Components of Spatial Information – What is Needed?

Gerhard MUGGENHUBER, Austria

ABSTRACT

Customers are using Spatial Information for their decision-making. They are accessing different components and services in digital form. How can they manage it? Is it by a coordinated approach of the information providers or is it much more a demand driven initiative, not withstanding all the hindrances?

What are the challenges for the customers? The **customers** get more and more involved in the unpleasant aspects of **merging, transforming, overlaying, filtering information**. A sound infrastructure however needs some harmonization for optimised common use of services and data provided. This paper shows activities and needs as well as examples from **Europe**.

Everybody is speaking about the new challenges and opportunities, which came up as a result of our fast changing **information society**. We all are aware about the changing demand on infrastructure when we change our main source of income from producing industrial goods to a service oriented "**knowledge economy**".

However is everything really new or is it just a repeating story that we should already know from the past, where also a longer process of trial and error was needed for developing sustainable infrastructure and business models, which are still under permanent improvement?

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TS3.3 Spatial Data Infrastructure: Developing Trends   1/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

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1. THE VIRTUAL WORLD AS SURROGATE OF THE REAL WORLD

1.1 Information as Value

In our business world we often use surrogate – not having access to the original. Information and data allow modelling a "virtual world" for orientation and decision-making. We are relying on information as surrogate of the "real world", being in a distance regarding space and time to the facts we can't prove ourselves. From that point of view information has a similar role like money, vouchers and documents, which replaced the exchange of goods.

What kind of infrastructure is needed in order to let these mechanisms work? In Europe we recently introduced € as common currency for our joint market. This procedure increased awareness about frame and needs for integration of a fragmented market into a joint European approach. In a knowledge-based economy some of the lessons leant may also be helpful for introducing information as a surrogate (of given value) for facts proved or collected by ourselves.

1.2 Information - Activities in Europe

Integrating tools for a joint information infrastructure is a longer process similar to the political decisions in the fifties for a common currency, which needed 50 years for implementation or the strategy decision on telecom liberation, which showed good results within 10 years. Telecom and wireless internet are tools needed for letting Tele-cartography and Location Based Services become real.

The further integration of the European economies leads to an increasing demand for **pan-European information products.** Activities in Europe started with strategies, but focuses now more and more on a practical approach:

In 1999 the EC published a Green Paper on "Public Sector Information". In July 2001 a **"White Paper on Governance"** announced that all EU-legislation will be accessible for free on the Internet in all the Union languages from 1.1.2002 onwards (through the EUR-Lex portal).

In Oct. 2001 the EC published a strategy paper: "eEUROPE 2002: CREATING A EU FRAMEWORK FOR THE EXPLOITATION OF PUBLIC SECTOR INFORMATION", highlighting the following:

TS3.3 Spatial Data Infrastructure: Developing Trends   2/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

*The leading principle: A general right to re-use public sector information*
Fair trading: Prohibition of exclusive arrangements
Principles for pricing: Any compensation requested for the reuse of public sector information should be adequate; prices should be transparent.
Intellectual property rights: In many instances information products and services may have been developed by the public sector in conjunction with private sector partners and the rights of third parties are not affected by what is proposed.
The European Markets:

A right to re-use public sector information would not therefore mean that the **situation in the US would be imposed**, where there are practically no costs involved for companies that want to re-use the information.
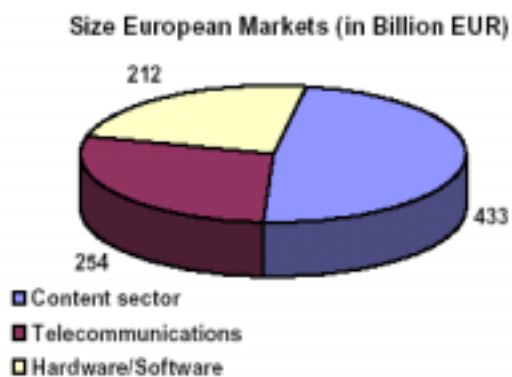
The extensive possibilities to reuse public sector information in the US have given way to an information market that is up to 5 times the size of the EU market with a growth rate of 10 to 30 % in the last 6 years. (Study for the EC by Pira International on commercial exploitation of public sector information, October 2000).

