

Changing demands for Spatial Data Infrastructure assessment: experience from The Netherlands

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Abstract. The Spatial Data infrastructure (SDI) is an emerging phenomenon world-wide. With their growth also has the demand for assessment approaches to evaluate their development and progress. The early approaches were developed by scientists and were mainly curiosity driven. With the increasing involvement of government officials and policy makers over the years the assessment demands have also changed. Current demands focus on measuring implementation progress and the use of SDIs. SDI assessment developments in The Netherlands follow this overall generic trend and it is a challenge for scientists to contribute to these trends in which they are no longer leaders but contributors.

17.1 INTRODUCTION

The SDI is an emerging phenomenon world-wide (Masser, 2005). From a niche activity, it has developed into the backbone of today's geo-data provision. With the growth of SDIs, the number of stakeholders has also increased, and in some countries (for example India, USA, Chile and Canada) it has become a topic for policy makers on different levels of government. With this increasing popularity, the quest for a more systematic description and evaluation of the phenomena has also increased. Policy makers show an increasing interest in a systematic evaluation of SDIs. For instance this interest resulted, on the European level, with the initiation of the 'State of Play' studies (SADL, 2005) which describes the SDI status in the different countries in Europe. The assessment of SDIs also starts to attract the attention of scientists. Various scientists formulate approaches for the assessing (parts of) SDIs. Delgado-Fernández et al. (2005) designed the SDI-readiness approach, which measures the degree to which a country is prepared to deliver its geographical information to the community. Crompvoets et al. (2004) propose the clearinghouse assessment approach which examines the developments of the existing national spatial data clearinghouses around the world. Furthermore, Kok and van Loenen (2005), formulated the organisational assessment approach, which identifies, describes and compares the current status of the organisational aspects of the NSDI.

The main emphasis of all these publications is on developing methodologies and selecting indicators. The underlying demands for developing a particular assessment methodology are, however, not very well documented. In this chapter SDI assessment is discussed from a demand point of view. Are there really clear demands for SDI assessment? What are the developments in assessment demands over time and how might they change in the future? What is the development in changing assessment demands in The Netherlands? These questions will be discussed in the following sections: section 17.2 presents assessment in general; section 17.3 discusses the underlying demands for some existing assessment approaches are discussed and is finalised in section 17.4 by providing some practical experience about the changing assessment demands of the Dutch SDI.

17.2 ASSESSMENT

Assessment is a fundamental activity in nature and for human beings. We continuously assess our environment and take actions on the basis

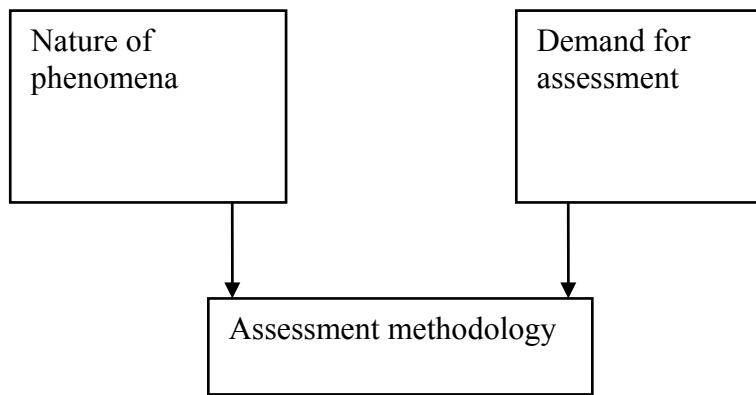
of these assessments. For example when driving a bike we observe our environment, evaluate the observed information and make decisions. This assessment process is fast, almost autonomous and operates without explicit mental reasoning. The assessment can be classified as an **intuitive** or subjective assessment and is fundamental for the survival of animals and humans on our planet. In contrast to an intuitive assessment a more rational or objective assessment can also be distinguished. This type of assessment starts with formulating the goal of the assessment, followed by identifying the relevant variables, the establishment of an assessment framework, the actual measurement of the values of the variables and finally the evaluation. In this chapter this form of assessment is called **rational** assessment. Rational assessment plays a central role in decision making in our society. Evaluating the state of our environment, economy, school system and employees are increasingly based on rational assessments. Many countries in the world have institutionalised aspects of rational assessments. Statistics agencies play a central role in collecting base data for all kind of assessments, while national planning offices are performing evaluations for the government. In The Netherlands, for instance, three national assessment bodies exist: The Netherlands Bureau for Economic Policy Analysis for the economy; The Netherlands Environmental assessment Agency for nature and environment and the Social and Cultural Planning office for social developments. On the European and world level similar institutions can be found. Examples of well known international assessments are the publications of the IPCC on climate (IPCC, 2007), the global competitiveness report by the World Economic Forum (2008) and university rankings (Times Higher Education, 2007).

