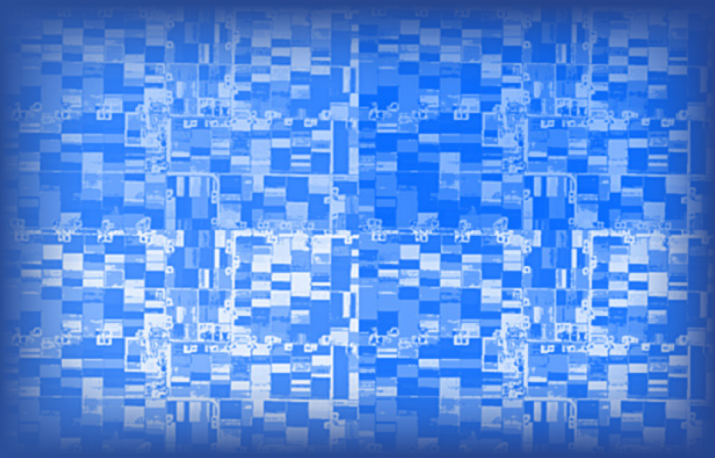
GeoICT Uniformity in Flexibility



Analysis of the influence of geoICT coordination
on the cooperation between public organisations with geoICT

Walter Timo de Vries

GeoICT Uniformity in Flexibility

- Analysis of the influence of geoICT coordination on the cooperation between public organisations with geoICT -

Walter Timo de Vries

GeoICT Uniformity in Flexibility

Analysis of the influence of geoICT coordination on the cooperation between public organisations with geoICT

GeoICT uniformiteit in flexibiliteit

Analyse van de invloed van geoICT coordinatie op de samenwerking tussen publieke organisaties met geoICT

Proefschrift

Ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
Op gezag van de
Rector magnificus

Prof.dr. H.G. Schmidt

En volgens besluit van het College voor Promoties
De openbare verdediging zal plaatsvinden op

vrijdag 17 mei 2013 om 13:30 uur.

Walter Timo de Vries
geboren te Katwijk aan Zee

Promotiecommissie

Promotor: Prof.dr. V.J.J.M. Bekkers

Leden:
Kleine commissie:
Dr. V.M.F. Homburg (EUR)
Dr.ir. M. Janssen (TUD)
Prof.dr. M. Thaens (EUR)

Acknowledgements

Obviously no PhD trajectory is straight forward or easy, so neither was mine. It was ‘somewhere in the cloud’ for a long time, but it needed to be picked up. I have to admit that many times I felt I was starting all over again, and re-inventing wheels for both myself and others. This, I learnt, is perhaps one of the key challenges of completing a PhD document. In that sense I’m not different from others, except for the fact that the support for my endeavour has been very specific. These specific people I would like to acknowledge. I should start with thanking my promotor Victor Bekkers, who agreed to work with me on this in 2008 and who has consistently provided me with constructive comments and ideas in response to any new documents that I provided – and I provided many! I learnt especially that formulation, framing and presentation needs diligence, patience and perseverance – qualities which do not always come naturally. They have to be nurtured and there is no geodetic line – a shortest route - to get there. The first to inspire me to pursue a PhD was Dick Groot. Although this seems already a long time ago, he paved the way to start thinking about research beyond traditional geodesy and geoinformatics. In addition, I would like to thank Yola Georgiadou for the continuous encouragement, constructive comments showing a clear path from geodesy to governance, and for being opponent during the final session. On that last note I would also like to thank all members of the reading committee for given me critical feedback. Furthermore, there have been a number of colleagues and friends who have helped me forward. Specifically, Gianluca Miscione, has always priovided me with new ideas, inspiration, theoretical notions and positive feedback. Jaap Zevenbergen who has regularly reminded me about finishing up. And, all the colleagues from GMI, PGM, GeoGov. This is where this research and the original ideas for the document started. In the execution of the research I should certainly not forget all the respondents and interviewees. They were all willing and supportive in providing me with details of the experiences and their views. In retrospect they formed the core of my findings. Last but not least, and most of all I owe this work to my family. Rini, Daniel and Elies – the eternal back-up - always remained loving and supportive - I could not have done this without you. I thank you with all my heart.

Table of Contents

Chapter 1

Empirical entry point of the research – the 'Wuthering Heights' of the Netherlands

1.1 Introduction

This chapter begins with an empirical case where various public sector organisations in the Netherlands have cooperated with a particular type of technology, geoICT, since 1996. Throughout this document, GeoICT refers to the *collection of Information and Communication Technologies (ICT) based systems allowing the study of natural and man-made phenomena with an explicit bearing in space* (de By, 2004:15). Specific to 'geo-'ICT is that it creates and manipulates 'geospatial data.' Similarly to other types of ICT, it has only partly affected the four spheres of government: policy, politics, public organisation, citizens (Zouridis and Thaens, 2005). However 'Geo-'ICT has the potential to influence the public organisation beyond the operational core of public administration (ibid.). Section 1.2 begins from this assumption and presents the case. Section 1.3 follows with a conceptual analysis of this case, to derive a set of basic research questions. Section 1.4 formulates these research questions. Section 1.5 explains the approach with which these research questions are addressed. Section 1.6 describes the position of this research in relation to three research domains: geo-information science, public administration and organisational science. Section 1.7 provides a summary of the section and its relation to the subsequent chapters.

1.2 AHN: the 'Wuthering Heights' of the Netherlands

In 2005 the national project for the collection and distribution of height data for the whole of the Netherlands (AHN in its Dutch acronym) reached a deadlock. The project's partners included the National Agency for Water Affairs (RWS in Dutch, an implementing agency under the authority of the Ministry of Road and Water Infrastructure), the combined water boards (local government agencies responsible for groundwater maintenance) and their national association (UWV in Dutch), all provinces responsible for regional environmental planning including the land-water relation, and the association of provinces (IPO in Dutch). Each partner deals with water management. RWS is responsible for managing national water infrastructures, IPO is responsible (through the provinces) for regional water management and UWV (through water boards) for local water quality and availability. A covenant in 1997 had spelled out the governance of the cooperation, and had appointed a steering committee with representatives from all partners. The deadlock became public knowledge when project partners publicly accused each other of not wanting to sign the extension of the 1997 cooperation covenant. While the AHN committee stated

euphemistically "*We are still working hard on structural improvements in the cooperation,*" the provinces complained that "*The AHN is not meeting expectations; it brings unpleasant surprises, and causes confusion.*"[1] The provinces' complaint contradicted earlier IPO reports stating that "*The provinces have always been supportive of the AHN initiative from the water perspective. As the AHN could also be of use to other provincial policy areas, in 2004 we will strive to broaden the support,*" and undermined IPO's original intention to sign the new covenant (IPO, 2004; p.100 - original document in Dutch).

Technically, there was no obvious obstacle to extending the cooperation agreement. The project had generated a series of new height data sets by 2003. In the course of the project, the AHN partners had explored a subsequent phase for improving the handling of the increasing number of requests for renewed data collections, new data distribution and pricing policies, and better connection to national base registrations policies (Twynstra Gudde, 2003). Nevertheless, the polemic disagreements aired in the regular AHN newsletters and in congress presentations by each of the partners had damaged both the internal and the external image of AHN as a successful project. In 2005[2] the AHN steering committee hired an independent consultancy to map out the difficulties and possibilities of continuation. The agency concluded that the main users of the height data, mostly the water boards themselves, seemed dissatisfied with the data quality and governing structures. Relations among AHN partners had deteriorated to such an extent that the project management was seriously considering discontinuing the project.

By the end of 2007 after a two-year deadlock, a new cooperation agreement was signed, for a project referred to as AHN.2. The AHN.2 cooperation agreement included:

- A redefined constellation of just two contract partners: the Water boards and the RWS/DID, a newly-created department under RWS, the Data Information and Communication Technology (ICT) Service (DID – 'Data-ICT-Dienst'). The IPO and the individual provinces were no longer included in the cooperation agreement, despite their proclaimed reliance on the AHN data.
- A reform of the governance structure. The new covenant established a governing council ('regieraad' in Dutch), with representatives from RWS and UWV. This governing council took on the overall responsibility for AHN.2. The new steering committee, now only with representatives from RWS and individual water boards, took on the responsibility of preserving

[1] Original in Dutch – translated from summary of the 2005 AHN users' day at http://www.ahn.nl/gebruikersdag/gebruikersdag_2005.php

[2] http://www.ahn.nl/besluiten_sgahn20.php

the coherence of the AHN-related activities, defining the AHN-related policies, and the budget. The new covenant also created two different mechanisms for the project's implementation and management. A new organisation, the 'Waterschapshuis', has the task of updating the data with water boards' project managers. DID is now responsible for contracting and acquiring new AHN.2 data through new technologies. The DID service desk also maintains all AHN data and manages distribution. There was an overall shift of strategic management towards the water boards, while the RWS/DID agreed to take up technical operational responsibilities (new technologies, new types of data collection, data distribution).

- A set of revised data sharing arrangements. The agreement partners have access to all data, whereas third parties have to pay for each data request. Since the formation of the IPO, the provinces were no longer part of the agreement and their access to the AHN data effectively changed.
- A renewed data distribution policy. A new price policy for the data came into force on 1 January 2007. The most important changes included a general 25% price reduction, a reduction for certain institutions, fixed prices for complete sheets, and a minimum price of 125 Euros.

The AHN partners also decided on some practical issues:

- The use of new data acquisition technology. Following a pilot study in Zeeland, presented during the AHN users' day in 2007,[3] the steering committee decided to start using more accurate laser altimetry. This technique, involving the use of laser beams from aircraft to measure topography, results in a set of point measurements with height values. The more points there are per area, the more accurate the height measurement. The pilot study increased the accuracy from 600 to 100,000 points per hectare. This higher accuracy offers potentially new applications, in particular in water and dyke management.
- Re-confirmation of cost reduction priority. The partners deemed that realising cost reduction possible through sharper data acquisition contracts, increased revenues through sales and more (re-)use of the data.

The objectives of the old and the new cooperation agreement guiding AHN and AHN.2 were however largely the same: aiming for national data coverage, reducing the costs of data collection across the public sector, and stimulating knowledge development for the specific technology. An important change in AHN.2 (compared with AHN) is the type of image imparted in the AHN.2 publications. Most of the rhetoric related to AHN.2 seems to focus on increased accuracy and reduced data-processing time. Reports on AHN also showed that the internal struggle among partners for the extension or a new phase of the

[3] http://www.ahn.nl/gebruikersdag/gebruikersdag_2007.php

project had harmed AHN's public image. This struggle was taking place in the public domain of newsletters, conferences etc., where IPO was blamed more than once for not participating in a new AHN phase. The decision that IPO was no longer part of AHN.2 did not therefore come as a complete surprise, even though negotiations on AHN.2 had not been completed, according to IPO. Thus IPO's exclusion from AHN.2 also reflected on IPO's image. Where the new contract partners emphasised that AHN.2 was technologically more sophisticated, more accurate and reliable, the image of IPO and the provinces implicitly became one of less sophistication and reliability. Such a qualification does not reflect a technological image, but reflects the social and organisational one. Apparently the process of cooperating with geoICT relates not only to technological details, but also to more social and inter-organisational concerns and strategies of individual partners.

1.3 Analysis of the AHN case

AHN as a stable geoG2G

In evaluating this case, one can note that the change from AHN to AHN.2 is a change from an older, relatively stable structure and set of responsibilities and tasks to a new, relatively stable structure and set of responsibilities and tasks. Both these stable states involve geoICT, and both reflect an intertwined inter-organisational relationship between different public sector organisations. I will refer to stable states from now on as a **geoG2G**, an abbreviation for Government-to-Government (G2G) applications, defined and evaluated by Flak(2007) and Joia (2004), with the adjective 'geo'. Flak (2007:35) defines a G2G as a set of applications supporting '*horizontal and vertical integration of agencies and competing stakeholder interests.*' The applications consists of technology, which is structured in a domain of the public sector with different organisations at different levels (hence the 'G' or 'government' connotation). The analogy also concerns an ICT application through inter-organisational cooperation (hence the '2' connotation, similar to 'B2B'). Finally, the prime technology of interest is geoICT (hence the 'geo').

Although 'geoG2G' is a useful new concept, one cannot clearly distinguish geoG2Gs from non-geoG2Gs at the outset. Using a number of characteristic features can help to identify and recognise geoG2Gs and to distinguish geoG2Gs from non-geoG2Gs:

GeoG2Gs are:

- Cooperative agreements with relatively **stable** cooperation conditions. This stability is apparent through the time-span during which the same conditions apply. In the AHN example the stable conditions apply for the time-span of 1997 until 2003 for AHN, and new conditions apply from 2005.

- Formed by two or more different **public sector organisations**. The exclusion of the corporate sector is crucial because this excludes pure commercial motivations, i.e. profit-making, as one of the underlying drivers for the inter-organisational cooperation. One might also say that geoG2Gs have a public administrative function. This function is either to support the public mandates of each of the respective contributing organisations, or to support a specific public mandate which forces the public organisations to cooperate. This limitation is crucial, because it emphasises that public organisations establishing a geoG2G can only work within the institutional boundaries of what public organisations can and are allowed to do.
- Constructed to work cooperatively with at least one **type of geoICT.** In AHN the partners relied on 'conventional' mapping technology, such as aerial surveys and photogrammetry. Experiments with laser scanning were ongoing but not yet operational. In the prelude to AHN.2, laser scanning technologies were rapidly increasing in accuracy and started to provide a realistic alternative to the conventional technologies in terms of cost, operational management and data reliability.

While the public sector setting and the geoICT technology define the context, the issue of stability requires further conceptualisation beyond the empirical reconstruction of only the AHN. A geoG2G can be considered **stable** over a certain period of time in terms of power, economic rules, conformity and collectivity. Each is further elaborated:

- ***Power and authority*** distribution. Each partner agrees on who has responsibility and authority over what. This agreement is coordinated with internal objectives. The distribution of responsibilities introduces a power question along the lines of the (stable) dependency relations, because the structural resource allocation introduces new constraints for each partner on the use and allocation of their own internal resources (human, financial etc.). As the geoG2G lays claim to some of the resources, and as the geoG2G structure governs these resources, the individual partners become partly dependent on external decisions. So cooperating with geoICT introduces a power question on the one hand (given the new or revised control and access to resources) and a dependency relation on the other (given the distribution of resources).
- ***Economic*** and institutional arrangements, including who gains what benefit from the geoICT production process. Each partner has an accepted economic benefit from the production of a geoICT product and/or service. Resource-wise, individual staff (and sometimes budget and other resources) from each organisation are allocated to work for the geoG2G. The AHN example shows that the cooperation contract not only formalises the operational details of which contract party is to handle the geoICT in which way, and which contract party is to distribute geospatial data and

how to third parties, but also specifies the rules regarding how any contributing organisation gains authority over a particular resource (technology, funds, human resources), and which resource (internal funds, staff allocations) each contract party is obliged to bring to the cooperation.

- ***Mode of conduct conformity*** in internal behaviour in relation to the specific geoICT. All partners share and accept how they deal with each other internally once they are working with geoICT, and each geoG2G staff member follows and continues this behaviour. By definition, the resulting operational procedures within geoG2Gs are a balancing act between what is institutionally allowed and what is operationally possible. In reality this may mean that internal organisational structures can be both formal (following legally formulated regulations and guidelines) and informal (following non-legally-documented guidelines).
- ***Collectivity and partnership rules*** in behaviour and standpoints towards the external world. All partners to the agreement are expected to adhere to the internally agreed social 'partnership' or 'membership' model, and all internal partners agree to be consistent in displaying their joint geoG2G profile to the external world. Those who adhere to this collective behaviour can be members, while those who don't, or are unwilling to, cannot be members. The AHN example shows that the new collectivity principles of AHN.2 were no longer acceptable to the provinces and IPO.

Following these criteria of stability in power, economic rules, conformity and collectivity, the AHN is a geoG2G, and the AHN.2 is a different geoG2G. There has however been an evolutionary process from AHN to AHN.2. This process has three specific elements: 'geoICT coordination', 'uncertainty' and 'discretions'. Each of these can be further elaborated. I will argue that geoICT coordination is an action of change in geoICT related activities across different organisations, which may cause changes in structure and behavior in the cooperation involving geoICT. This action changes the geoG2G stability elements of power, economic rules, conformity and collectivity, and as a result of this change it triggers uncertainty among internal geoG2G actors. Because of this uncertainty, actors within the geoG2Gs construct new decisions, which I will refer to as discretions, given the individual (as opposed to organisational) character of the decisions. The discretions create new or newer geoG2Gs. So the thesis is that geoG2Gs evolve over time through geoICT coordination actions, which trigger uncertainty among individual partners in a collaboration around geoICT, and as a result individual actors working in these partnering organisations reach to discretions which ultimately derive new working practices and thereby generate new geoG2Gs. Each of these three elements is explained further below.

GeoICT coordination as a comprehensive action causing change in a stable geoG2G

Reflecting on what happened during the deadlock between AHN and AHN.2, and why the partners ended up deciding to start a new cooperation, it becomes apparent that AHN involved more than just a process of agreeing on the technical specifications. AHN was stable in terms of power, economic rules, conformity in behaviour among actors and social collectivity, yet these stability elements were challenged by a number of activities and changes which occurred both inside the geoG2G (i.e. inside the participating organisations), and outside the geoG2Gs.

