

## The Digital Earth : Spatial Data Infrastructures from Local to Global Concept

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**ABSTRACT** The development of the concept of the Digital Earth (DE) will be influenced by technological, political, economical, philosophical, educational and as well as cultural aspects. The idea of DE and globalisation generally is technologically unifying the World. On the other side on many places around the World are very different starting conditions for development and applications of the DE concepts depending on economic level, technological development and cultural heritage of the countries. In the regions and states we can recognise different accents on above mentioned spheres. The aim of DE concept should be to open and ensure to them to be able to be part and to play important role in the global processes. Today in many countries a lot of people are glad but as well as some of them also afraid about certain aspects of the globalisation. The objective of the DE development should be different, to help to them to go to the process and be part of them. One of very important technological presumption of the DE concept is creation of SDI as a part of the National Information Infrastructures (NII). Author of the paper is giving basic concept of the Spatial Data Infrastructures (SDI) in the local and regional level (on the example of the relatively small country - Czech Republic, former Czechoslovakia) and is giving idea of the concept and agenda how to link the SDI of small countries with SDI of the regional (European Union) and global level. The paper will be based on the key present day UN, and other countries (e.g. EU) documents.

**KEY WORDS** NSDI, RSDI, GSDI, sharing of data

### Introduction

Concepts of DE is developed mainly in the single or groups of the developed countries. Very often the development is understood only as a technological one. But there are open questions about other aspects of the DE, mainly about full acceptance of the people with different level of education, living in different economical conditions and in different political circumstances. The concept of the DE would be not only demonstration of the new technological achievements but also the concept of the creation of the global information society which will be open for all types of the countries: developed, developing and last but not least countries in political and economical transition. To realise this concept requires to analyse and integrate many aspects of the contemporary world. One of the steps of the realisation is design of the information infrastructures (II) and SDI as a part of them. The terminology looks very technical, but well organized infrastructures able to solve a lot of the global and regional problems should be based on the wider than only as a technological concepts.

### 1. Globalisation, Information and Communication Technologies

The development of the concept of the DE will be influenced by technological, political, economical, philosophical, educational and as well as cultural

aspects. The idea of DE and globalisation generally is technologically unifying the World. On the other side on many places around the World are very different starting conditions for development and applications of the DE concepts depending on economic level, technological development and cultural heritage of the countries.

The real world situation is commented by the UN in the *Human Development Report* (HDR), 1999: "The real wealth of a nation is its people. And the purpose of development is to create an enabling environment for people to enjoy long, healthy and creative lives. This simple but powerful truth is too often forgotten in the pursuit of material and financial wealth" (HDR 1990 in HDR 1999).

Globalisation is not new, but the present era has distinctive features. Shrinking space, shrinking time and disappearing borders are linking people's lives more deeply, more intensely, more immediately than ever before. Contemporary era of *globalisation is characterised by* (HDR 1999):

- 1) *New markets* – foreign exchange and capital markets linked globally, operating 24 hours a day, with dealings at a distance in real time.
- 2) *New actors* – the World Trade Organisation (WTO) with authority over national governments, the multinational co-operations with more economic power than many states, the global networks of non-governmental organisations

(NGO's) and other groups that transcend national boundaries.

3) *New rules* – multilateral agreements on trade, services and intellectual property, backed by strong enforcement mechanisms and more binding for national governments, reducing the scope of national policy .

Globalisation has many faces. Very important part is created by *new information and communication technologies*. They are playing two roles contemporary: driving globalisation but as well as polarising the world into the connected and the isolated. With the costs of communications plummeting and innovative tools easier to use, people around the world have burst into conversation using the Internet, mobile phones and fax machines. The fast growing communication tool ever, the Internet had more than 140 million users in mid-1998, a number expected to pass 700 million by 2001. Despite the potential for development, the Internet poses severe problems of access and exclusion. Who is in the loop in 1998?

There are a geographical **risks of the marginalization of some of the countries**. This risk of marginalization does not have to be a reason for despair. It should be a *call to action for*.

*More connectivity*: setting up telecommunications and computer hardware.

*More community*: focusing on group access, not just individual ownership.

*More capacity*: building human skills for the knowledge society.

*More content*: putting local views, news, culture and commerce on the Web.

*More creativity*: adapting technology to; local needs and opportunities.