Europe is seeking for a balance between initiating market growth and charging for public sector information free of charge on the way to a knowledge economy. The key factor for success seems to be the joint interest of partners involved based on **economic factors**, which was already, within the telecom-business, the driving force for improved services.

A new initiative in 2002 on an Environmental European Spatial Data Infrastructure (E-ESDI) could be a triggering force for a joint European action on **spatial data infrastructure** in practice. A **coordinated decentralized approach** should ensure a flexible solution based on freedom of access to environmental information with **national, regional and local responsibility.**

E-ESDI long-term vision: Spatial data on the environment should be of such a level of detail and accuracy that the citizen in Europe can follow on a day-to-day basis the state of local living environment. This same local information in summarised form should then be the basis for formulating, implementing and monitoring policies at the higher levels of decision-making (regional, national and community).

2. DATA – INFORMATION – KNOWLEDGE

2.1 What is Information?

It is not just about the availability of information. Information exchange as a process enables humans to share and acquire knowledge from others. Information technologies, developed to

TS3.3 Spatial Data Infrastructure: Developing Trends   3/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

support information processes are still designed to operate within established structures of closed systems. In order to overcome the barriers of closed communication cycles and to enable wider access to knowledge, it is not sufficient to deliver data. We have to create information entities, containing indicators for potential common interests, values, interpretation patterns including rules for intended goals [J.Ortner]. New knowledge can only be achieved when the result of the "view on incoming information" can be linked to old or existing knowledge. Therefore a different view on information results in a different knowledge, which also depends on existing knowledge. Spatial Information technologies and services have to consider the users perception.
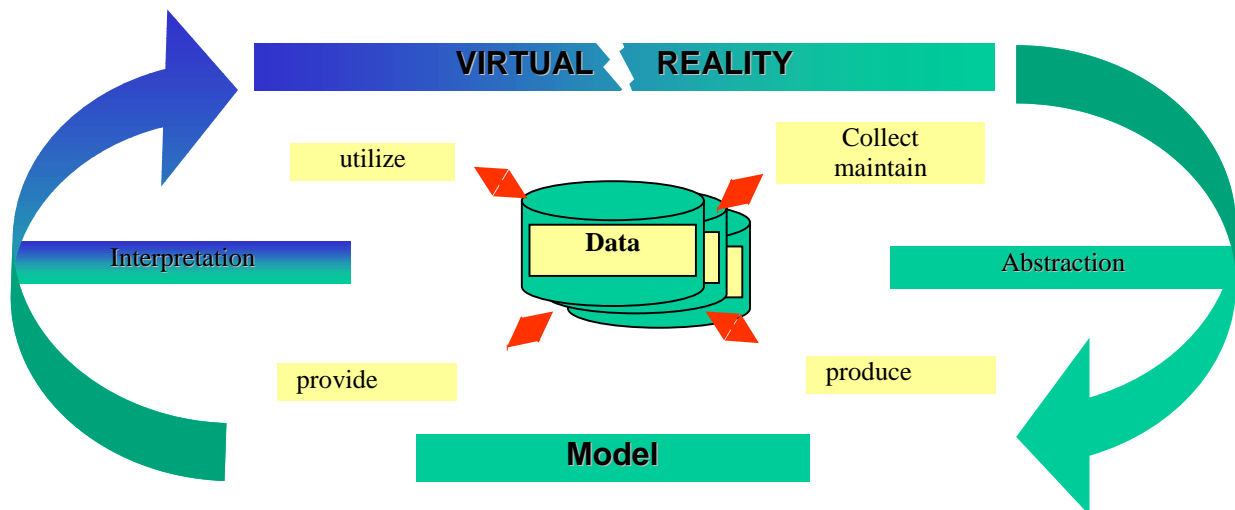
2.2 Parameters for a Joint Information Market

The parameters during the 50 years have matured from the "white-coated-technicians" to the economic management of spatial information along the following path:

1. Data modelling level: Abstraction – modelling – interpretation of information
2. Infrastructure (for transfer, tools for exchange)
3. Procedures
4. Institutional settings (Mutual agreement, Trust – trustees)
5. Economic factors for more user orientation
6. Information - Knowledge sharing.