Inside the geoG2G, the AHN partners were each being reorganised. RWS had been the single national agency in the Netherlands where technology, the people and the knowledge to handle height measurements and processing were available. RWS had complete control over the entire process, and all other agencies were 'simply' users of the output of this process. During the deadlock period (between 2003 and 2007) RWS in particular and, to a lesser extent, the water boards were reorganised. AGI, the responsible department within RWS, transformed its role from '*a traditional survey organisation to a geoICT service provider organisation'*[4] in 2005 to that of a data-ICT service provider in 2007[5]. The notions of 'client orientation' and 'cost reduction' came to the forefront and started to affect the work processes and the incorporation of tools, including the technical management of geoICT. Such notions clearly reflected the spearheads of New Public Management (NPM). NPM focuses on cost reduction, and public sector reorganisation through decentralisation, devolution, following business principles, downsizing and orchestration (Hood, 1995; Mathiasen, 1999; Pollitt et al., 2007). At the beginning of the AHN project (1997) the NPM notions were reflected prominently in the initial justification for the RWS to join the AHN (Twynstra Gudde, 2003)[6], as a way to decrease the cost for geoICT related water and height related data collection, dissemination and use.

Over the same period, the community of water boards in the Netherlands also reorganised internally. As most water boards had acquired access to geoICT technology, they indicated that constituting a central organ would be beneficial to better manage their geoICT activities, products and services. The first contours of the 'Waterschapshuis' arose. The rationale was that a 'Waterschapshuis' could enable research and development in practical geoICT solutions, and that it could also act as a coordinating organ to negotiate geoICT

[4] http://www.geonieuws.nl/html/pdf/geo-2005-1/o-01-05-1.pdf (last date of access: 28-1-2013)
[5] http://www.geonieuws.nl/html/pdf/geo-2007-2/o-01-07-2.pdf (last date of access: 28-1-2013)
[6] "*De bestuurders zien de voordelen en/of noodzaak van samenwerking op het gebied van de hoogtegegevens in: kostenbesparing; eenduidigheid in ingewisselde gegevens; efficiëntere inrichting van eigen en gezamenlijke werkprocessen."*

solutions with other domains. The water boards thus saw the 'Waterschapshuis' as both a technological vehicle and an organisational vehicle for aligning geoICT needs of water boards internally and externally.

Parallel to the internal reorganisations of the AHN partners, at a national level the AHN.2 partners tried to re-position the AHN database as a potential key register of the Dutch national (spatial) data infrastructure, and a necessary component of the Dutch implementation strategies for electronic government. The common notion behind these three national strategies (electronic government (e-government), spatial data infrastructure (SDI) and key or basic national registers, was that once all spatial (and non-spatial) datasets are aligned, easier sharing of data nationwide will follow as a consequence, and hence better cooperation between public agencies producing these data and/or dependent on these data. The geoICT community was active in setting up coordination bodies for e-government, SDI and key registers at various levels of public administration. Examples of national bodies include Geonovum (Netherlands), GDI-DE (Germany) and FGDC (USA). JRC/INSPIRE (EU) and ANZLIC (Australia, New Zealand) are also examples of supranational coordination bodies. As some of the actors in the AHN geoG2G were part of the (inter)national geoICT community, they were directly affected by one or more of these coordination bodies, and were therefore inclined to adhere to the considerations and guidelines generated by some of these bodies.

Summarising the above, the internal reorganisations of the RWS (driven by NPM motives) and the water boards (fostered by increasing access to the technology), and the external reorganisation of public service delivery (focusing on national policies, such as the construction of e-government, spatial data infrastructure and key registers) triggered two new views of how to work with geoICT, which resulted in in a call to re-organise the cooperation within the AHN geoG2G. The goal-setting of geo-ICT related work processes and the actions to align these goals of both RWS and the water boards constitute **geoICT coordination**, because they involve a coordinated change in geoICT operations, in realignment of geoICT functions and in geoICT responsibility. The activity of geoICT coordination can therefore be regarded as a comprehensive goal-setting and goal-implementation action which aims at aligning geoICT activities and choices in at least two organisations.

The effect of this action is a change in how organisations agree on their cooperation. Ultimately, the geoICT coordination actions result therefore in a change intervention in how public sector agencies cooperate with geoICT. The geoICT coordination action modifies the stability elements within the AHN geoG2G. Examples of this modification include:

- Power change. Internal reorganisation within RWS forced RWS to reduce internal allocations for technical activities, resulting in sharing its

monopolistic technical authority on height data with other partners. The change of power is visible through the fact that additional partners can now claim authority over the height data technology and the height data production process. Simultaneously, the e-government, SDI and key registers projects were advocating public sector integration, which also implied sharing or re-distributing authorities over data with public interests.

- Change in shared economic rules. The active implementation of the new AHN governance structure opened up the production process. The partners allowed new technology development players in the height data production chain. This fact altered the economic rules within the AHN geoG2G, as it started to involve public-private partnerships with alternative money flows. Simultaneously the e-government and SDI projects utilised project funds and new budget allocations to influence geoICT activities in all public organisations. Both introduced new or potentially new financial dependencies and principle-agent relationships, and thus triggered changes in how AHN partners had agreed on economic conditions.
- Changes in conformity. The activities necessary to constitute the 'Waterschapshuis' are exemplary of how the water boards realigned their internal operations with geoICT. It set in motion a process of constructing water-related geoICT standards in the Netherlands. Simultaneously, the European SDI Directive (INSPIRE) included prescriptions for national organisations to construct elevation and hydrographical data. Both activities reflected a change in which standard geo-data or standard geoICT procedure to adhere to, and this change in conformity rules for AHN partners.
- Changes in collectivity. The reorganisation of both RWS and the water boards directly challenged the original AHN collectivity principles, because it was no longer clear who among the clusters of partners was speaking and acting upon whose behalf. This lack of clarity confused the AHN partners as to which public image to portray to the external world. The participation of individual staff members of the partners in technical committees and working groups of e-government, SDI and key registers also challenged the unique commitment and loyalty of these staff members to AHN.

On a more conceptual level, one can thus see that geoICT coordination is an intervening action of change. This intervening action changes the stability elements of power, economic rules, conformity and collectivity. The reactions to geoICT coordination comprise activities aimed at re-harmonising and realigning each of the four stability elements.

Uncertainty as a result of geoICT coordination

The AHN example shows that geoG2Gs are stable on the one hand, yet over

time are also increasingly subject to the dynamics of geoICT coordination. As geoICT coordination touches the stable inter-organisational conditions of power, economic rules, conformity and collectivity, the immediate result of these dynamics is **uncertainty** among the actors in terms of power, economic rules, conformity and collectivity. A first type of uncertainty in the AHN example was the uncertainty in power. Partners reflected this type of uncertainty when they started to report difficulties in the negotiations on how to continue after all heights had been measured in the Netherlands. The difficulties during the negotiations reflected uncertainty as to who would have which authority when using alternative technology, and when distributing the height data in a different way. This uncertainty reflected a power dilemma. The power dilemma emerged between the organisations (which organisation can take the lead, which one decides etc.), but also within the organisations (which type of staff should handle the negotiations, who within each organisation should execute and who can make decisions).

A second type of uncertainty arose on operational issues when dealing with new technologies. This type of uncertainty became apparent through the question of which internal resources to allocate, and how to estimate and deal with future demands for height data (if provided in a different form). Although two AHN signatories (water boards and RWS) considered cost reduction and increase of revenues to be a crucial condition for AHN as a whole (a condition which was largely driven by internal reorganisation drivers), this condition was not as crucial for the provinces (which were evaluated on different criteria). This difference in priorities for future projects created uncertainty over the economic rules which would apply in the future.

A third type of uncertainty arose from the emerging difference in insights of the geoICT epistemic community and the requirements set by new geoICT coordination policies. Historically, most of the geoICT technical developments in AHN had been closely tied to the relationship that individual staff members had with the overall geoICT epistemic community. The geoICT epistemic community comprises people who share the same educational background and professional association memberships. (Koerten, 2007; van Ooijen, 2007) sketch the historical development of the geoICT community, and its organisational and cultural origins. They observe that this community has preserved certain professional norms, and that the professional norms within the geoICT community have always been tenacious. Uncertainty among AHN staff members arose when – through the national e-government strategies amongst others – norms emerged from another epistemic context (of e-government professionals). Whereas the AHN technical staff members mostly shared a background in engineering sciences, the e-government domain consists mostly of professionals with an information sciences and/or public administration background. The conflict between the professional traditions resulted in

uncertainty among staff members about which professional rules and community to adhere to.

A fourth type of uncertainty related to the changing access of individual organisations to the geoICT technology. In the AHN preparation trajectory (before 1996), geoICT consisted of digital mapping technology, and mapping technology was vested in national mapping agencies. The mapping technology needed for height data consisted of aerial surveys, photogrammetric equipment and photogrammetric processing software. Most of these components were too expensive for single agencies, and the underlying knowledge required to work with these was so specific that it required considerable training and education. For height measurements and processing, RWS had been the national agency in the Netherlands where technology, the people and the knowledge to handle this technology and process the data were available. RWS organised this complete process, and all other agencies were 'simply' users of the output of this process. However, this situation changed in the course of the 1990s and the early years of the 21st century. The 'democratisation' of the technology (Chrisman, 2005; Sieber, 2004) made access to the processing capabilities of geoICT available to former outsiders, because the technology for data acquisition and data processing became easier, cheaper and more numerous. Examples include technologies such as Global Positioning Systems (GPS), laser scanning and other remote sensing technology. Thus individual organisations other than national mapping agencies gained more freedom to acquire geoICT-related technology, and to make their own decisions regarding how to apply this geoICT technology. In the case of AHN, individual water boards gradually acquired GIS software packages from the year 2000, and as a consequence gradually developed skills and knowledge inside their organisations. In the preparation for AHN.2 the monopoly of national mapping agencies as the main processor and provider of geospatial data could thus be challenged. This resulted in uncertainty about who to work with in future geoG2Gs.

In sum, the changes in geoICT technology and geoICT coordination generate uncertainties for individual staff members working in geoG2Gs. These uncertainties relate to their individual authority (issue of power), their day-to-day work (issue of economic rules), whose rules they have to follow (issue of conformity) and whom they have to work with (issue of collectivity).

Discretions when dealing with uncertainty
Uncertainties constrain staff members in their cooperative activities with geoICT. They thus seek practical answers to reduce the uncertainties. In the AHN example, this practice is visible through the agreements on technology, data sharing and setting priorities in cost reduction, which are symptoms of issues causing uncertainty and symptoms of issues that partners would like to see managed. By fixing different (levels of) agreements, uncertainty over the individual authority and over the day-to-day operations decreases, yet uncertainty increases on whose agreement rules they have to follow and with whom they have to work. (Nedovic-Budic and Pinto, 2000) also observed this emergence of additional uncertainties as a result of addressing only one type of uncertainty in geoG2Gs: "*The sense of upcoming change and the uncertainty brought with it was, in fact, unsettling to many agencies and their personnel.(…) The attempts at managing expectations were predominantly focused on technology. The real concerns however were about the implications of the technological change and joint database activities for subsequent organisational alignment.*" (Nedovic-Budic and Pinto, 2000: 467)

An effect of having to work with various types of uncertainties is that individual actors create a certain degree of freedom to handle these uncertainties, or to deal with the internal restrictions needed to combat uncertainty. I will refer to the degrees of freedom which individual actors of each contract partner have to negotiate (inter-organisational) decisions on geoICT as the 'discretionary space', leading to '**discretions**'. Discretions are decisions by individual actors, based on personal judgments, rather than organisational procedures and fully rational assessments (Davis, 1969). Davis (1976:4) refers to discretions as the *freedom to make a choice among possible courses of action and inaction within the effective limits of someone's power*. Hupe and Hill (2007) argue that the presence of discretions is inevitable once such effective limits exist. Lipsky (1980), one of the first authors to point to discretions of 'street-level bureaucrats', argues that the sum of all discretions in a public sector system influences the overall governance of that system, and as a result the sum of all discretions is also part of how government functions: "*The actions of most workers actually constitute the services 'delivered' by government. Moreover, when taken together the individual decisions of these workers become, or add up to, agency policy*" (Lipsky, 1980:3).

Fenger and Noordegraaf (2001) add that it is not only 'street level bureaucrats' who have individual discretions, but that public sector managers also rely on certain discretions in the execution of their daily work. As their daily work constitutes handling organisational transformation processes, their combined discretions have an effect on the overall transformation. The implication is that discretions occur at all levels of the organisational system. If government relies on chains of activities involving different staff members, than the result of the

chain also relies on discretions at different levels in the organisation (Fenger and Noordegraaf, 2001). Discretions of operational 'street-level' bureaucrats differ from discretions of public managers. Furthermore, the variety in discretions depends on the character of the individual staff member, the issue at stake and the type of institution ruling the individual.

Several authors identify the reasons why individual staff discretions exist or emerge:

1) The perception among individual staff members that the institutional rules and concepts are too abstract (Fenger and Noordegraaf, 2001). This perception creates uncertainty in both hierarchical relations (power) and in operational procedures (economic rules), and allows public sector staff to make individual interpretations of these concepts and rules.
2) The impossibility for managers to control every activity of individual staff members. As a result, within every organisational structure every individual staff member maintains a certain degree of freedom to act individually. This opens up the possibility of relying on norms other than the strict organisational ones, and this creates uncertainty on conformity.
3) The presence of unpredictable events in operational activities, which force individual staff to act beyond organisational procedures, and to rely on their own personal insights. Hupe and Hill (2007) note that many street-level bureaucrats perceive themselves as professionals, and regard their personal insights as professional insights. However, in their discretions they rely on decisions from other 'professionals' in cases where there are uncertainties. Their discretions may challenge current collectivity principles from the organisation in which they work.
4) Hupe and Hill (2007:295) describe how networks of accountability structures and networks of relations with peers and colleagues (*"... bottom up as well as top-down, but also sideways"*) enmesh 'street-level bureaucrats' in their daily activities. As a result of these multiple accountabilities, they "*... produce possibly contradictory action imperatives,*" and "*... constantly weigh how to act.*" (Hupe and Hill, 2007:296).

The multiplicity of discretions, and the presence of discretions at different layers in an organisational system, is also visible in the AHN case. Both geoICT managers and geoICT system designers obtained a certain degree of freedom once uncertainties emerged about which technology to use. Traditionally, only a handful of organisations used to decide on the course of new geoICT developments, and within those organisations only a few dedicated staff decided on the operational details of the geoICT. Outsiders simply had to accept these decisions. Hence in geoG2Gs many of the rules were dependent on the professional discretion of a few dedicated staff from a handful of 'insider' organisations. With the emergence of new policies, such as the e-government

and spatial data infrastructure, new rules were introduced, which partly conflicted with the existing historical ones. This dilemma resulted in uncertainty among individual staff members about which (or better: whose) internal rules to follow. The decision of the provinces to opt out of the AHN.2 was primarily a decision by the strategic staff of the national coordinating body of the provinces, IPO, and not a decision by individual geoICT operational staff members of the provinces. A strategic, political discretion within IPO was dominant to step out of the governance structure. By contrast, at the operational level provincial staff members decided to continue working with AHN products and AHN staff members. The difference between the discretions at the strategic level and the operational level of the provinces led to the emergence of both formal and informal relations and dependencies within AHN.2.

Other operational discretions were visible on the distribution side. During the AHN period certain user requests emerged for which no particular distribution rule existed. In most cases, the data service desk distributed the data on an ad hoc and case-by-case basis. However these requests presented the distribution officers of AHN with the dilemma of how to respond consistently to requests, and where (or not) they would have to freedom to accept and handle certain requests. In some cases, the officers handled the requests, while in other cases they didn't. To deal with this dilemma structurally, the AHN partners installed an advisory council of users, which would meet on a regular basis and which would advise the AHN steering committee on particular user needs. This would clarify the discretionary space of the distribution officers. The discretionary dilemma of individual officers thus resulted in a new operational and governance structure, and thus implicitly in a change in power from the operational officers to the users. As the users were predominantly technical geoICT users, one could also argue that some of the power within AHN shifted from the strategic and operational staff members to some of the technical geoICT staff members.

Summarising the discussion above: individual staff members in geoG2Gs rely on individual discretions when confronted with uncertainties. Different kinds of uncertainties may lead to discretions at different levels in the organisations. Discretions may vary depending on the level of the staff member, and on the entanglement of the staff member in accountabilities. The combined discretions of all staff members change the stability factors of geoG2Gs. The result of the combined discretions is thus a revised or evolved geoG2G.

