic for sustainable development, both for commerce and industries and for tourism. Thanks to the funding provided by the European Union (through the INTERREG Program), the Regione Friuli Venezia Giulia and the ICE-CRUI[4], about 1,200 km of roads have been already surveyed in the Balkan Adriatic Coast area.

The Universities of Rijeka, Podgorica, Tyrana, Sarajevo and Novi Sad actively took part in the project. In the meantime, working in partnership with the University of Verona[5] (from which we received helpful suggestions and contributions), we tested the application of the data gathered to tourism and territorial planning in the Verona area as well as in the Marche Region. The positive results of the work carried out convinced us to intensify the efforts and survey a wider area (the ALADIN one), aiming at covering the whole of Central Europe (which is not yet fully surveyed, though research such as this is needed here).

The first step in this project will be to better identify the technological methodology needed to acquire, store and distribute the detailed road network data used in urban planning for construction and maintenance of the road network (within the area of the Autonomous Province of Vojvodina). Resorting to satellite navigation systems will imply both the use of GALILEO - when ready – and of EGNOS (which is currently available).

This project consists of the application of instruments and methods that are currently available but are to be used in an innovative way (also in view of the European EGNOS and Galileo Systems). Therefore, it is potentially in synergy with those financed (and supervised) by the Galileo Joint Undertaking, Bruxelles. Moreover, it could be consistent with the INTERREG projects, which deal with the preservation and increase in value of cross-border cultural heritage. There is, also, a direct link between this project and the Road Cadastre prototype (already produced); a project coordinated by the Regional Government itself and concerning the roads in the four provinces of the Friuli-Venezia Giulia Region.

In addition to this, a type of survey is planned – and just begun – of regional harbour access, including piers and service roads. Applying the results of these prototypes to the road segments in the PAO areas will also be of use in order to maintain homogeneity with the Italian rules and conceive a coherent and official set to refer to. The participation of the PAO Partners is very important for adjusting, if necessary, the Italian rules for road information systems, taking under due consideration the unique conditions characterizing the PAO road network. The same revision could be necessary after surveying the harbour infrastructures (the width of the piers etc).

The project draws on previous researches carried out by Italian Universities (under the coordination of the University of Trieste); activities carried out under projects of

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[4] A joint programme by the Italian Institute for Foreign Commerce and the Italian Universities Rector College.
[5] Chair of Geography of DESI (Department of Economics, Society, Institution), Faculty of Modern Languages

national relevance (PRIN) in 2000, 2001, 2002. In addition, the results were obtained in part thanks to cooperation with the University of Warmia and Masury (Poland), the University of Prague and the (ex) Austrian GPSNETZ (Differential GPS by using DARC data radio broadcasting). These results have been distributed within the Central European Initiative (CEI) WG on Satellite Navigation Systems, during several meetings in Trieste and in the CEI Countries.

The project refers to some (general) recommendations and decisions of the European Commission. In the document titled "The Transport and Energy Infrastructure in South East Europe" (Bruxelles 15th October 2001) we read the following: "Improving the transport and energy infrastructure in the region and integrating the countries of South Eastern Europe with the rest of Europe is important in order to support improved quality of life through economic growth, regional integration, social cohesion and adequate environmental conditions" (p. 5). The document then continues, saying: "Three recent planning exercises involving countries outside the EU and the region focused on are specifically relevant and have been taken into account: the decision of the Pan-European Transport Conferences, particularly those held in Crete and Helsinki, concerning the concept of Pan-European transport corridors and areas. A number of these Corridors and Areas (PETrAs) cross or concern the Balkan region: Corridors IV, V, VII, VIII, X and the Adriatic-Ionian PETrA" (p.6). In the same document: "The state of the network is very variable, although in general it shows a serious lack of periodic and current maintenance. The maintenance problem is becoming particularly acute in certain cases. In the Federal Republic of Yugoslavia it is estimated that only 30% of the roads are in a satisfactory condition. Furthermore, many roads do not comply with the requirements of European trucks. This needs special attention" (p.7). Among the principles, the same document states the following: "Priority is given to the existing infrastructure by repairing and rehabilitating it. Upgrades or new infrastructure components should be kept to a minimum" (p. 9).

Moreover, in the same document, we see the following criteria among those listed for the selection of network sections: "The network definition will take account the infrastructure planning of the UN-ECE European agreements, the E-routes for land transport to which the South East European countries agreed to" (point 1, p. 9). "The network should concentrate accessibility to only a few Adriatic ports, with the aim to support short sea shipping that requires the convergence of substantial traffic flows. These ports should be adequately linked to the land transport network and equipped for combined transport" (point 4, p. 9). "Furthermore, the ports of Rijeka, Split, Ploce, Dubrovnik, Bar and Durres should be connected to the network" (point 5, p. 11).

Describing the project now in more detail we could say that **its first segment (as designed by Zora Konjovic)** defines the data model that accurately describes the road network. The model is based on recommendations defined by the **EuroRoadS** project[6]. The **EuroRoadS** project has

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[6] http://www.euroroads.org

defined an outline for the European Directive (to be issued) governing the field of data related to the public road network. It covers the framework of the Pan-European road network data infrastructure and the implementation of the national/regional databases. This segment of the project covers:

■ the information model,
■ the core data,
■ the data exchange model.

The second segment defines the technological background, standards and procedures for model-specified data acquisition.

■ the technological background for precise data acquisition comprises remote sensing, GIS and GPS technologies;
■ the standards are related to measuring equipment, communication protocols and data formats;
■ the procedures are aimed at the specifications of acquisition protocols according to best practices.

The project verification will be carried out by deployment of the pilot installation.

■ the first step will be the selection of certain areas in Vojvodina. The basic criterion for selection will be the presence of the various road categorise (city roads, magistral roads, regional roads, etc.). Additional criteria will concern the existence of appropriate digital maps for the region as well as the measurement infrastructure supporting the availability of data acquisition (precise GPS positioning, communication infrastructure, etc.) and remote sensing data (satellite and airborne images, etc.).
■ the second step will cover the acquisition of data for the selected regions. The acquisition of the data will be carried out deploying technologies, standards and procedures defined by the Project.
■ the third step will be the creation of the electronic database. The database will be created following the **EuroRoadS** framework. The data base will be accessible via the Internet.

The expansion of ALADIN (the ALpe ADria INitiative Universities' Network) has been already presented and is under analysis, particularly for the cost (having the SISA Project given good information on cost and feasibility). The ALADIN group covers **the following Universities:** *Graz, Rijeka, BW München, the* University of Trieste, *the* Novi Sad Business School *and* Košice.

2   Project Organisation

2.1 The University of Trieste, GEONETLAB

The Centre of Excellence for Telegeomatics, GEONETLAB, approved as a centre of Excellence and also co-financed by the Italian Ministry of University and Scientific Research, carries out research in GPS and Glonasss applied to general and thematic cartography, as well as in several applications of the geographic information systems methods (GIS), including Road GIS by means of its surveying vehicle. It

includes Telematics infrastructures, tools and norms, services and Operational Research for transport optimisation. The Centre is Coordinated by the principal proponent: Prof. Giorgio Manzoni (Full Professor of Topography, Faculty of Engineering, Department of Civil and Environmental Engineering, University of Trieste), under the Administrative Management of CSPA, Centro Studi e Progetti Avanzati, University of Trieste, directed by Mr. Bernardo Sannino.

2.2 The University of Novi Sad, CGITS

The University of Novi Sad, Centre for Geo-Information Technologies and Systems, Faculty of Technical Sciences, provided instruments and experience in the Geomatic field (including a GPS net), in order to carry out tele-informatic support activities during the survey operations. It will also collaborate in the dissemination and provide support in finding cartography and geodetic nets in Serbia; the University of Novi Sad also employs highly skilled software specialists (particularly in the field of Internet programming), who are relied on for setting up proper web based communication systems for the Project.

