

# Balancing Infrastructure and Innovation in Geoinformation- infrastructure projects

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## Abstract

Spatial information is increasingly exchanged between organizations within a National Geo Information Infrastructure (NGII). While a lot has been written on implementation strategies, yet little is known what really goes on in concrete projects. In this paper an ethnography is presented based on a narrative approach of a Dutch project, in which innovative technology impedes the establishment of such an infrastructure. In this project, the initial goal of building an infrastructure shifted towards applying a stream of innovative technologies, which did not help to bring about an infrastructure.

## Introduction

There is a worldwide tendency to create facilities on a National scale to collect and disseminate data with reference to a physical location, which is generally called geoinformation (Crompvoets 2006). This information is increasingly used within organizations, governments and by the general public, mostly managed with Geographical Information Systems (GIS's). However, government organizations increasingly exchange geoinformation through the development of National Geo Information Infrastructures (NGIIs) (Rajabifard and Williamson 2001; Nebert 2004; De Bree and Rajabifard 2005; Masser 2005).

Over the last twenty years, programs have been conducted to establish NGIIs, where policy advisors take organizational aspects seriously, but do not treat them as manageable phenomena, while technical aspects are regarded as crucial (Nebert 2004; Georgiadou, Puri et al. 2005; Crompvoets, Rajabifard et al. 2008). Implementers seem to overlook organizational consequences, denying the relationship between organizational change and NGII implementation (Koerten 2008). As a consequence, organizational structures, modes of cooperation and work relations were hardly subjects for research in NGII implementation, however while they were treated as important (Georgiadou, Rodriguez-Pabón et al. 2006).

Infrastructure development is mostly cast into projects, of which we still have little knowledge concerning members' lived experience of daily practice (Hodgson and Cicmil 2006; Van Marrewijk and Veenswijk 2006; Veenswijk and Berendse 2008). Research in this vein might bring knowledge on NGII implementation further. The research question guiding this paper is: how can narrative analysis help to learn from NGII-implementation

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projects? We offer an in-depth ethnographic case study on a Dutch NGII implementation project called Geoportals, which was meant to realize a part of the Dutch NGII, by disclosing governmental geoinformation in a thematically organized way. Our research findings demonstrate that the initial project goal, building an infrastructure, gradually changed towards knowledge creation for innovations for developing the NGII.

We use a narrative approach in an in-depth ethnographic case study of an implementation project called Geoportals, originally intended to realise a part of the Dutch NGII by disclosing governmental geo information through thematically organised internet portals. After a theoretical elaboration and an account of the research methodology, we provide a case description, followed by an analysis of the project in terms of theory we conclude with a discussion and some concluding remarks.

## **2. The narrative ANALYSIS approach to research**

Stressing the ability of humans to see themselves from another point of view, symbolic interactionism was expanded by Goffman using the theatrical terms of a 'front-stage' and a 'back-stage' (Goffman 1959; Ritzer 1996). However, he did not specify how these ritualistic frames emerge (Goffman 1974; Gonos 1977; Manning 1992). Bourdieu implicitly suggested that structures are socially constructed (Bourdieu and Pels 1989). With concepts like 'habitus' 'practice' and 'field' he conceptualised a network of relations among objective positions, external to individuals, with positions having economic, cultural, social and symbolic capital, with field and habitus defining each other in a dialectical relationship (Bourdieu 1984; Bourdieu 1998).