There seems to be an innate unwillingness of the customers to be trained in the providers perception. However there are success stories within the computer and entertainment business (electronic games) showing that the introduction of new concepts does not necessarily need intense training for the customers.

2.3 Abstraction – Modelling – Interpretation of Information

TS3.3 Spatial Data Infrastructure: Developing Trends   4/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

2.4 Infrastructure (Transfer, Tools)

A lot of conferences and papers focus on the infrastructure needed. At the beginning of this development the awareness focused on technical questions like:

- Are communication lines available? Telecommunication was one of the booming markets during the 90's also based on the deregulation and privatisations during the 80's.
- Are the customers technically equipped to access information provided? Studies on Internet penetration showed increasing amount of customers, which we all know from our own habit.
- How to train the customers for better understanding the new concepts.

Comparing this with other success stories like electronic products shows that the market accepted new products and concepts without additional training of the customers as long as the interfaces are well designed. Are you reading a manual before using a new tool – I am usually not!

The development of the **conceptual level of data modelling and structuring** seems to be a longer process – similar to the slow rate of change in the legal world. The ongoing process of standardizing all the different aspects of spatial information shows there is a long way to go (ISO-TC/211, CEN 287, OGC, etc.)

New business models for distributing spatial information are introduced with a high rate of fluctuation. Sustainable business models for "spatial information management" are still rare. The mechanisms for rewarding those who invest and act as facilitators regarding information are still on the way. [D.Grant] gives details about the – finally successful - example of the Australian way to cooperate on horizontal as well on vertical level over the last 50 years shows the long way to go:

> In 1945 the "National Mapping Council"(NMC) was an attempt to coordinate projected land development, which was replaced in 1987 by the "Inter-Governmental Advisory Committee" (IGAC). The next relevant and parallel initiative was the creation of the "Australian Land Information Council" (ALIC), which later became the "Australian and New Zealand Land Information Council" (ANZLIC). ANZLIC has worked closely with the "Intergovernmental Committee on Surveying and Mapping" (ICSM) - formerly the IGAC- in supporting the development and implementation of the Australian Spatial Data Infrastructure (ASDI).
> Joint business interest forced in 1992 the public sector mapping agencies of the States and the Territories of Australia to cooperate as a consortium, to be known as the "Public Sector Mapping Agencies" (PSMA) in response to the Australian Bureau of Statistics' 1996 Census Mapping Tender.
> *"The Vision of PSMA Australia is the return of economic benefits to the nation through the coordination, assembly and delivery of standards-compliant, client-specific national datasets from fundamental databases held by the Member Agencies".*

TS3.3 Spatial Data Infrastructure: Developing Trends   5/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

In practice PSMA Australia focused during the last few years on cooperation with Private **Sector, Spatial Data Access and Pricing** based on **the Institutional Framework established, with Datasets agreed on,** with a **Clearinghouse** as facilitator.

3. THE PARTNERS INVOLVED: CONSUMER – BUSINESS – GOVERNMENT

Increasing awareness over time resulted in a slightly changing focus in the following sequence: e-Business (B2B), e-Consumer (CRM) and finally e-Government.
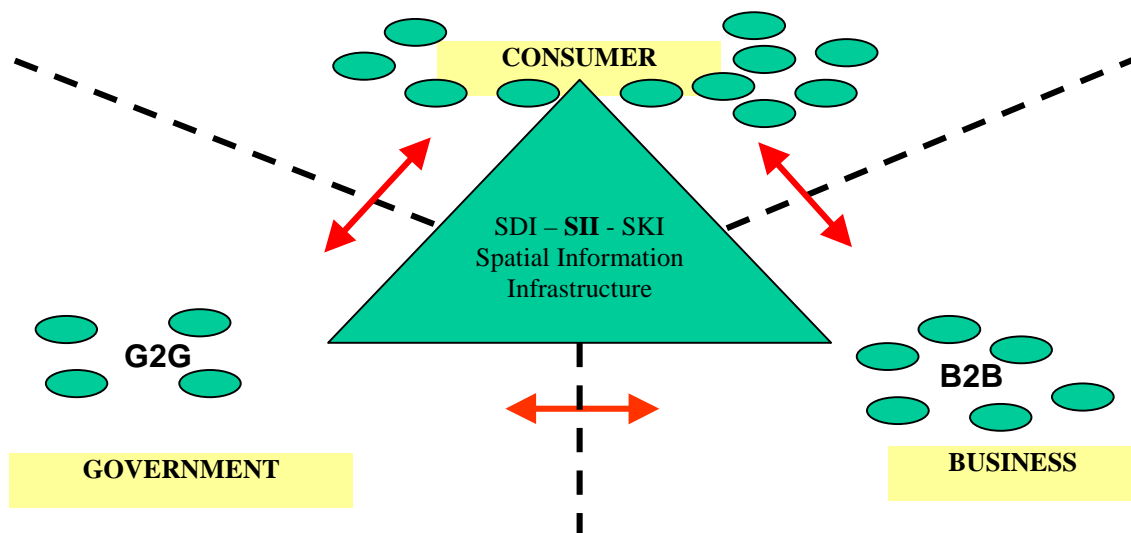
3.1 How to Transform from 1:n to m:n (Provider : Customer)?

