

“Convergences between Geo Spatial communities: A key condition for decision making”

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SUMMARY

This paper describes the effectiveness of the convergence process in global decision making. That is why the GSDI Association has launched the convergence issue in its Strategic Plan 2009-2013.

One of the main conclusions at the GSDI 11 Conference held in 2009 was that successful convergences in the SDI community can be made between the various regions of the world. In this paper will be explained in more detail that the current SDI's are in a high stage of institutional maturity.

A roadmap for further convergences between the SDI community and the geospatial community is currently in preparation.

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1. INTRODUCTION

Organizing and realizing convergences among the geo spatial communities are currently the central themes of the Global Spatial Data Infrastructure Association’s (GSDI) strategic approach.

Progress in the spatial data infrastructure (SDI) community is remarkable in the different regions.

Europe has now developed a legal and operational framework for environmental data to support governmental managers in making decisions on citizen related activities. This framework should be studied and perhaps emulated by other regions around the world.

The USA and Canada in North America have initiated and evolved numerous innovative approaches and technologies both within the government and commercial sector. They have created many partnerships for providing geographic data and related services directly to citizens and consumers.

Spatial data infrastructure developments in South and Central America as well as in the Caribbean have become more evident and visible with each passing year. There is a particular focus on being responsive to the societal and environmental challenges in those regions.

In the Asia Pacific Region we have seen strong emphasis on spatially enabling e-government due to government investment in spatial data infrastructures. All sectors of government can gain from those investments and pass benefits on to citizens.

Both the geo-spatial and spatial data infrastructure community are ready to support governments in their decision making process. A joint approach can be made. Serious ecological world problems are becoming worse and worse, such as global warming and the extreme waste of energy and other resources. For that reason cooperation is essential with other communities such as GEO GEOSS, Digital Earth, United Nations and the World Bank. This is what we are referring to as we talk about Convergence.

A broad approach to the convergence issue is necessary because of earlier mentioned serious world problems and preparations are currently being made within GSDI to develop an Alliance with GEO GEOSS and Digital Earth.

The sphere of decision making in all relevant policy processes requires an integrated basis of thematic information. This is the only way to solve extremely important global problems such as poverty, urban sprawl, lack of minerals, deforestation, water pollution, disasters and climate change.

2. RAPIDLY CHANGING GEO SPATIAL LANDSCAPE

We are currently living in a rapidly changing geo spatial landscape. Firstly, there is an immense growth worldwide in the use of computers, internet services, mobiles and smart phones of all different types offering location based facilities. Secondly, the fast growing spatial industries are integrating GI data with widely used IT technologies, such as Google Earth and Virtual Earth. Citizens know increasingly faster what is happening throughout the

world. In other words; the knowledge of our planet is becoming more and more democratic and everybody is becoming more and more aware of changes to our planet. Thirdly, consumer markets are developing well as I mentioned before and geo spatial technology plays an important role. Geo information and GPS are essential tools nowadays in mobile phones. Fourth, there is a strong growth in the production of geo data around the world consisting of huge amounts of sensor data, space information and aerial photographs. Geodesy science is in a well advanced stage of collecting data, which can be easily integrated into various systems. In this perspective three dimensional modeling and real time systems in 4 D are promising areas of growth, as they assist in tackling societal issues such as climate change, global warming and disaster prevention. Fifth, another important trend is the link to and exchange of voluntary collected data in communities with professional organizations. This Wikipedia approach is a very important trend which needs to be endorsed by our entire society. It stimulates cooperation at the local level, and brings coherence into society and gives governments legitimacy to act. Sixth, more and more Cloud computing systems are used. These systems make it possible for a huge amount of spatial data to be transported to customers via the internet. It is possible nowadays to have computers facilitated by other companies, provide flexible distribution centre facilities. These facilities can vary depending on the amount of customers. This flexible system works very well for educational and research purposes. In summary; the integrated geographic information and geo-spatial technologies play an increasing important role in primary business processes within fast increasing and broad consumer markets as well as within government organizations and research institutes.

3. INCREASING ATTENTION ADDRESSING GLOBAL PROBLEMS

Through the strong transformation from traditional industry towards a knowledge economy, integrated geo spatial systems are increasingly being used by broad groups of citizens around the world. One of the impacts of this process is a tremendous change in the mindset of citizens. This implies that the knowledge of our planet is democratic in the scope of a visual object and space is as such becoming a more and more important element for making decisions on pressing global problems. More and more awareness is being raised by society as a whole that administrations should address and regulate more climate change, disaster management, poverty, safety and security issues.