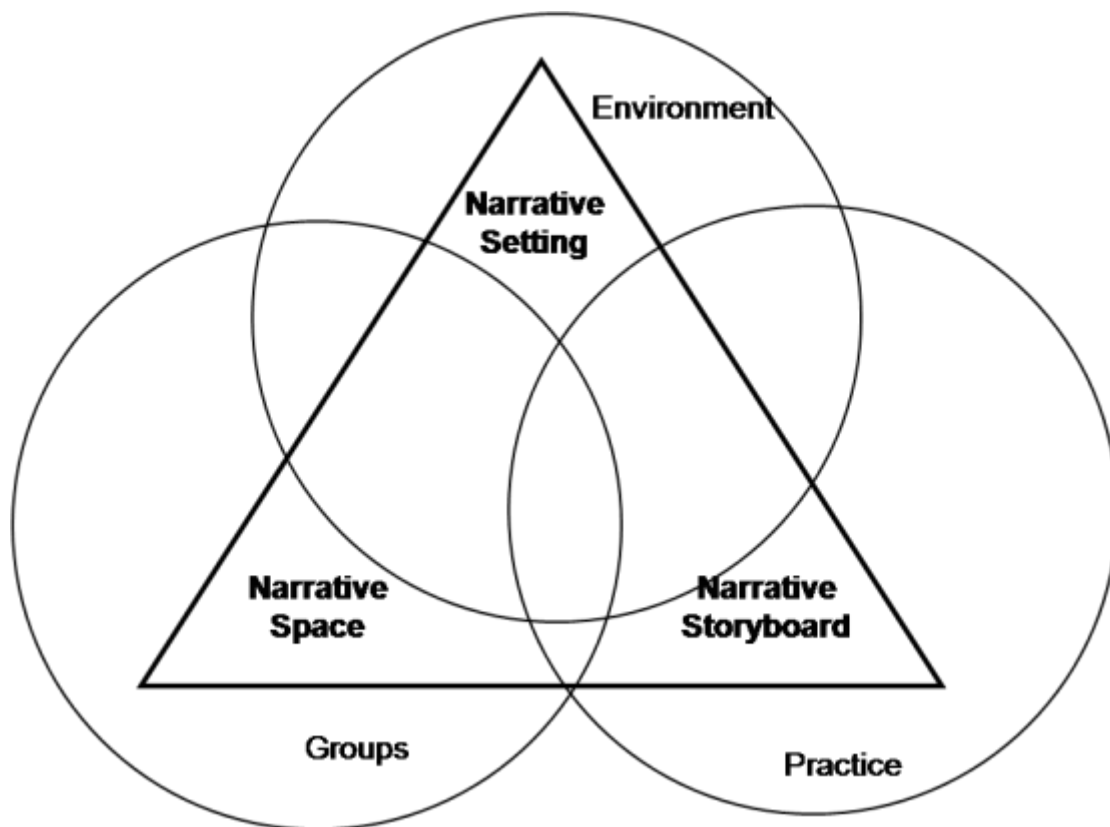
Comparing Goffman's dramaturgical perspective and Bourdieu's habitus reveals that Goffman's notion of frames resembles Bourdieu's field concept and that practice is more or less interchangeable with Goffman's concept of the 'front-stage'. However, they both leave the very aspect of meaning creation unaddressed. As they implicitly assume univocality, ubiquitousness and fully informed actors, they overlook ambivalence, ambiguity and incompleteness of worldviews.

Extending the interpretation of lived experience as a guide for action towards a narrative approach is our focus, using interpretation, meaning creation and sense-making as guiding concepts of a less positivistic method (Polkinghorne 1988; Gergen 1994; Hatch and Yanow 2003). We identified two approaches: a discourse oriented 'linguistic turn' and a story oriented 'narrative turn' (Verduijn 2007).

Discourse makes linguistically sense of people writing, reading, speaking and discussing; using messages which convey myths, sagas, results, setbacks, challenges or strategies, (Ricoeur 1973; Oswick, Keenoy et al. 2000; Grant, Hardy et al. 2004). The dynamics of organisational practice have invoked interest in metaphor, stories and drama (Grant, Keenoy et al. 1998). Grounded in literary criticism, new methods of analysis have emerged and been labelled as the narrative turn, aimed at delineating stories and storylines rather than texts (Frye 1957; Burke 1969; Gabriel 2000). The concept of narrative can be regarded as structuring human memory, being both medium and process (Bruner 1991), helping to make the notion of organisation more dynamic (Hatch and Yanow 2003).

People use narratives to give meaning to experience through interpreting the story in a favourable manner (Gabriel 2000). Either for single use or retelling them endlessly, stories get altered and are a frame of reference for future stories and actions, becoming narratives, loosely or even poorly connected to the original (Boje 2001; Tesselaar, Sabelis et al. 2008), turning into universal images, culminating in identity-creation (Beech and Huxham 2003). From a manager to a company car, identities are created by storytelling, leading to continuously reconstructed narratives, being prominent or latent, conscious or unconscious, real or imagined (Boje 2001). Looking for a clear overall picture, blanks are filled with fantasies that function as experiences (Ricoeur 1973; Bruner 1991).

Humans only notice change when it is reduced to a series of instances (Bergson 1946; Burrell 1992; Burrell 2000). An influx of stimuli is converted into adequate fixed concepts for sense-making (Chia 2002). While shifts in meaning rarely occur, they do however gradually change. Stable narratives in changing circumstances, have the quality of ‘deep structure’ (Douglas 1986; Schein 1992). Our framework conceptualises the creation and maintenance of stable narratives about scene, actors and actions, in terms of narrative setting, narrative space and narrative storyboard respectively (see Figure 1) (Burke 1969; Harré 1976).



**Figure 1. Theoretical Focus**

The narrative setting conceptualises narratives about the environment, time and space. A location is enacted, using images from the past, present and future, from the local community to the global environment (Douglas 1986; Lefebvre 1991; Scott 1995). Entailing the physical environment (Yanow 1995; Gastelaars 2008) and technology

(Orlikowski 2000), locations may have different meanings, relating to tangible and non-tangible aspects (Schneider 1987; Lefebvre 1991; Weick 1995). An intangible software program, used through a tangible computer, may have a fundamental impact on how things are done (Orlikowski 2000). Technology is shaped through subjective, partial and distorted images of application (Bijker 1995; Orlikowski 2007), linked to time and space (Burrell 1992), creating a relatively stable image of the environment, which only will be redefined when it becomes untenable.