In practice, combinations of the two assessment approaches can be found. For instance the global competitiveness of countries is presented as a rational assessment, while in reality some of the underlying variables are estimated in a rather intuitive way. Also, the selection of relevant variables for a rational assessment is often based on intuition. It is our notion that rational assessment is considered to be superior to intuitive assessment, but lately, due to research in psychology field, intuitive assessment has gained appreciation. In reality there are a number of factors that influence the choice of assessment type. Table 17.1 presents some of the key factors.

Table 17:1 Key factors influencing the choice of the two assessment types

| Key factors | Intuitive Assessment | Rational Assessment |
|------------------------|-----------------------------|---------------------------------------|
| Knowledge of phenomena | Limited | Developed |
| Audience | Person or limited community | Large community, country, world |
| Number of stakeholders | Few | Many |
| Purpose | Development, knowledge | Accountability, development Knowledge |
| Type of results | Qualitative | Qualitative and Quantitative |
| Time involved | Seconds to days | Weeks, months and years. |

Although there is some overlap in factor values, some differences between the two assessment types can be found. Intuitive assessment is more applicable where there is limited knowledge of the phenomena, when fast decisions are required and/or the audience is limited; while rational assessment is more applicable in the case of clearly understanding the phenomena, accountability purposes with quantitative results and/or a large audience. Intuitive and rational assessments are two broad types of approaches. The selection of a particular assessment methodology is determined by a) the demand for the assessment and b) the nature of the object or phenomena to be assessed (see Figure 17.1).

**Figure 17:1: Main factors influencing the selection of an assessment methodology**

17.3 DEMANDS FOR SDI ASSESSMENT

In this section the possible demands for existing and emerging SDI assessment approaches are discussed. In Part one and two of this book, the following five SDI assessment approaches and methods were (among others) introduced and described: the SDI readiness approach, the clearinghouse suitability, the organisational approach, Multi-view SDI assessment and INSPIRE State of play.

If we take a look at the origins of the SDI readiness, clearinghouse suitability and organisational approaches, they were initiated in an academic environment. All three approaches were developed as part of PhD research (Delgado Fernández, 2005; Crompvoets, 2006; van Loenen, 2006) and there was no formal demand for these three studies. The studies originated from the need of the scientific community to explore and build knowledge about the SDI data access facility and its organisational aspects. The multi-view SDI assessment framework is also a result of PhD research, funded by the Dutch innovation program ‘Space for Geo-information (RGI)’. However the demand to develop the multi-view SDI assessment framework is not only coming from academia but also from SDI practitioners who have interest in assessing SDIs and is one of the results of the innovation program, the space for geo-information (RGI). The INSPIRE State of Play assessment methodology was developed as a result of the process of establishing an infrastructure for spatial information in the European community (INSPIRE). In 2002 European Commission initiated a study to describe, monitor and analyse the activities relating to the national SDIs of 32 European countries. The study covered the period between 2002 and 2007 (Vandenbroucke and Janssen, 2008). The demand for the INSPIRE State of Play assessment approach came from policy makers (European Commission) who were particularly interested in assessing the state-of-play of SDI-efforts in the European Union. This last approach is developed by academics of Katholieke Universiteit Leuven.

As SDIs develop in various countries and regions, they tend to take on a more formal character. Official implementation strategy documents and visions are being written and come into force with a good example of these developments being INSPIRE, the directive to establish an Infrastructure for Spatial Information in the European Community.

The INSPIRE directive also defines, in a formal way, the demand for monitoring infrastructure for spatial information (see previous chapter 16). Article 21 states that:

“Member States shall monitor the implementation and use of their infrastructures for spatial information. They shall make the results of this monitoring accessible to the Commission and to the public on a permanent basis...”

The INSPIRE Drafting team for monitoring and reporting is responsible for developing rules to monitor the implementation of the directive and use of the spatial information infrastructure.

Based on the INSPIRE example and personal observations from trends in other countries, it might be suggested that the demands for SDI assessment are evolving and becoming more formalised. In the initial stage of SDI development the demand for its assessment was primarily coming from the academic environment to build knowledge and understand the processes and mechanisms behind SDIs. However, with the progress of SDIs development, more formal demands for assessing SDIs are emerging. New demands tend to mainly come from policy makers and politicians who expect to relate the current SDI activities to concrete objectives that they expect to achieve. The development of SDI assessment in The Netherlands provides a nice example of this generic trend.

17.4 EXPERIENCE FROM THE NETHERLANDS

The development in the assessment of the Dutch SDI follows an increased understanding and awareness of the SDI phenomena and changing demands. From an assessment point of view, roughly four different development phases of the Dutch SDI can be distinguished:

1. initiation phase;
2. awareness phase;
3. RGI phase; and
4. GIDEON phase.