2.3 The University of Verona – DESIGEO (Dpt. of Economics, Society and Institutions, Geography Section)

DESI (an interdisciplinary department) has experience in local industrial spatial development (analyzing business strategies, their behaviors and their impact on the territory) and, recently, mainly in the following fields: Tourism and Transport Logistics. It adopts methodologies based on both the GIS/GPS and the quantitative/qualitative approaches used in social sciences. It processes data for geographic tourist itineraries (also on PDAs), focusing on landscape, agricultural and cultural heritage in the Adriatic Regions. On one hand, the work aims to get a better understanding of how tourist typologies are evolving and, on the other, at matching tourist needs (at the global level) with the localized richness of locations. In this latter area, they could benefit from the use of ICT tools and design/implement local

economic policies that are sustainable and able to achieve greater competition among the various destinations in the Mediterranean countries. DESI also works at analyzing the way local/global logistics networks grow and how the role of Verona as a logistic node (with regards to a continental or world-wide situation) adjusts to changing (global) economic processes.

References:

The proceedings of the Workshop "BALKANS: A LABORATORY OF EXCELLENCE, **Results of the SISA Interreg Project**, Trieste (Chamber of Commerce and Central Europe Initiative Secretariat), September 18, 2006, in printing at the University of Trieste
Contributions by **GUESTS:**
- Antonio Arrighi, Italian Military Geographical Institute, Florence, "The Institutional Italian Contribution to Balkans Cartography"
- Ali Dedei, Institute for Transport Studies, Tyrana, "Albanian Road Network"
- Francesca Krasna, Dipartimento di Scienze Geografiche e Storiche-Sezione di Geografia Economica e Politica del Territorio, Facoltà di Economia dell'Università degli Studi di Trieste. "I Balcani nello scenario geopolitico mondiale",
- Giacomo Borruso, Facoltà di Architettura dell'Università di Trieste, "Cultural Heritages in Balkans and International Cooperation"
- Claudia Robiglio, University of Verona, " Gli itinerari turistico-culturali per la qualità della vita"

Contributions by the University of Trieste SISA STAFF:
- Bernardo Sannino, "Management del Progetto SISA"
- Luca S. Rizzo, "Satellite Navigation Technologies and Hypothesis of Development in Balkans"
- Giorgio Manzoni, "Road Information System for Countries across Adriatic Sea
- Giulia Grandi, University of Trieste, "Automatic road extraction from satellite images"
- Giorgio Bolzon &Andrea Piemonte, "Survey, Mobile Mapping System GIGI One, Data collection and elaboration, Output formats"
- Raffaela G. Rizzo "The use of MMS data for tourism".

Maritime Safety and Security in the Alpe Adria Region - Concept for LivingLab

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This paper introduces principles for the creation of the Maritime Safety and Security Lab, and its possible impact on the Alpe Adria Region. Maritime trade is discussed as a principal source of globalization, as along with global maritime trade statistics. Maritime accidents causing economic and environmental damage amounting to billions of euros are briefly highlighted. Maritime security issues, increased after 9/11, are briefly discussed, as well as how the lack of research on security impacts the supply chain. As a result, the authors state that only good cooperation between the maritime and logistic sectors in the region is a winning solution for this problem. The integration of safety, security and commercial information and data are the only favourable safeguards against disasters and security threats in the region.security and commercial information and data are only favourable safeguard against disasters and security threats in region.

1   Introduction:

The maritime safety and security LivingLab is focusing on the development of safety and security procedures for maritime transport, as well as procedures for search and rescue at sea. The whole coastal area of the Republic of Croatia, in all its size, the full 6,000 kilometre length coast of Adriatic Sea and its thousands of islands, represents a remarkable natural resource.

The maritime system should be looked on as a complex system divided into segments of activities bearing different technical, economic and legal characteristics. Although there is considerable variety between certain component parts of the maritime system, they are also closely dependent on each other and this should be taken into consideration when defining developing measures and goals. The Adriatic Sea, like every other sea, is a means of integrating not only neighbour countries, but all the countries in the world. The process of protecting the Adriatic Sea is not just local, but primarily a regional concern and then a global one.

2   Description of the Concept

The main concept of the living lab is the prevention of accidents at sea, including maritime terrorism, as well as establishing a system of navigation, a ship reporting system, complete coverage of the radio communication system and a vessel control service in port areas and in the access routes to ports with the largest volume of passenger and cargo traffic, especially regarding dangerous and hazardous cargo, improving mutual cooperation with corresponding offices in the neighbouring countries, such as the Republic of Slovenia and the Republic of Italy, in applying the regulations protecting the marine environment against pollution, and

the application of the Coast Zone Management principles.

The maritime system is closely coupled with all other industries and especially with logistics. It would be unjustified to create a safety system without connection to related companies in the supply chain as a whole, especially in the ICT. The integration of information between the safety system and the commercial companies is a primary goal of our Living Lab, thus creating an interface between both.

3   Maritime Trade

The maritime world can also be seen as a primary source of globalization because it is the medium by which 90 percent of the world trade (as measured by weight and volume) is transported (Santoso, 2002). The barriers to global commerce would be insurmountable without maritime trade and the history of the world would have been vastly different. E-commerce and the Internet may be the symbols of the most modern form of globalization, but historically the symbols have been the ever-increasing size and speed of ships and the shrinking cost of commercial transport (Cullinane et al., 1999, Cullinane et al. 1997, Komadina et al. 2000). Transportation and logistics can be seen as real parts of virtual business and ultimately the open ocean is still globalization's prime medium and symbol

In the past few decades many barriers to trade have fallen. Key factors in supply and demand have resulted in a burgeoning of trade relationships between regions and nations across the world At a global level, the growth in the value of international trade since 1989 (up 190%) has substantially outstripped the growth in production (up by 80%) (Cachon and Lariviere 2001, Holland International Distribution Council, 2001).

Complex trading networks have evolved primarily to exploit differentials in labor cost and the availability of raw materials in particular countries (Frankel, 1999a). Their development has also been facilitated by major regulatory and technological trends. Trade liberalization, especially within trading blocks such as the EU and NAFTA, has removed constraints on cross-border movement and reduced related 'barrier costs' (Gilman, 1999). Advances in telecommunications and information technology have given companies the means to manage the physical movement of products over long and often circuitous routes.

Around 90% of merchandise is transported by sea. According to WTO data, world seaborne trade amounted to 5.9 billion tons of loaded goods in 2002, up by 0.8% from the previous year (Santoso, 2002). In 2002, the share of seaborne exports from developing countries was equal to 49.4%, while that of developed countries was 40.4% (the developed countries' share in seaborne imports being 60.3%, while that of developing countries was 31.4% (Frankel, 1999b).

The global economy is expected to expand, but much will depend on the rate of industrial development in Asia, the growth of import and export in the United States and Europe, and the price of oil. In line with these developments, European ports showed a throughput of 60 million TEU in 2003, an average 10.5% increase compared to 2002 (Ferrari et al., 2005).

All this shows that the maritime transport industry is changing clock-speed (Frost 2000). From industry where changes were only expected over decades, maritime transport is suddenly changing into industry that moves fast, where changes are constant and new logistic strategies are introduced daily.