Conceptual view of the AHN case
The changes from AHN to AHN.2 reflect an evolutionary transformation process in AHN power, economic rules, conformity and collectivity, which takes place in a highly dynamic context of public sector management in general (aimed at restructuring of public sector agencies for example) and public sector

information management in particular (aimed at standardisation of geoICT related data for example). This context may have an effect on all parts of the transformation process, but this research looks in particular to how geoICT coordination generates effects. GeoICT coordination actions instigated by both partners triggered the changes in the AHN geoG2G. The coordination produced various types of uncertainty for the actors operating within the geoG2Gs. Conceptually, handling uncertainty causes actors to change their discretionary space and may make them decide to change their cooperation conditions in the original geoG2G. If any actor decides to change the cooperation conditions, this alters the stability elements within the geoG2Gs and therefore results in a reconstructed geoG2G. The actions of geoICT coordination and the reconstruction of discretionary space occur sequentially and recurrently. New uncertainties lead to new discretions and thus to renewed power, economic rules, conformity and collectivity. A new set of power, economic rules, conformity and collectivity replaces the original set of relatively stable power, economic rules, conformity and collectivity. In essence, by studying the actions of geoICT coordination and discretions one can describe the evolutionary transformation of geoG2Gs. Figure 1.1 reflects this process in diagrammatic form:

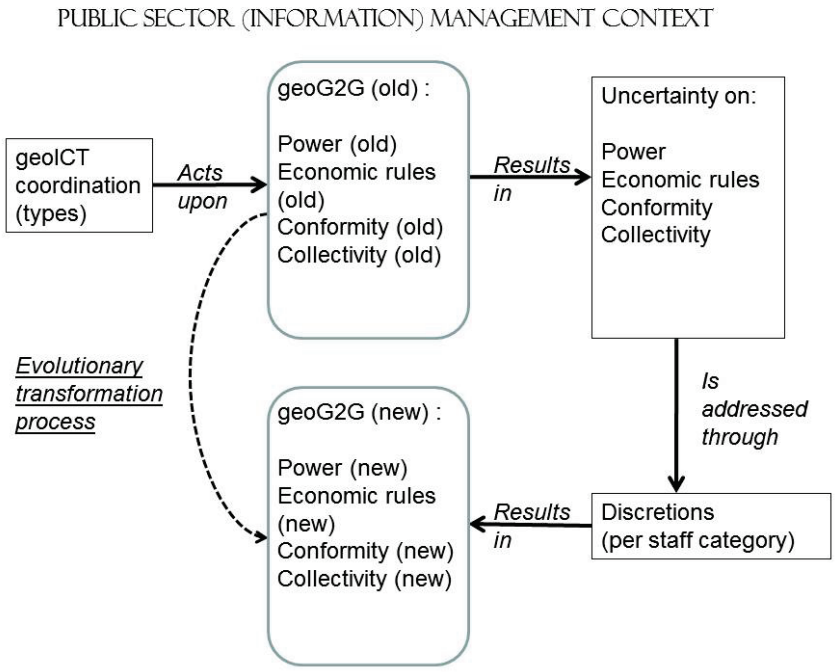


Figure 1.1: Explorative model of geoG2G evolutionary transformation

The explorative model in Figure 1.1 encapsulates two different theories on

conceptual modelling: process models and variance models (Langley, 1999; Sabherwal and Robey, 1995). Process models use actions, events and sequential states to explain dynamic phenomena. In contrast, variance models incorporate independent variables that cause variation in dependent variables. Process models would seek to explain the outcome models as a result of preceding actions and events, whereas variance models would explain the variation in outcome by identifying significant predictor variables. From a process perspective there are two types of actions in the evolutionary transformation of geoG2Gs, namely the actions of 'geoICT coordination' and 'discretions'. These actions affect the stages of geoG2G. From a variance perspective, variation in the attributes of the geoG2Gs (the stability elements), and how dependent each attribute is on geoICT coordination, uncertainty or discretions, would explain the overall outcome of new geoG2Gs. Following DiMaggio (1995) and Sabherwal and Robey (1995) it is possible to combine both models as long as they are mutually informative. This is the approach which I will follow.

In the AHN example the partners emphasised a need to change technology for data collection (using LIDAR) simultaneously with a change of governance structure for the cooperation between the partners (adding new layers of governance in AHN.2). With regard to discretions, the discretions of the AHN distribution staff (operational/'street-level' staff) were different from the discretions of the strategic staff. So there are not only preceding and succeeding actions leading to variation in geoG2Gs (the logic of process models), but there is also variation and interdependence in the actions (discretions being dependent on uncertainties; uncertainties being triggered by geoICT coordination), leading to variation in the stability conditions (of geoG2Gs). The combined result of these interdependent actions is a change in geoG2G stability elements related to power, economic rules, conformity and collectivity. Combining the two models is possible when using the process logic to explain the sequence of variations, and the variance model to explain the interdependencies between the variations. This makes the variation in 'discretions' an intervening action, which surfaces when the independent 'geoICT coordination' action starts to influence the dependent result of the geoG2G stability elements of 'power', 'economic rules', 'conformity' and 'collectivity'. The intervening 'discretions' action surfaces as a function of the independent 'geoICT coordination' action and helps to conceptualise and explain the influence of 'geoICT coordination' on the geoG2G stability elements. Figure 1.2 depicts the translation of Figure 1.1. in an explorative action-result model.

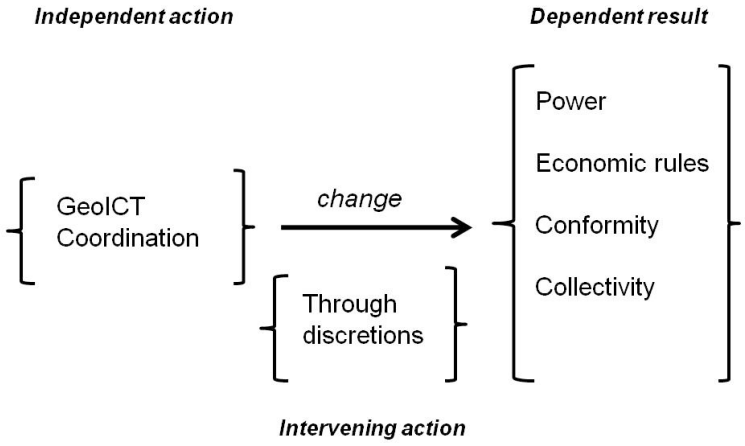


Figure 1.2: Explorative action-result model of geoG2G transformation

1.4 Research objective

The starting point of the research is that it is unknown exactly how and why the variations in geoICT coordination and discretion actions, and the variations in geoG2G stability elements effects, occur. There are a number of reasons for this.

Firstly, there is insufficient understanding of the 'geoICT coordination' and 'discretions' actions in a public sector (geo-)information management context. Most authors in geo-information research regard the 'geoICT coordination' action independently from the dynamics that 'geoICT coordination' may incur. Williamson et al. (2006:5) state for example that there is "*... the need for more inclusive coordination mechanisms to be created which are understood and accepted by stakeholders from all communities of practice.*' This view on geoICT coordination acknowledges insufficiently that changing coordination actions will also change the reactions to the coordination. As a result, 'acceptance by stakeholders' does not necessarily follow from a change in coordination type, because a different type of coordination may generate a different politico-organisational context reacting to this type. In addition, research on the 'discretions' action tend to narrow focus on either the discretions when delivering public services to citizens (Evans and Harris, 2004), or discretions when executing public policies (Fenger and Noordegraaf, 2001). Hence previous research has not yet emphasised the role of discretions in the execution or construction of public sector geo-information management. Secondly, there is a void in understanding the process of G2G transformation.

Scholl (2005b), for example, acknowledges the presence of a transformational process in G2Gs, but does not expand on what exactly is transforming in the G2Gs, and why this happens. Flak et al. (2008) provide some of the underlying reasons why the processes are occurring, emphasising conflicting stakeholder interest, yet does not expand on who ultimately decides, and how discretions of individual stakeholders play a role in the (re)construction of G2Gs.

Thirdly, there is no comprehensive view on the differences in objectives, methods, instruments and results of geoICT coordination. Although Lance et al. (2009), for example, researched the effects of geoICT coordination on changes in governance and power, the analysis only focused on one specific type of geoICT coordination instrument (namely budgeting, and budget allocations) and left aside other types of geoICT coordination. Lance et al. (2009:251) however recommend further study of these relations "*... in countries with different politico-administrative systems (than the USA and Canada) to broaden the empirical base of the theory of network-hierarchy dynamics."*

These three reasons imply that understanding the AHN case in a broader sense requires comparing AHN against other geoG2G cases and investigating whether different types of geoICT coordination change the stability elements in similar geoG2Gs differently. It is also crucial to investigate how which type of geoICT coordination causes changes in the uncertainty perceptions and discretions of the staff member participating in geoG2Gs. Finding cases similar to AHN, which evolve in a similar environment and time-span, implies relying on cases in the Netherlands. As the national geoICT policies in the Netherlands apply for all actors in Dutch geoG2Gs, the external environment of geoICT coordination is likely to be similar. A comparison between geoG2G cases would then be better at revealing which actions determine the changes in geoG2Gs.

Combining these implications leads to an overall research objective, namely: to understand and explain which effects geoICT coordination activities and objectives have on geoG2Gs in the Netherlands. A crucial part of this analysis will be rooted in describing and explaining how and why which staff members in geoG2Gs make their own decisions (the discretions) when they deal with the geoICT coordination requirements. So, the changes in geoG2Gs are assumed to be the result of both direct influence of geoICT coordination activities and more indirect influence of staff discretions.

The central research question is therefore:

How and why do different geoICT coordination types change the geoG2Gs in the Netherlands, and what is the influence of staff discretions in this process?

1.5 Research approach

The description of the AHN case resulted inductively in a set of actions and results. The actions of 'geoICT coordination', 'discretionary space' and the results in geoG2G stability elements 'power', 'economic rules', 'conformity' and 'collectivity' are, however, rather intangible. Thus researching the inter-relations between the actions and results in stability elements is complex. Moreover, as the initial observations in the AHN case could not make the relations between the actions and results very concrete, analysing the underlying processes and reasons about how and why the results emerged becomes complex. Constituting the actions and results, and analysing how they relate to each other would therefore require more induction or even a more grounded theoretical approach (Glaser and Strauss, 1967; Strauss and Corbin, 1998). Strauss and Corbin (1990:23) refer to grounded theory as:

A grounded theory is one that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed and provisionally verified through systematic data collection and analysis of data pertaining to the phenomenon. Therefore data collection, analysis and theory stand in reciprocal relationship with each other. One does not begin with a theory, then prove it. Rather, one begins with an area of study, and what is relevant to that area is allowed to emerge.

This approach relies strongly on perceptions and actions by individual people, who perceive and act depending on their social role that they embody at the moment of empirical observation. It also relies on the interpretation of the individual researcher and thus entails the risk that there is a time and social context dependency in the understanding of what influences and drives individual staff members in their day-to-day actions, behaviour and perceptions. A crucial implication is that theory building and observing and interpreting the practice of actors are closely related. Knowledge building as a result is gradual, incorporating theory and practice cyclically (Putnam, 2001; Wicks and Freeman, 1998). One uses the results of an inductive research process as the start of a new inductive process.

An ontological and philosophical method which is useful for this cyclic knowledge building process with simultaneous theoretical reflection and practice observation is **pragmatism**. The origin of pragmatism lies in the work of James, Pierce and Mead in the early years of the 20th century (Baskerville and Myers, 2004; ten Kate, 2007), yet more recently philosophers such as Rorty (Rorty, 1979) and Putnam (Putnam, 2001; Putnam, 2005) have revived interest in pragmatism. This philosophical stream reasons that actions of actors are determined by the value that people attach to the results of these actions (ten Kate, 2007). However this value is based on subjective perceptions, and is, in

the pragmatist view, constructed by personal experience and by social interactions. As Rorty claims in an interview[7]:
"We make our practical decisions on the basis of experience, the people we've run into, the books we've read, everything in our past lives. We don't make them typically on the basis of principle."

The implication for the research process is that the legitimisation of ideas results from laying a bridge between practical knowledge, theoretical knowledge and the interpretation of both this practical and theoretical knowledge (Putnam, 2005). Furthermore, if theory and observed practice cannot be separated, knowledge can only be rooted in what is reflected and confirmed in practice. "*Reality is undeniable and unavoidable,"* (Wicks and Freeman, 1998; 126), however "*There is not one privileged description of events, and this is no way to find a truly objective account of a situation."* (ibid. : 126). The implication is that all inquiry is fundamentally interpretative, and that the research process needs to interpret by explaining reality from different perspectives. A pragmatist approach fulfils these conditions by **linking theory with practice and interpretation**.

The choice for a pragmatist, gradual knowledge-building research approach necessitates regular access to the practice of actors, and a 'practice-driven theorising process' (Gherardi, 2000; Yanow, 2006). Not only does this imply having longitudinal access to the empirical data, but also understanding of the details of language of practitioners. Understanding how practitioners use, or conceal, language is crucial in interpreting the underlying perceptions and motives of why practitioners behave the way they do. Understanding language in all its details, and interpreting perceptions of practitioners through the language they use results in pragmatist conceptualisations. Price (2004:1) argues that:

"Pragmatists recommend that in approaching a problematic concept, philosophers should begin by examining the role of the concept concerned in the practical, cognitive and linguistic life of the creatures that use it."

The requirement to understand the details and subtle differences in the use of language of practitioners resulted in grounding the research in empirical context which uses a single language. In the Netherlands' context, the practitioners only use the Dutch language. Limiting to geoG2Gs in the Netherlands also provides longitudinal access to data and people. Both elements allow for a more grounded theoretical, incremental approach to answering the different components of the central research question.

[7]Available on youtube.com: http://www.youtube.com/watch?v=X6qkpPfqJNk&feature=related

1.6 Research questions

The overarching research question is: **How and why do different geoICT coordination types change the geoG2Gs in the Netherlands, and what is the influence of staff discretions in this process?** This research question contains 3 main components: geoICT coordination, discretions and stability and change in geoG2Gs. Each of the components of the central research question is elaborated further below:

A first issue in this central research objective is the issue of 'geoICT coordination.' Both 'coordination' and 'geoICT' are 'container' issues, given the large number of approaches and theories existing on 'coordination' and given the bulky accounts of how individual projects have 'coordinated' different types of geoICT. In the AHN example 'geoICT coordination' came out as a set of adjustment and synchronisation actions related to work processes and responsibilities of geoICT across two sets of organisations , resulting in a change of stability elements in a geoG2G. Yet what the action of 'adjustment and synchronisation' entails and which priorities geoICT coordination actors choose in the adjustment and synchronisation actions is largely anecdotal. It remains unknown how to differentiate the geoICT coordination goals and actions, and which effects each type of these goals and actions have on the stability within a cooperation dealing with geoICT.

The first research sub-question is therefore:

1. ***What is' geoICT coordination', and what are geoICT coordination actions about***?

As the pragmatist requirement is to link theoretical notions with practice observations and interpretation, addressing this research question requires a synthesis of both professional and scientific insights. To cater for these requirements, the induction of the 'geoICT coordination' action follows from both scientific literature (theory), professional views and experience (practice), and interpretation which matches theory to practice (interpretation). The intention at the start of the research process on geoICT coordination was to find and construct different types of geoICT coordination actions, because the variation in geoICT coordination actions becomes clear through describing differences in types.

The second component of the central research question relates to the 'discretions.' GeoICT coordination actions cause uncertainties in power, economic rules, conformity and collectivity, yet it is first of all unclear *whose* power, economic rules, conformity and collectivity is targeted by the geoICT coordination actions. Secondly, it is unknown *how* these targets differ from the stable conditions of power, economic rules, conformity and collectivity?

Combining these two questions leads to the second research question:

2. Whose discretions are affected by geoICT coordination in the Netherlands, and how are these affected?

Applying the pragmatist approach to research question 2 follows a similar process as with research question 1. It starts with an inventory of how professional publications and individual practitioners refer to new uncertainties and how these uncertainties affect which type of staff. This results in a synthesis of how actors in the Netherlands use and perceive discretions in their daily activities (practice). This synthesis is then extended with a more conceptual view from scientific publications on how to differentiate actors and their discretions in geoG2G (theory). As with the concept of 'geoICT coordination', the pragmatic process was to come up with a result of different types of discretions, or a description of different levels at which certain discretions play a role. Combining the theory with the practice of discretions then leads to a set of different types of discretions for different actors (interpretation).

A third component of the research question concerns the 'analysis' of the type of effects for individual staff members in terms of uncertainty, and the resulting choices that individuals make in their discretionary space. The analysis is the link between geoICT coordination and the discretions on the one hand, and the changes which occur to the stability elements (power, economic rules, conformity and collectivity) on the other. The analysis relies on a theoretical expectation and on empirical verification. The theoretical expectation draws upon several theoretical views of the stability elements (power, economic rules, conformity and collectivity). Each theoretical view provides a stereotypical process. The empirical verification confronts these stereotypical processes with reality. These two aspects (theory and empirical verification) lead to two main research questions:

3. How to describe and evaluate changes in each of the geoG2G stability elements?

Addressing research question 3 begins with a synthesis of where and how practitioners perceive changes in any of the stability elements (practice). Secondly, a comparative review of literature addresses how theories, and which theories, approach and explain changes in power, economic rules, conformity and collectivity (theory). Combining the views from theory leads to an argument to approach 'power' and 'power change' from resource dependency theory, 'economic rules' and their changes from transaction cost theory, 'conformity' from the tenets of isomorphism theory, and 'collectivity' from collective action theory. Induction from the theoretical views and combining this with the reality of practitioners provides a categorised list of existing geoG2G cases in the Netherlands, and a pragmatic way to qualify changes in the stability elements of these cases (interpretation).

Research question 4 uses both the results of Chapter 2 and 3 and the four theoretical views of Chapter 4 to construct a method to conduct practice-based data collection in a selection of geoG2G cases in the Netherlands. The requirements for the empirical data collection method in each geoG2G case include justifying how to collect data to seek the relations between geoICT coordination, discretions and stability elements (theory), and which data to collect in which geoG2G cases (practice). Employing the empirical data collection methods results in a method to verify if the existing geoICT coordination types and discretion types (the values of the independent and) relate in a systematic or coincidental way (intervening variables) to the stability elements (the values of dependent variables).

4. ***What are appropriate indicators to verify the extend of relations between geoICT coordination types, discretions and stability changes, and with which techniques is it possible to determine the values of those indicators?***

Upon completion of the data collection in the selected cases, the fourth component of the central research question is the interpretation of the observed data within the cases. This question refers to the choice of empirical methods of data collection and data analysis. The interpretation leans on a theory-based analysis (qualitative coding process), and aims to find and explain consistencies and patterns (or the lack thereof) in the actions (process model) and results (variance model) in practice. Finding consistencies and patterns in qualitative research is the continuous process of comparing cases with each other. The method of finding consistencies and patterns is specifically useful when studying phenomena for which a researcher assumes that fundamental social processes explain something of human behaviour, perceptions and experiences (Glaser and Strauss, 1967). This leads to the fifth and final research question:

5. ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?***

This research question is empirical. It addresses both the description and the explanation of observed changes and differences. This starts with laying the theoretical basis for data analysis, such as the reliance on coding principles and other qualitative analysis techniques (theory). The interpretation follows from inductively constructing and legitimising conclusions from the empirical data such as interview transcripts, participants' observations etc. (interpretation). Both the interpretation and the practice description rely on the application of qualitative software.