Narrative spaces refer to departments, organisations, professions, religions or any other configurations of actors. Acting as mental ‘zoning plans’ for enacted human groups, they invoke action or conversely create a deadlock or cease-fire. They may form quite complex combinations, not linked to formal organisational structures (Lipsky 1980; Douglas 1986; Schein 1996). Change is conceptualised as moving from one form of stability to another (Barley 1990; Bartunek 2004; Ybema 2008).

Narrative storyboards are the bedrock of human action, providing predefined scripts in a world that is made up of a constant flow of events, creating fixed recipes for action, based on past, present and future actions (Bergson 1946; Berger and Luckmann 1967; Weick 1995). People feel uncomfortable when mostly unwritten rules are not appropriately applied (Garfinkel 1984). Storyboards provide a narrative to move from one state of affairs to the other, linking the action in question to time and space. They may guide apprentices learning the general way of doing (Wenger 1998), moving from chaos to order (Latour and Woolgar 1986), and allowing people to know what to expect (Czarniawska-Joerges 1998). Their predictable features make them triggers for change, providing building blocks for the analysis of change, shedding light on how narrative change can be mapped (Boje 1995).

### **3. Method**

Ethnographers have to be convincingly authentic (‘been there’), plausible (relevant to the reader) and engage in critical analysis (Golden-Biddle and Locke 1993). In order to do so, this research project followed writing conventions developed by Watson and extended by Duijnhoven concerning the transfer of field notes into convincing and authentic texts (Watson 2000; Duijnhoven 2008). We will present excerpts from our interviews and field notes, which may have been condensed into a representation of the typical form of a discussion or commentary concerning a particular topic. The research materials revealed narratives, showing how projects function as arenas for narratives.

The Geo Portal project was monitored by one researcher during its course, who was accepted as a member of the project committee, which further consisted of one representative from every participating organisation. Monthly management meetings, two brainstorm sessions and four workshops were monitored and also 22 interviews were conducted with key persons, both during the commencement and conclusion phases of the project. Relevant documents and some video footage were also analysed.

### **4. Analysis**

In this section we provide a detailed description of three phases of the Geo Portals project. Each is described separately and followed by a narrative analysis that identifies the narrative setting, space and storyboard.

#### 4.1 Getting started

The *Ruimte Voor Geoinformatie* (Space for Geoinformation, RGI)-programme started in 2002, with the idea of stimulating innovation in order to boost geo information sharing. The next step was to bring together representatives of organisations in the geoinformation-field to make goals more concrete. The result was a glossy brochure with a programme outline, produced by a consortium of 10 universities, 20 research institutes, 60 companies, 40 governmental bodies and 30 geo information producers (RAVI 2003). It was argued that government needed complex information about a complex society to develop convincing policies. To make the information manageable, it was to be ordered spatially as geo information, disclosed by a National Geo Information Infrastructure (NGII). The bottom line was to make geo information available in a structured manner, with it being disseminated independently by individual organisations.

To promote future projects, RGI organised ‘broking and bargaining days’ on which representatives of organisations from the Geoinformation (GI)-sector were invited to generate project ideas. It was in this context that the concept of Geo Portals emerged. Some typical observations of those in attendance were as follows:

RGI mobilised the field. They organised broking and bargaining days in order to get rough ideas. Some 25 ideas were identified as potentially successful. In the end, these ideas were connected to organisations; it was just one big dating show. It became obvious that some central portal facility was needed and that our organisation should play a role in its development.

I remember how Geo Portals emerged. The idea behind broking and bargaining events organised by RGI was that through discussion among representatives of geo information organisations, ideas for concrete projects would pop up. During one of those meetings, the Geo Portals concept just came out of a plenary discussion. Then the moderator asked which organisations were willing to participate. Representatives of interested organisations raised their hands, as did I. So, all of a sudden I was an initiating member of an instantly formed club of enthusiastic people who wanted to disclose geo information through portals.

That the overarching concept of Geo Portals should be *liberty united*, was obvious from the outset. A central, top-down organisation was totally out of the question. The idea was a network of portals of different nature, working together with a minimum set of rules.

Those involved in the discussion saw the rudimentary concept of Geo Portals as a collective idea in need of development. The thirty organisations willing to participate were gradually reduced to thirteen, and in October 2002, representatives from these organisations presented an initial proposal which envisioned thematically categorised, colour-coded portals like red for built environment, green for nature and agriculture, and brown for subsurface conditions (Schmidt and Nieuwenhuis 2002).

After the initial submission in 2002, a rewriting process occurred, giving the project more focus. In the minutes of early project meetings, there are clear conceptions about how data should be distributed. It was stated that all the processes for disclosure, search, diffusion and payment should be web-based, while how all the different data sources were to be connected was not a matter of discussion. The first rudimentary description of the geo

portal framework presented a static image of a portal based on proven technology and standards with a fixed notion of information-architecture (Hoogerwerf and Vermeij 2005).

