

Local and Regional Spatial Information Infrastructures in Czech Republic: Concept, Tasks and Organisational Aspects

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Abstract. Paper describes selected concepts of the spatial data infrastructures and as well as Digital Earth as a fundamental approaches to the creation of the infrastructures on regional and local levels. On the example of Czech republic is commented and compared situation and necessary steps for the realisation of the development of the vertical and horizontal infrastructures for different activities. The necessary steps of the next development are commented.

1. Selected concepts of the national spatial data infrastructures.

NSDI is developing in number of developed and as well as some of the developing countries. The most known, visible and successfully developed is NSDI in the USA. There exists similar models but not identical, for example developed in Australia and New Zealand and also in some European countries, for example in Great Britain, Netherlands and Germany (DoE 1998, GI 2000 1997). Progress was achieved in some Central and Eastern European countries (CEEC) such as Hungary, Czech Republic, Slovakia and Poland. So called Bangeman report (Europe and the...,1994) is considered as a milestone of the development of European information society. In the World activities accelerated since beginning of nineties mainly in USA.

The detail overview of the US National Spatial Data Infrastructure development is given by Nancy Tosta (1997) and David Rhind (1997). During the early 1990's, the Mapping Science Committee (MSC) of the United States National Research Council began to investigate the research responsibilities and the future of the National Mapping Division (NMD) of the US Geological Survey. The MSC coined the phrase "*National Spatial Data Infrastructure*" and identified it as the comprehensive and co-ordinated environment for the production, management, dissemination, and use of geospatial data. The NSDI was conceived to be the totality of the policies, technology, institutions, data and individuals that were producing and using geospatial data within the United States. The MSC (1993) report proposed a number of actions and responsibilities for various agencies and for the Federal Geographic Data Committee (FGDC) which related to their vision of the NSDI whilst another report a year later urged the use of partnerships in creating the NSDI (MSC 1994).

The FGDC adopted the term NSDI to describe a „*national digital spatial information resource*“ and discussed the concept of the NSDI with the Clinton Administration teams which were exploring means to “reinvent” the Federal Government in early 1993. The NSDI was recognised as an idea and a means **to foster better intergovernmental relations, to empower state and local governments in the development of geospatial data sets and to improve the performance of the Federal Government.** In September 1993, the NSDI was listed as one of the National Performance Review (NPR) initiatives to reinvent Federal

Government. Vice-President Gore stated that "In partnership with State and local governments and private companies we will create a National Spatial Data Infrastructure" (Gore 1993).

One of the primary means of implementing the initiatives arising from the National Performance Review was through Presidential Executive Orders. In April 1994, Executive Order #12906 (Clinton 1994): „Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure“ was signed by President Clinton, directing that federal agencies carry out certain tasks to implement the NSDI.

This document contains also definition of the **geographic information**, which is critical to promote economic development, improve our stewardship of natural resources, and protect the environment. Modern technology now permits improved acquisition, distribution, and utilization 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)

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 its short lifetime, NSDI has generated huge levels of interest in the USA and beyond (see, for instance, Masser 1997). Some considerable successes have been achieved, notably in the formulation of some standards and the creation of the "clearing house" of metadata. Perhaps its greatest success however has been as a catalyst, acting as a policy focus, publicising the importance of geospatial data and focusing attention on the benefits of collaboration – especially important in a country as large and governmentally complex as the USA. The process of involving many parties continues on several fronts; the MSC, for instance, has attempted to anticipate the most significant GIS developments to society in the period up to 2010 through a large and heterogeneous group drawn from many backgrounds (MSC 1997).

2. The Digital Earth Concept

The Digital Earth Concept, which should be understood as a second step of the concept of SDI in global scale, described A. 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. We often find that we have more information than we know what to do with. The Landsat program, designed to help us understand the global environment, is a good example. The *Landsat satellite* is capable of taking a complete

photograph of the entire planet every two weeks, and it's been collecting data for *more than 20 years*. In spite of the great need for that information, the vast majority of those *images have never fired a single neuron in a single human brain*. Instead, *they are stored in electronic silos of data*. We used to have an agricultural policy where we stored grain in Midwestern silos and let it rot while millions of people starved to death. Now we have an insatiable **hunger for knowledge**. Yet a great deal of *data remains unused*.