Secondly, policy drivers from the objectives defined by the United Nations as Eight Global Goals for the Millennium are nowadays becoming more and more part of important regional programs. The World Bank has launched the World Crisis and Stimulating Plan in a vulnerability fund as well as Work for Food Programs. One of the elements is to stimulate projects with sustainable energy objectives. The European Commission introduced the 20-20-20 Climate Plan. It formulates a target to decrease greenhouse gas by 20 percent in the Year 2020. It calls for a 20 percent increase in energy recycling and energy saving methods. The Obama government announced a change in their environmental policy approach that will be discussed in the USA Congress in 2010. An agreement on climate change has been drawn up by the leaders of USA, China, India, Brazil and South Africa and has been recognized by the parties of the UN Framework Convention of Climate Change. Although the Copenhagen Conference in December 2009 did not conclude with a final agreement, more and more Governments are aware that a roadmap needs to be set up and agreed upon. There is a growing awareness that financial solutions need to be made between developed and

developing nations in order to drive back climate change symptoms. In the national environmental plans of the North Western EU countries, emphasis lays more and more on energy savings, architecture and choice of building materials, re use of industrial areas for the adoption to climate change, management of soil and water systems and regulated flooding areas.

4. CONVERGENCE ISSUE: CENTRAL THEME GSDI11 CONFERENCE, JUNE 2009

The reason mentioned in the second and third paragraph increases the growing need to work on a roadmap for convergences. The GSDI Association’s new Strategic Plan focuses on the realization of this convergence process as one of the main activities in the coming years. This institutional and organizational convergence issue was the central theme of the GSDI 11 Conference held in Rotterdam in June 2009. It was organized in cooperation with the European partners Joint Research Centre of the European Commission and EUROGI, as well as with local Dutch partners Geonovum and the Space for Geo Information Foundation. We brought together successful SDI initiatives in order to make a contribution towards stimulating the convergence process in the coming years. The stories told by the international spatial data infrastructure community from different regions were quite remarkable.

5. CONVERGENCE PROCESS BETWEEN SUCCESSFUL SDI COMMUNITIES IN REGIONS

Some countries are in a high state of institutional development and approaching a state of a real mature SDI. This means that data are becoming commonly shared and frequently reviewed.

Aspect	Stage			
	Stand alone	Exchange / standardization	Intermediary	Network
Vision	Focus on individual organization	Developed with all stakeholders	Implementation	Commonly shared, and frequently reviewed
Leadership	Focus on individual organization	Questioned	Accepted	Respected by all stakeholders
Communication	Focus on individual organization	Open between public parties	Open between all stakeholders	Open and interactive between all
Self-organizing ability	Passive problem recognition	Neutral problem recognition	Actively helping to solve identified problems	Actively working on innovation.

Figure 1 Maturity of SDI from an organizational perspective.doc

This overview shows the framework for the assessment of success of an SDI through its organizational characteristics. Strategic alliances between successful SDI’s in the third stage of institutional development make cooperation attractive. There are similarities and differences in different regions around the world. Europe has now developed a legal and operational framework for environmental data to support governmental managers in making decisions. This framework should be studied and perhaps emulated by other regions around the world.

The USA and Canada in North America have initiated and evolved numerous innovative approaches and technologies both within the government and commercial sector. They have created many partnerships for providing geographic data and related services directly to citizens and consumers.

Spatial data infrastructure developments in South and Central America as well as in the Caribbean have become more evident and visible with each passing year. There is a particular focus on being responsive to the societal and environmental challenges in those regions.

In the Asia Pacific Region we have seen strong emphasis on spatially enabling e-government due to government investment in spatial data infrastructures. All sectors of government can gain from those investments and pass benefits on to citizens.

In this way strategic alliances between these successful SDI approaches stimulate the optimization of the convergence process in the SDI community and decision making on global level.

5.1 Successful Sdi's In More Detail

I will now explain a few successful SDIs in more detail in order to demonstrate their various approaches.