4   Maritime Safety

Accidents such as the 'Herald of Free Enterprise' (1987), 'Derbyshire' (1980) and 'Piper Alpha' (1988) tragedies, along with environmental disasters such as the 'Amoco Cadiz' (1978) , 'Erika' (1999), 'Prestige' (2002) and Solar (2006) pollution incidents, have focused world opinion on maritime safety in both design and operation. Unfortunately it is a fact of life that designing for safety and safe operational practices are only appreciated after serious accidents have occurred.

With serious concern being raised on the safety of ships the world over, the International Maritime Organization (IMO) has dealt continuously with safety problems in the context of operations, management, surveying, ship registration and the role of the administration. The improvement of safety at sea has been strongly emphasized and the international marine regulations on safety have been driven by serious marine accidents. It was serious accidents that taught the first lessons. Regulations and rules were then produced to prevent similar occurrences. There has been a significant change in the regulatory regime for offshore safety worldwide since the 1990s.

One of the main problems of maritime safety is knowledge and training seafarers. As Efthimios Mitropoulos, Secretary-General of the International

Maritime Organization, stated in Athens on 6 May 2005 "… Today's ships represent very high value assets and, because of their size and the nature of the cargoes they carry, have the potential of incurring unimaginable destruction, both on human lives and the environment. The burgeoning liquid natural gas (LNG) sector is a good example: the number of these specialized ships in service is expected to increase by over 50% in the next 3 years and there are already insufficient numbers of officers with the requisite skills. How comfortable will we feel when we have doubts about the quality of those in command of such highly sophisticated ships?"

5   Maritime Security

Ten or even five years ago, the concept of 'terrorism' referred to a fairly traditionally defined category, but in recent years our thinking has encompassed new threats and scenarios. The fear that terrorists could launch attacks using chemical, biological or nuclear materials has been added to our concerns about the rise in terrorism in general (Frost, 2000).

Maritime terrorism is evolving and encompasses a wide range of events such as direct attacks on vessels (the USS Cole and the Limburg), hijackings (the Achille Lauro) and the transport of individuals and materiel in support of terrorist groups and activities. Maritime terrorism refers to 'any illegal act directed against ships, their passengers, cargo or crew, or against sea ports with the intent of directly or indirectly influencing a government or group of individuals', US Department of Defense, definition provided in www. militaryworld.com.

Essentially, there are three potential safety problems in the maritime world: container trade, tankers and liquid natural gas carriers.

There are approximately 15million containers in circulation worldwide, making over 230 million journeys each year. Containers now carry tamper-proof security seals (to ensure that nothing has been added to the container after it has been loaded, inspected and closed), but they are not always reliably inspected. In fact only 1% of all containers are inspected per year (Gilman, 1999). It is common knowledge that there are more than twenty ways to introduce material into a container that has been sealed without breaking that seal. Furthermore, containers do not remain at ports and this can cause significant safety problems in the supply chain.

As stated in the previous selection, any tanker accident can have tremendous impact on industry and especially on the environment – but an LNG ship can be seen as a weapon of mass destruction. LNG tankers can hold 3.3 million tons of liquefied gas and can be as long as three football fields. Although reports show that these ships are safe in their working environment, their potential use in terrorist actions is a terrifying.

6   Work to be Done

The analysis of maritime safety and the development of a maritime security regime point towards many directions for further study, because an effective maritime security

regime must involve an impressive degree of national and international cooperation.

A formal safety assessment framework consists of the following five steps

■ the identification of hazards;

■ the assessment of risks associated with those hazards;

■ ways of managing the estimated risks;

■ a cost-benefit assessment of the risk control options;

■ decisions on which options to select.

All this should be done not only in connection with neighboring countries, but with all the countries in Europe, because ports are focal points of international trade and supply chains.

The literature on supply chain disruptions focuses mainly on information distortions such as the bullwhip effect (US Department of Transportation), disruptions that affect production in subsequent stages (Evangelista and Morvillo, 2000) or forecast sharing (Durvasula et al., 2001). Hendricks and Singhal (2005) show the impact of glitches in their supply chains on the company operating performance and Huggins and Olsen (2003) look at a supply chain where extraordinary methods must be built in to make sure that the supplier can always deliver. Chopra and Sodhi (2004) provide a general framework for supply chain risks and categorize methods for reducing those risks. Authors do not know about comprehensive research into supply chain safety and security, so this is one of the directions of research. As there are initiatives in creating complex supply chain projects, known as the "Silk road" and the "Amber road", safety and security should be one of the distinctive parts of this projects.

7   The IT and Communication Infrastructure

Many different systems exist today across the numerous companies and agencies that work in the field of maritime safety and security – and even more in the supply chain environment.

It is common knowledge that in incidents of crisis and consequence management over the last decade, responders consistently reported that an unwieldy number of different devices were needed to talk to the other participants. It is possible that lives were lost because the first responders were unable to communicate and share their awareness of the situation.

Each communication and IT system was created for (and is currently used for) a variety of purposes and missions. For example in the Alpe-Adria region, numerous security systems are in place. The military, coast guard, police and particularly the VTS (vessel traffic systems) and AIS (automated ship identification system) are being controlled separately by each country and always without connections with the neighboring country. Even systems in the same country are not connected to each other, especially the safety systems and commercial information systems in the ports.

Connections and interactions between the systems should be a habitual way of working in the field of safety and security. No specialized safety system can work properly without commercial data retrieved from the port or customs IT systems, because they are information resourceful. The same thing is necessary for the safety of the supply chain, because national agencies in continental
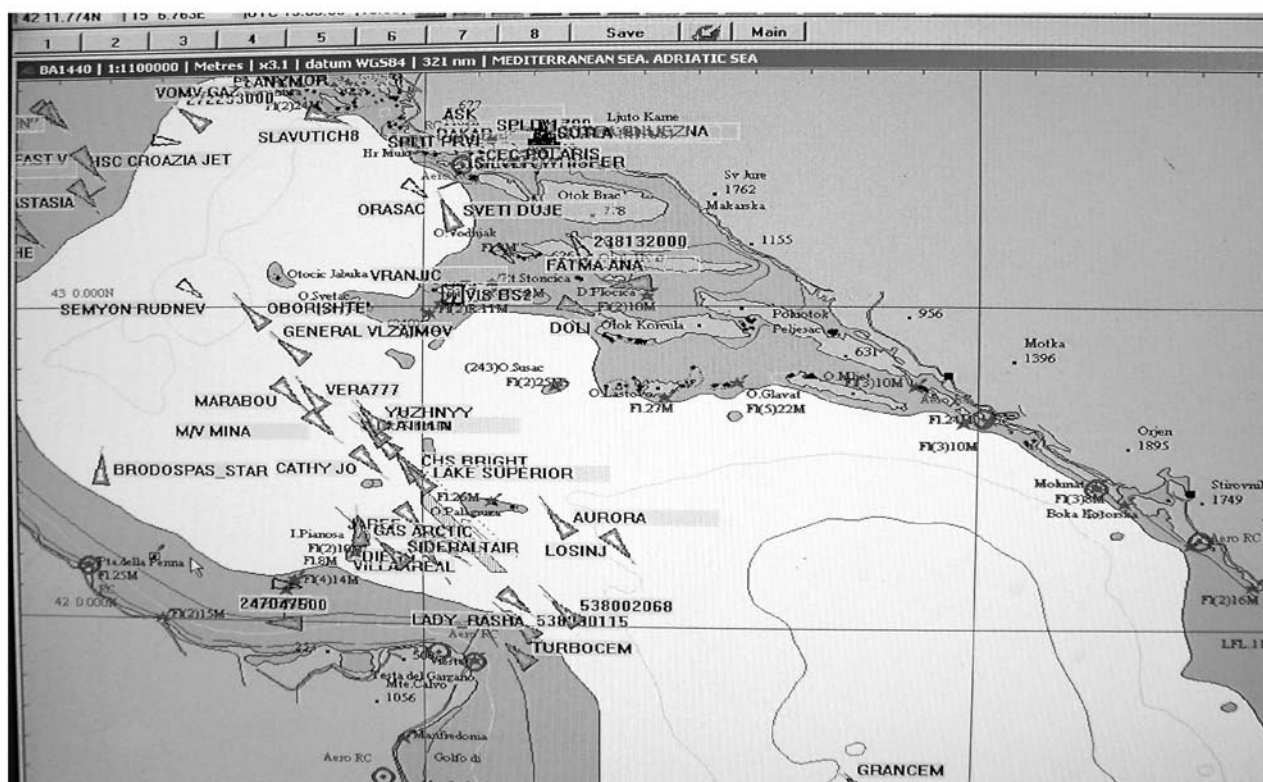