Part of the problem has *to do with the way information is displayed*. Someone once said that if we tried to describe the human brain in computer terms, it looks as if we have a low bit rate, but very high resolution. For example, researchers have long known that we have trouble remembering more than seven pieces of data in our short-term memory. That's a low bit rate. On the other hand, we can absorb billions of bits of information instantly if they are arrayed in a recognisable pattern within which each bit gains meaning in relation to all the others – a human face, or a galaxy of stars.

The tools we have most commonly used to interact with data, such as the "desktop metaphor" employed by the Macintosh and Windows operating systems, are not really suited to this new challenge. I believe we need a **Digital Earth**. A multi-resolution, three-dimensional representation of the planet, into which we can embed vast quantities of geo-referenced data...."

In compare with the USA and Canada the development in Europe (Konecny 1996, 1998; Boes 1998) is not so successful at least in connection to the understanding by the top political officials. There are a lot of partial and successful activities but e.g. fundamental GI2000 document has not been approved , yet. But in many European states the effort to enhance the necessity of the creation of the NSDI as a umbrella for geographic data and information is visible. The ways are only a little bit different, not common yet. The NSDI is construct neither as a unique systém (e.g. RAVI), or as a part of national (state) information systems (infrastructures).

The evidence of the above mentioned process is "*First Generation of National Geographic Information Strategies*" (Masser, 1998): "The advent of modern GIS technology has transformed spatial data handling capabilities and made necessary for governments to re-examine their roles with respect to the supply and availability of geographic information. This is because government agencies are not only the main external providers of geographic information for most operational applications of GIS technology but also they exert a profound influence on national developments as a result what Rhind has called "a cocktail of laws, policies, conventions and precedents which determine the availability and price of spatial data". Given these circumstances, many governments throughout the world are beginning to think more strategically about geographic information.

According to Rhind (1997), efforts to foster greater coherence have begun in a significant number of countries. Typically they have been manifested by idiosyncratic national initiatives, often graced by the title of spatial infrastructures. Most reflect national priorities: thus Mooney and Grant's (1997) description of the Australian National Spatial Data Infrastructure differs considerably from Tosta's (1997) views. They are however driven by a number of **factors which interact differently in different regional or national domains**. These factors are primarily:

- the impact of new technologies on data collecting organisations, changing what they do, how they do it and the consequences for their customers or users;
- rapid change in the expectations of users. Few are now content to be told what they can have and, as a result of this and financial changes, the power of the customer or user is now much greater. As a consequence, fewer and fewer data providers are now production-led;

- changes in society values, such as the greater concern for privacy, a diminution of trust in government and the shift of responsibilities to lower level (e.g. communities) from higher level governments;
- the effects of reform in government, such as major reductions in staffing, new management approaches, new approaches to financing the framework and public exposure of successes and failure. Some are manifested in new roles for data collecting organisations, as seems to be arising from the 1994 Executive Order of the President of the USA;
- the advent of commercial sector data providers (though some still primarily operate by collating public sector information). The advent of commercial organisations selling satellite imagery on a global basis in 1997/98 may well be very significant;
- the effects of regionalisation and globalisation of business and even government. In Europe, directives made centrally within the Union (i.e. EU) force change in national laws on Intellectual Property, trading practices and much else. At the global scale, the work of the World Trade Organisation may well impact on information trading. All this should be contrasted with the need for global data for scientific purposes where little funding is usually available to pay for the data (e.g. Collins and Rhind 1997).