*More collaboration*: developing Internet governance to accommodate diverse national needs.

*More cash*: finding innovative ways to fund the knowledge society everywhere.

The recent great strides in technology present tremendous opportunities for human development – but achieving that potential depends on how technology is used. What is technology's impact on globalisation -and globalisation's impact on technology?

With the *knowledge economy* at the forefront of global interaction, much attention has become focussed on new technologies: on information and communication technologies and on biotechnology. For the reasons of this paper is very important , that the fusion of computing and communications – especially through the Internet– has broken the

bounds of cost, time and distance, launching an era of global information networking...

A global map for the new technologies is being drawn up faster than most people are able to understand the implications let alone respond to them-and faster than anyone's certainty of the ethical and developmental impacts. *The global gap between have and have-nots, between know and know-nots, is widening*:

- In private research agendas money talks louder than need.

- Tightened intellectual property rights keep developing countries out of the knowledge sector.

- Patent laws do not recognise traditional knowledge and systems ownership.

- The rush and push of commercial interests protect profits, not people, despite the risks in the new technologies.

As the communications revolution turns digital, it promises far reaching change, globally, nationally and locally. Network communications connect everything to everything else, *creating a network society that forces complex and contradictory shifts*:

- *Decentralisation versus recentralisation*.

Multinational corporations have spread their activities around the world thanks to fast and cheap communications, computer aided design and the standardisation of tasks-yet they can still coordinate and control their world-wide operations as a unit. They operate in an arena beyond the jurisdiction and accountability of any one country, in a global context that does not yet have an adequate framework for regulating them. At the same time network communications have been a tremendous levelling force for small businesses, enabling them to compete-and succeed-in lucrative niches of the global market.

- *Fragmentation versus integration*. Cutting across the tradition of national communities is the rise of on-line communities, drawn together by politics, ethnicity, interests, gender, work or social cause. Using the network, they fire up debates and rally instant responses, bringing a new lobbying power to previously silent voices on the global stage. At the same time network communications can forge closer local communities, providing community information and making local government more transparent.

- *Homogenisation versus diversity*. The global entertainment and media industry-spreading opinion, culture and politics-is dominated by a handful of major companies. They control both distribution network and the programming...at the same time the declining costs of technology have allowed a diversity of voices and cultures to be aired.. Multilingual Internet sites and radio

programming in local languages reach out to minority groups (HDR 1999).

Important role would play also science. The development adequate scientific and research methods for the regional and global studies is urgent. In the Opening Address at the World Conference on Science, W. Arber said: "As far as know, the basic properties of matter and most properties of life are the same anywhere on our planet and perhaps through the universe. It is for this simple reason that most scientific investigators communicate intensively with each other on global scale. Personal relations thereby develop on the basis of recognised quality of the scientific knowledge exchanged..." (Arber W., 1999).

In the Framework for Action (World.,1999) are between many others mentioned the ideas: "Advancing the objectives of international peace and the common welfare of humankind is one of the highest and most noble goals of our societies...The objectives are as valid now as they were fifty years ago. However, while the means of achieving them have been greatly improved over this half century through scientific and technological progress, so have the means of threatening and compromising them. In the meantime, the political, economic, social, cultural and environmental context has also changed profoundly, and the role of the sciences (natural sciences such as physical, earth and biological sciences, biomedical and engineering sciences, social and human sciences) in this changed context needs to be collectively defined and pursued; hence the grounds for a new commitment" (World.,1999).

### 1. European approaches. European Way

Above mentioned ideas were created by UN specialists for all world. We have technologically dominating countries and groups of them, but we have also different experiences, cultures, political and economical systems. Globalisation and technology tools are giving to us a lot of possibilities to connect many places of the world in real time. But also different parts of the world should preserve their specific aspects and share with their experiences with other nations in the global scale. Some of the efforts have been develop in Europe.