17.4.1 Initiation phase 1990-1998

The development of Dutch NSDI dates back to 1990 when RAVI, a network organisation for geo-information, was established. Initially RAVI was an official advisory committee on land information for the Ministry of Spatial Planning and Environment (VROM). In 1993 RAVI changed its status to an independent consultative body for geo-

information, comprising representatives of various public sectors. RAVI's missions, with respect to the Dutch NSDI, were to organise and promote the provision of geo-information required for the performance of public tasks at a minimum cost for society as a whole. VROM recognises itself as the formal geo-coordinator however the NSDI initiative has always been left to self-regulation by the GI-sector which has no formal powers to compel public agencies to participate in the Dutch NSDI.

In 1992 RAVI presented a structure plan for land information that soon turned out to be a vision of the Dutch NSDI. The vision's idea was to arrange agreements between authorities to better stimulate the exchange of core registers. In 1995 several organisations initiated in a bottom-up manner the process of building the Dutch NSDI clearinghouse (NCGI) and in 1996 it was launched on the Internet (Bregt, 2000).

The assessment of the Dutch SDI in this phase was, in parts, not systematic and highly intuitive. The number of people that were aware of the SDI concept was limited and among professionals no clear common perception of the nature of the SDI existed. One of the early assessment approaches developed was the so-called clearinghouse maturity model (Bregt, 2000). This model ranks organisations (on a scale of five) of their ability to participate in the Dutch National Clearinghouse. The purpose of the model was to evaluate and potentially advise organisations of their (potential) participation in the Dutch National Clearinghouse. The clearinghouse maturity model was developed in 'brainwave' for a limited audience. The model produced qualitative results, was easy to apply and was a typical example of an intuitive assessment type.

17.4.2 Awareness phase (1998-2003)

Over the years the attention for SDI has increased as a result of both national and international developments. On the national level there was quite some discussion about the development and direction of the national clearinghouse for Geo-information, and the development of authentic registrations. On the European level, the discussion on the development of a European Spatial Data infrastructure commenced (Masser, 2007).

Assessment demands in The Netherlands during this period focused on identifying the problem, creating awareness and (political) agenda setting. The assessment approach used for assessing the SDI in this phase used the well known SWOT analysis methodology. This

generic assessment methodology produces qualitative statements of the Strengths, Weaknesses, Opportunities and Threats of a particular phenomenon. The SWOT analysis methodology is used worldwide and particularly popular among managers and policy makers. Its success is based on the simplicity of the methodology and its ease of interpretation. In Table 17.2 the SWOT analysis of the Dutch SDI is presented, reflecting the opinion around the year of 2001/2002.

Table 17.2: SWOT analysis of the Dutch SDI (RAVI, 2003).

| Strengths | Weaknesses |
|---|---|
| <ul style="list-style-type: none"> • Internationally perceived, The Netherlands is a geodata-rich country and is potentially equipped to convert this into geo-information wealth • It has commanded a strong position in the field of geo-information from time immemorial • Strong networks of parties who work collaboratively and exchange knowledge on geo-information, joined together in various interdisciplinary organisations with RAVI as umbrella organisation • The hallmark of the sector is its soundness • Extensive and sturdily growing geo-work field • Presence of abundant knowledge and experience in the field of satellite observations | <ul style="list-style-type: none"> • The geo-information facility set up is sectoral and has no coherent concept. Problems lie with: exchange, duplication of data collection, integration of files and data, standardisation and accessibility • Dissemination of geo-data is very supply-oriented and many organisations are extremely reticent about making data available • There is little awareness of the concept of the NGII and it has been insufficiently unmasked • The sector is introvert and the exchange of does not function well |
| Opportunities | Drawbacks |
| <ul style="list-style-type: none"> • Space in The Netherlands is scarce; there is need of multifunctional and high-quality use of space. There is an increasing need of integration and linking of geo-information to support spatial decisions. • The growing need of open and transparent policy-making demands the direct accessibility of geo-information • New ICT developments offers the geo-industry new opportunities and brings technologies to consumers (e.g. GPS) and mobile • The ambition of the Dutch cabinet to make information available for innovative purposes • It is the ambition of The Netherlands to be among the leaders of Europe in the field of knowledge and information economy • The ad-hoc demand for geo-information creates a new structural demand • The digital era has altered map use into dynamic models and has paved the way for new applications such as virtual reality | <ul style="list-style-type: none"> • Integral solutions for social problems with the help of geo-information hardly gets off the ground • Inability to take advantage of international social issues and international legislation • Education and research are lagging behind because the sector is not appealing enough • Companies lack sufficient innovative power • Risk of large disinvestments in the infrastructure components because of the lack of a coherent NGII concept • The old coordination-oriented approach is no longer enough; powerful steering is needed |

The SWOT analysis presented in Table 17.2 has a high intuitive character and the most of the claims are not backed by a solid systematic analysis of the underlying issue. However, the general feeling was that the SWOT was more or less correct and it proved to be a good starting point for further investment in the Dutch SDI. In 2003 the Dutch government funded the innovation program “Space for Geo-information” (Bregt and Meerkerk, 2007).