While the project goals were stated clearly and unambiguously, at their regular meetings the representatives of the participating organisations expressed doubts about how to proceed. They were uncertain about the financing and procedures for reporting to RGI, but even more about the essence of the project. Now the project was about to start, they felt the need for definitions about what a portal should look like, how users would be reached and what technology would be used in its setup. A typical discussion in a meeting of representatives would proceed as follows:

A: If we want to set up a proper Geo Portals, we need to be clear about standards. It is obvious that we use the most recent and commonly used standards. We are not going to use any standard that has not been accepted by the community, or that has not proved to be useful.

B: I agree on that. If nobody objects, we should proceed to the next topic, and that is user orientation. We have to be demand-driven, preventing us from making the same mistakes they made in the NCGI project. So how can we be demand-driven?

C: First and foremost we need to disclose our data in a way that it can be readily found. Furthermore, we need to present it in a format that can be read by the user. So, we need to use the proper standards.

B: I agree. We need to use proper standards, those that are widely accepted.

A: Now we agreed on how to settle the standards issue, we are discussing standards again.

The motto of Geo Portals was ‘liberty united’, which reflected the fact that it was a network of portals established by various organisations, each with its own autonomy, but working according to a minimal set of rules. In defending this view of the essence of Geo Portals, it was often explained as a reaction to a former national project regarding geo information, the National Clearinghouse for Geo Information (NCGI). The feeling was that NCGI had failed due to the central, top-down enforcement of detailed standards and work procedures and this had proved to Geo Portal protagonists that organisations were not inclined to comply voluntarily with strict rules. To avoid another failure, they decided to meet as a small group of motivated organisations connected through a minimal number of mutually agreed standards.

While Geo Portals was sketched out in organisational terms, discussions on how to proceed would always come down to technical matters. Standardisation was considered to be crucial, followed by the question of whether the data was accessible enough. The bottom line was that it was most important that the issue of technological standardisation should be settled properly. Technological matters dominated discussions:

A: Technology is not really a problem anymore. We can build everything we want without any limit. All the techniques needed are at our disposal.

B: That’s right; the things that do matter are organisational aspects. Look at the US example of Geospatial One Stop. They just do it: American government agencies put everything they have on the web, without restrictions.

C: But its quality is doubtful at best, they don’t guarantee its accuracy. I wonder if anybody actually uses it.

A: If we follow the example of Geospatial One Stop, then it will look like NCGI. We have to do better than that.

B: Just use the right standards. That is of paramount importance. The architecture we have developed is perfectly equipped to set up a network.

A: If we stick to proven technology and standards, nothing can go wrong.

B: But what is that, which standard is proven, which standard is commonly used, which one really works?

C: Here we go again!

In November 2005, the core team, made up of representatives of a few major participating organisations, attempted to tackle the problems experienced by calling the project team together for a two-day brainstorming session in a remote countryside hotel. The technology and standardisation issues had been declared settled, but still played a role, while the intention was to produce a strategy for developing a user-driven approach. The programme for the session mentioned a meeting with a public relations consultant and the question of how to bring more user-drivenness into the project. In fact, user orientation was extensively discussed, eventually leading to a ‘motto’ of which the team was very proud: ‘Able to find and allowed to use’.

The subsequent working conference, in which the project was to be presented to the GI community in December 2005, was also a pressing issue. The project team had mixed feelings about whether there was anything tangible to demonstrate and thought that if this was not the case, it would be better to cancel the presentation. After some deliberation it was agreed that a rudimentary version of the Red Portals would be demonstrated.

Thus, in December 2005 the Geo Portals project was launched before a GI audience at the first Geoportal conference. The core team was determined to make a convincing statement by showing that the project was user-driven and was doing the right thing in terms of technology, but also felt a little uncertain. The audience was familiar with RGI and its projects and knew of the existence of the Geo Portals project without additional information. Sheer curiosity brought about fifty GI professionals together.

In his introduction, the scientific director of RGI signified the importance of Geo Portals for RGI, proclaiming it to be a key project. The core team then gave a presentation about the demand-drivenness of the project and elucidated the ‘motto’. Despite the importance with which this was regarded by the project team, it barely raised the interest of the audience. However, the demonstration of a rudimentary version of the Red Portals website using data from the built environment had an astonishing effect. What the Geo Portals team considered window-dressing was the very thing that convinced the audience of the project’s importance. In subsequent discussions it became apparent that participants were convinced that the Geo Portals project was RGI’s key project and that it was technically well managed and would make a difference. The Geo Portals project team celebrated the day as a success.

#### *Narrative setting, space and storyboard*

Technology is the dominating factor in the narrative setting here. In the past it has been an impediment with respect to infrastructure development, but in this setting this was no longer the case, the team considering it possible to apply GI technology for the disclosure of data in a way that society as a whole would benefit. Now GI technology is seen as an ever-developing and changing phenomenon that will be mastered through the application of standards and result in an infrastructure with a rather static form, divided into thematically organised compartments of data that give it a neatly arranged appearance.