To create and develop Information Society in Europe several basic European Union (EU) documents were created:

- White Paper on Growth, Competitiveness, Employment: The challenges and ways forward into the 21st century
- Europe's Way to the Information Society: An Action Plan
- The Information Society: From Corfu to Dublin
- Europe at the Forefront of the Global Information Society: Rolling Action Plan
- Green Paper on Public Sector Information

#### 2.1. Ministerial conference on Global Information Networks (GIN)

On 1997 ministerial conference on Global Information Networks (GIN) was held in Bonn, Germany. The objective of the conference has been to broaden the common understanding of the use of GIN, to identify barriers to their use, to discuss possible solutions and to undertake an open dialogue on further possibilities for European and international co-operation (GIN 1997). The Ministerial Declaration contains from several parts. In the foreword part, *An Opportunity for All* "Ministers consider the emergence of GIN a highly positive development. This is a issue of crucial importance for Europe's future and an opportunity for all, businesses small and large, citizens and public administrations...Global networks represent a powerful influence in the social, educational and cultural fields – empowering educators, lowering the barriers of entry for the creation and dissemination of content in different languages, offsetting the effect of distance for more remote users and offering users access to ever richer sources of information".

In the third part *A key role for the private sector* "Ministers recognise the key role which the private sector is playing in the emergence of GIN, in particular through investments in infrastructures and services." In the part *Two, important roles for governments: providing the framework and stimulating new services* "Ministers recognise that the public sector will need to play active part in order to ensure that GIN fulfil their potential...Will leverage the procurement activities of the public sector, itself a major purchaser and user of GIN, in order to improve the quality of services to the public, the effectiveness of public administrations, and the participation of citizens. They will encourage the creation of public/private partnerships in order to facilitate the development of new technology and services... will stimulate research and development so as to foster innovation and create a user-friendly information society,...urge research centres to further co-operative research using GIN by linking up throughout Europe and interconnecting to the Global research Village".

## 2.2. European Way

Very progressive and important elaboration of the idea of the *European way* have been done by the J. A.G.M. van Dijk, R. Pestel and F.J. Radermacher, members of the *Information Society Forum European Commission*. The paper deals with a *European Way* in the sense of a vision of how to move towards a *global Sustainable Information Society*. Better ways into the future and towards sustainability are now being broadly discussed within Europe. Here, sustainability is understood as an adequate balance between society's economic, social, cultural and environmental concerns from a long-term perspective. This topic is also central to the *Information Society Forum (ISF)* which is the key advisory body to the European Commission concerning all questions of Europe's participation in a transition into a world-wide Information and Knowledge Society.

In this context, the Information Society Forum has analysed the central – perhaps predominant - *role of information and communication technology (ICT)* in eventually reaching sustainability and improvements in the **quality of life**. The Forum takes the position that whether we can reach a sustainable state will be decided while shaping the future Information Society. That is because, on the one hand, these technologies are major drivers of economic globalisation in a world that will eventually reach 10 billion people or more, and because of this - in an indirect way - are now causing additional social and environmental burdens world-wide. This is a typical so-called *rebound effect* of technological progress. On the other hand, these technologies offer, in principle, huge opportunities for overcoming social exclusion, for supporting cultural diversity, for stimulating the economy and for reducing environmental burdens by increasing material productivity. While this so-called dematerialization is a typical, promising feature of most technological progress, ICT has by far the highest potential in this regard.

Whether information and communication technologies will, in the end, lead to more sustainability or not, essentially depends on the *further development of global economic and societal frameworks and corresponding attitudes and values*. Building such frameworks is the *single most important challenge* to politics and societies when entering the 21<sup>st</sup> century. In this respect, better global instruments are needed in the social and ecological fields in particular, to commit the industrialised states to support and co-finance social and ecological developments and standards in countries in transition and in developing countries, aiming in the long run at something like a global

civil society and a global citizenship. Here, caring for and trading of ever-scarcer environmental resources - such as an atmosphere with a sufficiently low concentration of greenhouse gases - in the form of pollution rights is seen as an instrument to justify and organise such co-financing. In this context, the Kyoto protocol and its international instruments (Tradable Permits, Clean Development Mechanism, Joint Implementation) offer promising starting points for further agreements and international partnerships (van Dijk et al., 1999).

## 2.3. Global Information Society and European Enlargement

Above mentioned ideas about Information Society are in Europe (mainly but not only in the member European Union states and states in the process of the accession) realised and supported by the programmes and activities of the European Commission. One of the most important is creation of the *Information Infrastructures*. The *General Information Infrastructures* (Boes 1999) consists of the *global access to information and technology push* realised by WWW / Internet / Intranet / Extranet. Still a lot of the information islands exists. The new communication order is unclear. Also regulatory problems are enormous.