5.1.1 EUROPE

Europe has made some impressive developments. INSPIRE is a well balanced program aiming to create a legal framework built upon National Spatial Data Infrastructures using an open and participatory approach. It is quite a sophisticated and interactive approach between European Commission officials, professionals in the geo spatial community, Non Governmental Organizations (NGO's) throughout the European Union Member States and all of the relevant decision makers, officers and professionals in the Member States itself. From an organizational point of view this approach is quite innovative. Legislation requires that every EU country sets up a national portal to give insight into the current state of access to data, services, network facilities and innovations. During the GSDI 11 conference an overview was presented of INSPIRE's transposition into national legislation. It appeared that the Directive had been transposed into national legislation in Hungary, Finland, the Netherlands and Denmark. In the other EU countries the transposition process will be realized soon, because the implementation in most of the countries is well coordinated.

Before the INSPIRE initiative was started, many EU countries were on their way to developing their national SDI. In the Netherlands, Norway, Denmark and Finland, the National Mapping Agencies, Land Administration Agencies and Cadastral Mapping Agencies were taking the lead to develop their national SDI. They are today successfully implemented.

In the Netherlands the Dutch Cadastre and the Dutch Department of Housing Building, Spatial Planning and Environment played a crucial role in the development of authentic registers. They are an integrated part of the Dutch eGovernment program. The SDI registers form a major basis for the Authentic Registers. They have a legal basis and public agencies and departments are obligated to use them. The Dutch Cadastre, Land Administration and Mapping Agency is one of the main organizations responsible for the implementation of the Dutch SDI and is the distributor for much eGovernment data including cadastre data, small scale topography data, buildings, addresses and cables and pipelines.

Denmark, Sweden and Norway have high-tech SDI's due to the fact that their national mapping agencies play a central strategic role in the creation of eGovernment strategies and plans.

In Norway their SDI is developed with high advanced international standardization concepts created in cooperation with local authorities and municipalities. They initiated a National Digital Norway portal as part of the national eGovernment program. It can be currently used as an eDemocracy tool by citizens and interest groups.

Spain has developed a portal which is one of Europe's success stories. This IDEE portal was created in close cooperation with the academic and research communities and is based on agreements with almost every autonomous region in Spain. In this portal information is freely available to every citizen. The Spanish approach is currently being used as a model for further SDI development in the South American countries.

In conclusion the European SDI has a mandatory legal framework. Leadership is defined and accepted, and participation is arranged on all levels. The framework obliges Member States to define a broad range of high quality datasets, which can be used by citizens, private companies, NGO's, research institutes, government agencies and institutions.

5.1.2 USA

5.1.2.1 Partnerships building and e-government

In the USA a long tradition of coordination and cooperation exists. The Federal Geographic Data Committee currently lays focus on free provision of online discovery and access to geo spatial resources on federal and non federal levels. The FGDC is responsible for launching the Presidents' Office of Management and Budget "OMB E- Government Initiative" that is now owned and managed by United States Geological Society. The USA Government initiated the first Spatial Data Infrastructure at the same time as the Netherlands. The so called Clinton Order obligated every Federal agency to work on standards for data exchange and develop tools for meta data. Their National Clearinghouse, developed in the nineties, was the first Clearinghouse in the world to stimulate more transparency and access to federal spatial data for citizens, private companies and municipalities. Partnership programs were started to stimulate cooperation among counties and municipalities in the fifty States. Today initiatives are being introduced to stimulate partnership building via the website. The Partnership Marketplace was created to identify partners for data sharing and for developing capabilities to handle data acquisition requests from citizens and private companies. Federal Agencies are required to post their plans to the Marketplace. State and Local authorities are welcome and encouraged to do so. The Geospatial One-Stop is an OMB E-Government Initiative that is now owned and managed by USGS. GOS currently has approximately 150,000 publications. Their approach is technology driven and it stimulates an SDI framework for data services via any OGC implementing application.

