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ABSTRACT

Many countries are developing or starting to develop National Geographic Information Infrastructures (NGIIs). The Netherlands Council for Geo-information stimulates the development and further implementation of the NGII in the Netherlands. The publication of the visionary Ravi-document Structuurschets in 1992, promoting the establishment of four uniquely defined and interlinked core datasets (registration of parcels, natural persons, enterprises, and buildings) pushed the development of the Dutch NGII. In 2001 the original vision has almost completely been brought into practice. This accomplishment may be explained by the close interaction between the geo-information sector and the broader national political arena. This paper presents an overview of the interaction between policy makers within the national government and the geo-information sector. It will show that the geo-sector's focus should not only be on creating consensus within the sector but also should be aimed at influencing the national political arena at large. The paper will give attention to the concept of Authentic registers (registers of core datasets). This concept is to a large extent based on the framework of the Dutch NGII and is now a key component of the national e-government policy.

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Dutch NGII on Course: A practical approach on implementing a vision

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1. INTRODUCTION

Many countries are developing or beginning to develop a National Geographic Information Infrastructure (NGII). A definition that is commonly used in the spatial information literature is: "A Spatial Data Infrastructure (NGII) is one that encompasses the policies, organisational remits, data, technologies, standards, delivery mechanisms and financial and human resources necessary to ensure that those working at the appropriate (global, regional, national, local) scale are not impeded in meeting their objectives" (GSDI). One of the most significant benefits of a NGII is that it promotes the minimisation of duplicate data collection. By facilitating data sharing and to allow for data integration, the use of existing data resources is maximised.

The Netherlands Council for Geo-information (Ravi) stimulates the development and further implementation of the NGII in the Netherlands. The publication of the visionary Ravi-document Structuurschets in 1992, promoting the establishment of four uniquely defined and interlinked core datasets (registration of parcels, natural persons, enterprises, and buildings) pushed the development of the Dutch NGII. In 2001, the original vision has almost completely been brought into practice. This accomplishment may be explained by the close interaction between the geo-information sector and the broader national political arena.

This paper presents a chronological overview of the interaction between policy makers within the national government and the geo-information sector. It will show that the geo-sector's focus should not only be on creating consensus within the sector but also should be aimed at influencing the national political arena at large. The paper will give attention to the concept of Authentic registers (registers of core datasets). This concept is to a large extent based on the framework of the Dutch NGII and is now a key component of the national e-government policy.

2. THE NETHERLANDS

The Netherlands covers 41000 square kilometres, with a population of about 16.1 million. The population density is 420 people per square kilometre. The Dutch GDP is roughly Euro 401B (2000 est.). The economic growth is almost 4% in 2000 and about 1.5% in 2001 (est.). According to the IDC/ World Times Information Society Index 2000, it is one of the most developed countries in the world wide information society (seventh). There are about five million mobile telephones (2000), and about 50 percent of the population use the Internet, a number that is growing fast.

The responsibility of the collection, utilisation and supply of nation covering geographic information is, for most geographic information, in centralised government agencies. These public agencies produce high quality geo-information. The Cadaster is responsible for the

cadastral data (1:1000), the National Mapping Agency (NMA = Topografische dienst) for the topographical data (1:10000), for statistical data the CBS is responsible. Building information, and the maintenance of the natural persons register (GBA) is a general task of the municipalities. The local chambers of commerce maintains the enterprise register. The Large Scale Base Map of the Netherlands (1:500, 1000, 2000) is a Public Private Partnership of the Cadaster, the Utilities, the municipalities and the water boards. The cadastral data, the topographic data, and the large scale base map are ubiquitous and available in digital format.

The Ravi takes initiatives and stimulates the commitment within and outside the geo-information sector, and promotes the development of the national geographic information infrastructure (NGII).

3. THE DEVELOPMENT OF THE NGII

The development of the NGII in the Netherlands has a typical grassroots approach. The development depends on the activities of the geo-sector itself and the adherence to or the role the sector plays in the development and execution of overall national government policy lines. In this respect, primarily three policy lines can be recognised:

1. The promotion of the efficient use of information within
2. The promotion of the communication of the public sector with citizens and enterprises: one-stop-shop and access issues
3. The promotion of the development and implementation of new technology

Since the geo-sector actively participates in and benefits from the first two policy lines, we will focus here on these first two policy lines.