Every provider considers the relation to his customers as a 1:n relation. In fact however it is a m:n relationship. The data format, business-procedures and copyright and pricing policy proposed by the provider of products and services multiplies the effort to be invested by the customer for using spatial information. A well sustainable environment for spatial data infrastructure has to develop, **organizational partnerships**, has to work out consensus on data content and last but not least has to distribute data in a way, which causes revenue for the organizations contributing. This revenue is not only a monetary value.

In Europe often the example of the **United States is given,** where access to and re-use of government federal information is enhanced by a clear and simple legislative framework with a broad right to electronically access and reuse this information. There is no copyright and no restrictions to re-use public sector information. Furthermore fees for re-use are limited to, at most, marginal costs for reproduction and dissemination.

In contrary to that example from US the European examples are often still characterized by:

– Uncertainty about the conditions for reuse
– The lack of standards
– Language diversity

TS3.3 Spatial Data Infrastructure: Developing Trends   6/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

3.2 How to Push GSDI Forward?

During the 90's the telecom-business in Europe was under increasing economic pressure caused by licensing and privatisation. It seems that a real essential step forward was achieved as a result of economic pressure. Suddenly the infrastructure and service providers within the telecom business became more service oriented and customer focused.
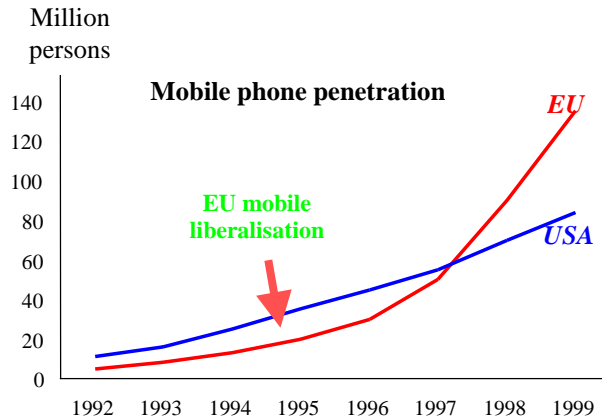
4. INFORMATION SHARING- KNOWLEDGE SHARING

4.1 Organizations

Good examples on Information and knowledge sharing on internal levels are:

– GSDI, Global Spatial Data Infrastructure
– The GSDI-cookbook as one of the deliverables of GSDI gives a good conceptual overview as well worldwide examples of **best practice**
– ISCGM, International Steering Committee for Global Mapping
– PCGIAP Permanent Committee on GIS Infrastructure for Asia and the Pacific
– EUROGI European Umbrella Organisation for Geographic Information
– PC-IDEA Permanent Committee on SDI for the Americas
– ISO-TC-211: Geographic information/Geomatics
– OGC, Open GIS Consortium.