The field of *Internet and World-Wide-Web* is characterised by the:

- Universal and interoperable networks
- Explosive growth
- Major driver
- Continuous and rapid change
- Future needs higher performance and user-friendliness
- Future needs trust and electronic commerce build on Internet.

The development is *realized in the industrial and economic context*:

- ITC is driver of the global market
- Convergence of IT, communications, consumer electronics and media
- Deregulation, privatisation, mergers
- Old jobs disappearing, new jobs created
- Competitive advantage in the future will depend on:
  - access to information, usability & best practice
  - quality of human resources
  - speed of (re-)action.

Boes (1999) also describes *the key factors for the use of ICT*:

- Telecommunications Infrastructure
- Qualified Personnel
- Awareness
- Technology Transfer
- Collaboration and Partnership
- Public- Private-Partnerships
- EC and Administrations are catalysts

Finally *The Way Forward needs*:

- Integration & Standardisation
- Networks and Pilots
- Education and Training
- Global Co-operation
- International Regulation
- Citizen in the centre

## 2. Spatial Information Sector Development

Lord Chorley Report "*Handling of Geographic Information*" (DoE 1987) was in fact the first state/regional oriented report formulating the spirit, role and influence of the geographic information. The report was a critical appraisal of current GI provision in the UK and sent out the barriers to its wider use. All Chorley's recommendations have played central role in establishing a framework for GI in the UK (and beyond) which has served the GI community well for a decade.

Ten years on the Association for Geographic Information (AGI) looked back at the recommendations made in the Chorley report and use these as a basis to judge progress and look to the future. The results was the symposium "*The Future for the Geographic Information: Ten Years after Chorley*" ( Heywood 1997). The aim of the symposium was to start a wider debate about the future of GI in the UK. The symposium identified successes in the areas of: digital topographic mapping, availability of data, linking data, awareness, education and training, research and development, coordination.

Participants of the symposium also provide a checklist of issues which the GI community in the UK would do well to heed if the GI market is to be strengthened. The checklist includes the need to:

- Improve the mechanism by which GI is made available to users (incl. development of appropriate pricing policies, licensing arrangements and copyright agreements).
- Encourage more products in the GI marketplace to support the National Transfer Standards (NTF) by close cooperation with software developers and European and international standards organisations.

- **Establish an affordable national data infrastructure at an appropriate scale for widespread distribution and use** (text highlighted by the author of the paper).The National Geospatial Data Framework could be used to do this.

- Develop improved methods for informing users about what GI exists, where it can be found, and how it can be accessed.

- Encourage the private and public sector to work in partnership to develop the equivalent of GI hypermarkets where users can shop for data. World Wide Web technology could be used to do this.

- Encourage government to speed up its programme of opening up access to government-held GI.

- Encourage wider adoption of the ideas implicit in the GI charter Standard Statement.

- Encourage the development of GI computer environments there are more user-friendly and oriented towards the way people without technical training work with GI.

- Improve data access for educational institutions, at all levels, to enable them to raise awareness among potential users and train tomorrow's GI professionals.

- Promote awareness about the wider value GI at all levels from schools through to government.

- Establish an appropriate professional development programme linked to in-service awards or educational qualifications.

- Ensure there is coordination of research rather than competition between academic institutions.

- Facilitate links between academic research and commercial product and application development.

- Address the problem of how to promote the ethical use of GI products, which handle socio-economic data yet encourage wider access to GI.

- Ensure close cooperation between UK GI initiatives and those taking place at European and international level (Heywood 1997).

Another world famous initiative was officially started in USA. In April 1994, *Executive Order #12906 (Clinton 1994): „Co-ordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure“* (NSDI) was signed by President Clinton, directing that federal agencies carry out certain tasks to implement the NSDI. These tasks were similar to those that had been outlined by the FGDC in its Strategic Plan a month earlier and since up-dated (FGDC1997). The Executive Order created an environment within which new partnerships *were not only encouraged, but required*. In practice, state and local governments will often voluntarily co-operate with federal

agencies if this makes it likely to result in funding or improve their access to data. In addition, the Executive Order had significant effects in increasing the level of awareness about the value, use and management of geospatial data among federal agencies specifically. Perhaps more importantly, it raised the political visibility of geospatial data collection, management and use nationally and internationally.