3.1 Stage I: 1990-1994: Efficient Use of Information within Government

3.1.1. Activities on the National Level: Cope with Inefficiencies within Government

A landmark in the development of the information infrastructure in the Netherlands was the Policy Report on Information Supply in the Public Sector (TK 1, 1987-1988, BIOS nota). The report addressed the inefficient use of information within government. The focus in the report is on technology: automation of the processing, storage and communication of information within and between government agencies and enterprises and citizens should be promoted in order to work more efficient. One of the conditions for efficient data communication is the introduction of standards for data communication.

As a result of the BIOS nota, the Secretary of Interior was appointed in the Decree IVR 1990 (BiZa, 1990) as the principal co-ordinator of information supply to co-ordinate useful developments of government information supply. The role of the Secretary of Housing, Spatial Planning, and Environment (VROM), as co-ordinator for the geo-information sector, was then formally confirmed.

The Decree IVR 1990 also ordered the responsible Secretaries to explore the direction of the development or the desirable development of the information supply in order to respond effectively and efficiently to the opportunities Information and Communication Technology

(ICT) offers. Involved stakeholders, and the characteristics and impact of data sets need to be identified, and means to arrive at a desirable situation suggested. The results of the exploration had to be laid down in a so called structure plan (structuurschets).

3.1.2. Activities in the Geo-Information Sector: Organising and Creating the NGII Vision

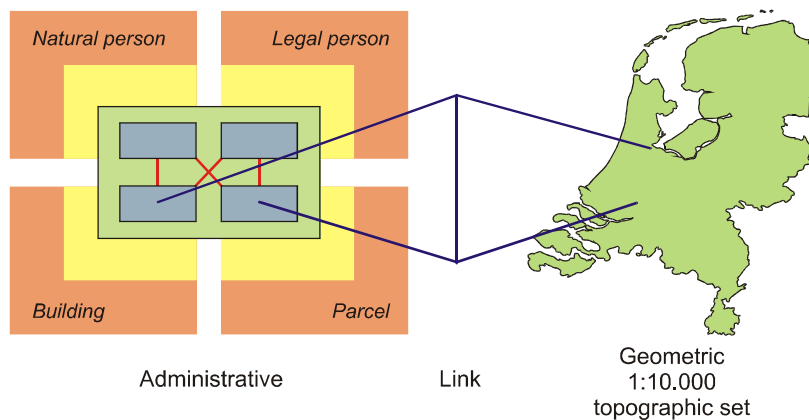
Due to the execution of the BIOS nota, the Secretary of VROM asked his official advisory committee on land information, Ravi, to investigate the current and desirable organisation of the land information supply in the context of effective and efficient use of information technology, the tasks of the existing organisations, the data and data flows, and to propose a plan of action to promote the development of the land information supply. At that time Ravi consisted of 21 stakeholders with different backgrounds: 7 representatives from national government, 7 representatives from utilities and local government, and 7 members from the scientific community and representatives from the enterprise community.

In 1992, Ravi presented the requested information in a document that later turned out to be the first vision for the Dutch NGII. At that time it was called the Structure plan for land information (Ravi, 1992). This national structure plan for land information was approved by the Dutch Council of Secretaries in 1992.

The vision consisted of the idea that between the most important core registrations exchange of core data had to be stimulated based on agreements between the responsible authorities of core registrations. Core registrations are registrations with a uniquely defined data set, which government agencies are obligated to use. The register of natural persons (GBA), the cadastral registration, the register of enterprises and the building register were identified as core registrations. Moreover, the structure plan indicated that a nation-wide digital topographical data set on scale 1:10000 had to be developed. The structure plan also promoted the involvement of new users in setting-up these new registrations. An example of it is the establishment of the Users Platform OGT (Association Users Platform TOP10 Vector). Aside from this, the structure plan also inspired the quality improvement of the registrations and the development of standards.

The vision stimulated the further co-operation between parties involved in the geo-information sector enormously, especially in the period between 1993 and today.

Structure Plan Land Information (1992)



In 1993, the national government discontinued almost all advisory councils. Ravi did not wait until its discontinuation. The members of Ravi transformed its advisory body for the Secretary of VROM to a consultative body for the geo-information sector, funded by its members and the Secretary of VROM. New public bodies joined the Ravi network in the period between 1993 and 1995: geographers, urban and rural planners, environmental experts, experts in the field of natural environment and agriculture, traffic and transport experts, land information co-ordinators within municipalities, and the Progis group within the provinces amongst them. This new group of producers and consumers stimulated the further co-operation with the traditional geo-information sector and the development of the NGII (Kok, 2002).