The most notable areas in which these attentions have focused are on the “core” or, more specifically the framework data (Smith and Rhind 1998, Rhind 1997). The reasons for this are self-evident: the data are the most widely used and are central to use of other data sets. Without them, the use of Geographical Information Systems is severely constrained. That said, the principles and practices of many other data collecting and using parties also have a feedback effect on the collectors of these core data. There is therefore much merit in considering them as a whole. Rhind comments mainly situation in UK in regard to enhancing the availability and use of *Geographical Information*. International initiatives which are in some sense comparable to the national activities, examines some of the complications of operating in a multi-national, multi-sectoral and multi-actor environment.

Critical point of view for real situation *in data integration* is given by Blakemore (1997):

- agencies which collect the data have no mandate to disseminate the data,
- data series provided by private agencies are not free to potential users,
- public Agencies resemble natural monopolies.

He is pointing out the *differencies between UK and USA*: “The situation regarding information dissemination policy and costings in the USA is superficially wonderful, but is a global anomaly and in Europe we have little realistic chance of achieving this, short of an economic miracle that generates massive financial surpluses in government. Even then, the ideologies of most government are not sensitive to the USA model. Indeed, we could argue that if we compared the large-scale mapping of the USA and the UK, then the USA mapping is privatised, whereas the UK has a public-interest mapping service that takes into account the needs of all customers”.

In fact, many of the GI oriented projects are not visible in preparing of the fundamental EU documents. It is a pity because good EU strategies will progressively help to the countries in accession process. Earlier or later the CEEC will be part of EU. If we would like to look for GI2000 as a European Geographic Infrastructure, we have to accept Europe as a continent which will play very important role in the creation of the Global Spatial Information Infrastructure (GSII). Just today is necessary to look for local and regional levels with respect to the next GSII.

3. PUBLIC SECTOR INFORMATION: A KEY RESOURCE FOR EUROPE. GREEN PAPER ON PUBLIC SECTOR INFORMATION IN THE INFORMATION SOCIETY [COM(1998)585]

This document was created by EC for public discussion in member states of EU. In its consequences it would be one of the main EC strategies towards information in Europe and a background for creation, handling and implementation European spatial data and information. The extent of this green paper (GP) is not allowing me to overview all material. Let me only mention the content and concept of it. The geographic or spatial information is mentioned only once and not in the context of NSDI. The document is still open for discussion.

In the *Introduction* is description of 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 issue 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....”.

The Green Paper is divided into three chapters and subchapters:

Chapter I: Why is public sector information a key resource for Europe?

Importance of access for European citizens. Public sector information: opportunities for economic growth and employment.

Chapter II: The Information Society and the public sector

Electronic Government. Electronic Government and public sector information. Electronic Access for all?

Chapter III: Issues linked to access and exploitation of public sector information.

Between “Issues linked to access and exploitation of public sector information (Chapter III)” are:

1) Definition

Public sector information: – varies from one Member State EU to another and it is still open question.

Three approaches to the definitions are mentioned:

- 1) The *functional* approach; in which the public sector includes those bodies with state authority or public service tasks.
- 2) The *legalist/institutional* approach; only bodies that are explicitly listed in the relevant law(s) have a public sector character.
- 3) The *financial* approach; whereby the public sector includes all bodies mainly financed by public funds (i.e. not operating under the normal rules of the market).

In the Green Paper are characterised these **types of public sector information:**

Administrative and non-administrative

The first category relates to the function of Government and the administration itself and the second one to information of the outside world that is gathered during the execution of public tasks (Geographic information, information on business, on R&D etc.)

Fundamental for the functioning of democracy v. does not have such a fundamental character
Like laws, court cases, Parliamentary information versus does not....

Relevant for a general public v. for very limited set of persons that have a direct interest
Like Parliamentary information v. limited set of persons

Economic value (potential)
Both administrative and non-administrative information can have a considerable market value.

Text is accompanied by questions.

Question 1:

Which definition of public sector is the most appropriate in your view?

What categories of public sector information should be used in the debate?

2) Conditions for access to public sector information

The existence of an access right does not mean automatically unlimited and unconditional access to public sector information. Different member States and the EU apply different rules and have different practices.

Questions relevant for both citizens and for the competitiveness of businesses are:

- Existence of an interest,
- Exemptions to the right of access,
- Time quantity, format.