That Order and the FGDC identified *three primary areas* to promote development of the NSDI.. The first activity area is the *development of standards*, the *second improvement of access to and sharing of data* by developing the National Geospatial Data Clearinghouse, and the third is the development of the *National Digital Geospatial Data Framework*.

In the Executive Order is *geographic information* defined as a critical to promote economic development, improve our stewardship of natural resources, and protect the environment. Modern technology now permits improved acquisition, distribution, and utilisation of geographic (or geospatial) data and mapping. The National Performance Review has recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data in such areas as transportation, community development, agriculture, emergency response, environmental management, and information technology (Clinton, 1994).

*National Spatial Data Infrastructure* means the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilisation of geospatial data.

The **Digital Earth** concept, which should be understood as a second step of the concept of SDI in global scale was published by *Al Gore* (1998): "A new wave of technological innovation is allowing us to capture, store, process and display an unprecedented amount of information about our planet and a wide variety of environmental and cultural phenomena. Much of this information will be georeferenced: - that is, it will refer to some specific place on the Earth's surface. The hard part of taking advantage of this flood of geospatial information will be making sense of it - turning raw data into understandable information."

The Gore is continuing that "part of the problem has *to do with the way information is displayed*. I believe we need a *Digital Earth*: A multi-resolution, three-dimensional representation of the planet, into which we can embed vast quantities of georeferenced data.

Although this scenario may seem like science fiction, most of the technologies and capabilities that would be required to build a Digital Earth are either here or under development. Of course, the capabilities of a Digital Earth will continue to evolve over time. What we will be able to do in 2005 will look primitive compared to the Digital Earth of the year 2020. Below are just a few of the *technologies that are needed*:

- Computational Science,
- Mass Storage,
- Satellite Imagery,
- Broadband networks,
- Interoperability,
- Metadata.

Clearly, the Digital Earth will not happen overnight. In the first stage, we should focus on *integrating the data* from multiple sources that we already have. We should also connect our leading children's museums and science museums to *high-speed networks* such as the Next Generation Internet so that children can explore our planet. University researchers would be encouraged to partner with local schools and museums to enrich the Digital Earth project - possibly *by concentrating on local geospatial information*.

In the months ahead, I intend to challenge experts in government, industry, academia, and non-profit organisations *to help develop a strategy for realising this vision*. Working together, we can help solve many of the most pressing problems facing our society, inspiring our children to learn more about the world around them, and accelerate the growth of a multi-billion dollar industry."

The Gore vision is really magnetic, but the realisation as a global concept needs a lot of another steps and evaluation of the real situation in the different parts of the world.

Rhind (1999) is warning that we may well all be wrong. As an example he is using the advent of "GIS Bible" only a year after the publication. Nobody from the authors did not mention Internet and Web applications. He is giving very important message: "*we are not already living in a digital Earth!!!*" As an example he uses the world which will be reduced to a *village of 1.000 people*:

There would be 584 Asians,.... 95 Eastern/Western Europeans,...520 female and 480 male...650 will lack a telephone at home, 500 would never use a telephone, 335 would be illiterate...ten would have a college degree. *Only one will own a computer*".

As an example of the situation in developing countries is paper characterising SDI situation in the Caribbean (Opadeyi J. et al. 1999): "Large volumes of data pertinent to the spatial data issues have already been acquired and mapped for

individual countries of the region. Analysis of these data in a regional context has been hampered by the lack of a SDI. In the Caribbean, much of the data available is in analogue form and are mostly out of date. The data that are in digital format are not available online for Internet access. Costs of digital data are generally low, however, owing to the restrictions on availability in flexible formats. Spatial data on the smaller scales are often manually generalised leading to inconsistencies when compared with the large-scale data for the same data theme. Presently, no formal arrangement exists for the development of a regional SDI. There are however, some sporadic data acquisition projects being implemented in some of the countries. These projects, it is expected, would provide support for the development of a regional SDI. These projects include:

- a) Uniting the vertical datum of the different countries via one regional tidal determination network
- b) Map revision.
- c) Geodetic linking of countries to a global GPS network
- d) Digital cadastre development".