It should be noted that, within the geo-information sector, considerable support existed for the implementation of the recommendations of the structure plan (Kok, 1999, 17). Partly because of this support the vision developed into a national geographic information infrastructure between 1993 and 1996.

3.2 Stage II: 1994-1998 Improving Quality and Efficiency of Government

3.2.1. Activities on the National Level

After the elections in 1994, the new government introduced two important goals for the period 1994-1998.

1. An efficient government
2. Improvement of the quality of government services.

These goals were laid down in the coalition agreement. The National program on electronic highways (TK 2, 1994-1995) addressed the goals by bringing together different policy lines on ICT of different ministries in the first coherent ICT policy for the nation. The policy line announced a cornerstone report about the information society: BIOS III.

BIOS III (TK 3, 1994-1995) focused again on the efficient use of information within government and the effective communication of government with its constituents (citizens and enterprises). It emphasised the need for a strategic approach on the issues of standardisation for information exchange within government. It suggested the possible introduction of an Act on Core Data to address the efficient use of core (government) information.

3.2.2. An Efficient Government

In 1997 the results of this strategic approach were published in the report Streamlining Key Data (M&I Partners, 1997) initiated by the Secretary of the Interior. The report recognises that information on natural persons, enterprises, geo-information and income is intensively communicated between government agencies. Integration of these data sets may be helpful to address the following (political) goals:

- To work efficient within government
- To serve the client in one-stop-shop
- To decrease fraud (misuse of social security facilities)
- To decrease poverty (huursubsidie).

Not only the role of technology is recognised as important for the development of a National Information Infrastructure (NII), also the organisation of a NII was now recognised. Considering the structure plan for land-information, the geo-information sector was in this respect already ahead of the national information policy makers.

The study identified many grassroots initiatives already there. For example, the geo-information sector worked on the fulfilment of the structure plan by connecting the Cadastral registration to the natural persons registration in 1996 and connecting it to the Enterprise registration in 1998.

In the Streamlining study, respondents from consulted sectors, the geo-information sector amongst them, identified the following critical issues to come to the communication of information within the public sector:

- Political awareness for information sharing issues
- The need for a common overall vision on the sharing of information within government; this is considered more important than putting a dollar figure on the benefits of the streamlining
- The establishment of Authentic Registers, giving data sets of critical importance a special status, as an important condition to successful communication
- Need for harmonisation of sector legislation
- Central communication necessary to co-ordinate all the grassroots initiatives.

Further, the study states that not only for the successful communication within government the streamlining of core information is necessary, it is also critical for the communication with citizens and enterprises: an efficient government is pivotal for the success of the one-stop-shop vision. In this one-stop-shop project the focus should be on first creating a solid back office with streamlined processes and data and then addressing the front-office.

Finally, the report sees several roles for national government (Ministry of the Interior) for the implementation of the Streamlining program: an architect, a director, a referee or a coach. A mix of the coach, referee and the architect role was recommended for the facilitation of the existing grassroots initiatives (coach), whereby formal instruments are necessary when consensus and co-operation are lacking (referee) and a helicopter perspective of the information infrastructure in the Netherlands may serve as a reference for success (architect). This mix of roles is similar to the role Ravi plays in the geo-information sector.

The study recommended the Secretary of the Interior to identify current available data sets and data flows within government. Ravi did this for the geo-information sector five years earlier in the structure plan in 1992. The experiences of the geo-information sector and the

ideas of the sector for the development of the NII were welcomed by the Streamlining strategy group. In 1998 the E-government action program (see below) introduced a special Streamlining Key Data program.

3.2.3. Government Services: Public Counter 2000

Overheidsloket 2000 (Public counter 2000) is the official name for the Dutch local government one stop shop project. A special bureau was created by the Dutch government in 1996 to initiate the integration of the public services from the perspective of the citizen instead of the mission of the organisation, and for using the Internet as the new way of communication between the front desk and the back office. This approach needs the standardisation of the internal procedures, such as a standardised description of demand patterns, a catalogue of matching products and services, interactive forms, and a model integrated web site.

The major emphasis of Public Counter 2000 is on customer demand patterns. Examples of citizen demands include: moving to a new town, starting a business, building a house, finding a home for senior citizens, and so on. To do this effectively, this requires the integration of many separate government services, the separation of front and back office. Of course, this exercise needs a broad approach, crossing the boundaries of public organisations. This will lead to the introduction of physical and virtual counters and pro-active services.