5.1.2.2 Place Based Policies

President Obama established data.gov in the beginning of this year, which is an open government initiative. In August 2009 the OMB initiated their effective Place- Based policies in using geo spatial technology to integrate place into Federal fiscal planning and policy implementation. It is an innovative means to access geospatial data as well as technology by using the data.gov facility in an interactive way. Geospatial technology can combine various sources of information into integrated displays that allow interactive manipulation, queries, and rapid calculation. Decision makers can see where agency funding is going and then

compare that information to data on citizen needs. In this way it enables them to more readily define appropriate performance indicators to evaluate the effectiveness of spending. FGDC will assist agency budget submittals and budget requests by pursuing place based initiatives from 2011. This means in detail that they will assist agencies in defining the geographies of interest related to OMB budget policies. That is important to precisely specify common geographic frame of reference for place based policy, especially for interagency collaboration. They will do that for the Washington DC metropolitan area, the Great Lake region and South Florida. Second they will assist agencies in deciding how to use their existing agency databases to generate useful information that could be geo-enabled. Third they will help agencies to secure externally available geo spatial information that might be useful for analysis. Fourth they will assist agencies in developing documentation of place based success stories and sharing them across federal enterprise. And fifth they develop a virtual national forum on Place Based Policies with federal government geospatial program executives, with state and local representatives, with the general public communities of interest and with industry and academic constituencies.

5.1.2.3 Interaction between SDI and Space Communities

From 2005 the FDGC has promoted data access from the space community. This has led to a decision that from January 2008 all Land Sat Aerial photographs can be downloaded by the public. At this moment there has been 108 million downloads of these datasets. President Obama expressed in his speech at the National Academy of Sciences in April that strengthening our earth observation from space is necessary for the management of land, water, forests and stewardship of coastal zones and ocean fisheries. Currently the USA plays a stimulating role in making space information available at the global level in cooperation with other important partners in the GEO- GEOSS program. The USA also plays a stimulating role in getting data exchanged between the space community and the geo spatial community. This is due to the fact that GEO GEOSS data architecture and harmonization processes are more or less matching. This approach illustrates their technology driven open access approach with a growing leadership role of the USA Government.

5.1.3 CANADA

Another successful example of the use of SDI's in North America is the Canadian Geo Data Infrastructure and Geo Connections. It helps decision makers make use of online location based information such as maps and satellite images. It is also designed for value added commercial activities. Their SDI provides the necessary technology, policies and people for sharing geo spatial data throughout all levels of government, private and not profit sectors and the academic community. It provides the 16 federal partners with an SDI with standards and content portals. The Standards of the National Partners Program of Natural Resources Canada promotes the Canadian Geo Data Infrastructure. This infrastructure also provides services to the 16 national federal partners as well as to other autonomous organizations, including Canadian provinces and hundreds of municipalities, private companies and academia.

In conclusion SDI Canada is a nice example of interaction between public domain, private companies, academia, decision makers and society to optimize the use of location based information in defined public priority areas. Partnership building is an important key success element in the Canadian approach

5.1.4 BRAZIL

The National Spatial Data Infrastructure in Brazil also deserves attention. Brazil's basic vision is based on the fact that geo spatial data is becoming increasingly available, and services are becoming more and more important to end users. In their SDI the main target is to work on distributed GIS over the internet, composed by data, meta data and services. They work with data and layers as an essential part of the SDI but they are identifying several specific information layers which are becoming more and more important for further dissemination. There is a strong relationship between the use of the NSDI and other data layers that opens new horizons. In census mapping for example, new web based technologies are being introduced. They make use of high resolution imagery that can help to update processes for making census maps. This is a good example of how the space community and geospatial community can interact in an effective way. Information for census purposes is collected by space facilities and additional data is made available through the NSDI by using the same standardization processes.

5.1.5 ASIA PACIFIC

In the Asia Pacific region different successes are being made. India's industry is growing very fast.

The Indian business community, space industry and government are successful catalysts. The new Minister of Science and Industry is working on the establishment of a national GI Authority.

Australia is laying emphasis on the Spatial Enablement of Government (SEG) issue. They recently included it as an essential issue for their eGovernment programs. They are ready to launch their national address file as a standard tool for data exchange. This system is already operational in the State of Victoria where citizens are able to type in their address on Google map and find their cadastral parcels. In the State of Queensland significant investments is being made in the integration of Land Administration Systems. In the state of Western Australia the Shared Land Information Platform provides integrated information for national resource management, land development processes, emergency management for government agencies and citizens, as defined in their e government programs.

The Singapore Land Authority is developing a spatial data infrastructure that is fully integrated with eGovernment requirements. SLA is responsible for the so called Land Data Hub. The vision is to create a spatially enabled Singapore. The goals are for national level decision making in the so called land data hub, for public security in the so called security hub, cost effective business and the location awareness among citizens in the peoples hub.