With the answer to question 5 it becomes possible to explain and predict how other geoG2Gs in the Netherlands would or do evolve. Induction and generalisation to a broader context use the internal analysis of the cases as a theoretical starting point and use the time and social context of the cases as a

practical empirically-collected starting point (practice). The theoretical starting point describes which aspects and which types of geoICT coordination – through a comparison of the case study findings – influence the uncertainty and discretionary space of individual staff members working in geoG2Gs. The practice inventory describes which aspects of timing and social context in each of the selected empirical cases were so specific that they influenced the empirical results. Combining these two perspectives leads to an overall synthesis of the research objective.

6. Which theoretical and practical conclusions and recommendations can be drawn from this research?

Based on the results of the analysis it is possible to draw the conclusions to the overall research objective, and to suggest recommendations for both further research and for practitioners. This includes a synthesis of the overall research objective in view of the scientific contribution and in view of the relevance of the results for practitioners in the field of geoICT.

The pragmatist approach allows the derivation of the concepts, and is based on combining different strategies of data collection. After this follows an empirical evaluation and validation research process, which is primarily based on grounded research rooted in semi-structured interviews and qualitative analysis of documentation. The evaluation is possible through a case study approach in which both the concepts and their relations are evaluated and, where possible explained and/or validated with both theory and practice. Figure 1.3 provides the overview of research methods in relation to the research focus.

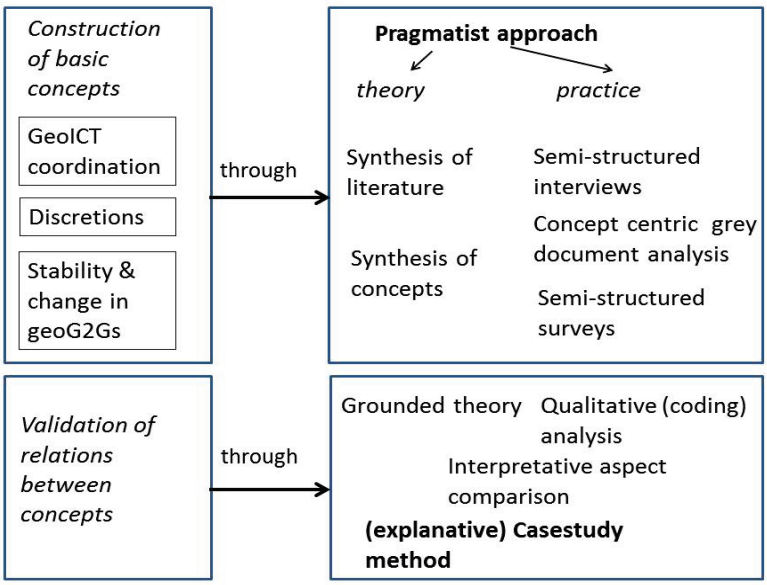


Figure 1.3: Overview of research methods in research approach

Table 1.1 summarises the pragmatist elements (theory, practice, interpretation) of the research approach.

	Pragmatist approach elements		
Research question	**Theory**	**Practice**	**Interpretation**
1. *What is' geoICT coordination?' and what is geoICT coordination about*?	A synthesis from scientific literature on 'geoICT coordination.'	A synthesis from practical experiences and practitioners on 'geoICT coordination.'	A categorisation of geoICT coordination types.
2. Whose discretions are affected by geoICT coordination in the Netherlands, and how are these affected?	A synthesis from scientific literature on types of uncertainty leading to types of discretions.	An inventory of uncertainties among geoG2G actors resulting from geoICT coordination strategies, and an inventory of their practices of discretions.	A categorisation of types of discretions for different types of actors.
3. How to describe and evaluate changes in each of the geoG2G stability elements?	An analysis of theoretical views on changes in each of the geoG2G stability elements	Inventory of practitioners' perceptions on the changes occurring in geoG2G stability elements.	A pragmatic way of how to qualify changes in the stability elements in geoG2Gs.
4. What are appropriate indicators to verify the extend of relations between geoICT coordination types, discretions and stability changes, and with which techniques is it possible to determine the values of those indicators?	A categorisation of empirical indicators for each theoretical perspective.	Inventory of actual cases in the Netherlands. Selection of at least one case per category of cases.	A method to conduct practice-based data collection in a selection of geoG2G cases in the Netherlands.
5. Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?	A theoretical basis for coding and other qualitative analysis techniques.	An inventory of results showing variation geoICT coordination discretions and geoG2G stability elements..	Inductive analysis per case, leading to the construction and legitimisation of conclusions on patterns of actions and results.
6. Which theoretical and practical conclusions and			Synthesis of overall research question and

	Pragmatist approach elements		
Research question	**Theory**	**Practice**	**Interpretation**
recommendations can be drawn from this research?			academic contribution and the relevance for practitioners.

Table 1.1: Research output generated per research question using a pragmatist approach

1.7 Position of this research within different research domains

The above research questions are relevant for geo-information science, public administration science and organisational science. Each can be clarified.

Within geo-information science the primary emphasis has been on technical geoICT innovation, yet there are relatively few studies on the influence of the socio-organisational context on geoICT decisions. Harvey and Tulloch (2006) suggest that in contrast to just the technical focus, furthering the concepts and policies of a national geoICT coordination strategy, such as the one for spatial data infrastructures, would require being based on *jointly* considering technical and institutional aspects. Lance et al. (2009) argue that studying the joining up of geo-information systems should be more in line with the study of joining government. "*Geospatial information systems span all government policy sectors, so the 'joining up' of these systems cannot be limited to a set of government agencies working in a particular policy area*," (Lance et al., 2009:251). This research is therefore in line with the call by Georgiadou (2008:20), who argued that "*We need to substantiate, understand and explain the use and scaling up of geo-information in the real world of practice*." This real world of practice has been predominantly within the context of the public sector and public policies.

In terms of public administration science, van Thiel (2007) suggests that public administration research is either about the functioning of a policy (organisational, political) as an object of study, or the construction of a policy as a result of the study. In this research, the key focus is on how and why changes in discretionary space in geoG2Gs occur, hence the coordination logic and mechanisms, and the influence of the logic and mechanism on uncertainty and discretionary space are the objective of the research. The objective is therefore to understand how this interaction mechanism works, rather than formulate societal and or economic objectives for which a (coordination) mechanism needs to be created. With this knowledge, one can ultimately improve the policy instruments and techniques for handling this coordination.

As stated in the introduction of this chapter, and following from the discussion above, geoICT also has the potential to influence additional aspects of the four

spheres of government, described by Zouridis and Thaens (2005). The main sphere addressed in this research is indeed the public organisation, but by emphasising the elements of environmental uncertainty and discretionary space, I introduce the issue of organisational politics. This issue cannot be seen in complete isolation from general political discussions and national policies on public organisation. Thus some of the results will also contribute to these discussions.

While the empirical entry point for this research concerns geoG2Gs, one of the central issues is 'discretionary space'. In public administration discourses discretionary space is usually associated with decisions of 'street-level bureaucrats'(Hudson, 1989; Lipsky, 1983). The central theme is that the presence of 'discretion', the ability of public sector professionals to make autonomous decisions on resources and to control other people (clients, citizens) through processing procedures, is a source and agency of power. Lipsky (1983) argues that this is problematic because the accountability of an organisation becomes impossible to verify if the professionals have a high degree of discretion. As the original discussions on discretionary space were confined to 'good-and-bad' or 'present-or-absent' dichotomies, the critique has been that *"Discretion should be regarded as a series of gradations of freedom to make decisions and, therefore, the degree of freedom professionals have at specific conjunctures should be evaluated on a situation-by-situation basis"* (Evans and Harris, 2004:871). So public administration science needs more empirical evidence on the degree of discretion and the extent of the discretionary space in order to assess the changes in power relations and accountability of public sector organisations.

Bovens and Zouridis (2002) also argue that given the ICT developments and the rapid intrusion of ICT in public sector activities, evaluating discretionary space should no longer only be focused on street-level bureaucrats and their discretions, but also, or perhaps more so, on 'system-level' bureaucrats, who are key actors in the design and implementation of information systems. This research will therefore draw empirical data (on their role and discretions) from this group of actors in particular.

Finally, on the degree of discretionary space, Zuurmond (1994) notes that informatisation process in the public sector reflects diminishing uncertainty and tighter control of public sector staff discretions. For the delivery of social services Zuurmond (1994) argues that: *"Checking information, previously an exclusive task of professional staff, is increasingly replaced by IT"* and "*Information systems not only ensure control over the actions of employees, but they also put limits on their thoughts. Through this electronic control, the 'masters' of an organisation can determine what is seen as fact (as data) and what is not seen at all"* (Zuurmond, 1994:256) – translated from Dutch). In line

with these observations, van de Donk (1997) states that 'street-level bureaucrats' find increasingly regulatory constraints in their discretions arising from ICT. Informatisation in this case does not generate operational uncertainty, but reduces this operational uncertainty, and limits the discretions of individual servicing staff. Similarly, Jorna and Wagenaar (2007) argue that the relationship with the role of ICT tends to delete discretions at operational levels. Despite this apparent decrease, Jorna (2009) remarks that the informatisation process in a number of Dutch cases did not exactly destroy operational discretion, but instead obscured operational discretion. He also found that because operational staff are often not entirely aware of the norms underlying the ICT systems, they have to define their own norms. These are reflected in their personal discretions. It is therefore necessary to research the role of discretions at different levels.

Within organisational science the issue of 'discretionary space' relates to studies of organisational structuring and resistance to control. Firstly, Moe (1984:767) argues that discretions in bureaucratic organisations arise because of the different interests in the interaction between politicians and bureaucrats: "*What the bureau is supposed to be doing and what the politicians are asking it to do may often be two quite different things."* He came to the conclusion that what needed to be researched is the informal control behaviour between actors in the public system. Rather than focusing on the effect of regulatory instruments, it made more sense for Moe (1984) to consider how bureaucrats have informational advantages and engage in agenda control and how, in response, decision-makers and politicians could influence bureaucrats through *"... overview, appointments, budgets, etc., without passing new laws*." (Moe, 1984:772).

Finkelstein and Hambrick (1990) emphasised the need to focus on managerial discretions, which were considered the combined result of both the organisational environment (of resource dependencies for example) and the values of the upper-management dominant coalition. The latter is reflected in common values which originate either from within the organisation (historical contingency) or from outside it (such as common education, background etc.). This research will therefore incorporate this element of the degree of managerial discretion and its impact on organisational outcome.

Finally Zenger et al. (2002) argue that the structure of organisations and inter-organisational alliances is influenced by the interaction of both formal institutions (contracts, incentives, authority) and informal institutions (norms, routines, political processes). They argue that organisational scholars have focused primarily on formal institutions as functional substitutes for informal elements governing inter-organisational exchanges, whereas informal institutions are treated as exogenous forces. Yet the interaction between the two, and the influence on how certain informal institutions can influence traditional

hierarchical governance structures, has been under-researched. The element of discretions, based on informal links that staff may have, thus needs to be part of the new research.

1.8 Subsequent chapters

The chapters of this document follow the sequence of the research questions, and progressively derive more insight in the components of the explorative research models and the relations between those components pictured in Figure 1.1. and 1.2. Each chapter contains the pragmatist elements of theory, practice and interpretation. Certain research questions contain several components, which require a separate discussion. In these cases the components are spread over more than one chapter. The sequence and content of the chapters is as follows:

- Chapter 2 starts with addressing research question 1 on geoICT coordination, and generates the categorisation of geoICT coordination types. Following the exploratory model is assumed that each category has a different effect on both discretions and stability elements in the geoG2G.
- Chapter 3 considers research question 2 on discretions, and concludes with a categorisation of 'stereotypical' narratives on actor types and their discretions in geoG2Gs. The chapter also derives a set of assumptions of how the discretions types relate to each of the geoICT coordination categories.
- Chapter 4 provides the justification and explanation of the framework to describe and evaluate how to view and analyse changes in the geoG2G stability elements: power, economic rules, conformity and collectivity. This addresses research question 3. As the changes stability elements are considered to be related to both geoICT coordination types and discretion types, the chapter also includes the derivation of a set indicators of how to evaluate a change in each of the stability elements. This provides a first step towards an empirical evaluation of whether such changes can be contributed to a specific type of geoICT coordination and/or a specific type of discretion.
- Chapter 5 deals with research question 4, namely how to evaluate the potential relations between the components of the explorative model. It starts with a practice-based categorisation of geoG2G cases and a method of case study comparison. The differences and similarities in cases determine what to compare. The view from theory emphasises how to convert the conceptual views on stability element changes of chapter 4 into an empirical data collection strategy. The chapter formulates a list of empirical indicators for each theoretical framework, and an approach to store and manage the data. Combining the case selection and the empirical indicators provides a pragmatic method for conducting practice-based data collection in a selection of geoG2G cases in the Netherlands.

- Chapter 6 addresses research question 5 through an empirical evaluation in 4 cases. Results follow from implementing the case study research strategy and incorporating the empirical data collection strategy as explained in Chapter 5. This derives per case how and why the components of the explorative model appear to relate to each other.
- Chapter 7 emphasises the comparative and interpretive part of research question 5. This chapter derives the patterns and consistencies per empirical aspect of geoICT coordination types, discretions and the changes on stability elements, and compares the results in aspects between the cases. With these comparisons it derives answers to the degree of influence of geoICT coordination and discretions on stability.
- Chapter 8 synthesizes the results of all chapters and provides the answers to the 6th research question. This chapter contains two types of recommendations: one relating to the research questions which would require further research, and one type relating to potentially new research questions which arose as a result of this research.

Chapter 2

GeoICT coordination

2.1 Introduction

This chapter addresses research question 1 '***What is geoICT coordination, and what is geoICT coordination about?***' Chapter 1 showed that geoICT coordination is as a comprehensive goal-setting and goal-implementation action which aims at aligning geoICT activities and choices in at least two organisations, and which usually results in a change intervention in how public sector agencies cooperate with geoICT, visible in each of the four stability elements of geoG2Gs (power, economic rules, conformity and collectivity). This goal-setting and goal implementation action may however take different forms and focuses in different contexts. This chapter conceptualises and categorises these actions by using an inductive pragmatist approach. The approach induces a comprehensive view of geoICT coordination by combining a view from practice with one derived from theory. This derives four geoICT coordination types. The following three sections describe the induction process. First, section 2.2 synthesises a view from practice, relying on two sets of artefacts of practitioners: written publications by practitioners in professionally-oriented conferences, and verbal statements by practitioners on their views and experiences. The synthesis of the view from practice relies on how and how much practitioners use certain words. Secondly, section 2.3 provides a view from theory, relying on an analysis of scientific literature. This generates the theoretical conceptualisation of geoICT coordination types. Section 2.4 combines the views from practice and theory, and derives different geoICT coordination types. Finally, section 2.5 synthesises the complete Chapter 2, and makes the link to Chapter 3.

2.2 Conceptualising geoICT coordination by a view from practice

Price (2004) states that pragmatist conceptualisations start by looking at how practitioners use language and refer to concepts. A view from practice needs to rely on the analysis of written and verbal manifestations of the language of practitioners. In light of this need, the subsequent section 2.2.1 describes the methods of collecting written and verbal language manifestations of practitioners. Section 2.2.2 compiles the written language manifestations of practitioners in conferences. Section 2.2.3 summarises the verbal comments and responses from practitioners during interviews and workshops. Section 2.2.4 uses the results of these two sections to synthesise and compare geoICT coordination types. The section also extends the categorisation by reflecting on how each type impacts uncertainty. The final section concludes on how the results respond to research question 1, and how the results link to the

subsequent research questions.

2.2.1 Method of viewing geoICT coordination practice

The induction of a view from practice relied on two data collection methods:
1) compiling and analysing written documents by practitioners (grey literature), and
2) conducting and interpreting semi-structured exploratory interviews with key practitioners.

The motivation for these two methods is further explained.

Firstly, the written language of practitioners is considered visible in 'grey literature'. 'Grey Literature' (or 'Gray Literature') is literature that is not always available through the usual bibliographic sources, such as science databases or indexes. Instead grey literature includes unpublished articles, conference presentations, organisations' strategy papers and position papers. It can be in print and increasingly in electronic formats (including compressed files on conference CD's/DVD's, posters, working papers on-line, blogs). Grey literature is produced by government agencies, universities, corporations, research centres, associations and societies, and professional and commercial organisations.[8] Despite not publishing in science-indexed literature, practitioners use grey literature to clarify their motivations, deliberations, trial and errors and preliminary ideas for actions related to coordination.

In general, (Di Cesare et al., 2008) find that highly-cited documents are increasingly including grey literature, and that citation counts between grey literature and conventional literature tend to disappear. Two criteria are however conditional when using grey literature in scientific research (Mitton et al., 2007):
(1) the grey literature should provide a novel addition to the peer-reviewed literature, and
(2) the grey literature should make a substantial contribution to the knowledge base as a whole.

With regard to the first criterion, grey literature in geoICT, and especially conference papers related to geoICT, tend provide relevant information on cases at certain stages of development. Many of these publications do not develop into complete scientific papers, and thus contain knowledge and experience on development and change processes which is not reported and reflected in the scientific media. In terms of geoICT development, many peer-reviewed articles cite the conference paper of Bernard et al. (2003) and the publication of Nebert (2004), for example, as there is no equivalent to these papers in the scientific

[8] http://www.csulb.edu/library/subj/gray_literature/

literature (or scientific search engines). Hence the complete corpus of grey literature provides a richer view of practitioner experiences and insights than only the peer-reviewed literature.