At this moment the services of municipalities can be characterised as fragmented. The citizen who needs a service has to integrate the information and products, he gets from his city or province, himself. In the integrated public counter, the back office is separated from front office and by use of knowledge management systems and Client Follow System the front office can deliver services.

The first three years (1996-1999) the pilot phase of this program was designed to find out in practice whether the idea of a single counter was feasible. On an experimental basis, physical and virtual counters were introduced in 15 municipalities, in three areas in the domain of geo-information, services for handicapped and elderly, moving to a new town. The organisation of IT in the public counter is a major element of achieving the right level of success. The lack of a consistent overall legal system was considered a major impediment. The e-government program of 1998 further accelerated the process.

3.2.4. Activities in the Geo-Information Sector: Awareness Building and Vision Implementation

In the period 1994 -1998 the geo-information sector, represented by Ravi, put the system of the structure plan and the agreements concerning the data policy from the NGII on the political agenda of the Ministry of Interior. The sector worked on the implementation of the NGII vision. Although the vision of the structure plan remained to be a guideline, the sector extended it with a broader view on the NGII (Ravi 1995b).

The introduction of a business platform within Ravi in 1994, enabled Ravi to represent not only the public geo-information stakeholders but also the individual geo-enterprises. More

than 50 individual geo-information enterprises are a member of this business platform. Especially with respect to the access and standardisation issues Ravi has acted as a sounding board for its members for pressing issues. This enabled Ravi to represent the geo-information sector as one voice in the national political arena.

The sector made significant contributions to the Streamlining Key Data report, founded the national clearinghouse geo-information, developed national standards and worked on the implementation of these standards. Also a core 1:10000 digital topographical data set was realised. Further, the natural persons registration was connected to the cadastral registration in 1996 and two years later the enterprise registration was connected to the cadastral registration. Finally, Ravi started to investigate the need for a nation-wide uniform building register (Ravi, 1995a). Also the increasing completion of the structure plan brought the awareness within the sector of the need of an immediate set-up of a nation-wide building registration.

The NGII stimulated the geo-information sector to actively participate in the development of the policy with respect to the accessibility of government information (TK 5, 1995-1996) and the policy concerning the prohibition to open up governmental information by the public sector and the execution of tasks that are reserved for the private sector (TK 6, 1995-1996).

In this period Ravi started participating in international discussions. It became a founding member of EUROGI, and participated in GSDI meetings. The Secretary of VROM supported the set up of an European GII. Unfortunately this did not result in an European overall action plan for implementation. Ravi, and with it the geo-information sector as a whole, learnt from the international spatial data infrastructures experiences. The NGII, for example, has been set-up in 1995 after the U.S. model of the National Spatial Data Infrastructure (see Ravi, 1995b).

3.3 Stage III: 1998-2002: Electronic Government

3.3.1. National Policies

In 1998, the Ministry of Interior proposed an E-Government Action Program for the nation (TK 7, 1998-1999). The program was approved by the parliament for implementation government-wide. The action program e-government brings together two policy lines of the Ministry of the Interior: Streamlining Key Data and Public Counter 2000. Two major points of the program are:

1. A digital accessible government
2. The organisation of the infrastructure behind the public portals and service desks.

3.3.2. A Digital Accessible Government

The e-government program states that a digital accessible government results in better access to government data and services, and the creation of interactive and proactive services. In the program the national clearinghouse geo-information is presented as one example of how to

improve the knowledge of the existence of data sets within government. Accessibility to government information was improved after the introduction of a new government web site in 1999 (<http://www.overheid.nl>). This site offers access to all levels of government. Parliamentary documents, as well as legislation and regulations published are free of charge available through the Internet, creating a simplification of citizen access to services and information. At the same time a helpdesk was installed to guide and help government organisations to build full-sized web sites. The implementation of integrated service counters is an important action as well. As a result the public counter 2000 initiative was continued and by the end of 2002 at least 25% of the public services should also be available both through an analogue medium as an electronic medium.

Also the access to government information policy is an important issue in the program. The action program requires that more government information is available in digital format. Access to government information policies may help to reach this goal.

Since the mid 80's cost recovery has been the leading principle applicable to data supply by Dutch government bodies to third parties (De Jong, 1998). In the public sector a general tendency towards self-financing and thus cost-recovery became evident. Therefore legislation has been draw up, for example the Land Registry Act, which states that the Cadaster must be 100% cost recovering. While the NMA has to recover the costs for 50%.