In the narrative space, the project team has a direct relationship with the GI community. Individual project members belong to organisations that financially support the project, but these organisations are not recognised as individual partners. As a whole, the organisations have a neutral and minor role and are all seen as equal and as supporting the common cause of sharing GI data. GI data users are recognised as a defined group through the user motto, but a clear picture of these users has still not been developed.

A storyboard emerges concerning the propensity to let technology work for the GI sector through the application of standards. The Geo Portals project is seen to be acting on behalf of the entire GI sector, detached from individual organisations and creating a stable infrastructure.

#### **4.2 Attempting to reduce uncertainty**

The project team continued its project meetings on a fixed day of the month in a centrally situated venue, with meetings held in a building occupied by one of the participating organisations. Usually, the morning agenda was devoted to management matters, while discussions prepared by a core team member or an external speaker took place in the afternoon. However, fundamental issues would emerge during the morning sessions and be discussed over lunch, sometimes continuing throughout the day, suggesting a certain level of insecurity. Nevertheless, a research paper written by the project members to convince European peers expressed confidence (Zevenbergen, Hoogerwerf et al. 2006).

The Geo Portals project was meant to provide all possible kinds of data, to be delivered to both professional users and the general public. Professional users only needed disclosed data, while lay users could be provided with software services which had to be developed for integrating, harmonising and presenting data. Existing examples of the disclosure of geo information through websites were reviewed; flaws convinced project members that there were many difficulties involved in bringing together different sources. Services designed to harmonise and present data were seen as essential to Geo Portals, emphasising the user orientation of the project, which was communicated to the GI community. The core team developed the example of a beer brewer in need of geo information to assist in finding a location for a new brewing facility. In all the subsequent presentations and promotional material, including a promotional RGI film, this example – which connected different processes within different public organisations – was made prominent (Van de Laak 2007).

User orientation also generated interest in legal aspects and the issue of digital rights management. A researcher affiliated with Geo Portals translated an approach for regulating copyright on the internet into a model applicable to the field of geo information. This model, regulating legal and economic aspects of geo information, was regarded as essential for Geo Portals, although, however important it was felt to be, it was also seen as a separate entity, unlike technological issues. Technology was held to be dynamic, while the access model was found to be static. Further development of the model was embedded in another RGI project, placing it beyond the control of the project team.

At the end of 2006, the project team began to feel uncomfortable about the lack of steering capacity at RGI. While RGI saw Geo Portals as the core project of the programme, the core team thought RGI, giving voice to the management of individual organisations, should provide an overarching framework. As RGI was seen as the custodian of the



National Geo Information Infrastructure (NGII), a serious discussion among project participants was devoted to this topic:

A: We are supposed to work on NGII. For RGI, Geo Portals are considered as focal, but they don't say anything about the guidelines we should follow or how to connect to other projects that are part of the NGII.

B: They are talking about us as a test bed for NGII, but are we only a test bed? Are we supposed to deliver something that actually works?

C: We are certainly working on our data viewer, but to what standards should it comply? Are there any organisations that are going to use it?

A: They say that a new GI coordinating organisation is in the making – yet another organisation that is supposed to organise something. We need guidelines and all they do is establish a new organisation. This does not sound like coordination to me!

D: I think that as a Geo Portals team we should take a stand and do what RGI refuses: take the lead!

The core team did not feel supported by RGI, which until then had been seen as the keeper of the NGII, of which Geo Portals was a part. At the end of 2006, RGI published an article in a leading professional magazine with the provocative title: 'Where to with the Dutch Geo Information Infrastructure?' (Bregt and Meerkerk 2006). It provoked discussion, but also made the core team feel that RGI had no strategy.

Geo Portals concentrated on the work to be done: new services had to be developed with new software. Choices had to be made on what technology to use and what standards to apply. The core team, representing three government-supported knowledge institutions and a software company, felt responsible for this part of the project and took up the challenge of drawing up a framework and organising software development.

During the software development process, the core team came together on a weekly basis to coordinate software development which was undertaken by software engineers from core team member's organisations. In spring 2007, these efforts resulted in a data viewer, a software device designed to be capable of consistently retrieving geo data from different sources on a computer screen. The Geo Portals core team, being enthusiastic about it, saw it as a requirement for bringing the ultimate goal, a system of Geo Portals, one step closer.

While celebrating this achievement, project members soon felt that the newly developed data viewer was already becoming outdated because new techniques were now available, allowing software engineers the opportunity to develop even more sophisticated viewers. Thus, while having a tested product ready for implementation, the development process went on, with an enthusiastic core team managing the same team of software developers. While working with the newest technologies they gave the impression that these developments were quite normal for them – new technology had to be explored and applied.

#### *Narrative setting, space and storyboard*

In this phase of the project, the narrative setting becomes increasingly dominated by technology. To serve lay users, services have to be developed using state-of-the-art technology. Standards are still important, however now appraised as being of lesser

concern. Legal aspects are seen as a separate area that needs to be dealt with, but not necessarily by the project management team.