The Korean spatial data infrastructure is an integrated part of governmental technology policy, and the SEG component plays a supreme role in it. The Korean government invested 1.5 billion USD in three master plans between 1995 and 2010. The results of the Asia Pacific SDI's will be presented in more detail at our GSDI 12 conference to be held from October 19th till 22nd 2010 in Singapore.

5.2 The Way Forward

One of the main conclusions of the GSDI 11 June 2009 Rotterdam Conference was that further convergence and strategic alliances between successful SDI's throughout the world will be endorsed by the GSDI Association.

As Figure 1 the Maturity Matrix of SDI's from an organizational perspective shows, SDI's must be in at least the third stage of SDI development (Intermediary stage) in order to qualify for organizational and institutional mature status. This means that an SDI vision must be developed with all relevant stakeholders, and that leadership is accepted, communication between the stake holders is organized and the partners are actively cooperating. Interestingly, similarities between the SDI approaches in Europe and South America can be found. INSPIRE works with a strong legal commitment and a well organized communication strategy. The state of the art of the current SDI development in the South American countries shows that about 50 % of the current SDI's are based on a legal framework. It illustrates that in most of the cases the legal frameworks are the driving forces behind their developments. In some EU countries NCMA's were the driving force behind the developments of their national SDI and its inclusion in their national eGovernment programs, even before the INSPIRE initiative was started. This was the case in the Netherlands and in Norway.

The approaches in the North Americas teach us that their success is related to technology push and partnership building rather than working with a legal framework as a fundamental starting point. The Asia Pacific success is mainly related to innovations, research and development and a strong relationship with eGovernment. This variety of approaches is attractive for partnerships building potentials at the global level.

6. STRATEGIC ALLIANCES WITH THE GEO-GEOSS PROGRAM AND DIGITAL EARTH

Convergences are currently going on between the SDI communities and the Earth Observation communities, such as with the GEO GEOSS program and Digital Earth. I expect that these convergence trends will grow exponentially in the future.

A joint approach needs to be arranged in cooperation with other geo spatial communities as well, such as with GEO GEOSS and the United Nations or with the World Bank. A broad approach to the convergence issue is necessary because of earlier mentioned serious world problems. The sphere of the decision making in all relevant policy processes requires an integrated basis of thematic information. This is the only way to solve these problems.

GSDI is currently making preparations for alliances between the Spatial Data Infrastructure communities and the GEO GEOSS. In the spatial data community spatial data infrastructures provide network-enabled access to data, maps, and base imagery, using a common set of standards for metadata, services, and data. The key element of the draft GEO work plan includes establishing the GEO Portal, promoting free access to data, the GEO Biodiversity Observation Network, and a system monitoring carbon. The GSDI Association is working on alliances between both of these communities to arrange synergies on several levels. On the technical level from an architectural point of view, the GSDI and GEOSS approaches are closely harmonized. To support the architectural approach, the GSDI community has developed a "SDI Cookbook" as a guide, and it includes a baseline of SDI-related standards promoting interoperability.

On an organizational level, the implementation of more open data sharing principles, as being considered within GEO principles, should be consistently applied to all earth observations and spatial data.

The GSDI Association is exploring the possibility of creating a strategic alliance to amplify the success of both organizations and seeks a similar level of ministerial and executive

visibility and support of contributed systems, products, and services through coordinated efforts.

Thirdly, data sharing principles and practices in the SDI community are generally more open than those currently in the earth observation community. We welcome the implementation of more open data sharing principles that could be consistently applied to all earth observations and spatial data. This is being considered within the GEO principles.

On the strategic level the GSDI Association would like to work on a strategic alliance in order to seek a similar level of ministerial and executive visibility and support of contributed systems, products and services through coordinated efforts. We are working out a road map for detailed actions now.

Another initiative for the conversion is the relationship with Digital Earth. The position paper “the Next Generation Digital Earth “from the Vespucci Initiative for the Advancement of Geographic Information Science that was published in 2008 in the International Journal of Spatial Data Infrastructures Research introduces the next generation Digital Earth for the coming time. One of the essential elements for the next generation is the statement that not one Digital Earth, but multiple connected globes/ infrastructures addressing the needs of different citizens, communities, policy makers, scientists and educationalists are needed. Crucial for this vision is the way in which data is converted to understandable information for different user groups.

7. IN CONCLUSION

We are in a position today to realize convergences in the short term, by making use of the successful approaches existing today in the different regions around the world as the illustration shows.