With regard to the second criterion, the peer-reviewed literature in geo-information science related to issues of geoICT and coordination also makes substantial use of non-peer-reviewed sources. Not only do some conference papers contain the build-up towards more consolidated scientific papers, but the conference papers are also much more accessible to practitioners and scientists, and are thus often more frequently cited. The conference papers of Rajabifard et al. (2000) and Rajabifard and Williamson (2001) are more frequently cited (59 respectively 58 times cited according to Google Scholar) than the similar peer-reviewed article Rajabifard et al. (2002) (cited 11 times in Google Scholar). Hence the grey literature provides a substantial contribution to both the innovation and the knowledge base of geo-information.

Considering both arguments, the inclusion of grey literature in the review of what geoICT coordination entails is relevant. An additional, yet overlooked, argument to include grey literature in the construction of a geoICT coordination concept comes from the concept of geo-information itself. Maps and 'spatial information' are in fact a special case of grey literature (McGlamery, 2000). Although maps are important information carriers in terms of content, their content and relevance are often too little studied, as they are not properly included in libraries. McGlamery (2000:6) claims that "*While maps probably are represented in all libraries and archives, typically they are under-catalogued, under-preserved and poorly stored and retrieved*." Researching the practice of how actors coordinate spatial information may therefore also lack documentation in the scientific databases. As a result, the research should include such undocumented sources.

The selected grey literature for this research included all documents (papers, presentations, introductory documents, resolutions) from five annual geo-information (GI) conferences (GSDI, ESRI user conference, ICA, ISPRS, AGILE) and three annual electronic government (Egov) conferences (Egov/DEXA, HICCS, Dg.O) over the period 2002-2008. These are the conferences that are most associated with issues of geoICT and coordination on the one hand, and the impact of ICT within the public sector on the other. Unlike other specific conferences related to ICT or public administration, the GI and Egov conferences include presentations on specific geoICT applications and innovations. The public sector context of the geoICT applications is also most prominent in these conferences. A more practical justification for the choice of these specific conferences within the two domains was also that the proceedings and other documents were available (online and/or in written form), on the relatively wide international spread of participants in these

conferences, and on the presence of socio-technical oriented working groups or streams in these conferences.

Analysis of the grey literature began by automatically calculating word frequencies and by reviewing the word concurrences of the most frequent words. The underlying rationale of reviewing word frequencies and concurrences is the assumption that the aggregate of all words in a corpus of text provides a set of basic concepts which represent the content of the entire corpus of text. Concurrences, the words and sentences nearest to the basic concepts, determine the meaning of the contexts, in which the primary concepts make sense (Bellegarda, 2000; Landauer et al., 1998; Letsche and Berry, 1997). TEXSTAT[9] is a free software tool to compute word frequencies in a (set of) document(s), and to list the concurrences of every word (Huning, 2005).

In practical terms, reviewing the written language manifestations in grey literature followed four steps. The review started by scanning each document for the presence or any reference to the issue of 'geoICT coordination.' Documents which contained this reference were added to a grand corpus of text. The second step was to execute the statistical computations using the TEXSTAT software for the entire text corpus containing all selected documents and transcripts. This step resulted in word frequencies and word concurrences of every word. The third step was to filter the results for non-usable words (including particles, auxiliary verbs, references to figures, tables etc.), and to correct the results for combinations of words with similar meanings ('infrastructure' and 'infrastructures') or words with similar typography ('e-government' and 'egovernment'). The filtering resulted in a list of word frequencies, expressed in promillages. The promillages of word frequencies reflected the relation of words or topics with other words or topics. The fourth and final step was to query and interpret the word frequencies and concurrences, which resulted in basic concepts and the interpretation of these concepts.

The second data collection method to induce a view from practice was the compilation and categorisation of verbal statements of practitioners during interviews. The interviews were with staff members who were active in the GI domain and/or in the Egov domain. Annex 1 provides the full list of interviews with key informants. A total of 14 interviews were conducted with public sector practitioners in the Netherlands. The choice for these specific 14 actors derived from searching for regular presenters during (inter)national conferences, active participants in national working groups or online discussion groups, and as a result of exploratory interviews. All key informants had at least ten years'

[9] Available through http://www.niederlandistik.fu-berlin.de/textstat/software-en.html (date: 21 April 2010)

experience in management and policy advisory functions in the geo-information domain, and all had obtained this experience primarily in the public sector.

The interviews had an explorative character, focusing on exploring, rather than explaining, actual practices and perceptions on geoICT coordination. Transcripts of each interview provided the written texts for further analysis. Eventually, the fourteen interviewees included seven practitioners working at national level, three with practitioners working at a regional scale and four interviews with people working in municipalities. With regard to the issues of geoICT coordination, the interview sections related to their work with geoICT, their experiences with geoICT coordination and their views on geoICT coordination.

2.2.2 Results of viewing geoICT coordination practice through grey literature

The text analysis followed after compiling the grey literature documents into one corpus of text. The resulting corpus comprised 1,584 grey literature documents (810 from the GI domain and 774 from the Egov domain). Figure 2.1 depicts the word frequencies for the grey literature of the GI domain. The figure shows the promillages of word occurrences (decreasing outwards from more than 1 ‰ in the inner circle, to less than 0.5 ‰ in the outer space).

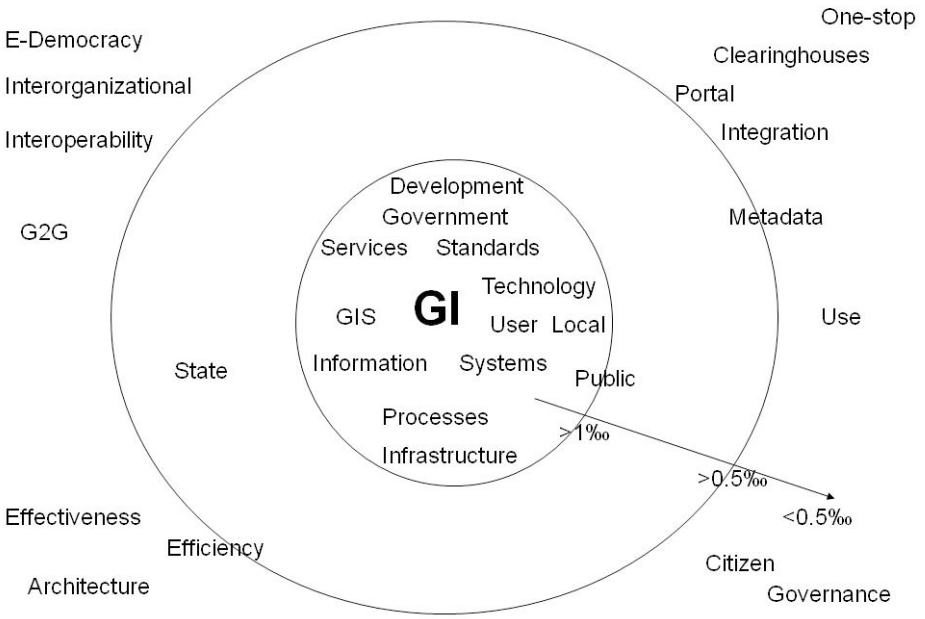


Figure 2.1: Core issues related to geoICT coordination in GI grey literature

The word frequency calculations reveal that some terms are truly at the core within the GI domain, such as 'GIS', 'standards' and '(spatial data) infrastructure.' Very few practitioners use the specific term 'geoICT' in any of the selected documents. Most prefer to use 'GIS' or 'geo-information technology'. Those who use 'geoICT' refer to 'geoICT' as combinations of information technologies, software types, hardware types (such as GPS, remote sensing sensors, certain display screens), to structure (geo-) spatial, to acquire the data, to process the data and to disseminate the data. Essentially, practitioners refer to the 'geoICT' technology as encapsulating 'GIS', 'GIS software', the functional and analytical capabilities of GIS, 'image processing' or 'remote sensing' software as the technical tool to process such data. GeoICT also encapsulates the technologies used for both hard-copy (paper-maps) and soft-copy (or virtual) dissemination.

There are a relatively large number of occurrences of the term 'local' in the grey literature. The term 'local' concurs consistently with the term 'national' and 'global.' Examples include (the underlined sections highlight the concurrence of 'local' with 'national' or 'global'):

"The approach in each state differs due in part to the legal framework of the United States (and North Carolina) and Germany (and North Rhine-Westphalia), respectively. One final goal of the sister state activity is to define the content of specific framework data layers that are applicable to any public sector entity from local to global." (Johnson, 2002:1)

"It was decided that this project could be used as a cornerstone to raise the awareness of, and advance the concept of, the Global Spatial Data Infrastructure (GSDI), which is beginning to enable communities and organisations at the local, national and global levels to readily share geographic information and services across a rapidly growing telecommunications network." (Pulusani, 2002:1)

Practitioners apparently perceive the existence of 'local' or 'localised' geoICT only when the local geoICT is connected to 'national' and/or 'global' geoICT. Coordination actions refer to this hierarchical connection, and coordination actors work towards establishing the hierarchical connection. In the eyes of GI practitioners 'GeoICT coordination' therefore consists of actions related to geoICT in a particular location, from the perspective of geoICT-related activities and ideas at a higher level. The coordination activities have a top-down character.

Besides the focus on 'local', practitioners prominently emphasise developing and constructing geoICT technology and geoICT products in GI grey literature. In the articles on the construction process of such products, the practitioners

tend to make a direct connection to ‘users.’ Remarkably, there is little attention for ‘use’ or ‘uses’ compared with attention for ‘users’. This indicates that geoICT practitioners neglect the context in which users use the geoICT, and as a result neglect the coordination activities related to any context of use. The neglect of actual use is apparent through the lower frequencies of terms such as ‘governance’, ‘citizens’, ‘re-use’, which would relate to the context of use. There are also very few occurrences referring to structures in which ‘use’ plays a role (such as G2G, G2B etc.). Instead, the grey literature focuses primarily on the process of delivering an end-product to an imaginary or stereotypical user. The grey literature does not provide a clear picture of actual users or the context of use. Consequently, the coordination in these articles deals primarily with organising and aligning internal production processes, and not with aligning production to use or to users.

This conclusion is similar for the references and concurrences of the word ‘processes.’ When referring to ‘processes’, the practitioners in the GI domain tend to refer to ‘business processes’, or to ‘information production processes’, rather than to processes of ‘organisational development’ or ‘transformation.’ This narrow utilisation of ‘processes’ would suggest that practitioners who coordinate the production of information products refer to the term ‘user’ as something external to the geoG2G.
The word frequencies in E-Government grey literature are shown in Figure 2.2. This figure shows that the spread of word frequencies in Egov grey literature is far less dichotomous than the one for the GI domain.

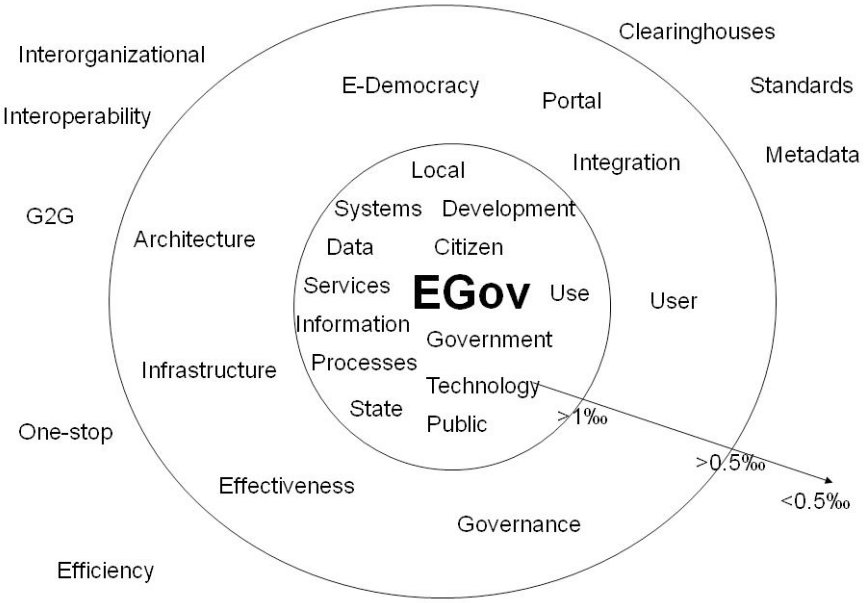


Figure 2.2: Core issues related to geoICT coordination in Egov grey literature

The core of EGov grey literature focuses on information systems in the context of 'government', 'state', 'public' and 'citizen'. The Egov documents mention technical terms such as 'architecture' and 'infrastructure' more regularly than the GI grey literature, although 'standards' and 'efficiency' appear less frequently than in the GI domain. The relatively frequent occurrence of the word 'local' is similar to that in the GI grey literature. This suggests that practitioners in the EGov domain use 'local' in a similar way to practitioners in the GI domain. 'Local' also concurs with 'national' and 'global', as the following two quotations show:

"Addressing issues surrounding the balance of emerging global ICT and local ICT adaptation therefore requires an examination of the disembedding and reembedding processes from a variety of perspectives related to the three interconnected subsystems of the sociosphere."(Soper et al., 2006:2)

"The major tsunami disaster that hit the Indian Peninsula in December 2004 indicated once again that international, federal, state, and local government agencies must develop coordinated strategies and adopt advanced and usable technologies to prepare for and cope with crises."(MacEachren et al., 2005:114)

When combining both grey literature sets of the GI and Egov domains, seven

words appear most frequently : 'local', 'data', 'information', 'services', 'processes', 'government' and 'public'. By combining these words, one can derive two major suppositions with regard to geoICT coordination in a public sector setting. On the one hand, the combination of the words 'local', 'government' and 'public' highlight the hierarchical (public administrative) process of geoICT coordination. The coordination process in this first view works in a top-down manner, and is strongly linked to public administrative legal instruments and regulations. On the other hand, 'services' combined with 'information' and 'data' refers to how geoICT coordination can contribute to how an end-product is being produced. Coordination in this second view does not necessarily highlight the legal-institutional nature, but emphasises the construction of an end-product.

A complicating term in the combined corpus concerns 'processes'. The term 'processes' is rather ambiguous in the context of geoICT coordination, as it refers to both the process of constructing or delivering products and services (by means of ICT), and the process of organisational change or development. The context in which practitioners use the term 'process' becomes apparent when examining the concurrences of the terms (i.e. the links that the terms have in complete sentences or paragraphs). Two examples of these different 'process' concurrences are:

(from the GI domain) *"The implementation of ArcGIS technology is to enhance the existing spatial and attribute data maintenance, query, and display processes."* (Hailu and Belsham, 2003: 1 - abstract)
[The emphasis is on software technical processes to construct data].

(From the Egov domain) *"Transnational digital government relies on collaborative government processes that use information technology to address problems of a regional or global nature." (Fortes, 2005:1)*
[The emphasis is on (inter-)organisational processes].

It remains crucial however, that geoICT coordination relates to government actions at the 'local' level, or actions towards the local level, i.e. 'localising' government. As practitioners in many of the reviewed grey publications consider geoICT coordination actions through municipalities or by municipalities to be crucial, the municipalities are a crucial point of encounter of geoICT coordination actions and results. The geoICT coordination actions aim at re-addressing **where** geoICT activities take place. GeoICT coordination actions consist of actions which convert geoICT-related processes (both technical and/or organisational processes) to, or at, particular administrative levels.
Equally crucial from the above terms review is the emphasis on the end-product, namely the 'data', 'information' or 'services'. Rather than emphasising

the 'where', this emphasises the '**what'** (i.e. 'What products should geoICT coordination deliver?').

Combining both GeoICT coordination characteristics from grey literature (the where and what emphasis), leads to a conclusion that practitioners consider geoICT coordination actions as actions which aim towards the delivery of an information product ('what'), provided by or at a local government or another lower level ('where').

2.2.3 Results of viewing geoICT coordination practice through verbal statements

The collection of verbal statements relied on exploratory interviews with fourteen practitioners, as listed in Annex 1a. These practitioners were found through starting a first round of communication with professional contacts which existed at the ITC (in Enschede) in the execution of educational programs, and extending the list of potential context on the basis of employing a snowballing strategy of finding references to other professionals. A selection was made to have interviews with practitioners working at different administrative levels (national, regional and local). With each professional an open discussion was held on the issue of geoICT, their activities and their views on geoICT coordination. These discussions were recorded and transcribed in order to make a compilation of their responses possible. The presented excerpts hereunder refer to these transcripts.

When exploring the issue of 'geoICT coordination' during these exploratory interviews, most interviewees mainly associated 'geoICT coordination' with national policies and national implementation strategies. These three statements (interview excerpts 2.1; 2.2; 2.3) are exemplary for this instant association:

"*Our vision is that we have to look at that at a national level…there must be more direction in the coordination of the whole sector.*" (Kadaster)

"*We strive towards our data becoming part of the national base registers. We are ready for the base registration.*" (Water Board)

"*We are reforming, so that our central system becomes lighter, and that we can better connect to the national picture (…). Ideally we would like to coordinate this with all parties in the Netherlands."* (Regio Twente)

Interview excerpts 2.1; 2.2; 2.3

All interviewees could list specific national policies in the Netherlands which influenced their geoICT operations and their geoG2Gs. These include the nationally-coordinated basic (key) registrations (such as the 'BAG' – the key

registration of buildings and addresses; 'BKT' – key registers for Cadaster and topography; 'BGT' – the key registers for large-scale topography – previously GBKN); the nationally-coordinated e-government implementation trajectories (such as 'e-municipalities'), and the national programme on digital exchange in spatial (planning) processes ('DURP'). Staff members in municipalities frequently mentioned the BAG as their current primary focus of attention. The primary association that staff members made in relation to BAG is that it changed the way in which they cooperated with staff members from other organisations. Implementing BAG made cooperation more complex. Staff members also referred to the Public Law Act (WKPB) and the policy on digital plans (DURP) as strategies which influenced their work with geoICT. The interviewees perceived that both strategies made the organisation of operational work more complex.