In the narrative space, the management of individual participating organisations is seen as collectively organised into advisory boards of the RGI programme. The programme itself is considered to be unsupportive, as it simply does not have a policy, and board members are not seen as GI experts, but as serving the interests of individual organisations, which are not necessarily the interests of the Geo Portals project. Those involved in the Geo Portals project must recognise that in order to be successful they must plot their own course, which will be to address the newest trends in GI technology.

The storyboard at this stage is at the point of exploring the latest GI technology and incorporating this into a test website. Once the technology is ready to be used as a building block for GI infrastructure, further effort will be put into assessing newer technological improvements.

### **4.3 Towards judgement day**

In 2007, the Geo Portals project was on track as far as software development was concerned, but the core team was becoming increasingly agitated, feeling that the initial goal of sharing geo information was moving out of reach. At the project team meeting in April 2007, a discussion on this point was initiated by two core team members in an attempt to engineer a breakthrough:

It is terribly sad that we cannot build on the achievements of RGI. It looks like management does not recognise what it is all about. In the Netherlands we have an abundance of geo data, distinguished scholars, high GIS penetration, a vast and schooled workforce and many knowledge-exchange networks. Perfect circumstances for great ideas. But guess what? We just keep on chatting!

Nobody seemed to be in charge of developing the NGII, and the decision-makers at RGI were depicted as abstract thinkers with no practical knowledge. It was felt that a breakthrough was needed, and the appraisal of the RGI promotional conference held in March 2007 did not display any confidence:

A: I am sad to say that real sharing of geo information is further away than ever. We have just had the RGI conference in Rotterdam. It lacked any ambition. The bottom line was: 'The NGII has to be developed, but let's move on as we did'. That's not the way to get it done.

B: It was a convention of the same people that you see all the time at such events; 'the usual suspects' were doing their ritual thing.

C: It was like being in some religious rally, people celebrating and praising something of which everybody has a different image.

B: It is a paradoxical situation. When we need a breakthrough, surprise, surprise, nobody wants to change, we keep on doing things the way we did, and nothing really changes.

C: Everybody talks about the costs of an NGII, the benefits are not mentioned.

A: An NGII will add value, that's the *raison d'être*. If we only want an NGII for incident management and fighting terrorism we're on the wrong track.

Despite the uncertainty, Geo Portals was considered to be successful because it offered technical solutions. It was felt that technology only had to be brought to a meaningful

conclusion in order to establish the NGII, but failing management seemed to obstruct this. Perceptions of the goal of Geo Portals started to change:

It is perfectly clear that it was unattainable to build an infrastructure. Just look at the budget we had for this project: it was clear even before we started that it was insufficient. Our job was to deliver building blocks, to innovate for the sake of an NGII.

We are good at the technological aspects. So if they ask us for such a project, we will handle technology. Without any guidance from RGI, it is impossible to develop an NGII. What we can offer for a future NGII is best practices and software tools. We form a community for NGII development.

Another working conference was organised for November 2007 with a striking theme: 'Just do it'. External experts were asked to focus on financial, legal and organisational aspects, while Geo Portals project members were willing to present the technical aspects. The message in workshops was that new software applications, as developed by Geo Portals, were fully capable of integrating geo data from different sources. This message was symbolised using Lego blocks, representing geo data building blocks which could be put together in any possible way.

Now that the finish was in sight, the project team wanted to deliver results which could be used in the future. Slowly but steadily, the project goals were redefined. The obligation to produce tangible products changed, with the Geo Portals team coming to see itself as a 'community of practice'. The image of the project as developing building blocks for an NGII now changed, with Geo Portals being reconceived as a knowledge-creating project. The atmosphere also changed, from distress to optimism to euphoria, although one of the more sceptical project team members noted that what was occurring was 'expectation management'.

It was felt that the positive results should be disseminated to the GI community, for example in a research paper for an international audience (Zevenbergen, Bulens et al. 2009), and towards a new sector-wide policy coordinating organisation called Geonovum which began to promote itself. While the Geo Portals project team had at first thought that this organisation was covering up the failings of the geo information sector, they now thought that Geonovum could secure the innovative achievements of Geo Portals for the future. The image of RGI changed accordingly, from a funding vehicle to becoming a knowledge-boosting programme that should be continued.

At the closing conference in December 2008 there was confidence about the results. The highest civil servant responsible for geo information in the Ministry of Housing, Spatial Planning and the Environment gave the keynote speech, addressing 150 people in a prestigious location. A specially produced video presented geo information sharing as an ongoing project, suggesting that there was much work still to be done. Software applications were presented as stepping stones in a continuous progression, invoking a great deal of interest in newly developed techniques. A new website with a new name (Carta Fabrica) was also launched, meant to make the achievements of Geo Portals available. Both the core team and the audience were optimistic about the future.

In interviews held after the completion of the project, the image of technology as dominating all developments was persistent. Standards were seen as a thing of the past

because technology was now being capable of connecting all forms of data. The approach was referred to as 'Web 2.0', signifying that the new technology was obviously web-based. It was also noted by Geo Portals project members that Geonovum was still working on a National Geo Register aiming at the registration and standardisation of all governmental geo data but that this project was obsolete because Web 2.0 would solve all connection problems where standardisation had failed. However, most importantly, the National Geo Register was seen as a project hampering rather than stimulating innovation.