17.4.3 ‘Space for Geo-information’ phase (2003-2009)

The Space for Geo-Information (RGI) program started with a budget of 20 Million Euro. Its mission statement was: “[...]the enhancement and innovation of the geo-information infrastructure and the geo-knowledge community in The Netherlands towards sound and efficient public administration and a robust business”. As can be seen from the mission, the innovation of the National Geo-Information Infrastructure (NGII) played a central role. A large number of projects started with RGI funding to boost the NGII development and innovation. All components of the NGII (spatial data, standards, technology, people and policy) received attention in one or more projects. For instance one project focused on the innovation and test beds for geo-portals; one project on analysing GI-access and licensing policy; one project on standards and another project on the culture of the GI sector and the impact on innovation and data sharing. Within this phase the demand for assessment changed from a qualitative description of the situation to a more quantitative analysis. A simple SWOT analysis was not enough and the program supervisors of the government wanted a more rational assessment approach with a clear description of the SDI phenomena and directions for the future. At that time such a robust and well established assessment method did not exist, but the demand triggered scientific research in order to develop one. The project ‘Development of a framework to assess SDIs worldwide’ started. This project resulted in the insight that an SDI can be considered as complex adaptive system (Grus et al., 2006), and as a consequence its assessment is also complex. The resulting multi-view assessment framework is described by Grus et al. (2007). Another description of the framework can be found in Chapter 5 and Chapter 18 presents a first application of this framework

The RGI program also triggers a country wide debate among professionals and policy makers about the vision and future of the SDI in The Netherlands. After intensive discussions, a common vision for the future was formulated — the GIDEON strategy. In 2008 this vision

was accepted by the Dutch Cabinet and Parliament as the vision for the future. With this new vision the demands for assessment also changed.

17.4.4 GIDEON phase (2008-)

GIDEON is the policy of the Dutch government to further develop the SDI in The Netherlands (VROM, 2008). The document has been developed in close cooperation with the stakeholders and formulates the following objectives for the Dutch SDI:

- *the public and businesses will be able to retrieve and use all relevant geo-information about any location;*
- *businesses will be able to add economic value to all relevant government-provided geo-information;*
- *the government will use the information available for each location in its work processes and services; and*
- *the government, businesses, universities and knowledge institutes will collaborate closely on the continuing.*

Various parties are working together on GIDEON. To realise the GIDEON policy seven implementation strategies have been formulated. Jointly these strategies will lead to the creation of a key geo-facility for The Netherlands. The seven strategies are to:

1. give geo-information a prominent place within e-services;
2. encourage the use of the existing four key geo-registers, and to set up two new ones;
3. embed the INSPIRE Directive into Dutch legislation and to implement the technical infrastructure;
4. optimise supply by forming a government-wide geo-information facility, which is to include geo-data standardization, new infrastructure, and collaborative maintenance;
5. encourage the use of geo-information in numerous government policy and implementation chains, such as safety, sustainable living environment, mobility, and area development;
6. create a favorable climate for adding economic value to available public authority geo-information; and
7. encourage collaboration in knowledge, innovation and education, for the permanent development and renewal of the key geo-information facility for The Netherlands.

With the formulation of the GIDEON objectives and the associated implementation strategies, the demand for assessment also changed. The national government requested an assessment approach that focuses on the progress of monitoring and reporting. A reporting format and associated assessment approach, based on milestones defined in GIDEON, is currently being developed. These activities will result in an annual report informing stakeholders about the progress of implementing GIDEON and will be the basis to progress monitoring for the Dutch parliament as part of the national e-service strategy. It is likely that the future GIDEON assessment approach will be more rational than those of previous phases.

17.5 CONCLUSIONS

The demands for SDI assessment have changed over the years. In the early period of SDI development the assessment demands were not clearly formulated. The assessment activities in this period started mainly as an academic exercise and were driven by curiosity. Later, with the increasing attention for SDI from government officials and policy makers, the demands for assessment also changed. Formal progress reports on implementing and using SDIs are needed. In other words, a shift can be observed from a more intuitive to a more rational assessment of SDIs. It is a challenge for academia to follow the changing assessment demands by developing scientifically sound and policy relevant assessment approaches.

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