Figure 1: AIS picture of ships in the central Adriatic

countries do not know all the security facts about ships and their cargo. Austrian or Hungarian police and customs can not get information on a particular container, for example, that has been on a ship pirated in Asia. Taking into account the previously stated security risks (the possibility that explosives could be inserted in the container) and this can be very dangerous treatment.

There is a strong need for an integrated system, which would allow the new safety and security structures to conduct operations effectively – to share a common operational picture built on common data; to provide multilevel security information to accommodate local, state and regional needs; and to facilitate real-time communication between these local, state and regional entities. This task should include all the IT research facilities in the region, especially the LivingLabs in the Universities connected with the ALADIN group.

8　Conclusion

Researchers and students of the Faculty of Maritime Studies, University of Rijeka, are developing operational cases in safety and security, as well as logistics projects, in close cooperation with numerous organizations. Current research and development areas of the maritime safety and security LivingLab include: Information Systems, the Interoperability of Organizations Involved in Major Disaster Relief in the eRegion, the creation of a multinational Adriatic Coast Guard system and multiple projects for the maritime industry. These activities form the key potential for future IT services in the maritime industry, logistics and the future applications in several services of the AlpeAdria Region.

9　References

Cachon, G.P. & Lariviere. M.A. (2001). Contracting to assure supply How to share demand forecasts in a suply chain, *Manage Sci,* **47**(5) (2001), 629–646.

Chopra, S. & Sodhi, M. (2004). Managing risk to avoid supply-chain breakdown, *MIT Sloan Manage Rev,* **45**(4) (2004), 53–61.

Cullinane, K, Khanna, M. & Song, D. W. (1999). How Big is Beautiful: Economies of Scale and the Optimal Size of Containership, Liner Shipping: What's Next?, Proceedings, Halifax Conference of the International Association of Maritime Economists, September, pp. 108-140.

Cullinane, K. & Khanna, M. (1997). 'The Economics of Deploying Large Containerships', International Conference of Maritime Economists, 1997 International Conference, London: International Association of Maritime Economists.

Durvasula, S, Lysonski, S. & Mehta, S.C. (2001). Understanding the interfaces. How ocean freight shipping lines can maximize customer satisfaction. *Industrial Marketing Management,* **31**: 1–14.

Evangelista, P. & Morvillo, A. (1999). Alliances in liner shipping: an instrument to gain operational efficiency or supply chain integration? *International Journal of Logistics: Research & Applications,* **2**: 21–38.

Evangelista, P. & Morvillo, A. (2000): Co-operative strategies in international and Italian liner shipping. *International Journal of Maritime Economics,* **2**: 1–16.

Ferrari, C., Morchio, E. & Parola, F. (2005). Southern European ports and the spatial distribution of EDCs. Proceedings of the International Association of Maritime Economists Conference, Limassol, Cyprus.

Fleming D. K. & Baird A. J. 1999. Comment Some reflections on port competition in the United States and Western Europe, *Maritime Policy & Management,* **26**(4): 383-394.

Frankel, E. (1999b). Intermodal integration. *Lloyd's Shipping Economist,* **21**: 10–11.

Frankel, E.G. 1999a. The Economics of Total Trans-ocean Supply Chain Management, *International Journal of Maritime Economics,* **1**(1), September, 61-9.

Frost, E (2000). Globalization and National Security: A Strategic Agenda, in The Global Century: Globalization and National Security, ed. R. Kugler and E. L. Frost (Washington, DC: National Defence University Press, 2000),

Gilman, S. 1999. The Size Economies and Network Efficiency of Large Containership', *International Journal of Maritime Economics,* **1**(1), July- September, 39-59.

Hendricks, K.B. & Singhal, V.R. (2005). Association between supply chain glitches and operating performance, *Manage Sci,* **51**(5), 695–711.

Holland International Distribution Council, Worldwide Logistics, The Future of Supply Chain Services, HIDC, The Hague, 1998.

Huggins, E.L. & Olsen, T.L. (2003). Supply chain management with guaranteed delivery, *Manage Sci,* **49**(9): 1154–1167.

Komadina, P., Cisic D. & Pocuca M. (2000). Modelling the Documentation Flow In Transport Supply Chain - Results From The Simulation Experiments, International Trade, EconWPA.

Notteboom, T. (2006). The Time Factor in Liner Shipping Services, *Maritime Economics & Logistics,* **8**: 19–39

Santoso, T. (2002). A comprehensive model and efficient solution algorithm for the design of global supply chains under uncertainty, Ph.D. dissertation, School of Industrial and Systems Engineering, Georgia Institute of Technology.

U.S. Department of Transportation, Office of Intermodalism, The Impacts of Changes in Ship Design on Transportation Infrastructure and Operations, U.S. Department of Transportation.

United Nations Conference on Trade and Development, Review of Maritime Transport (annual - various issues). New York: UNCTAD.

Serbia as an eCommerce Region: The Role of Trust

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1   Introduction

Serbia is the country which has an important geographical location in Southeast Europe, which descended on a path of economic changes after a decade of stagnation. The World Bank has rated Serbia as the "leading reformer in 2005."

Higher rates of Internet use have been noted in the past few years in Serbia. These data are even much better than they are shown in presented statistics, because the population of Kosovo was taken in them, while there are not any accessible data about the penetration of Internet in Kosovo. However, like Albania (Papazafeiropoulou, 2004), Serbia experiences a paradox of high Internet growth and limited access to the Internet. An explanation of the paradox could draw on the time factor: because of the late start, there has been no sufficient time for achieving a better Internet penetration and bridging the digital divide with earlier adopters. According to (Travica et al., 2006) the software industry, e-payment/e-banking, and legislature give a pass to e-commerce, telecommunications and people attitudes halt it, while the state of network/delivery and education also encourage ambivalence.

As telecommunication infrastructure is growing very fast in Serbia in these days, main obstacle for better treatment of Serbia as real eRegion is in attitudes if the citizens of Serbia. This paper focus social aspects which are slowing the penetration of ICT and Internet into all parts of life in Serbia, with the trust as the most important factor.

2   Serbia: reasons for mistrust

Significant group of new researchers are taking trust as the most important factor of cultural perception for acceptance of e-commerce activities (Genis-Gruber et al., 2006). These authors are taking trust as a proxy for cultural differences among countries. Oxford Dictionary defines trust as the strong conviction that someone can have faith in some person or thing. More specifically, trust in e-commerce is defined as belief in competence, reliability and security of system in risky situations (Tung et al., 2001).