Table 2.1 lists the various initiatives in the Netherlands which interviewees mentioned during the interviews. For each they provided further details of the main organisations which were responsible and the level at which the initiatives were implemented.

Examples of national geoICT-related strategies / policies / laws	**Characteristics of these strategies**
Key registers (BAG, BKT, BGT)	National orientation; coordinated by 'VROM' (Ministry for Housing, Regional Development and the Environment) with associations of public agencies at all levels; execution by national and local organisations.
DURP	National programme; execution by public planning agencies at all administrative levels
WKPB	National orientation; execution/implementation by municipalities.
E-municipalities	National programme with local orientation; execution/implementation by municipalities, association of municipalities, supported by national programme and national organisation (ICTU).

Table 2.1: Examples of national geoICT related policies / strategies

The association of connecting 'national' and 'local' in the given examples in the Netherlands is similar to that in the grey literature, but the interviews also revealed that staff members perceive that different types of strategies influence them simultaneously. A staff member may be simultaneously responsible for acting for the basic (or 'key') registrations programmes, while also having to act with other technological changes. Local practitioners added that they had insufficient influence on the national policy formulation and implementation.

They argued that most formulation and implementation actions followed a top-down, hierarchical approach, where local implementers could hardly contribute to the implementation objectives. Rules were decided '*elsewhere*', and there is a strong feeling of mismatch between what regulators formulate at the national level against what practitioners have to implement at the local level. Thus geoICT coordination actions are not only localisation actions, but also actions of which the objectives are formulated predominantly by national (rather than local) actors. The following interview excerpts 2.4 and 2.5 reveal this sentiment.

"*If you talk about the supply of geo data…that has all been decided at the national level.*" (Municipality of Enschede)
"*…the ministry is forcing us to cooperate…for example on the issue of key registers…*" (Municipality of Boxmeer)

Interview excerpts 2.4; 2.5

As in the grey literature review, the quotes show that the action related to localisation is a central issue of geoICT coordination. The localisation action consists of transposing national ideas, formulated in national policies or national strategies, to a local implementation setting. The transposition action relies on convincing and enforcing local actors of national ideas. In this instance, geoICT coordination action refers more to 'where' action should take place, rather than to 'what' they need to achieve, or 'how' they need to achieve it.

A second type of association of practitioners when discussing 'geoICT coordination' was the 'result' of coordination actions. The interviewees referred to either narrowly prescribed results such as '(improved) environmental data sharing' or to more abstract results, such as 'enhanced information management'. The following three interview excerpts are examples of how practitioners define results in relation to 'geoICT coordination'.

"The idea should be that municipalities should organise their ICT and data in such a way that they do not compete with other parties and other public agencies, but that they organise their data services optimally. They have the instruments to coordinate this." (Kadaster)

"In the beginning you agree on what the data should look like, and how they should be delivered." (Regio Twente)
"We have an information task for four Ministries.(...) Our funds are earmarked for the information management task. We are coordinated by our highest council to implement the management of the data." (TNO/DINO)

Interview excerpts 2.6; 2.7; 2.8

Technical developments which the interviewees labelled as influential for current geoICT-related work included the use of online tools such as Google

Earth, Google Maps and Microsoft Virtual Earth, Open GIS and Open Source geoICT. Table 2.2 lists the characteristics of each of these technical tools and developments.

Examples of geoICT tools and results	**Characteristics of these tools and results**
Google Earth, Google Maps, Virtual Earth	Freely-available maps and mapping/geoICT tools – helps to create visualisation products.
Open GIS, Open Source geoICT	Openly-available geoICT engineering tools – helps to create geoICT products and services.

Table 2.2: Examples of tools influencing geoICT coordination

These developments are not specific to administrative levels, but are more tool and practitioner oriented. Nevertheless they affect how practitioners work and cooperate with geoICT. In practical terms, the practitioners referred to different layers of cooperation agreements – formal or informal – as a mechanism to guide towards these results. The perceived coordination action in this case relates to the '**what**' (i.e. what needs to be the end result of the geoICT coordination?). The action usually consists of narrowly formulating a result, and then aligning all actors and activities towards that result. The end result in most cases needs to be geo-information storage, management and exchange. An example of how a local manager phrased that is interview excerpt 2.9:

Q:
"So, what do you align, according to you? People, activities, processes or uncertainties?"

A:
"Actually, everything, yes, really everything, because you work on all aspects. I describe work processes; I implement those; I make sure people go by those; I make sure they use the equipment; I make sure they provide the right data; that the data are cleaned and that they are all checked. So, I coordinate many different things."

Interview excerpt 2.9

This excerpt shows that practitioners view geoICT coordination as a set of intervening activities, aimed at aligning people and resources to generate one or more products and services. The specifications of the products are defined by actors other than those working in the geoG2Gs. Nevertheless, geoICT coordination actions in this case rely on *what* the product needs to be, rather than what the role of actors is vis-à-vis each other.

2.2.4 Constructing a conceptual view of geoICT coordination from practice

The above analysis of grey literature and interview excerpts of practitioners exposes two types of 'geoICT coordination'. The first is where practitioners prioritise the '***where',*** i.e. 'where' geoICT coordination actions take place and 'where' actors should be most active. Typically the 'where' actions consist of realigning geoICT activities at local levels, such as within municipalities. The second type is where practitioners emphasise ***'what'*** type of output geoICT coordination needs to generate. Typically, the output is referred to as specific data, models, information products or information services.

In the first type of geoICT coordination, actors emphasise alignment actions at certain localisations. In the second type actors emphasise actions towards the generation of specific outputs. I label these two types of geoICT coordination as LOCUS geoICT coordination (LOCUS is the Latin word for location, place), and EVENTUS geoICT coordination (EVENTUS is the Latin word for outcome, result). The first type, LOCUS geoICT coordination, is a set of actions whereby the goal is to localise the geoICT choices. Localisation is the alignment action where a general plan developed at higher administrative levels needs to be translated and coverted into detailed, compatible plans at local levels. The higher administrative levels in these cases could be supranational (e.g. European) levels, national levels or some supervisory levels. Consequently, the lower levels could be national levels, municipal levels and any other more localised levels. A characteristic of LOCUS geoICT coordination is therefore that it has a transposition requirement from higher to lower levels or from a principle to an agent. Here LOCUS geoICT coordination assumes unproblematic hierarchical or principle-agent relations.

The second type, EVENTUS geoICT coordination, is an alignment action type which emphasises the intended practical results, and the processes towards the results. It is a highly pragmatic kind of coordination which consists of alignment actions aimed at certain concrete results. Coordinating actors usually phrase the results as geo-information storage, management, sharing and exchange, and managers following this coordination strategy put all in place to obtain the results.

2.3 Conceptualising geoICT coordination by a view from theory

A pragmatic approach to finding or defining theoretical concepts seems at first to be a contradiction in terms, because pragmatists would claim that there are no absolute concepts which are universally true, known or accepted. However, Emel (1991:389) argues in the essay on provocative pragmatism: "*Theories are not truths but tools.*" This means that, in a pragmatist view, a theoretical foundation is not necessarily a consistent and comprehensive framework of

concepts and ideas, but something which can be understood from its practical consequences and actions. Conceptualising 'geoICT coordination' – and relying on scientific literature to do that – should therefore be understood as the process of identifying how subsequent authors are consistently using and applying certain 'geoICT coordination' concepts from others in scientific literature. This gradual identification is possible through a 'concept-centric' literature review, relying on analysing the written manifestations of the concepts by theoretical scholars, and the consistent references of these scholars to each others' concepts. In light of this need, the subsequent section 2.3.1 describes how one can collect such concept manifestations by theoretical scholars, section 2.3.2 describes the content and meaning of the manifestations, while section 2.3.3 concludes with the implications for the conceptualisation of geoICT coordination from a theoretical view.

2.3.1 Method of reviewing geoICT coordination theory

The concept-centric literature review used 'geoICT' and 'coordination' as starting point to query the scientific databases. The term 'geoICT' only recently appears in scientific literature, while the combination 'geoICT coordination' is still rarely encountered. The earliest reference to the term 'geoICT' in scientific literature dates back to 2002 (Van Oosterom et al., 2002). The derived key terms from section 2.2.2 plus a combination of 'coordination' with either 'geoICT' or 'ICT' thus functioned as a list of relevant keywords to query 4, scientific search engines: ScienceDirect, Web of Science, JSTOR and Google Scholar. This resulted in a list of scientific articles. The key words also provided search queries for finding additional articles from four major journals in the GI domain: Computers, Environment and Urban Systems (CEUS), Journal of the Urban and Regional Information Systems Association (URISA), International Journal of SDI research (IJSDIR), and the International Journal of GIS (IJGIS). The search only included articles up to 10 years old (>1998). Although this may seem an arbitrary limitation, prior to that year there was very little literature available relating to geospatial technology, let alone geoICT coordination.

The key list of articles formed the basis for the concept-centric discourse analysis. This analysis focused on distilling the conceptual views on the actions of geoICT coordination from how authors refer to the actions and results of actors working with geoICT. The concept-centric literature review followed the recommendation of Webster and Watson (2002), who use concepts to organise a literature review, in contrast to an author-centric approach, which only derives a summary of relevant articles.

2.3.2 Results of reviewing geoICT coordination theory

From the query results, 40 articles were found to be relevant to derive a conceptual view of 'geoICT coordination'. The 40 articles comprise three

categories. The first category conceptualises 'coordination', asuming that 'geoICT coordination' is a specific form of 'coordination', exhibiting and inheriting similar characteristics of other types of coordination. From this first categorization it is possible to differentiate two types of dsicourses about 'geoICT coordination'. The first category mainly analyses (geoICT) technology, and the second deals primarily with the organisational and/or social environment of geoICT. While the first category takes the geoICT technology as a starting point for the discussion, the second takes the social and organisational environment in which actors use or introduce the technology as a starting point. The first following subsection describes a set of basic elements of 'coordination' and the following two subsections describe the two main discourses on geoICT coordination.

Conceptualisation of 'geoICT coordination' as a specific type of 'coordination'
The debate about the concept of 'coordination' in the public sector is not new, however it is regularly revived in different forms. Pollitt (2003:36), for example, argues that the debate about 'joined-up government' is essentially a '*manifestation of one of the oldest preoccupations in the field of politics and public administration – the co-ordination of policymaking and administration (Pollitt, 2003:36)*. Arguably coordination is a central theme in public administrative processes, yet a first scan of literature shows immediately that there is no universal definition of 'coordination'. Some refer to coordination as an end-state *characterized by minimal redundancy, incoherence and lacunae* (Peters, 1998:296). Others prefer to emphasize the process of decision making and working relationships as coordination (Mulford and Rogers, 1982). Others again zoom in to the structure or hierarchy as coordination (Alexander, 1993). In these types of studies the concept of coordination is often simplified to the study of hierarchy (Keast and Brown, 2002; Painter, 1981) as opposed to the study of markets, networks or relationships. The common notion is currently that coordination deals with all of those aspects, yet depending on the type of domain and area of interest there researchers tend to place a certain emphasis on one or other aspect of coordination.

A crosscutting reference when searching for 'coordination' and intersecting 'coordination' with 'public administration' is the book of (Chisholm, 1989), who refers to coordination as '*mechanisms through which communications take place and solutions are sought and implemented'* (p.65). In other words, coordination is an interactive and operational activity of communication and implementation, but it is also a normative activity of solution seeking and choosing of priorities among possible solutions. These solutions are solutions to public sector problems of public sector accountability at large or public sector organizational efficiency and service provision, for example (Webb, 1991). When treated as a public organizational problem, coordination is an activity

which connects organizational structure (formal or informal) to organizational tools (including technology).

When intersecting 'coordination' with 'ICT' the coordination solutions are represented as a form of alignment between different options. The alignment can be the activity of connecting strategy to information technology, but may also be the activity of finding the middle ground between the views and values from different actors with respect to the use of a technology. In either case the activity intervenes in current organisational routines and may involve a restructuring of inter-personal or inter-organizational relations. Emerging technology may thus be the start (of cause) of the coordination (the activities conducted to adapt the organizational routines to the emergent changes in technology), or may be the effect of the coordination (the emerging technology from the activities between different people or organizations).

Combining the above sections on 'coordination' with 'ICT' in the 'public sector' or 'public administration brings about the generic characteristics of 'coordination' which would likely also apply for a specific type 'geoICT coordination': coordination is a normative activity associated with (inter-) organisational tools geared at certain outcomes which are relevant in a particular (inter-) organisational context. Specific for the public sector is the public sector context and the public sector relations. Specific for ICT is the set of tools that the set of activities applies to. This makes '*geo*ICT coordination' a subset of 'ICT coordination', relevant for geoICT norms, geoICT activities, geoICT outcomes and geoICT organisational contexts. Within this subset it is possible to emphasize the geoICT activities and outcomes (more technological-instrumental conceptualisation), or to emphasize the norms and organisational contexts (socio-organisational conceptualisation).

Technological-instrumental conceptualisation of geoICT coordination
The technological-instrumental article type associates the need for geoICT coordination with bottlenecks in inter-organisational production chains. One of the prime bottlenecks in these articles concerns inter-organisational geospatial data access and exchange. If access and exchange are difficult, then the sequential operational work flows which construct geoICT products and services suffer delays in throughput. Coordination actions are thus geared towards reducing access problems, and thereby increasing the throughput along the production chains. The coordination actions include careful re-engineering and redesigning of data models and information process models. The actions rely on the conceptual terminology such as 'interoperability' (Benslimane et al., 2000; Mansourian et al., 2006), 'ontologies' (Benslimane et al., 2000), 'clearing houses' and 'portals' (Beaumont et al., 2005; Koshkarev et al., 2008; Schindler and Diepenbroek, 2008), and 'spatial data infrastructures' (Mansourian et al., 2006; Nedovic-Budic and Pinto, 2004). Studying each of these conceptual terms

yields the overall aims and characteristics of the associated coordination action of the technological-instrumental stream.

Firstly, with regard to the issue of 'interoperability', Benslimane et al. (2000) write that the interoperability principles of heterogeneous systems will serve as a basis for solving alignment problems of data sharing and re-use. Interoperability, according to Benslimane et al. (2000), is an agreement on the meaning of the information (semantics) and the specifications of the operations used to process data exchange (translation, conversion, mediation). The way to improve interoperability is then by setting a common reference (standard) for both the semantics and the interoperability processes. A common standard would address the coordination problem among actors debating individual sharing procedures. The coordination challenge with this view is agreeing on a common standard. In reality this process of agreeing on the common standard is problematic.

A number of articles originating from data collection in the late 1990s, such as (Crompvoets and Bregt, 2003), refer to data warehouses and clearing houses as a way to create interoperability and solve standards and access problems. Portals are also similar to clearing houses as common reference frameworks. A number of authors refer to portals when aiming to solve access problems (Beaumont et al., 2005; Koshkarev et al., 2008; Schindler and Diepenbroek, 2008). Specific portals for geospatial data are referred to as 'geoportals', defined by Beaumont et al. (2005:51) as follows:

"Geoportals may be defined as World Wide Web gateways, anchors or major starting sites that organise content and services (directories, search tools, community information, support resources, data and applications), which provide capabilities to query metadata records for relevant data and services, and then link directly to the online content services themselves." (Beaumont et al., 2005:51)

Like 'clearing houses', 'portals' are technical tools which address the perceived interoperability problem, yet the portal concept is considered more sophisticated than the clearing house concept. Similarly to when using clearing houses, internet technology is a basis for sharing data. What is different, however, is that clearing houses only provide a passive direction as to where to find data, while portals also incorporate more active content services for users. The underlying idea when developing portals to replace clearing houses was that the addition of content services could increase the number of spatial data users. However in practice many of the portals are still only offering services to users passively and many spatial data portals tend to be designed without much involvement of spatial data users. And while the aim of portals was to create interoperability and act as a more sophisticated data exchange framework, the

practice shows the opposite. (Mercadante and Salvemini, 2008) find a high degree of fragmentation in geoportals. Other than an increased use of common standards, individual organisations have opted for their own solutions rather than depend on standardised geoportals.

Another technological solution for interoperability problems is that of 'ontologies.' Benslimane et al. (2000) provide an extensive description of ontologies and also add an explanation as to why they are useful:

"A data provider can use the terms of a shared ontology to describe its objects, allowing a potential data receiver to properly interpret the semantics associated with the data provider's content. Likewise, a data receiver can use a shared ontology to specify its requests and interpret returned results. Moreover, ontologies allow formal and declarative descriptions of the common terms, allowing for automatic or semi-automatic reasoning on shared data of a domain. The design of ontologies for interoperable urban information systems must take into account variations in the views (conceptualisations) of an application domain modelled by different information systems. These views may vary in levels of detail or the meaning associated with the terms that are used to represent domains. An ontology, therefore, can provide reference semantics or a basis on which the information systems can reconcile differences when conflicts arise in their views of an application domain." (Benslimane et al., 2000:197)

The assumption in this view is that once different organisations speak the same language of access, they can reduce problems of access and facilitate inter-organisational sharing. Similarly to the case of clearing houses and portals, the assumption behind harmonisation and standardisation through adopting consistent ontologies is that aligning geoICT across organisational boundaries occurs without any problems. Many of the spatial data infrastructure (SDI) discussions build even further on this assumption. In the view of some authors, not only are SDIs based on the development of technological standards, but they are also based on the coercive enforcement of such standards (Mansourian et al., 2006; Masser et al., 2007). As Mansourian et al. (2006) argues:

"Using an SDI conceptual model as a framework (which has been developed based on different technical and non-technical characteristics of community) facilitates partnership efforts among different participants in which they can better resolve the current problems with spatial data." (Mansourian et al., 2006:314)

The expectation in this statement is that technology standards can facilitate cooperation and data sharing, and that standards can be organised through policy enforcement.