However, the Netherlands is advancing policy to reduce or eliminate pricing for data, deemed essential for broad public use. In 2000 the commission 'Constitutional rights in the digital era' (TK 10, 2000-2001) recommended to change the goal of the Government information act¹ from 'controlling government' into 'the public right to access government information'. Government information has become vital for citizens in daily life: citizens should have the right to access (paper or electronic) public data. The parliament agreed with this new perspective "the more people use information, the higher its value for society'. The constitution needs to be changed to introduce this recommendation.

In the same year 2000, the memorandum 'Towards Optimal Availability of Government Information' presented new guidelines on the access of public sector information in the Netherlands (TK 9, 1999-2000). This memorandum is part of the E-government program, and promotes the availability of government information by stating that all government information should be disseminated at a maximum of the cost of dissemination. A new act will be prepared to optimise the use of this information for citizens and to decrease limitations for further use. Government information with its own pricing mechanisms, like cadastral information, is not subject to the new guidelines. The new policy also does not apply to data sets for which the new policy line would result in financial problems for the supplier of the data, like the data sets of the NMA, and some data sets of municipalities (taxation data). In this respect, Ravi suggested to allow the geo-information-sector itself to facilitate access to geographic data prior to a formal arrangement (law). This suggestion of self-regulation for the geo-information sector was welcomed by the Secretary.

Further, the Secretary of the Interior has asked Ravi to conduct a complete inventory of geo-data, with recommendations as to the data sets are to be free or for cost of distribution. Ravi

is also looking at alternative financing options to assure data maintenance. Ravi will also assure that free data is posted to the national clearinghouse.

3.3.3. The organisation of the Infrastructure behind the Portals and the Service Desks

In the e-government program 'streamlining core data' is considered an important tool to come to the most efficient collection and use of core data. A clear division of tasks between public organisations, based on agreement has to be made who is collecting data to avoid duplication of effort. The program Streamlining Key Data, residing under the e-government program, aims to minimise duplicate collection efforts of government and to maximise the use of collected data. Essential in this process is the establishment of a system of authentic public registers. The program concentrates on the development and implementation of various sources of authentic registration, such as a core enterprise register, a core building register, a geographic core data set and a uniform system for insurance. It also includes a stimulation mechanism which government agencies may call upon for realising the re-use of data in daily operations. The program should lead to a situation that citizens and enterprises provide government only once the same information.

3.3.4. Authentic Registers: Key Component of E-Government

Authentic registrations are registrations with a uniquely defined core data set, which government agencies are obligated to use. The collection and maintenance of the data is regulated in legislation, the data certified as accurate and current, and the producer assumes all liability for its use by others. Access to data in authentic registers should conform the guidelines presented in the memorandum towards accessible government (see in 3.3.2).

This approach requires continuous funding commitments to finance maintenance. Each Authentic Register is assigned to a "responsible" Secretary for maintenance and improvement. The introduction of authentic registers is an essential condition for reliable and optimised quality of government information provision. Guaranteed quality of the public data is necessary and the exchange of information should maintain the personal confidentiality of the data. Certification procedures such as the implementation of Third Trusted Parties for the public key infrastructure, the authenticity procedures of current core data of the NGII and the setting up of the Privacy Enhancing Technologies (PET's) are crucial in this process.

Authentic registers:

- High quality information
- Maintained accuracy and currency
- Multiple use
- Regulated and certified by the government
- Producer assumes liability
- Clear financing mechanism
- Process for user involvement

The geo-information sector was asked to provide input to the process of development and implementation of Authentic registers for core data. The cadastral registration, the

registration of the topographic data set 1:10000 and the building registration are now classified as authentic registers (after Kok 2002). These conform the original NGII vision. Further the address data set, the enterprise registration and the natural persons registration (GBA) are classified as authentic. By the end of 2002 the overall design of these registrations should be finalised and the implementation started (TK 11, 2001-2002). Ravi will continue to work with the geo-information community to identify any additional data sets deemed to be "core". In this way the NGII expanded to a part of the Authentic Registrations initiative.

Finally, the firework disaster in Enschede in May 2000 and the report evaluating the disaster (Commissie onderzoek vuurwerkcramp, 2001) contributed to the insight that transparency of the government should be improved. In this respect the report gave special attention to the process of granting and enforcing licenses for e.g. the storage of dangerous materials. The commission holds the opinion that this can only be achieved via a 'cultural revolution'. The safety issue and the insight for citizens as far as the nature, the quality and the storage of goods in buildings are concerned have partly contributed to a faster consensus with respect to the Authentic Registers vision in general and the Authentic Building Registration more specific.