Question 2:

Do different conditions for access to public sector information in the Member States create barriers at European level?

If so, what elements are concerned: requirement of an interest, exemptions, time, format, quantity?

What solutions can be envisaged?

3) Practical tools for facilitating access

Citizens and businesses alike can be seen as the „clients“ for the information services that are offered by the public sector. The concept of client implies that the needs of citizens and businesses are being taken into account when the services are conceived and that user-friendly search mechanisms are put in place. The data sets available in the public sector are numerous (The Netherlands some 36.000). To help the „information clients“ in finding their way in this mass of data it may be necessary to establish meta-data and directories. This leads to the following questions:

Question 3:

Could the establishment of European meta-data (information on the information that is available) help to the European citizens and businesses in finding their way in the public sector information throughout Europe?

If so, how could this best be realised?

What categories of content should directories of public sector information resources contain?

Other topics in the GP are only mentioned but not commented in this paper:

4) Pricing issues

5) Competition (National legislation, EU competition rules)

6) Copyright issues

7) Privacy issues

8) Liability issues

9) EU information

And as a finally selected question,

Question 10:

Which actions should be given priority attention at European level?

Some of the answers of the questions are developed in the geographic information community, some of them are problematic similarly as in the field of the public administration information. But one of the “priority attention” should be a question of the role of geographic information in public administration and process of the development information infrastructures.

4. Tasks

Next development in the field of the SDI should be influenced by the NSDI vision: “Current and accurate geospatial data will be readily available to contribute locally, nationally and globally to economic growth, environmental quality and stability, and social progress”. The NSDI will be built by: individuals and organisations co-operating using electronic technology to find and share geographic information; following mutually accepted standards; and developing common base themes of data so that together they create networks of organisations and unified collections of data to ease decision making for common pieces of geography.“

Masser (1998) searched situation of the NSDI in Europe. He was finding *the task to unified terminology* at least in the European countries as a task of the day. Different but objectives of the initiatives are generally similar as in the US. They include **three main concepts**:

- 1) *A mechanism for national co-ordination.* In many countries does not exist. There are several reasons for it. Underevaluating of the importance of the spatial information for decision making processes on the state, regional and local levels. The total concept of the national information infrastructure and the role of the spatial one in it. Different, often successful regional, local activities are not connected through the regional or national network. These are only several aspects of the problem.

The basic concept of the mechanism would be develop and realise on the basis of the national (state) information policy. In CR “*The State information politics, The Way towards the information society*” created by the Office for State Information System was approve by the Government of the Czech republic in 1999. The document is accepting the main streams of the development of the European Information Society way and as well as the main directions elaborated by the EC Information Society Forum.

- 2) *The creation of core digital data sets.* This is necessary presumption for realizing of any kind of the information infrastructures. In CR we have two kinds of the spatial data sets, civil and as well as military one.

The civil one is so called **ZABAGED** (Basic Base of the Geographic Data). It has been created by the raster digitalisation of the basic maps of CR in the 1:10 000 scale and by conversion to the:

- a) raster model ZABAGED 2, which was created in 1994 as a timely limited supplement of the ZABAGED 1;
 - b) topological -vector model ZABAGED 1, with the time limited raster representation of the component of a map in the build-up area and permanent representation of the relief by the network digital model.
- ZABAGED is harmonised with the European standards for geographic information which are also created. It is used to information servise for:
- a) different types of GIS and support of the analysisi and decision making process,

- b) design of the state thematical map series by digital methods,
- c) support of the international co-operation and programs.

The military sector is designing so called "Military topographic information system" (VTIS) which is including, e.g:

a) *Digital elevation model of the 1. generation (DMR1)*

It consists from maximum values of the elevations in 1 x 1 km squares.

b) *Digital elevation model of the 2. generation (DMR2)*

It consists from elevations in the network of 100 x 100 m squares

3) *The development of metadata services.*

Is fully accepting the responsible European organisation results and as well as ISO development.