The trust is a major driver of e-commerce when the domains of the economy, national culture and group psychology are mixed. The typical Serbian customer appears to maintain seriously undermined trust, in addition to being disillusioned and impoverished (Vidas-Bubanja et al., 2002). The old retail chains went bankrupt during the 1990s, giving way to a burgeoning black market and makeshift street shops. Quality assurance, product return policies, product servicing and other modern trading methods went to oblivion. As a result, trust in merchants disappeared. In the late 1980s, banks in the former Yugoslavia, encouraged by the federal government, engaged in overselling hard currencies to citizens. Rather than getting cash, the buyers would have the purchased amounts credited to their bank accounts. With the breakup of Yugoslavia, Serbian banks proclaimed this money to be "old savings" and canceled withdrawals for the next ten years. Recently, allowance was made for smaller withdrawals.

The scheming in the early 1990s caused another crack in trustworthiness of banks. Once again before the eyes of the government, pyramid-based banks took millions of dollars from individual citizens as their clients, attracting them with unrealistic interest rates. When the schemed banks broke, a large number of clients found themselves robbed of their money. Both the depriving of clients of their money and pyramid banks were characteristics of a period characterized by an overall decline in legality and ethics and a downright criminalizing of economy and the society (Dinkić, 1995). Because of these misgivings with banks, the Serbian client has refrained from putting the money in the bank again. This fact surfaced when the euro was introduced as the official currency of the European Union at the dawn of 2002, and citizens of Serbia brought 8,000,000,000 German marks to banks, which amounted to about a half of the 2001 GDP of Serbia-Montenegro.

The situation is slowly changing since the political and economic changes that commenced in 2000. New financial authorities introduced stricter financial control, reformed the banking system, and suppressed the black money market. The National Bank of Serbia gradually began compensating the clients who were robbed by pyramid banks. The consumers' trust may also be bolstered by a credit system that is in a steady process of recovery and by weeding out the black market and unregulated trading. Still, some applied psychology studies may be helpful for understanding the consumer profile relevant for B2C e-commerce in Serbia. According to (Vujić, 2004), most of the population is traditionally oriented and prefers stability, even if this implies stagnation. But, international brands

could make a difference with younger customer groups. In spite of a significantly limited purchasing power, the young consumer appears to equate fashionable foreign brands with a satisfactory value proposition regardless of price/value ratios. The value is seen in a social status and wealth that the brands are believed to signify (Maričić, 2002).

With respect to B2B e-commerce, the main problem is the lack of national legislation that is in the process of development (see the section on legislation). B2B Web sites mainly offer product information, and some of them support order taking. All the other activities are happening in back-offices. Currently, a significant problem for all commerce in Serbia is delayed payments caused by a strict control of the amount of circulated money. Therefore, many companies have no money to respond promptly to their pay obligations. What sort of partner is to be trusted in this business environment?

3   Impacts of Culture

Older consumer groups also exhibit their own peculiarities. For example, they prefer national brands, and the motivation appears to be political in character. Political chats are cultural ritual that consumes time and energy of the people (Kovacic et al, 1992). Today, these rituals evolve around the topic of "international community", an overused term in politics and media which refers to foreign powers that influence Serbia. The lack of trust in the "international community" appears to be creeping into older consumers' choice making.

Another cultural trait is a strong focus on the past time dimension (Jerotić, 2003) and a longer time horizon (Trompenaars & Hampden-Turner, 1998). On a list of 42 countries based on the perceived length of time horizon (the average of the perceived extension of the past, present, and future taken together), Serbia ranked about the top of the list (Trompenaars & Hampden-Turner, 1998: 131), being in the neighborhood of Hungary and Austria.

Shopping in physical market places is still considered an important social event in Serbia. For example, green markets are still very popular: this is where one can meet a friend, personally pick out the produce, and enjoy bargaining with sellers. Supermarkets are a new type of shop that gains in popularity. Catalogue-based selling is another innovation, which, of course, has a direct link to buying on the Internet. The German retail giant Neckermann, in collaboration with Serbian Post, has recently introduced mail-order sales. Delivery times and unfulfilled orders appear to be difficulties with distracting effects that mark the early stage of this sales channel. A counter example is the sales service called "Order Now," which combines TV and the Web for the purpose of display and ordering products. It uses cash-on-delivery payment, and increases customer's value by supporting a product return policy.

4   The winds of change

The typical Serbian customer appears to maintain seriously undermined trust in merchants and banks. This is a consequence of chaotic 1990s, when whole retail chains disappeared, black markets burgeoned, and both the government-run banks and pyramid schemes deprived clients from their savings. Older consumer groups do not trust foreign goods due to cultural praising of tradition and mixing of political attitudes with buying preferences.

In contrast, younger consumers embrace fashionable international brands, taking these as significations of social status and wealth. Another important fact which is encouraging is the fact that things are changing in the usage of electronic cards. While in 2003 there were only 250,000 users of them, strong penetration of the electronic cards usage is evident, so in 2005 there are more than 3,000,000 of registered users and significant growth is also registrated in 2006. Also, strong penetration of Internet, specialy among younger generations, gives hope to the growing idea about Serbia as an important e-region.

While regulatory changes and actions of financial institutions could strengten consumers' trust, cultural characteristics could moderate adoption of B2C e-commerce. These refer to time orientation, cultural valuing of shopping in physical stores, a lack of tradition of catalog-based shopping, and mixed experiences from early uses of this channel. B2B e-commerce faces challenges ranging from legal foundations, through partner trustfulness in a cash strapped economy, to e-branding of domestic businesses.

A mistrustful, conservative customer believes in the national misfortunes from history, stemming from the "unfortunate" crossroads-based position of Serbia. But, such ideas are loosing ground every day and people are beginning to see that "the crossroads of Europe" presents a great developmental opportunity for Serbia and a lot of younger people are trying to find their opportunity in the connection with the neighbors..

Serbia could benefit from a non-traditionalistic, more ambitious strategizing that capitalizes on Serbia's geographical location. For instance, the country might seek development opportunities through participation in international B2B trading cycles. In so doing, Serbia can draw not only on its traffic/delivery potential, but it can also find a lucrative placement for its software industry. The expatriate business community that has proved its worth in invigorating Serbian e-commerce may play a role in the process. The ongoing changes in e-banking/e-payment and legislature are supportive of such a B2B strategy. And so is the creation of conditions for facilitating business that has made Serbia the "leading reformer in 2005" (World Bank, 2005). Given that B2B rather than B2C e-commerce has a significant effect on economy and that the Serbian consumer currently has a very limited purchasing power, it is through B2B e-commerce that Serbia may have chances to become involved in the loops of the new, electronic, global economy.

If we analyze all the facts presented, we can see that there is a need for an institution which will not be a part of the rulling system and which could play an important role in the spread of the ideas connected with e-commerce and another usage of ICT among the people in Serbia and in the connections with other regions which are traditionally partners with Serbian people and other Serbian entities. The ideas of eInvoicing and Living Labs are strongly in

line with these facts and their implementation could help in the growth of trust to the B2C e-commerce and other dimensions of ICT usage.

References

Dinkić, M. (1995). *An economy of destruction: the great robbery of the people*. Belgrade, VIN.

Genis-Gruber, A., Onur, I. (2006). The Effect of Cultural Perception on e-Commerce. *3rd IADIS International e-Commerce Conference, Barcelona,* pp. 347-350 .

Jerotić V. (2003). *Serbia and Serbs (in Serbian). Belgrade*, Ars Libri.

Kovacic, B and Travica, B. (1992). *Yugoslavia: ethnic dramas without denouement.* In King, S., & Cushman, D. (Eds.), Engineering Visions of Order in the Socialist World. Albany, NY: State University of New York Press, pp. 30-55.

Maričić B. (2002). *Consumer behavior (in Serbian).* Belgrade, Savremena Administracija.

Papazafeiropoulou, A. (2004). Inter-country analysis electronic commerce adoption in south eastern Europe: policy recommendations fore the region. Journal of Global Information Technology Management, **7**(2), pp. 35-45.