All the instruments above (clearing houses, portals, standards, ontologies and SDI policy enforcement) rely on the assumption (or expectation) of unproblematic inter-organisational alignment and easy enforcements. The technological solutions seek an instrument to overcome the 'access bottlenecks' and the instruments rely on a constant process of redesign. The redesign of clearing houses became the portals, the revision of portal concepts resulted in the ontology concept and currently web services and web agent concepts are under construction.

The emphasis in all the examples above is on '**how'** to construct a solution to a practical problem. GeoICT coordination in this view comprises the actions which prescribe the 'how'.

Social-organisational conceptualisation of geoICT coordination
The social-organisational conceptualisation of geoICT coordination has a different take on what is considered a problem. The starting point is that actors develop technology through social-organisational networks. Consequently, the problems existing in these networks are likely to affect the technological outcome. The literature on these networks relies on conceptual terminology such as 'actor/social/multi-agency' networks (Harvey, 2001; Jankowski and Nyerges, 2001; Moutinho and Heitor, 2007; Omran and van Etten, 2007; Wastell, 2006), active awareness and willingness (Omran and van Etten, 2007; Thellufsen et al., 2009; Wehn de Montalvo, 2003), equity and fairness in access (Nedovic-Budic and Pinto, 2000; Niles and Hanson, 2003; Perkins and Xiang, 2006). The implication of these respective conceptual terms is similar for geoICT coordination. If geoICT development relies on the networks of individual actors, then geoICT coordination actions should also associate with the actions within these networks. Considering each of these conceptual terms yields the overall aims and characteristic of the associated coordination action of the social-organisational article type.

The most prominent term is 'networks'. Harvey (2001) explains how crucial social networks are for spatial data access. Spatial data access is not so much linked to the technology for accessing data but to the possibility to interact and transact with someone else. This relies on the networks in which geoICT actors operate. Such networks can start up and determine the dynamic actions of geoICT coordination, often with an organisational, strategic or political purpose. Consequently, the development and use of technologies reflect the interests of the actors and their networks.

These networks are not a reflection of the organisational hierarchy, but instead reflect different types of social interaction. GeoICT coordination actions in this view co-occur with active social networking. Actors cooperate with geoICT if it fits their own or their mutual interests. (Nedovic-Budic et al., 2004) share this

view. They conclude that technologically-oriented coordination strategies do not necessarily lead to more access to the technology and the data. Instead, local, informal and ad hoc networks provide this access:

"(..)although a large majority of the interactions is governed by formal agreements rather then being driven by ad hoc needs, the border between informal and formal seems to be fuzzy, and less formal ways of regulating the data-sharing relationships, such as mutual rules and procedures, appear to be as important as very explicit mechanisms." (Nedovic-Budic et al., 2004:20)

The local, informal and ad hoc networks may result in tacit awareness of coordination goals. In addition to tacit awareness, pro-active awareness may emerge when establishing additional coordination networks (Thellufsen et al., 2009). Thellufsen et al. (2009) conclude that awareness evolves in steps, whereby the motivation step of the internal awareness phase is the most essential in inter-organisational collaboration. In this motivation step, potential partners actively explore other partners' interest in collaborating. This is a pro-active organisational networking activity, which precedes data sharing. Wehn de Montalvo (2003) also relates the data sharing to the development of pro-active social networks. She relates willingness to share to planned behaviour. In her view the willingness to share depends on a behavioural belief. This belief may result in a particular action of geoICT actors. GeoICT coordination is therefore closely associated with actions promoting the willingness to share geoICT data.

The willingness to share spatial data decreases if actors perceive the access conditions to be unequal or unfair. Nedovic-Budic and Pinto (2000) find that:

"A frequently expressed reservation, particularly from agencies that perceived themselves as 'junior' partners in the data-sharing initiative, was how to ensure a sense of equity and fairness in data exchange and access." (Nedovic-Budic and Pinto, 2000:466)

Inequality and unfairness of access are particularly problematic when resources are scarce. Scarcity of resources and capacities may influence access. Perkins and Xiang (2006) describe the design of an 'info-structure' for Yap, one of the islands of the small island state of Micronesia. Contrary to most developed countries, the scarcity of resources and capacities on this island are enormous, hence the technical and data resources associated with the specific political and cultural realities out of which developed countries' planning support systems are usually designed, are lacking in small island states. Coordinating access then depends on a careful choice only among achievable alternatives, but having to rely on these scarce resources through mechanisms other than technology may also be a blessing in disguise for access.

"Even as data become available, limited technological literacy by support staff hinders the quick adoption and use of GIS (...) On a positive note, personal connections and obligations based on village or familial ties can facilitate cooperation between people of different agencies. In that way, Yapese cultural traditions may help ease adoption of GIS." (Perkins and Xiang, 2006:356)

Characteristic of the socio-organisational type of articles is the finding that geoICT-related actions occur in a socio-organisational context. Thus the authors of these articles associate geoICT coordination actions with the social relation in which the geoICT is used and applied. The social relation can be a bilateral relation, i.e. between two partners, but could also be a network of social relations. Within the network of relations the actors conduct a geoICT coordination type which values the purpose of the network relation. Rather than emphasising 'how' actors should employ geoICT, the socio-organisational type of articles emphasise 'why' actors employ geoICT. The social networks in which actors operate are considered to be the main driver and modeller for any uptake and development of geoICT. Hence, understanding the social networks pre-determines the understanding of what geoICT coordination entails and what geoICT coordination aims for.

2.3.3 Constructing a conceptual view of geoICT coordination from theory

In sum, the core attention of theoretical scholars is on **'how'** geoICT coordination takes place or needs to take place (the technological-instrumental view, design orientation), and **'why'** and in which context the geoICT coordination needs to occur (the social-organisational view, context orientation). The geoICT coordination emphasises goals in the form of particular instruments and tools (such as standardisation, portals, etc.), and which target specific contextual outcomes (inter-organisational networking, strategic improvement, development). I refer to these two types of geoICT coordination as MODUS and CAUSUS geoICT coordination. (MODUS is the Latin word for 'measure', 'method', 'mode'; CAUSUS is the Latin word for 'cause', 'case', 'context', 'pretext'). The third type of geoICT coordination, MODUS geoICT coordination, is an action type which emphasises the utilisation of certain tools and instruments, such as standards. The assumption here is that with the utilisation of these instruments it is possible to (re)align chains of operational geoICT activities. The fourth type 4, CAUSUS geoICT coordination, is an coordination action type which emphasises the stimulation of actions cultivating the adaptation of actors and activities to the changes in the socio-organisational context. The assumption here is that actors are willing to cooperate within their networks, and that the networks are sufficiently transparent to all actors.

Viewing the activity of geoICT coordination as either a technological-instrumental (structured deterministic, rationalistic) activity or as a socio-organisational (unstructured, contextual, bounded rational) activity can and has prompted different types of critiques. The most prominent critique on the former is that the activities are often presented as structured solutions, which are watertight, and which are in most cases heavily influenced by the promises of the technology. Reality on the other hand often shows fallibility and/or unsatisfactory solutions (Harvey & Tulloch, 2006; Rocheleau, 2007). Part of this critique is however incorporated in the socio-organisational set of research publications. For the latter type of classification the critique has mainly come from a group of scientists field which is often referred to as "critical geographers" or from a domain referred to as "critical GIS" (Pickles, 1995; Rajão, 2011). The critique focuses on the fact that the agency of geoICT is insufficiently taken into account if the studies relate geoICT primarily to the organizational context. In this way the social implications and interpretations of the technology, or of the activity of coordinating the technology in an organisational context, is insufficiently considered. Such social implications include the phenomenon that certain geoICT conceptions influence change in collective memory of public space (Rose-Redwood et al., 2008), or that geoICT conceptions are based on pre-defined epistemologies (McLafferty (2005) calls for example for more feminist geographies; Sheppard (2005) for more reflexive and critical thinking about the presuppositions of geoICT). As this research is however primarily focusing on the consequences of the choices of geoICT coordination – the discretions in an organisational context and the public organisational effects in the form of geoG2G stability - the epistemologies of the geoICT choices or the societal implications outside the public organisational context are considered beyond the scope of this research.

2.4 Conceptualising geoICT coordination through interpretation

Section 2.3 identified four types of geoICT coordination. The view from practitioners identified LOCUS and EVENTUS geoICT coordination types, while the view from theoretical scholars identified MODUS and CAUSUS geoICT coordination types.

Examples of strategies, policies, actions and tools which can be closely associated with geoICT coordination strategies are listed in Table 2.3. The table also includes the primary agencies involved in each of these examples, either through a formal mandate and/or through primary funding. The geoICT coordination types differ in terms of the primary aims of the actions, the actual actions which coordinators undertake, the kind of instruments or tools that the coordinators use to execute the coordination actions, and the underlying assumptions. As a result, each coordination type targets the stability elements within geoG2Gs differently.

LOCUS geoICT coordination aims to align geoICT activities and objectives at different administrative levels. LOCUS geoICT coordination emphasises that local levels should undertake alignment activities. The alignment activities rely on transposition activities, and if necessary, enforcement. The assumption here is that the hierarchical power relations are stable, and that compliance activities when transposing are unproblematic. EVENTUS coordination aims to align geoICT production steps to ideal-type geoICT results. This relies on the careful formulation and evaluation of end results, and the construction of layers of cooperation agreements. The assumption here is that the principle-agent relations arising from the contractual agreement are transparent and non-conflicting. It therefore relies on stable economic rules within geoG2Gs. MODUS geoICT coordination aims for the alignment in chains of geoICT production activities, through business redesign and re-engineering, and standardisation models. The assumption here is that redesigned business processes will be smooth and that actors comply with standards without problems. It therefore relies on stable conformity principles within geoG2Gs. CAUSUS geoICT coordination aims to align geoICT results with geoICT contextual needs, through adaptation, cultivation and active awareness building. The assumption here is that social relations are transparent and actors are willing to change their behaviour. This relies on stable collectivity principles.

GeoICT coordination type	Examples of geoICT-related strategies/policies/laws/tools /actions associated with each geoICT coordination type	Coordinating agency involved/funding from/by
LOCUS	Key registers (BAG, BKT, BGT), DURP, E-municipalities	Ministry of Housing, Spatial Planning and the Environment (VROM), Ministry of Interior, Associations of public agencies
EVENTUS	Google Earth, Google Maps and Microsoft Virtual Earth, Open GIS and Open source geoICT	Commercial companies, open internet groups, associations of business research communities
MODUS	Interoperability standards, ontologies, portals, spatial data infrastructures	(Inter)national standardisation agencies, independent SDI agencies or foundations, associations of practitioners/ engineering communities
CAUSUS	Thematic and domain-specific networking	Domain-specific groups or policies – Domain ministries, NGOs, individuals, associations of thematic research communities

Table 2.3: Examples of how geoICT coordination types relate to on-going activities and organisations in the Netherlands and internationally

Interpreting how these four types of coordination affect geoG2Gs generates two dichotomies. The first arises from how the different geoICT coordination types formulate alignment requirements for the geoG2Gs. On the one hand, the LOCUS and MODUS coordination types uniformly align any geoG2Gs . The localisation in LOCUS geoICT coordination consists of alignment activities, which use hierarchical relations between actors working at various administrative levels. This is a one-to-many relation, and the actors at the top of the hierarchy transpose their alignment priorities uniformly to all actors at the lower levels. The MODUS type reasons from generic production processes and generic answers to problems. This excludes context-specific conditions of certain geoG2Gs. So the MODUS geoICT coordination reasons by offering generic uniform solutions, which apply to any geoG2G. On the other hand, the EVENTUS and CAUSUS coordination types approach geoG2Gs in a more flexible way, taking into account the characteristics of a specific geoG2G. EVENTUS coordination types look into production processes which are necessary for specific results. Usually the foundation of specific geoG2Gs relies

on the formulation of specific results. Similarly, CAUSUS coordination types take into account the specific social-organisational context, which is unique for specific geoG2Gs. In summary, there is a dichotomy between uniform and integral approaches towards geoG2Gs on the one hand, and flexible, geoG2G-specific approaches on the other. Table 2.4 summarises the characteristics of the four types of geoICT coordination, in terms of primary aims, type of coordinating actions, underlying assumptions and approach towards geoG2Gs.

Emphasis of goals in geoICT coordinating actions				
	View from Practice		***View from Theory***	
	Where is the need for practical coordinating action?	**What** is the intended practical result of the coordinating action?	**How** should the coordinating action take place?	**Why** should coordinating action take place in which specific context?
Name of geoICT coordination type	**LOCUS**	**EVENTUS**	**MODUS**	**CAUSUS**
Primary aim of actions	Aligning geoICT activities at different administrative levels	Aligning geoICT production steps to ideal-type geoICT results	Aligning chains of geoICT activities	Aligning geoICT results with geoICT contextual needs
Types of goals set to support the coordination actions	Transposition of central ideas to local implementation	Formulating and evaluating of end results	Business re-design and re-engineering	Adaptation, cultivation
Type of instruments used	Legal/ institutional enforcement	Layers of cooperation agreements	Standardisation of geoICT models	Awareness building
Assumptions	Straightforward hierarchical relations and unproblematic compliance when transposing	Transparent principle-agent relations, and non-conflicting agreements	Smooth business processes and unproblematic compliance with standards	Transparent social relations and willingness to change
Approach towards geoG2Gs	Uniform, integral	Flexible	Uniform, integral	Flexible

Table 2.4: Characteristics of geoICT coordination types

A second dichotomy follows from the uncertainties which are likely to emerge once implementing the respective geoICT coordination types. Firstly, the assumptions of the LOCUS type include perfect relations between different administrative levels. If the relations are not so perfect, there is a risk of failure in the execution of this coordination type. Higgs (1999) notes, for example, that local offices often have lower capacities of geoICT expertise than national offices. Thus local offices are simply less equipped to execute certain operations than higher-level offices. Nedovic-Budic (2000) also note that multi-level transactions of spatial data are only effective in case of a perfect fit (technically and institutionally) between higher and lower levels. Problems in this fit might make the execution of LOCUS coordination problematic, and might introduce uncertainties for actors. If actors cannot rely on the perfect fit, then uncertainty emerges on the power stability element of the geoG2G. Given that LOCUS geoICT coordination targets actors operating at the intersection of one level with another, uncertainties emerge at this intersection point.

Secondly, the assumptions of the EVENTUS type include non-conflicting agreements for example. Yet, when product result specifications originating from different sources are in conflict, this assumption is challenged. Especially in municipal offices where there is a multitude of product and service requirements (both from within municipalities, and from higher levels of authorities) there is a high chance of overlapping and conflicting product specifications. Given such simultaneous requirements, adapting production lines becomes complex. This generates uncertainty in the economic rules, especially for product and process managers. As EVENTUS coordination primarily targets internal activities, the uncertainties emerge mainly with actors close to the production process, within the geoG2Gs.

Thirdly, in the MODUS coordination type, the assumption is that actors comply smoothly with new design requirements, such as standards, when implementing geoICT activities. This compliance is considered self-evident. However when actors have relied historically on contingent data and process models, they may not easily accept alternative models. In such cases uncertainty may arise as to which model to use. This is uncertainty which relates to the conformity stability element within the geoG2G. The uncertainty is felt primarily by actors working close to the production process, within the geoG2Gs.

Finally, in the CAUSUS type of geoICT, coordination assumes both transparent social networks and a willingness to change. In practice however, it is not always easy to see in which individual social network actors are active and to which social network norms individual actors adhere. Resistance to change is also very common in practice, especially if the social-organisational context requires actors to change their operations, attitudes and beliefs. The CAUSUS geoICT coordination type may thus result in collectivity uncertainties, on the

change itself. The uncertainties are likely to emerge at the point where actors within geoG2Gs relate to their social networks, thus at an intersection point of geoG2Gs with their environment.

Summarising, the LOCUS and CAUSUS coordination types approach the geoG2Gs at the point where the geoG2G intersects or interacts with the external environment of the geoG2G. The LOCUS coordination type specifically targets the geoG2G's senior managers. These senior managers are accountable to external control and evaluation officials, usually in the form of councils, ministers, supervisory boards or parliaments. The CAUSUS coordination types affect geoG2Gs in their immediate relation with the environment in the form of client, customer and citizen contacts. On the other hand, the MODUS and EVENTUS coordination types relate more to the internal production processes. MODUS coordination aims at aligning internal production processes; EVENTUS targets also specific internal product results. Table 2.5 shows the relation between the type and location of possible uncertainties arising from geoICT coordination types.

geoICT coordination type **Issue**	**LOCUS**	**EVENTUS**	**MODUS**	**CAUSUS**
Possible risks, resulting in emergence of uncertainties when there are:	Multiplicity of hierarchical relations	Multiplicity of demands; Conflicts between agreements	Conflicts on standards	Multiplicity of social networks and unwillingness to change
Location of uncertainty:	At intersection of geoG2G actors with external environment	Close to work processes internal to geoG2Gs	Close to work processes internal to geoG2Gs	At intersection of geoG2G actors with external environment

Table 2.5: Type and location of possible uncertainties arising from geoICT coordination types

Combining these two dichotomies derives the categorisation of geoICT coordination types according to how they target activities and actors of geoG2Gs. On the one hand there is the dichotomy of uniformity versus flexibility. On the other hand, there is the dichotomy of targeting actors working close to other actors in the production processes versus actors working at the intersection of the geoG2G with other actors external to the GeoG2G. Figure 2.4 shows the categorisation.