The above mentioned DB are important but they are still only first sets of the data which have to be added by many different data sets. The problem which is necessary to pay attention for is the future integration of the data from very different sources. Only guarantee of this aspect will allow to create new types of infrastructures.

5. 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.

Onsrud (1997) is characterising conditions in which U.S. NSDI and its implementation will be develop. "The society in which the following conditions exist relative to producing and accessing geographic information:

1. An individual or private business that creates a digital map or other geographic information product or provides a useful geographic information service gains reasonable compensation from their efforts or original works to the extent that the market values the contributions. The more useful the innovation or work is to society members, the greater are the rewards for the creation. Geographic information and products enter the public domain after a reasonable period of time for the creators or producers to gain substantial benefits from their efforts.

2. There is an analogue to the traditional "public goods" library model in our digital future whereby any person (child, scientist, citizen, business person, etc.) might browse, study, and borrow copyrighted information from the virtual global library at no direct cost. Thus, there is a "right to read" digital maps and geographic data files without the requirement to pay on a per usage basis or the requirement to physically travel to a "brick and mortar" library that has a subscription allowing general citizen access. If the virtual library funding mechanisms and operational rules and procedures are successful, they will help lessen the gap world wide between the "information haves" and the "information have nots."

3. Businesses are able to effectively use information about individuals, including locational information, to better develop and supply products and services desired by their consumers. As part of this increased effectiveness, businesses are able to efficiently gain permission from each individual to use information about that individual or efficiently obtain rejection of permission .

4. Individuals have the legal right to control information about themselves for information that is highly personal. They have the power to enforce these rights in court or through other effective means.

5. Government agencies stick to the business of responding to government needs for geographic and other information as those needs are defined through legislated public-purpose agency mandates. The lines between government data and services versus private data and services remain bright and distinct. The information gathered for public purposes is available to all at no greater than the cost of dissemination with no intellectual property restrictions on further use of this information gathered at taxpayer expense. Government agencies do not enter into the business of responding to private sector needs for information except where no private suppliers of information "services" have yet developed and under these limited circumstances government charges high prices for their services in order to encourage the private sector to compete with government and take over the servicing of private sector information needs."

One of the more and more accepted aspects of the Information Society generally and SDI particularly is *education and training process*. Markus (1997) stressed that "coming to the beginning of the 21st century it has been recognised that human resources produce much more profit than any other investment. The speed of changes in the field of information technology necessitates the reengineering of the present education systems and an overall need for lifelong learning. The relevant response to the challenges of these changes in human resource development is the flexible, open and very often distance education".

6. How to go ahead?

Masser (1998) searched national geographic information strategies in ten countries (Australia, Britain, Canada, Indonesia, Japan, Korea, Netherlands, Portugal, Qatar and the USA). Key features of the strategic approaches adopted in each of the ten countries. 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.

The strategy adopted in each case must reflect a large number of contextual and institutional factors....unlike the first generation, the evolution of these strategies will have to take account of the regional and global geographic information strategies that are beginning to emerge at the present time.

How is the situation in the Czech Republic?

The situation in the Czech republic is influenced by outside and inside aspects.

The outside influence are both, low acceptance of North American (Gore 1998), Australian, European (GI2000,1998) and other approaches and as well as low priorities NSDI in the European Union, namely on the level of politicians.

Inside aspects are:

- General concept of information infrastructure and its components does not exist. The steps must be coordinated by Office for State Information System (USIS) and Czech Office for surveying, mapping and cadaster (CUZK). It is necessary to realise organisation steps as in the USA and GB and then partial steps.
- Non governmental organizations should be involved.
- Resolving connections of government and private organizations.
- To make problems of spatial information more visible in the context information society (for ex. Newly established Czech Information Society Forum).
- To support research in the above fields.

7. New approaches

The spatial data specialists (e.g. cartographers, geographers, geodesists, photogrammetrists. etc.) are very often more looking inside their disciplines and less outside of them. But it is task of the day to go through the “discipline barriers” and as much as possible create new *vertical and horizontal infrastructures*. The vertical one should depend on the main trends going on in the public administration and as well as non governmental and private sector in Europe or in the global scale. The horizontal one should concentrate for the links between the data and information which have similar, very often regionally influenced characteristics. The co-operation will probably start on the level of the local and mainly regional governments and organisations (e.g. industrial chamber of commerce, agricultural one, professional societies, banks, insurance companies, etc.)