In Europe the EUROGI, the European Umbrella Organisation for Geographic Information developed the document "*GI2000: Towards a European Policy Framework for Geographic Information*". Geographic Information (GI) is characterised as an "information which can be related to a location on the Earth, particularly information on natural phenomena, cultural and human resources."

The concept is similar as the NSDI one, unfortunately was not improved yet by European Commission (EC). In Europe is a lot of very successful GIS projects oriented for the creation of the European SDI as similar concept as NSDI is not working yet.

As an example of the project which is creating the solutions for the development of geographic (spatial) information infrastructure is the *PANEL-GI project*. The objective of PANEL-GI project will provide the background information to address these topics and to create a network to discuss issues like:

- GIS Inter-Operability and Open GIS
- GIS data formats and standards
- metadata and data exchange
- GIS Applications: National and European dimension
- National GI Agencies
- European and National Geographical Information Infrastructure (EGII, NGII)
- GI legal aspects

- GI market organisation.

In the project are included not only EU member states but also Central and Eastern European countries (CEEC), such as Czech Republic, Poland, Hungary, Romania, Bulgaria.

Good practices are visible in other countries outside of EU. E.g. in Russia are developed a lot of ecological studies and as well as new types of atlases are created. Authors of the Atlas of Sustainable development of Russia which is in preparation process (Evtsev, Tikunov, Janvareva, 1999) are trying to find approaches to the integrated assessment of the environmental and social stability. It requires to identify the causes and factors affecting the environmental, demographic, social and economic situation, in order to propose the system of measures aimed at the sustainable development in all these spheres. The following tasks should be solved in his connection:

1. The survey of the state of the environment and the socioeconomic situation in the regions of the Russian Federation.
2. The spatial modelling of the environmental, demographical, social and economic situations in order to forecast the possibility of their sustainable developments.
3. The integration of the system of indicators to assess how close is the state of the regions to the model of sustainable development

Among the most important means of accomplishing these tasks is the system of spatial cartographic models. These models are applicable for many regions and states. The complexity of the factors of sustainable development leads to complicated structure and the thematic diversity of the atlas. At the same time it is necessary to conjugate the spatial and temporal elements of its content. The final structure of the Atlas could be as follows:

1. The basic inventory maps of the initial environmental potential and natural resources, the demographic potential and the social and economic potentials.
2. The evaluation maps of the state of the environmental components and the whole geosystems, the demographic situation and the state of the social sphere and the economy.
3. The integrated assessment of how close are the regions to the model of sustainable development.

#### **4. Step by Step Development of the State and EU Information Policies.**

Contemporary president of the EUROGI Ian Masser (1998) searched national geographic information strategies in ten countries Key features of the strategic approaches adopted in each of the ten

countries (Masser 1998). These will include matters relating to status (mandatory vs. voluntary and government vs. non-government), primary impetus (top down vs. bottom up), range (general vs. specific), scope of participation (primary public sector vs. public and private sector) and orientation (producer oriented vs. user oriented) as well as the resources available for implementation.

As mentioned by Rhind (1999) "almost all of the changes to our world are being through the actions of business and government. It is done by:

- changes in societal attitudes towards governments,
- a growing unwillingness on the part of the citizenry to pay for increasing government expenditures,
- changes in government's own views on themselves."

But in fact links between public and private sector are still very complicated and in many aspects unspecified.

The creation of the concept of information infrastructures and SDI as their part in the global and continental (European) level is important mainly for CEEC countries. In Czech Republic the situation is influenced by EU documents and acts of the Czech government. The example of the document which is still in the process of the discussion is: **Public Sector Information: A Key Resource for Europe. Green Paper on Public Sector Information in the Information Society [COM(1998)585]**

The issue of the document: *"Public sector information plays a fundamental role in the proper functioning of the internal market and the free circulation of goods, services and people. Without user-friendly and readily available administrative, legislative, financial or other public information, economic actors cannot make fully informed decisions.*

*Public information in Europe is often fragmented and dispersed and so in many instances it is less clear than intended...The ready availability of public information is an absolute prerequisite for the competitiveness of European industry... In Europe the issues is particularly crucial to SME's which have fewer resources to devote to and often difficult search for fragmented information. Ultimately this has a negative bearing on job creation. The same goes for the difficulties European content firms encounter in comparison to their American counterparts as far as the exploitation of public sector information is concerned...". Unfortunately in all document is not SDI mentioned.*