Some activities on national level are mentioned by example in order to highlight the fast and still ongoing organizational changes:

– Australia: ANZLIC - the Spatial Information Council is the peak council for public sector spatial data management in Australia and New Zealand. ANZLIC provides an overarching framework which guides other national bodies. Those bodies include the Public Sector Mapping Agencies (PSMA) and the Intergovernmental Committee on Surveying and Mapping (ICSM) which contribute to ANZLIC objectives. PSMA functions as a government owned clearing house, does not compete with private sector, but brings supply and demand together. ICSM covers both surveying and mapping issues, as they related to Government activities, to ensure continued technical cooperation in these activities on a national basis. In 2001 AUSLIG Australian Surveying and Land Information Group merged with AGSO into Geoscience Australia, the national agency for spatial information leaving the states to contribute and maintain the NSDI.

TS3.3 Spatial Data Infrastructure: Developing Trends   7/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

- Canada: <u>Geoconnections</u>: Canada has developed the <u>Canadian Geospatial Data Infrastructure</u>, with funding of C$60 million over five years.

- Germany: <u>IMAGI:</u> Germany - The current tasks of the **Interdepartmental Committee for Geoinformation) (IMAGI)** consist in drawing up an efficient geodata management on the federal level as well as in formulating the particular Bund-Länder-coordinations on standardization, compatibility, and royalties for the supply of geodata as well as public relations work. In more detail IMAGI focuses on harmonization of references, metainformation, development of interfaces, standards and procedures of data integration, step-by-step implementation of the National Geodata Basis, taking of the required political measures; optimization of the terms of purchase and distribution for geodata; initiatives of qualifications and further training; public relations.

- USA: In 1953 the US Office of Management and Budget issued Circular A-16 on Surveying and Mapping as a frame for coordination across the federal government. An <u>Executive Order 12906</u> called already in 1994 for the establishment of a <u>National Spatial Data Infrastructure</u> for the coordination of geographic data acquisition and access.

4.2 Frame and Business Models for Spatial Data Infrastructure

Examples given above show a lot of sharing of knowledge, but also merging, and transforming the institutional settings all over the years. In conclusion it can be said that the essential elements need time to be developed. The current success factors for a spatial data infrastructure include:

1. Having an **institutional framework** in place, using technical standards, agreeing on fundamental datasets and providing access to data.
2. **Establishing good cooperations –** Public / private sector, but also within the public sector – horizontally as well as vertically:
   Often the relation between the implementations is characterised by competition rather than co-operation. Existing systems primarily serve the purpose and mandate of their host organisations, which are only now beginning to co-operate and co-ordinate.

Within a well-tuned approach the responsibilities are clearly defined:

- the public sector is responsible for standards, policy and legislation;
- the public/private sector co-operatively designs and manages the private sector development of the infrastructure under contract and, over time, potentially assumes increasing responsibility for delivery of services; and
- the public and private sectors work co-operatively to market the services and technologies developed under the NSDI initiative.

Access to information is not only a question of ownership and attitude to communication. Transparency is not yet the main characteristic of communication culture

TS3.3 Spatial Data Infrastructure: Developing Trends   8/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

A **spatial information concept** needs clear mandates, tasks and responsibilities.

A **user oriented approach** with the task of promoting the benefit of using spatial information and having a large amount of users really benefiting from spatial information is the best partnership.

In some governmental agencies there is still a thinking of gaining power by withholding information and controlling it. In contrary to that those however hold the true power who distribute the information and whose information is widely used.

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BIOGRAPHICAL NOTES

Gerhard Muggenhuber has obtained a diploma in Civil Engineering (Surveying) from the Technical University of Vienna and in addition completed postgraduate studies on Geo-Information. 1993-97 he was head of the cadastre-planning department and since 1997 he is head of "international affair" – both at the *Federal Office for Metrology and Surveying* in Vienna, Austria.

Gerhard Muggenhuber has some 20 years of professional experience in management of cadastre and Geo-Information in Austria as well as abroad.

In his present function as head of international affairs he took part on several international initiatives on various cadastre issues to be initiated in Eastern- and Central European countries. As an active member of bureau of the **Working Party on Land Administration (WPLA)**, an advisory body on land registration matters to the **UN-ECE in Geneva**. He is also active within *FIG* and was recently elected as Vice-chairman of *Commission 3 (Spatial Information Management)*.

TS3.3 Spatial Data Infrastructure: Developing Trends   9/9
Gerhard Muggenhuber
Components of Spatial Information – What is Needed?

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002