#### *Narrative setting, space and storyboard*

In the narrative setting, technology is now treated as the essence of Geo Portals. Technology is seen as an unleashed phenomenon, labelled as 'innovation', and it is ready to solve any problem, with the aim of making this world a better place. Innovation is thus seen as an enabler of dynamic geo information management, without being chained by standards. However, solutions created by this technology are found to be obsolete before they can be used, not because they do not function properly but because they are superseded by solutions powered by even more sophisticated technology.

In the narrative space, both diverging and converging tendencies can be observed. Geo Portals project members see management within the GI sector, speaking through organisations such as Geonovum and RGI as inhibiting possibilities created by new technologies as they emphasise standards and provide insufficient funding. As initial goals became untenable, the Geo Portals team redirected their aim towards creating innovation to facilitate the creation of an NGII. As the RGI was supposed to stimulate innovation in geo information sharing, the Geo Portals project team felt quite comfortable with their new goals, knowing that their project would stimulate innovation.

The storyboard that emerges here aims at the production of new technologies to be made available to the GI sector. Goals become reframed, moving from the creation of a static infrastructure into making new dynamic technologies available. This reframing is justified through concluding that the funds originally granted by RGI were inadequate to realise the GI infrastructure considered in the initial plan.

## **5. Discussion and conclusion**

In this paper, narrative analysis with a framework of narrative setting, space and storyboard was used to analyse the Geo Portals project. Three phases of the project were identified, in which the narrative setting and space could be placed in a relationship with a developing storyboard. The project had a clear beginning and ending, preceded by some preparatory activities. During the course of the project, the aim of Geo Portals changed from the development of an infrastructure serving societal needs to providing a toolbox to stimulate innovation, while they considered themselves to be the vanguard of ever-changing technology. The idea of building an infrastructure slowly faded.

#### *A technology-dominated narrative setting*

The narrative setting, dominated by rapidly developing information technology, stimulates project participants to look to the future. The Geo Portals project is a means to collectively applying cutting-edge technology to create innovative software applications. By making

new technology available independently of their respective organisations, no individual or organisation can be blamed for failure since the Geo Portals project is supposed to be beneficial to the whole GI sector. As past technology is seen as an impediment with respect to infrastructure development, GI technology is seen as an ever-developing and changing phenomenon that will be mastered through the application of standards which will result in an infrastructure with a rather static form, divided into thematically organised compartments of data that give it a neatly arranged appearance. However, as the project is progressing, technology becomes the main issue. Services have to be developed to serve lay users, and it is felt necessary to apply state-of-the-art technology. Standards are still considered important, but now appraised as being of lesser concern.

Towards the end of Geoportals, technology has become an unleashed phenomenon, which has been relabelled as 'innovation' in order to handle it. Innovation is thus seen as an enabler of dynamic geo information management, without being chained by standards. However, these technological innovations are found to be obsolete before they can be used, not because they do not function properly but because they are superseded by even more sophisticated technology.

#### *A self-reliant narrative space*

The Geo Portals project team sees RGI as a temporary organisation, encouraging individual organisations to cooperate in order to be eligible for funding, making the Geo portals project subsequent and beneficial to the whole sector. The project team as a narrative space acts as if it has a direct relationship with the GI community, making it cautious, responsible and somewhat self-reflective. Individual project members belong to organisations that financially co-support the project, but these organisations are completely invisible within the project. As a whole, they are all seen as equal, supporting the common cause of sharing GI data.