For Czech Republic is important governmental statement **State information Policy - The Road to an Information Society** (1999). The introductory part is saying: *"The development of an information society is a task not just for governments and the state. This objective cannot be attained without a partnership between the government, the public administration, towns, municipalities, citizens, the business community, the information industry, the academic and research sector. For this reason the government is presenting to the general public this document containing the presentation of goals and priorities on the road to the building of an information society. The document contains annexes, which supplement the goals and priorities and specify them in selected concrete areas, as well as presenting the basic argumentation. "*

The basic idea of the document is the creation of the Czech Information Society. The road to an information society is paved by the current technological revolution, which is founded on the mutual integration of information, communication and mass media technologies. Its result is a dramatic reduction in spatial and temporal limitations and easier access to a large quantity of public information. As compared with the previous technological waves the impact of the integrated information, communication and media technologies is characterised by their wide distribution and a high rate of penetration into all areas of society. Within a very brief period of time the changes will affect practically all industry and services, the public as well as the private sector, the entire society at work and apart from work, education as well as entertainment in daily life. The information society will thus have a fundamental impact on business activity, the public administration and the life of every citizen.

*The Chances for the Czech Republic are characterised as follows:*

*"Thanks to the high qualifications and creativity of its citizens the Czech Republic has a chance not to be left behind in the information society that is presently coming into being. We can benefit from extensive foreign investments in modern information and telecommunications technologies, which elsewhere encounter the barrier of the availability of highly-educated employees. Such investments, however, cannot be expected if a transparent business environment is not sufficiently secured, along with the active and specific state support for the formation of an information society and cooperation of the public and private sectors. The implementation of such an information policy will not be possible without initiatory, coordinative and executive bodies. For this reason specific*

bodies have been established in the Czech Republic—the Government Council for State Information Policy and the Office for the State Information System.”

*As the basic objective of the state information policy is to foster and develop an information society and thereby to create the pre-requisites particularly for improving the quality of life of individual citizens, improving the effectiveness of the state administration and local government and improving the quality of support for the development of business.*

*Information Policy from the Point of View of the Citizen*

Information science and telecommunications are among the key factors of economic development and hence one of the means that can bring a fundamental reversal to the Czech economy, from stagnation to growth. The information society will bring citizens an improved quality of life, will offer a better utilisation of their qualifications and of their creative abilities.

A part of the development of an information society is the establishment of public administration information systems which will not only make it more effective and simple, but will be above all of benefit to individual citizens. They will, for instance, permit setting up an integrated network of public administration contact locations, where the citizen or organisation will be able to resolve their affairs involving the state administration.

The application of information technologies will create new employment opportunities. In an information society the demands for qualifications increase. One of the principles of the state information policy is, however, an active curtailment of the unfavourable impacts of the development of information technologies on citizens with a lower level of education and on economically and socially weaker persons, including handicapped citizens. The information technologies will also have a fundamental impact on the protection of the nation's cultural heritage (unique library, archive, museum and gallery collections) and its accessibility to all citizens.

*Information policy from the point of view of the management of the state administration and local government*

The development of an information society entails a wide application of modern information and communication technologies. The coordinated and planned construction and operation of information systems for public administration and the utilisation of such technologies will bring an entire series of benefits...

In November 1998, within the scope of one of the

working groups of the Information Society Forum, a conference was held in Vienna, entitled "The Information Society: Bringing Administration Closer to the Citizens" on the issues involved in making the functioning of public administration more effective. In the conclusions adopted, the so-called "Vienna Declaration," its participants agreed on the following six objectives and on an entire series of recommendations on what needed to be done to attain these objectives:

- the right of citizens to public information
- the wide-ranging provision of public services by electronic means and their universal accessibility to citizens
- the establishment of a partnership between the public and the private sectors
- the accessibility of public information from the point of view of its price (its provision free of charge in its original format)
- the adoption of standards and optimal procedures by means of pan-European initiatives (programs such as 5<sup>th</sup> Framework, IDA, TEN Telecom, Info 2000)
- the founding of information platforms for the continuous collection of information on initiatives making use of the new technology for public services.

*Information Policy from the Point of View of Support for Business Activity*

The application of modern information technologies will help foster a transparent environment from the point of view of information availability, with publicly accessible information on all commercial enterprises. The effective availability of all relevant information on business entities is one of the critical pre-requisites for a properly functioning market environment.