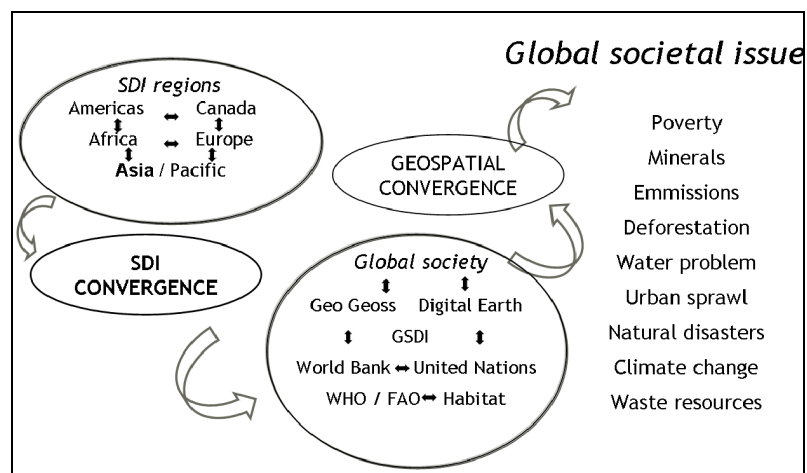


Figure 2: GI Society: A Partner in Setting the Global Agenda

One basic condition is conversion within the SDI community itself. I see much potential for this approach, because of the essential differences between the successful regional SDI's throughout the world.

- INSPIRE directive is an excellent legal framework composed in full cooperation with geo spatial professionals in the European Union member states.

- The USA approach for the promotion of open access for geo spatial data and Land Sat data and their leading role in the conversion process between the SDI communities and the Space communities.
- The successful partnership building approach in Canada in relation to the Canadian Geo Spatial Data Infrastructure.
- The boosting activities of the geo spatial and space industry in India and the stimulating role of the India Department of Science and Technology in the creation of a Geo Spatial Authority and providing this information to the public.
- The launching of the Spatial Enablement of Government issue which has stimulated many countries in the Asia Pacific area to link SDI's with their e government programs.

In parallel strategic alliances need to be made with the GEO GEOSS communities, national mapping agencies, Digital Earth and essential UN organizations.

The time is ripe for the Global Spatial Data Infrastructure Association to share and promote the effective use of geographic information. The broader societal communities also need to demonstrate their geographic information achievements to governments and decision makers. For this reason, strategic alliances between the GSDI Association and other important partners play a major role in the further execution in the SDI convergence process.

GSDI would like to amplify the success of our potential strategic partners to seek a similar level of ministerial and executive visibility and support of contributed systems, products, and services through coordinated efforts.

The GSDI Association will intensify cooperation through strategic alliances with all players including the GEO GEOSS community, United Nations, Worldbank, Digital Earth, national mapping agencies and cadastres world wide to communicate the successes throughout the world in more detail and stimulate capacity building in other parts of the world as much as needed.

Through these strategic convergence visions we can optimize on each others' technical, operational and institutional successes and work together to solve today's global problems.

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BIOGRAPHICAL NOTES

Bas Kok is at present the Director of International Affairs for the Cadastre, Land Registry and Mapping Agency in the Netherlands. Since 1998, he has a position as Associate Professor at Delft University of Technology in the Netherlands.

He is also the Past-President of the Global Spatial Data Infrastructure, which he helped to co-found in 1996. He was GSDI President from February 2008 until June 2009 and is a member of the Board of Directors. In the nineties, Bas Kok acted as the Director of the Netherlands Council for Geo-information (Ravi). RAVI is a foundation for the development and implementation of a Dutch national geographic information infrastructure. In 1994, he co-founded the European Umbrella Organisation for Geographic Information (EUROGI) of which he was Vice President from 1994 to 1998. He worked on the European Commission’s initiative GI 2000, which led to the INSPIRE project to develop a European Geo Information Infrastructure. Since 2002, Bas Kok is a member of the INSPIRE data policy and legal issues working group. In 2000 he co-founded the GSDI working group on legal and economic aspects and acted as its Chairman for many years. He is one of the initiators of the Dutch project: ‘Space for Geo-Information’ (‘Ruimte voor Geo-informatie’), a EURO 20 million initiative. This programme stands at the forefront of knowledge-development and innovation for the national geo-information infrastructure in The Netherlands.

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