Travica, B., Kajan, E., Jošanov, B., Vidas-Bubanja, M., Vuksanović, E. (2006). E-Commerce in Serba: a Case Study. 3rd IADIS *International e-Commerce Conference, Barcelona*, pp. 19-26.

Trompenaars, A and Hampden-Turner, C. (1998). *Riding the waves of culture: understanding cultural diversity in global business.* New York: McGraw Hill

Tung, L. L., Whye, B. Y. H., Tee, C. E. (2001). The Role of Trust in Business-to-Business Electronc Commerce in Singapore. *14th Bled Electronic Commerce Conference: e-Everything: e-Commerce, e-Government, e-Household, e-Democracy,* vol. 1: research, Bled, pp. 19-39.

Vidas-Bubanja, M, Jošanov, B, and Vuksanović, E. (2002). Role of e-business in transition of Yugoslav Economy. *Proceedings of the 15th Bled Electronic Commerce Conference.* Bled, June 17–19, 2002, pp. 19-35.

Vujić D. (2004). *Motivation for quality* (in Serbian). Belgrade, Center for Applied Psychology Press.

World Bank. (2005). Serbia ranked number one business reformer. Available: http://www.worldbank.org.yu. Accessed: January 12, 2006.

eLivingLabs in a Cross Border Environment with the Austrian eSchwechat Initiative as an Example

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Just recently the concept of LivingLabs has received major attention from the EU. On November 20th, 2006, the Finnish EU presidency launched the 'European Network of LivingLabs', which is a first step towards a new European Innovation Infrastructure that will be backed by the upcoming 7th Framework Program.

Why are the LivingLabs so important for the European Innovation System and what role can be played in this context by regional initiatives?

P. Makopoulos and G.W.M. Rauterberg (Technical University of Eindhoven, Netherlands) published a white paper in 2000 ("LivingLab: A White Paper", IPO Annual Progress Report 35) in which they defined a LivingLab as "a planned infrastructure that will provide an experimental platform for future home-related technologies". It is very important to stress that a LivingLab is NOT a showcase environment where new technologies are being demonstrated. Instead it is a real life (or at least close to real life) situation where real people in their respective roles (citizens, employees, customers, patients and so on) can make use of new technologies and applications within their "natural environment" while being closely observed by a professional scientific community.

It is obvious that the best results can be achieved if the participants in such a LivingLab can stay within their "usual" environment (homes, hospitals, offices, leisure clubs, etc.) with the new technologies and applications being introduced into their daily lives. If people are transferred to completely artificial environments (such as conventional labs, Focus Groups, etc.) the results are clearly less significant in comparison to the seamless introduction of new technologies and applications into daily lives.

It is also obvious that this type of experimenting and observation creates new challenges for the scientific community. Privacy and Data Security, for instance, are key issues for LivingLabs, especially in public infrastructures such as schools, hospitals or residential homes for elderly people.

It is also evident that LivingLabs are not limited to technological aspects. The human interaction, user acceptance and personal attitudes of the real-life participants suggest the possible additional involvement of social and cultural sciences. Cooperation between technical and 'Soft' Science therefore becomes more and more important as well.

The setting up of LivingLabs in a near-to-real-life environment will definitely be a substantial competitive advantage in the building of the 'systems of the future'.

As an example for possible cross border co-operation in the setup of a LivingLab we want to focus on one recently announced initiative in Austria (though it is definitely not the only one).

In August 2006, the city of Schwechat committed itself to become part of the international LivingLab community. The whole initiative is based on the concept of a "knowledge city" (Francisco Javier Carillo (Ed.): Knowledge Cities: Approaches, Experiences and Perspectives, Elsevier 2005) and considers the citizens of Schwechat as "research citizens"!

Schwechat, a town of some 16,000 inhabitants, is situated directly east of Vienna, adjoining the Austrian capital and within its conurbation.

Vienna International Airport, the hub for Central and Eastern Europe, is located on Schwechat's territory. The community also hosts a large logistic station for the Austrian ÖBB railway company, as well as the most modern section of Austria's motorways. The impressively large Danube harbour of Vienna is also very close by, though not actually in its territory. Further on is Austria's main production centre of the OMV oil and gasoline refraction company, a large Borealis chemical plant and the Brau Union brewery, all of which form Schwechat's major economic facilities. Due to this strong industrial and logistic infrastructure, the community offers more working places (~18.000) than it has inhabitants, which represents a unique profile in Austria.

As long as privacy issues are being appropriately handled and the citizens involved are authorizing the city Schwechat is ready to offer its public institutions (public offices, schools, residential homes, etc.) as partners for LivingLab situations.

The integration of the Schwechat airport is also of

major interest. Airports are definitely the most important for technological progress. The combination of logistics, modern technology, speed, security, information, various languages, large number of people and so on, make airports a specific microcosm of their own with thousands of possibilities for specific LivingLab situations. An airport is possibly the best place for observing the impact of new technologies on millions of people (although the special security restrictions may distinctly reduce the scope of such LivingLabs).

The "CEIT Central European Institute of Technology" (www.ceit.at) is the institutional cornerstone of the Schwechat initiative and it is ready to partner with regional initiatives in neighbouring countries, specifically in the fields of:

- e-health (medical and rehabilitation technologies of major use for "assisted living")
- e-infrastructure (research in conceptualisation, planning and designing, mainly of infrastructures and technological (sub)systems for transport and traffic).

The core idea of Schwechat's cross border initiative is that several cities/regions/communities, each with a competence in some domain, would aim to jointly find and develop more complete solutions than any one city could manage on its own. The way to manage this would either be

- with each partner contributing one part and then the various parts are integrated towards a complete solution or
- where one partner develops a prototype for all the others, which is then implemented for each participant, adapted to its specific needs.

The important aspect of this idea is that each city or region retains its own typical profile and also maintains its specific culture, but nevertheless it is willing to openly share its own ideas with other partners. In a way, this approach can be regarded as an adaptation of the so called "Open Source" approach to regional cooperation, which has become popular in recent years in Information Technology and bio sciences.

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4th International LivingLabs Workshop on the Innovative Cross-border eRegion

Faculty of Organizational Sciences, University of Maribor
Kidričeva cesta 55a, 4000 Kranj, Slovenia
Thursday, November 8, 2007, 9.00 – 17.30

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The European Network of Living Labs, www.OpenLivingLabs.eu

The mission
Our mission is to coordinate the development of a European Network of Living Labs. Together the partners will join forces as a network, to develop and offer a gradually growing set of networked services to support the "Innovation Lifecycle" for all actors in the system: end-users, SME´s, corporations, public sector and academia. It all starts by involving people in the streets and the users and user communities as contributors and co-creators of new innovations.

The concept
Living Lab is a new concept for R&D and innovation to boost the Lisbon strategy for jobs and growth in Europe. So what is Living Labs? The answer depends on who you ask because of the big differences between running Living Labs. But one thing is common for all of us; the human-centric involvement and its potential for development of new ICT-based services and products. It is all done by bringing different stakeholders together in a co-creative way.