In front of us is also development of a GIS-based European database for the compilation of socio-economic data for regional and state-wide retrieval of information supporting business investment decisions in connections to many regional and inter-regional activities of the EU.

There is a strong demand for GIS-based information systems for socio-economic data and information as the basis for business investment decisions. The aim is to compile data from various sources, create a common infrastructure for these data and make them available to the public. Today it is difficult for investors to get concise information (e.g. social conditions, economic conditions, educational conditions) about possible sites for investments in the pre-investment phase. This is especially true for small and medium size enterprises. Finding and compiling data is very often tedious and time consuming, since the data has to be compiled from different sources (e.g. governmental institutions, non-governmental organisations and private organisations). The task of looking at different alternatives which is common practice in investment planning is even more time consuming and costly. This might result in sub-optimal decisions imposing a high risk for the investors as well as for future employees. Against this background the objective of the project is to design and develop a system which helps to improve the current situation. Such a system improves to a maximum potential benefit the effectiveness of the work processes in this field.

This kind of projects will improve the access and utilisation of existing European spatial and statistical data and information (e.g. SABE, ABDS, Panel GI, PETIT, GDDD, CORINE). The system will thus help to create an open economic system and fair Pan-European co-operation among states and regions. It will also encourage processes which accelerate the development of the information society.

The main goal of the approach is introducing a different kinds of spatial and non-spatial information as a part of the infrastructures which is able to provide *reliable information for potential investors* with respect to the *field of economics*. Possible advantages should be:

1. potential investors will save time for gathering basic information in the pre-investment phase of a project;
2. this of course reduces the costs for the investors in early phases; and
3. the investment process will be accelerated which in turn increases the competitiveness of an investor in the global market place.

Potential users of the system should be several different interest groups that will benefit using such information system, e.g. policy makers, bankers, investors.. The data which is imperative for setting up long term and strategic economic planning scenarios. Banks will be provided with information which helps them to evaluate more easily investment risks for customers. The system may also serve as an instrument for

public services. It may provide information to people who are looking for a new job within a specified region and field of interest.

The information system using wider spatial and non-spatial information infrastructure should be based upon existing databases which are maintained at various national, regional and local institutions (e.g. governmental institutions and universities). Users should have access to the system using modern information society technologies (e.g. the world wide web).

8. What is necessary to do?

1. To create and implement concept of the future spatial data infrastructure as a part of the information infrastructures (in the state, Europe, World).

Possible players: Office for State Information System (USIS); Research Institute for Geodesy, Topography and Cartography, Zdíby (VUGTK); Czech Office for Surveying, Mapping and Cadaster Praha (CUZK); Land Surveying Office (ZU), Praha; Cartographic, Geographic Environmental and land policy and economy oriented departments in the Czech and Moravia universities and technical universities; Czech Society for Geographic Information (CAGI); Czech Cartographic Association; Czech Statistical Office, etc.

2. Information Infrastructures (spatial, non-spatial, economical, etc.) on the local and as well as regional levels.

Players: Local and district governments, chambre of commerce, agricultural chambre ones, real estates agencies, banks, insurance companies, etc.

3. Education and training for the users of the spatial and non-spatial information infrastuctures.

Players: universities, technical ones, high schools, training centres.

4. Clarify and develop the system of the co-operation of the government, public and private sector in the fields link with the creation, using, development and implementation of the information infrastructures.

Players: government, responsible ministeries and government offices, Czech Information Society Forum, Czech Association for Geographic Information.

The author of the paper is highlighting only several of the necessary steps which should be done in the close future, but which are necessary for starting of the process of the creation information infrastuctures in Czech Republic. The problems are probably very similar not only to other CEE countries but in some aspects as well as to other European countries.

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