However, although much progress has been made on the exploration of potential authentic registers, we are still waiting for specific authentic registration legislation.

3.3.5. Activities in the Geo-Information Sector: Political Awareness has been Built!

In stage III one can say that the geo-information sector obtained a permanent status on the political map: the e-government program uses examples from the geo-information to back up the proposed policy, and the implementation of the original vision of the NGII has become an important instrument for realising the streamlining programs and the larger Knowledge Infrastructure. Ravi contributes actively to the Streamlining Key Data program by providing important input on characteristics of geo-data sets and the need to give them a special, authentic, status.

Also awareness has been built in the broader political arena. For example, the e-government program is part of the broader Digital Delta program. This program provides the implementation of the ICT agenda of the national government (TK 8, 1998-1999). The update report of the Digital Delta program (TK 12, 2001-2002) acknowledges geo-information as being important for the success of this program. Especially the lack of the existence of a nation-wide building registration is recognised.

Further, Ravi stimulates also the use of modern geographical ICT and of data acquisition and presentation techniques to designers, policy-makers, and citizens for the benefit of major infrastructure projects such as the expansion of the Port of Rotterdam and Schiphol Airport aimed at enhancing the national knowledge information infrastructure.

Finally, the geo-information sector is heavily involved in national access to public data discussions and able to inform and convince policy makers of the need of the sector.

4. FUTURE DIRECTIONS

It has been the independent consultative body Ravi who stimulates the development and the further implementation of the Dutch NGII. Its activities continued to attract geo-stakeholders, being either private or public. By addressing societal problems with sufficient geo-information solutions, and advancing the common knowledge process of efficient government processes, it was able to almost complete the original vision of the NGII.

The broad political recognition of the importance of geo-information for the well-functioning of government and society makes the future development of the NGII promising. At this moment it seems feasible that the vision of 1992 will be completed within 10 years.

However, this is not the right moment to sit down enjoying the accomplished results. In May 2002 we will have national elections and these will result in new political priorities and choices. The geo-information sector will continue to work on the current issues, like the fulfilment of the original NGII vision, and will try to take advantage of the new priorities within national government.

Finally, the sector should look over the national border and increase the work crossing national boundaries, ultimately leading to a new start of the European GII.

5. CONCLUSIONS/ LESSONS LEARNT

This paper presents an overview of the developments of ICT policies on a national level and the role of the geo-information sector in the realisation and execution of these policies. It is stated that the national government policies can be important driving factors for the development of the Dutch NGII. On the other hand, the development of the NII partly drives on the experiences and initiatives of the geo-information sector.

Several reasons can be summarised why the Dutch geo-information sector was able to take advantage of these national government policies. Firstly, it organised itself as a sector and created a vision, which was agreed upon within the sector. The willingness of individual public agencies to work *together* on the successful implementation of the vision has been critical in the development process. Secondly, Ravi, brought together all geo-information stakeholders and represented them in the national political arena. Further, the implementation of the vision was rather successful which made the support for the vision grow. Thirdly, Ravi found supporters of the vision outside the geo-information sector, especially within the Ministry of Interior.

The Dutch case learns that the existence of a vision and continuous commitment for the implementation of the vision is pivotal to the success of the development of a NGII. However, one should realise that the paper presents the results of the development of a NGII in a small country with a stable economy, a democracy, a rather high penetration of information technology in society and where most essential data sets are already in place. We consider these conditions that need to be fulfilled in order to take full advantage of the experiences of the development of the Dutch NGII.

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Bas Kok has been the Director of Ravi, Netherlands Council for Geo-Information, since December 1993. From 1994-1998 he was Vice President of EUROGI (European Umbrella Organisation for Geographical Information). Since 2000 he is co-chair of the GSDI (Global Spatial Data Infrastructure) working group on legal and economic aspects. He is a visiting Professor at Delft University of Technology. His research centralises around the legal, and organisational aspects of National (Geo-) Information Infrastructures.

Bastiaan van Loenen graduated from Delft University of Technology in 1998 and from the University of Maine in 2001. In 2000 he started his PhD study at Delft University of Technology, Department of Civil Engineering and Geo-sciences. His current research focuses on the development of SDIs in general, and the role of legislation in the development of SDIs more specific.

ⁱⁱ The Government information act (Wet openbaarheid van bestuur) is the Dutch Freedom of Information Act.