The rapid development of information technologies over the last decade has permitted an entirely new dimension of business activity to arise — Electronic Commerce (henceforth E-commerce). The development of an information society thus generates new business opportunities not only for companies specialising in information and communication technologies but also for all business entities for which E-commerce provides another opportunity for penetrating world markets.

*The Eight priority areas for the state information policy are:*

- I. Information Literacy*
- II. Information Democracy*
- III. The Development of Public Administration Information Systems*
- IV. The Communications Infrastructure*

V. *The Trustworthiness and Security of Information Systems and Personal Data Protection*

VI. *Electronic Commerce*

VII. *A Transparent Economic Environment*

1. *The Establishment of a Transparent Economic Environment for the Support of Business Activity*

2. *Management of Public Financial Funds under Public Supervision*

VIII. *The Information Society: Stable and Safe*

*Information Support for Crisis Management and Environmental Protection*

*Information and Communications for Security Assurance*

*Defence*

The concept of the spatial (geographic) information is accepted.

### 5. Strategy of the Creation of the State, Regional and Global SDI

Henry Tom integrated concepts of the local and regional SDI to the concept of the *Global Spatial Information Infrastructures* (Tom 1997). He is formulating an idea of the hierarchy of spatial information infrastructures.

The establishment of Spatial Data Infrastructures (SDI) at the national, regional, and global levels is the international response to the challenges of organising and using geographic information. SDI at the national and regional levels are collectively stimulating the emergence of the global spatial data infrastructure. A SDI for a country is considered a *national* spatial data infrastructure (NSDI), which can vary by country. A *regional* spatial data infrastructure (RSDI) is comprised of several NSDIs and/or by a number a countries, in which an NSDI may or may not be present. Accordingly, the *global* SDI is formed by linking national and regional spatial data infrastructures.

SDI Components are:

- Standards,
- Technology,
- Data Policy,
- Institutional Framework

How is the position of the small countries towards global SDI concepts? Konecny (1998) specified the situation is in small countries, e.g. countries of Central and Eastern Europe (CEEC) . A great role while solving the problems would be:

- a common outlook on conception and structure and functionality of global SDI,
- defining rules, standards and norms for data compatibility and insuring interoperability, in the framework of global SDI as a whole,
- defining continental concepts resp. concepts of individual economical units, where the individual

countries are members or are planning to be a members in a near future; political and economical conditions are significantly influencing state interests and as a result financing of research and practical solutions while implementing II,

- defining concepts of developing II in individual, mainly small countries.

This is closely connected to the conclusions:

In the small and as well as developed (big) countries the agenda of the creation of II and spatial II is similar.

The possibilities of the investment, human and technical resources are different.

For small countries (e.g. CR) I recommend to follow these necessary steps.

- 1) to participate in the process of definition of global and continental (regional) frameworks of global II and global SDI;
- 2) to participate on R&D agenda in the field of global II and as well as global SDI;
- 3) to create spatial information concepts of individual countries in connection to national (state) II;
- 4) to start discussion between civil and military organisation, and as well as political and economical groups to avoid differences in spatial data products, standards, norms, legislation, etc.
- 5) to use the platform of Global and European Information Society generally and Information Society Forum (in Europe) partially for propagation, awareness, theoretical and practical activities for higher respect of the spatial data and information.

The directions of the organisational development in the USA, Canada, Australia were from the top-down. The activities in Europe and as well as Czech republic are more from the bottom-up. Using some successful experiences from the EU countries, mainly from The Netherlands, so call NEMOFORUM activity started. NEMOFORUM – information - real estates -land use is a new activity in Czech republic. It is a cooperation of the participants (Czech Office for Surveying, Mapping and Cadastre, Ministry of Finance, universities, unions of the real estates specialists, research institutes, etc.) aiming to support coordination of the solving the problems linked with the immobilises (lands, buildings) in the relationships with the land management and territory development and their information support. The initiatives is accepting geographic (spatial) information as a part of the Information Infrastructures as we know from USA, Canada, Australia, etc.

In the future is globally necessary to link technology aspects of the infrastructures with the other ones: political, economical, cultural, educational. The aim should be to create the infrastructures helping to improve human life and activities and support the solution of many global problems.

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