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Merging and Emerging Technologies, Processes, and Institutions
20th Bled eConference
Hotel Golf, Bled, Slovenia, June 4-6, 2007

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Conferene Details

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Further information:
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Research track

Co-chairs:

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Meetings:

eUniversity Forum:
eIntegration Challenges for Rectors & Deans: Cross-border Cooperation in the Innovative eRegion
Sunday, June 3, 2007, 16:00 – 19:00

Co-chairs:

Tapio Reponen, Rector & Professor of Information Systems Science Turku School of Economics & Business Administration, Finland

Andrzej Herman, Professor & Dean Collegium of Business Administration, School of Business Management & Head, Department of Small Business, Warsaw School of Economics, Poland

The eSilk & eAmber Roads Innovative Regions Think Tank Meeting:
Business and Government Executives & Professors' Commitment to Making a Difference
Monday, June 4, 2007, 14.00 – 17.30

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Tuesday, June 5, 2007, 14.00 – 17.30

ALpe ADria INitiative Universities' eNetwork & Association for Information Systems Chapters
Wednesday, June 6, 14:00 - 15:30

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Professor René W. Wagenaar ePrototype Bazaar:
The Undergraduate and Graduate Students Prototype Presentation

Co-chairs:
Andreja Pucihar, Assistant Professor & Head, eMarkets Laboratory eCenter, Faculty of Organizational Sciences, University of Maribor, Slovenia
Matthias Glowatz, College Lecturer Department of Management Information Systems, Quinn School of Business, Faculty of Commerce University College Dublin, Ireland

Major Contributors:

SRC.SI, Systems Integrator
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Faculty of Organizational Sciences

Merkur Day 2007
9th Undergraduate and Graduate Students eCommerce Conference
&
14th Business & Government Executive Meeting
on the Innovative Cross-border eRegion
http://eCenter.FOV.Uni-Mb.si/MerkurDay

Merkur, Trade and Services, Naklo, Slovenia
Friday, November 9, 2007
http://www.Merkur.eu

Call for Participation

About the Conference

Knowledge and experiences are exceptionally important to new generations of university students. That is why it is useful to gather knowledge collected through the degrees to share with students at other universities. It is also useful to present innovative ideas to organizations that have implemented eCommerce or that need eCommerce business solutions.

In the early 1990s, student theses and prototypes occasionally appeared at meetings of organizations' represented in Slovenia's eCommerce Project. The experience proved to be an important way allowing young eCommerce experts opportunities to meet with mentors to exchange ideas, to establish contacts, and to encourage further collaboration.

In the spring of 1999, the Faculty of Organizational Sciences, University of Maribor initiated an annual student event, supported by Merkur, Trade and Services designated as Merkur Day. Since the 2003, Merkur Day involves universities in Austria, Croatia, Czech, Germany, Hungary, Ireland, Italy, Serbia, Slovenia, and Slovakia. English is the working language of the conference.

Conference Objectives

- Experiences exchange.
- Stimulation to undergraduate and graduate students in "e" research.
- Collaboration between students and employers.
- Collaboration between business, government & academia.
- Discussion forum on integrated "e" projects and themes.

Participating in the program:

The student who has completed her/his study during the period September 2006 – October 2007 is expected to submit 3-5 pages of abstract of undergraduate, graduate or Ph.D. thesis. The submission must be supported by the student's professor/supervisor. Accepted papers will be published in the CD-ROM conference proceedings.

Contact:

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Kidričeva cesta 55a, 4000 Kranj, Slovenia
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V reviji Organizacija praviloma objavljamo dela s predmetnega področja revije, ki še niso bila objavljena in niso bila poslana v objavo v kakšni drugi reviji ali zborniku. Pisec je odgovoren za vse morebitne kršitve avtorskih pravic. Če je bil prispevek že natisnjen drugje, poslan v objavo ali predstavljen na strokovni konferenci, mora avtor to sporočiti, pridobiti soglasje založnika, če je potrebno, in navesti razloge za ponovno objavo.

V Organizaciji objavljamo **razprave** (znanstvene članke, rezultate raziskovalnega dela avtorjev, ali pregledne članke), **predloge za prakso** (strokovne članke, na primer prikaze in ocene pristopov in metod in njihove uporabe v praksi), **razmišljanja** (krajši prispevki), **informacije** in **knjižne ocene**. Občasno vključujemo tudi odmeve na objavljene prispevke, enciklopedične razlage, intervjuje s strokovnjaki s predmetnega področja revije in druga besedila. Približne omejitve dolžine prispevkov so naslednje:

- razprave in predlogi za prakso: največ **45.000 znakov,** vključno s presledki
- razmišljanja, informacije: do **10.000** znakov
- knjižne ocene, odmevi: do **5.000** znakov.

Znanstvene članke (razprave) objavljamo praviloma v angleščini, druge prispevka pa v angleščini ali slovenščini. Razprave in predloge za prakso **ocenita vsaj dva recenzenta,** druge prispevke pa uredniški odbor ali urednik. Na osnovi mnenj recenzentov in sourednikov uredniški odbor ali urednik sprejmejo prispevek, zahtevajo manjše ali večje popravke, dopolnitve ali ga zavrnejo. Če urednik oziroma recenzenti predlagajo večje popravke, se prispevek praviloma ponovno pošlje v recenzijo. Urednik lahko sprejeti prispevek pošlje v lektoriranje. Lektorirana besedila se lahko vrnejo avtorju v pregled.

Besedilo naj bo oblikovano za tiskanje na papirju formata A4 levo poravnano, z razmakom med vrsticami **vsaj 1,5**. Razpravam in predlogom za prakso naj bo dodan **povzetek** (izvleček) dolg 10-20 vrstic, **ključne besede** in kratek **strokovni življenjepis** vsakega od avtorjev (do 10 vrstic) in **letnica rojstva** (zaradi vnosa podatkov v knjižnični informacijski sistem COBISS, v reviji letnica ne bo objavljena). Na prvi strani besedila naj bodo napisani le naslov prispevka, imena ter poštni in elektronski naslovi avtorjev članka, po možnosti tudi telefonska številka enega od avtorjev. Da bi zagotovili anonimnost recenzi-

ranja, naj se imena avtorjev ne pojavljajo v besedilu prispevka.

Članek naj bo razčlenjen v oštevilčena poglavja. Naslovi članka, poglavij in podpoglavij naj bodo napisani z malimi črkami, da so razvidne kratice. **Povzetek**, **naslov članka** in **ključne besede** naj bodo tudi prevedene slovenščino, pri prispevkih, ki so napisani v slovenščini, pa v angleščino.

Slike in tabele v elektronski obliki vključite ~~kar~~ v besedilo. Oštevilčite jih z zaporednimi številkami (Slika 1, slika 2, …Tabela 1, Tabela 2, …). Vsaka slika mora imeti podnapis, tabela pa nadnapis (naslov). Vsaka tabela oz. slika mora biti vsaj enkrat omenjena v besedilu. Besedilu so lahko priložene slike in/ali tabele na papirju v obliki pripravljeni za preslikavo. V tem primeru naj bo vsaka slika na posebnem listu, oštevilčene naj bodo z arabskimi številkami, v besedilu naj bo označeno, kam približno je treba uvrstiti sliko: na tem mestu naj bo številka slike/tabele in njen podnapis. Slike bomo praviloma pomanjšali in jih vstavili v članek. Upoštevajte, da morajo biti oznake in besedila na vseh slikah naj bodo dovolj velika, da bo bodo čitljiva tudi pri velikosti slike, kot bo objavljena v reviji.Vse slike naj bodo črno-bele z belim ozadjem; barvnih slik ne moremo objaviti.

Pri sklicevanju na literaturo med besedilom navedite le priimek prvega avtorja, oziroma prvega in drugega (glej vzorec), letnico izdaje, lahko tudi stran. Popolni bibliografski podatki naj bodo v seznamu literature in / ali virov na koncu prispevka, urejeni po abecednem redu (prvih) avtorjev, literatura istega avtorja pa po kronološkem redu izida; če navajate dve ali več del nekega avtorja oziroma avtorjev, ki so izšla v istem letu, uporabite črkovno oznako pri letnici, na primer 2003a, 2003b, …. V seznamu literature in/ali virov ne navajajte del, ki jih ne omenjate v besedilu članka. Ne uporabljajte opomb za citiranje; eventualne opombe, ki naj bodo kratke, navedite na dnu strani. Označite jih z arabskimi številkami.