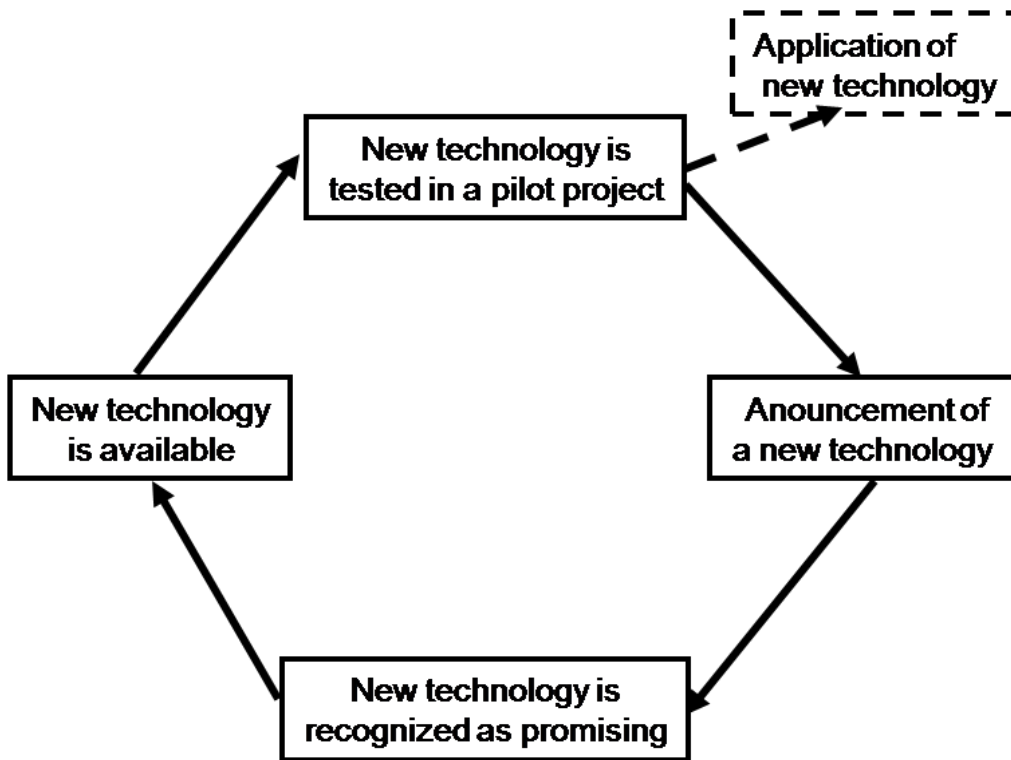
Geoportal project members see the management of individual participating organisations as collectively organised into advisory boards of the RGI programme. RGI stresses that it wants to boost innovation, but is considered to be unsupportive, because it lacks a policy. Board members are seen as serving the interests of individual organisations they represent instead of the interests of the GI community as a whole, allowing Geoportal project members to plot their own course, which is to apply the newest trends in GI technology.

When Geonovum comes into play, it tries to fill the gap of a lacking overall policy by emphasising standards, but that is seen within Geoportals as inhibiting the possibilities offered by innovative technology. In the end, RGI is held responsible for not delivering Geoportals as originally planned, since it did not supply sufficient funding. The Geo Portals team feels to be forced to redirect their aim towards boosting innovation to facilitate the creation of an NGII, which is valued positively since RGI was supposed to stimulate innovation.

#### *Emerging storyboards*

A storyboard structures and prescribes people's actions. They may either be unconsciously and tacit, or prominent and invoking discussion. When the initial aim of Geo Portals project to create a stable infrastructure is abandoned, the project team feels that it has to live up to the obligation of exploring the latest GI technology. However, once developed technology

is ready to be used, further effort will be put into assessing newer technological improvements. There is a storyboard guiding towards making new technologies available, compliant with the motto of RGI to stimulate innovation being cyclical in nature: whenever new technology is tested and approved, newer technology is already virtually available to be tested, and eventually to be confirmed as a new standard. Research data shows that this cycle is passed twice, following the pattern being depicted in Figure 1. This is the storyboard reflecting action which can also be interpreted as a vicious circle (Masuch 1985; Hampden-Turner 1990).



**Figure 1. The Storyboard of Innovation**

In a world with a pressing and increasing turnover of technological innovations, reliable infrastructures with fixed, predictable, stable, unambiguous and ubiquitous qualities (Edwards, Jackson et al. 2007), offer a narrative of stability, as described in the initial Geo Portals project proposal. However, strict standardisation is feared as indicated in the project's subtitle: 'liberty united'. Therefore, a limited, 'light' version of standardisation is proposed. Geo Portals project was meant to be innovative, with an emphasis on change. Newly developed software, already obsolete on the day of its realisation, was seen as essential, as project members saw tomorrow's technology as the solution to problems encountered today. The storyboard of innovation hampered the development of an infrastructure. For this reason, the project was reframed into a knowledge-generating endeavour and judged on its innovative qualities, presented through state-of-the-art software.

### *Conclusion*

Delivering infrastructure seems to involve a narrative of change, expressing the urge to have the newest technology, but also a narrative of stability, which sees infrastructure as predictable and stable and thus useful (Hanseth, Monteiro et al. 1996; Hanseth, Jacucci et al. 2006). These narratives reflect a basic stability/change contradiction (Douglas 1986; Chreim 2005). The confrontation of these two contradicting narratives has been called the 'innovation paradox' as it has been found in large public sector projects where a fixed infrastructure has to be delivered in an unstable environment (Veenswijk 2006).

It has been suggested that to understand the construction of infrastructures we need to focus on project designs in the light of cultural settings (Van Marrewijk, Clegg et al. 2008). However, here a GI community seems to be unable to enact a useable infrastructure. One project member suggested that infrastructures are always innovating and should be regarded as 'moving targets'. However, to be used infrastructures need to be stable. Thus, the sector as a whole must find equilibrium between stability and change in relation to infrastructure.

Efforts should be made to reconcile innovation and infrastructure without the pressure of ever-changing technology, or in other words: to adapt an infrastructure according to changing user needs instead of external technological forces. The concept of infrastructure should preferably be enacted independent from technological requirements. Future research has to focus on making concepts of infrastructure that exist separate from underlying technical requirements in order to make them truly user driven.

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