V seznamu lahko ločite literaturo (članki v revijah, knjige, zborniki konferenc, doktorske disertacije, …) in vire (dokumenti, zakoni, standardi, interni viri, …). Pri citiranju literature uporabite način, ki je prikazan na naslednjih primerih:

- "... v nasprotju z (Novak in Vajda, 1996:123) raziskava (Wilkinson et al., 2001: 234) nakazuje, da ..."
- "... kot poročata Smith (2003) in Jankowski (2004) metodo uporabljajo za ..."
- "... kot ugotavljajo nekateri drugi avtorji (Zima 1999; Novak in Vajda, 1996; Wilkinson et al., 1993), številna podjetja ....".

Bibliografske podatke v seznamu literature navajajte na »harvardski način«, kot to kažejo vzorci v nadaljevanju. Podroben opis tega načina najdete na http:// …

Članek v reviji:

Novak, A. & Vajda, B.M. (1996). Effect of surface runoff water on quality easurement, *European Journal of Information Systems*, **31**(4): 31 - 39.

Zraven letnika v oklepaju navedite številko v letniku le, če se vsaka številka začne s stranjo 1. Če revija nima letnika, lahko navedete mesec ali drugo ustrezno oznako, na primer **Poletje 1999.**

Članek v elektronski reviji:

Lynch T. & Szorenyi Z. (2005). Dilemmas surrounding information technology education in developing countries, *The Electronic Journal of Information Systems in Developing Countries*, **21**(4): 1-16, dosegljivo na: http:// www.ejisdc.org (22.8.2005).

Knjiga:

Smith, S.I. (2003). *Interpreting Information Systems in Organizations*, Elsevier Publishing, New York.

Poglavje v knjigi:

Zupan, N. & Leskovar, R. (2002). Pričakovanja v zvezi z elektronskim poslovanjem v malih organizacijah. *Organizacija in management – izbrana poglavja*. Uredila: Florjančič J., & Paape, B. Kranj: Založba Moderna organizacija.

Referat objavljen v zborniku konference:

Wilkinson, K.J., Kumar, R. & Kumar, S. (2001). We can do better: integrating theories of novel organizations, *Proceedings of the Twelfth European Conference on Information Systems*. Uredil: Johnson, M. Bled 12-14 jun. 2001. Berlin: Springer Verlag.

Diploma, magisterij ali doktorat:

Zima, B. (1999). Analiza potrebnih znanj diplomiranih informatikov v Sloveniji, magistrsko delo, Univerza v Mariboru, Fakulteta za organizacijske vede.

Poročila, interni dokumenti, zakoni, …:

ACM (1994). ACM SIGCHI Curricula for Human-Computer Interaction, The Association for Computing Machinery, New York.

Zakon o elektronskem poslovanju in elektronskem podpisu (ZEPEP), Ur.l. RS, št. 57/2000, 30/2001.

Pri **internetnih virih / literaturi** naj bo poleg (eventualnega avtorja in) naslova besedila naveden tudi internetni naslov vira (URL) in datum dostopa do dokumenta.

Banka Slovenije, Basel II – Nov kapitalski sporazum, dosegljivo na: http://www.bsi.si/html/basel2/default.htm (6.4.2006).

V literaturi ne navajajte internetnih naslovov (URL) brez drugih podatkov. Lahko pa se nanje sklicujete v besedilu ali v opombah na dnu strani.

Prispevek v elektronski obliki (po možnosti kot eno Word-ovo datoteko) predložite preko spletne strani **http://organizacija.fov.uni-mb.si.** Vprašanja v zvezi s predložitvijo in objavo člankov lahko pošljete na organizacija@fov.uni-mb.si (uredništvo). Lahko tudi vprašate po telefonu 04-2374-226 (Dunja Škofic). Datoteko poimenujte z imenom (prvega) avtorja ali avtorice, na primer *Kopac.doc.*

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ALADIN - ALpe ADria INitiative
# Universities' Network

http://ALADIN-Net.eu

ALADIN has been initiated based upon a Business and Government Executive Meeting "Regional Cooperation in eCommerce Development" taking place at the 14th Bled eCommerce Conference on June 25, 2001. The ALADIN Network was formally created by signing a Letter of Intent in Ljubljana, Slovenia on October 23, 2002 by the rector, or vice-rector of The Karl Franzens University Graz, Austria; The University of Rijeka, Croatia; The University of Trieste, Italy; and The University of Maribor, Slovenia.

ALADIN Involvement in the Cross-border Events:
- Annual ALADIN Meeting of the Bled eConference, http://BledConference.org.
- International Workshop on the LivingLabs in the Innovative Cross-border eRegion, http://eLivingLab.org.
- The Merkur Day, Undergraduate and Graduate Students eConference & the Business & Government Executive Meeting on the Innovative Cross-border eRegion, Merkur, Trade and Services, Naklo, Slovenia, http://eCenter.FOV.Uni-Mb.si/MerkurDay.
- International Conference on Digital Economy. Opatija, Croatia, http://www.mipro.hr/ede.html.
- SSIC-HECE – CEI-UN International Spring School, Applications of ICT in Biomedicine, IHE Transnational Committee for Central and Eastern Europe, Department of Electrical Engineering, Electronics, and Informatics, University of Trieste, Italy, http://www.ssic.units.it.
- Crisis and Emergency Management in the eRegion Workshops, http://eLivingLab.org/Safe & http://www.SafetyAndSecurity.de.

Joint Projects of the 6th Framework Programme of the European Union with ALADIN Members Participating:
- eGov RTD 2020 - Roadmapping eGovernment RTD 2020
  Visions and Research Measures towards European Citizenship and Innovative, Government, http://www.eGovRTD2020.org;
- mGBL – Mobile Game Based Learning, http://www.mg-bl.com
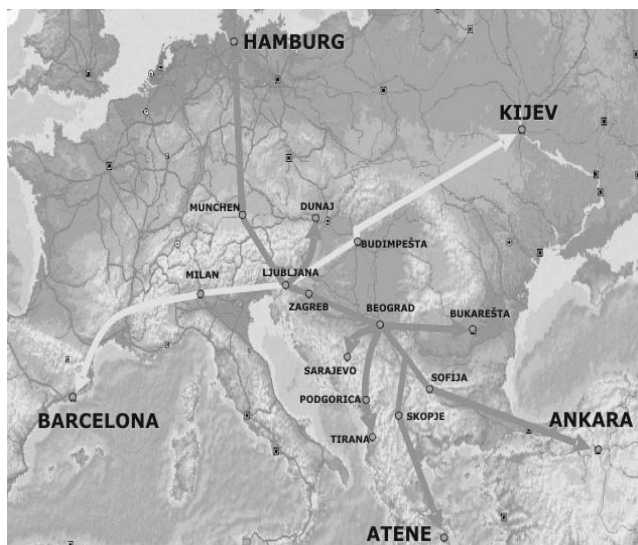
Pan-European Transport Corridors No. 5 & No. 10

ALADIN Members in 2006:
- Karl-Franzens University Graz, Austria
- Medical University of Graz, Austria
- University of Rijeka, Croatia
- Prague University of Economics, Czech Republic
- BW University München, Germany
- Corvinus University Budapest, Hungary
- University of Trieste, Italy
- Novi Sad University and Business School, Serbia
- Technical University Košice, Slovakia
- University of Maribor, Slovenia
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