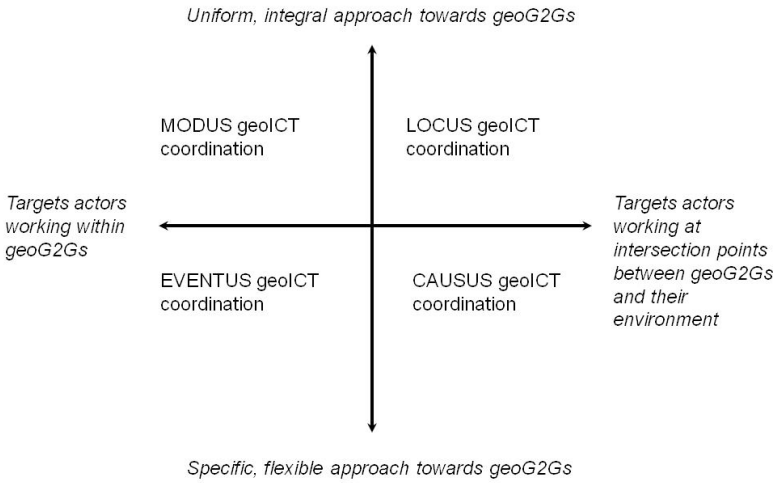


Figure 2.4: Relation of geoICT coordination types with activities and actors within geoG2Gs

2.5 Conclusion

This chapter addressed research question 1 '*What is geoICT coordination, and what is geoICT coordination about*?' Addressing this question continued from the exploration in Chapter 1. The exploratory model in Chapter 1 defined geoICT coordination as a comprehensive goal-setting and goal-implementation action which aims at aligning geoICT activities and choices in at least two organisations, and which usually results in a change intervention in how public sector agencies cooperate with geoICT. The assumption in Chapter 1 was that the coordination types could take different forms and would have different focuses in different contexts. This chapter started from this assumption and aimed to extend the insight in the focuses and contexts using an inductive pragmatist approach. The approach induced the conceptualisation and categorisation of geoICT coordination by combining a view from practice with a view derived from theory. The view from practice relied on a document analysis of grey literature by practitioners, and an interpretative analysis of interviews with key practitioners in the field of geoICT in the Netherlands.

The practice analysis from practitioners' written and verbal language manifestations revealed that geoICT coordination actions emphasise the need to align geoICT choices across all public administrative levels. This intention to localise and mirror national geoICT objective to local geoICT objectives is a specific type of geoICT coordination, labelled as LOCUS. EVENTUS on the contrary is a geoICT coordination type whereby the aims and activities

emphasizes aligning the geoICT production activities to foster certain specific outputs , while de-emphasing uniformity across public adminstrative levels the geoICT coordination . The theory analysis induced two additional coordination types which each exhibit other characteristics: one type emphasising the application of particular instruments and tools (MODUS), and one emphasising the alignment of activities to specific contextual outcomes (CAUSUS).

As the differences between the four geoICT coordination types are visible in how the actors formulate their aims and execute alignment activities related to geoICT and geo-information processes or products, one can assume that geoICT coordination types also differ in their fundamental assumptions and normative approaches to intervene in geoG2Gs. These fundamental differences in geoICT coordination approaches are relevant for the identification of the first component of the explorative model of Chapter 1, which is how each geoICT coordination type acts upon geoG2Gs and how it triggers or coincides with uncertainty and/or discretions.

The assumption is further that each of the geoICT coordination types results in an intervention in each of the four stability elements of geoG2Gs (power, economic rules, conformity and collectivity). One may therefore assume that each geoICT coordination type has a different effect on either the sequence of stability changes (using the logic of process models), and / or each geoICT coordination type acts as a different agent of change for the geoG2G stability factors (using the logic of variance models). In both logics a variation of geoICT coordination types corresponds to a (potential) variation in uncertainty. The emergence and variation of uncertainties is the first indication of a change in geoG2G stability factors. For LOCUS and CAUSUS coordination types the uncertainties are more likely to emerge among actors active at the intersection of the geoG2G with its environment, whereas for the MODUS and EVENTUS coordination types the uncertainties are more likely to emerge among actors active within the geoG2Gs.

The emergence and location of uncertainties (within geoG2Gs or at the intersection with the geoG2G environment) is relevant for the second component of the exploratory model of Chapter 1, namely the type and the location of discretions of geoG2G actors. As the assumption in Chapter 1 was that the discretions depend on and correspond with uncertainties, discretions thus also relate to geoICT coordination. Having identified different types of geoICT coordination, Chapter 3 addresses what type of discretions exist, and how each type of discretion relates to each type of geoICT coordination.

Chapter 3

Discretions

3.1 Introduction

This chapter addresses the second component of the central research question. Whereas Chapter 2 emphasised reviewing the content of geoICT coordination actions, this chapter focuses on the effects of geoICT coordination actions for individual staff members in geoG2Gs. The assumption in the explorative model of Chapter 1 was that geoICT coordination would influence discretions of individual staff members. However, up to this point, it has not been known exactly what these discretions consist of, and whose discretions are effectively influenced by each type of geoICT coordination. The research question under consideration in this chapter is therefore '***Whose discretions are affected by geoICT coordination in the Netherlands, and how are these affected?***'

As in Chapter 2, this chapter follows a pragmatic approach, where the interpretation of reality draws on the combination of what actors perceive in practice, with what scholars have conceptualised in theory. Section 3.2 begins with a conceptualisation of discretions by a view from practice. The conceptualisation relied on an exploratory analysis of the issue of 'discretions' in grey literature, and the interpretation of practitioners' statements on their own 'discretions' and the discretions of others in interviews and in an exploratory survey. Combined, this yielded a conceptual view of practitioners' discretion differences. Section 3.3 follows the practice inventory with a conceptualisation of 'discretions' based on scientific literature. Section 3.4 combines the findings of sections 3.2 and 3.3, and induces a conceptual model of the variation and causes of discretions by different types of geoG2G actors. This conceptual model provides the answer to the research question under consideration in this chapter, which is summarised in the concluding section 3.5.

3.2 Conceptualising discretions by a view from practice

The conceptualisation of 'discretions' by practitioners relied initially on the same grey literature and interview transcripts as in Chapter 2.2. As in Chapter 2.2, the analysis began by searching for concurrences in grey literature and interpreting statements of practitioners during interviews.
Annex 1a provides the full list of exploratory interviews with key informants. Fourteen interviews were conducted with public sector practitioners in the Netherlands. The interview sections dealing with discretions had an explorative character, focusing on exploring, rather than explaining, actual practices and perceptions on staff positions and staff discretions. With regard to the issue of

discretions, the interview sections related to differences in staff positions, possibilities for staff to make their own decisions, and views on freedom of decision-making in current job functions. The exploratory interviews were recorded and transcribed. Excerpts from these interviews hereafter are parts of these transcripts.

During this initial analysis of both grey literature and interviews, it was found that the grey literature and interviews were insufficient in revealing which discretions existed at more operational levels of geoG2Gs. Thus an additional data collection and analysis method was considered necessary to complement the data on discretions. An additional survey among 100 practitioners in the Netherlands was therefore conducted. The survey targeted staff at all three administrative levels, while targeting staff working in geoICT and Egov operational and internal organisational alignment and management activities. The survey explored how practitioners responded to geoICT coordination strategies, and what degrees of freedom they employed in doing so.

The subsequent subsections provide the results of the grey literature analysis, the interpretation of the responses during interviews and the results of the survey. The grey literature, the interviews and the survey results together provided the conceptualisation from practice. This consists of a general insight into the differentiation of discretions per staff type, and into how practitioners in the Netherlands view their discretions in relation to geoICT coordination strategies, as well as uncertainty arising from geoICT coordination types.

3.2.1 Results of viewing discretions practice through grey literature

The practitioners' conceptualisation of geoG2G staff discretions departed from the same corpus of grey literature as in Chapter 2 (the GI-related corpus and the EGov-related corpus). However the results in the review of 'discretions' in these two grey literature sets were less satisfactory than those in Chapter 2. Whereas a review of word frequency analysis was useful for the initial conceptualisation of 'geoICT coordination', there were zero word frequencies of the terms 'discretion' and 'discretionary space.' Thus the concurrency review had to rely on occurrences of other words relating to discretions. The other words were derived from the initial definitions in Chapter 1. Davis (1969) for example refers to the term 'personal judgments' and later to the term 'freedom' (Davis, 1976:4) when making a choice between possible courses of action and inaction. The initial key words to examine were therefore: 'decision', 'personal judgment', 'staff', 'uncertainty' and 'freedom'. Even though the occurrences of these words were relatively low, the review of the concept of 'discretions' relied on interpreting the concurrences of these combinations of words (just like the review of the concept 'geoICT coordination'). The review of the concurrences of these words in each of the two corpi (GI and Egov grey literature) is

elaborated further below.

GI corpus:
The word closest associated to 'discretions' was 'decision(s)'. The GI corpus did not include the words freedom ('free' only related to 'free' access), discretion(s), discretionary, 'uncertainty/uncertainties)'. A total of 33 documents included the specific word 'decisions'; the term 'decision' these 33 documents related to:

- Support (the concurrence 'decision support'): seven times
- Making (the connection 'decision-making'): six times
- Makers (connection 'decision-makers'): four times

In all other cases, the word 'decisions' followed an adjective, or an attributively-used activity (towards a decision). Examples of decisions relating to adjectives and attributively used activities:

"Resource and land use decisions should be based on the best resource information available." (Stokes, 2002:1)

"Reference data has especially in recent years proven its importance in making both political and governmental decisions. Some figures state that as many as 80 percent of business decisions are made based on geo-referenced spatial data." (Barwinski, 2002:1-webpage)

"The national Department of Housing is pursuing various ways and means of intervening in this negative trend, one of which is a National Housing Spatial Investment Potential Atlas which is a decision support tool to assist national housing to make informed decisions regarding housing investment and to make meaningful interventions to ensure that the location of housing projects occurs according to integration and sustainability principles." (Biermann and Smit, 2003:1)

"ROADS has taken advantage of GIS as a more effective means for making better-informed planning decisions." (Hailu and Belsham, 2003:1)

"Can governments take good and valid decisions in cases where the available...." (Paez et al., 2004: 1)

Examples of activities relating to the decision-making process include:
"Making these decisions requires a much more aggressive and effective use of WSSC's legacy Maintenance Management Information System (MMIS) data and geographical information system." (Tucker and Corriveau, 2002:1)

"Through enabling the exchange of compatible spatial data between government, business, and customers, decisions can be made with more thorough and more accurate information." (Barwinski, 2002:1)

"Reaching decisions about what needs to be done at the outset and during the course of a humanitarian emergency has been an ongoing challenge for all involved." (Messick, 2003:1)

"An ideal situation for a country or region will be to have a spatial data infrastructure (SDI) containing the datasets and models necessary to support all the planning and decision processes." (Paez et al., 2004:1)

"Attendees will learn what effects the results of the models may have on decisions regarding life and property." (Martin and Kiles, 2004:1)

"Meanwhile, the North Carolina Geographic Coordinating Council had begun phase one of planning and policy decisions for NC OneMap." (Kannan et al., 2004:1)

Comparing these examples shows that practitioners associate 'decisions' with the decision-making process, the decision-making result or the preparation, influencing or directing of decisions of others. All these 'decision' concurrences refer exclusively to top-level decision-makers, politicians, managers (sometimes even in an imaginary way). They do not relate to decisions of operational (street-level) or internal alignment (system level) staff members. Moreover, only five papers refer to 'staff' other than top-level staff.

Table 3.1 summarises these views:

Type of association	**Related to decision-making process**	**Related to decision outcome/result**	**Related to the preparation/ influencing/ directing of decisions of others**
Examples of word concurrences	Decision-making; decision makers	Land-use decisions; informed decisions	Decision support ; decision-makers; planning and policy decisions

Table 3.1: Association of practitioners with the term 'decisions' in grey GI literature

The following examples show however that the papers refer to staff members in a rather abstract way.

"Web technology is enabling governments to not only provide services to the public via the Internet, but to improve internal effectiveness by deploying Intranet business applications to their own staff and business partners. Spatially enabled decision-making is becoming critical to managers at all levels of government." (Parrish, 2002:1)

"This session is therefore aimed equally at the technical and administrative staff member from city and county government, the utilities, and others who wish to view their information from the perspective of the corporation, the industrialist, or the entrepreneur." (Mariahazy, 2002:1 - file on CD)

"Preliminary discussions with local government staff suggests that problems that arise in establishing data sharing and cooperation between agencies. For instance, pride of ownership is mentioned as a critical intangible issue for local governments who feel squeezed by state and federal guidelines and standards." (Harvey, 2003:1)

"Although government is a major employer, skilled GIS staff are spread thinly across several departments." (Mills et al., 2003:1)

*"The application allows City budget staff to create funding status reports and track the CIP project lifecycle from a budgetary perspective." (*Alexander et al., 2004:1)

Hence, it is insufficiently clear which type of staff relates to which type of decision, or which type of discretion. The quotes show however that geoICT-related activities involve different kinds of staff members (e.g. technical, administrative, local, city budget staff), and that each kind of staff member may have different rules to observe. As a result, the freedom to formulate personal decisions and/or discretions may also relate to the roles and rules related to each staff member.

The interrelation of concurrences of 'staff' and 'decisions' yields only a general insight into geoG2G staff and their discretions. The concurrences highlight that different types of staff members are associated with various types of decisions and various types of decision processes. It is therefore likely that different types of discretions may emerge in relation to these decision-making processes. What is unclear from the GI grey literature, however, is the extent to which actors are likely to reach personal discretions, and which type of decision-making process is more likely to result in which type of discretions.

EGOV corpus:
The Egov corpus included many more references (than the GI corpus) to the word 'decision.' A total of 138 papers included the word 'decision.' From the

concurrences, 'decisions' relate to decision support (nine times), decision making (37 times), decision-making (with hyphen '-') (30), and decision makers (11). The adjectives of 'decision(s)' are: 'better' decisions, 'business' decisions, 'policy' decisions, 'management' decisions, 'well-informed' decisions, 'alignment' decisions, 'IT investment and development' decisions, 'public' decisions. Finally, there is one reference to the impact of decisions:

"But, unlike most research on e-government adoption, this paper focuses on the citizen-centric and global legitimisation pressure factors that impact the decision." (Stoltzfus, 2005:333)

The Egov corpus only contained one paper with the word form 'discretion.' The 'discretion' reference was however to 'discretions' of a citizen web user, and not to discretions of a public staff member in a geoG2G:

"Digital government applications often involve websites to provide information for citizens and visitors about essential services such as passport application or motor vehicle registration to discretionary, but highly popular applications such as recreation and parks information." (Shneiderman, 2005:7)

A further search for 'discretions' was therefore necessary, such as the word occurrences of 'freedom' (to make decisions). Again, the references to 'freedom' did not however relate to freedoms (the liberty to decide) of individual staff members, but to other types of freedom, as the following concurrences show:

"Policymakers are addressing societal concerns such as privacy, freedom of speech, and intellectual property protection through the design of information technology. While scholars have noted the power of information technologies, there is little analysis of how people are affected or regulated by information technology." (Shah and Kesan, 2005:91)

"Citizens and enterprises in the European Union benefit from a common internal market and other freedoms." (Otjacques et al., 2006:70a)

The word 'uncertain(ty)' appeared in four publications of the Egov corpus. With regard to the extent of uncertainty, the concurrences show that practitioners view uncertainty either as system uncertainty, or as uncertainty arising from unknown or unforeseen action by others:

"Digital interaction, however, is inherently new terrain for many members, and any new activity entails uncertainty and risk. Furthermore, implementing and making effective use of innovations requires new knowledge and new operating procedures." (Esterling et al., 2004:1)

"Employing three-dimensional visualisation technology, the system also provides a visualisation tool for multisource spatial-temporal data integration and uncertainty analysis." (Li et al., 2006:430)

"Despite and/or because of this centrality however, formerly 'technical' domains of modelling have been opened up to new forms of public debate, scrutiny and critique, with uncertain policy consequences." (Jackson, 2006:95)

"The study found that the voters in a student election in actions as well as in stated views gave priority to convenience over security and privacy. They voted electronically from home despite uncertainty about the security of the technical system. We argue that this is an indication that the view of the principles of democratic practices will change, and that what might be called an 'e-practices mode of thinking' will to some extent prevail over a 'rigid democracy mode.'" (Grönlund, 2002:245)

The specification of 'uncertainty' is limited. In general, one could conclude that practitioners tend to avoid addressing 'uncertainty' in the grey literature, or that 'uncertainty' is not a primary problem for practitioners.

Finally, the term 'staff' appeared in 10 papers of the Egov corpus of grey literature. Similarly to the GI corpus, the inclusion of 'staff' does not provide a clear explanation of which specific staff members do (or are supposed to do), or what they can decide upon. The references to 'staff' merely provide a general reference to the kinds of staff which may be involved in certain activities. The following examples of concurrences show this:

"The main goal of this project is to develop a digital library system for natural resource managers, such as the forest supervisors of the USDA Forest Service national forest system, and their technical staff. This project has a goal of 'knowledge management' in that the scientific assessment, opinions, experience, and judgment of agency personnel are embodied in the various internal and external documents produced as part of various projects and decision-making processes." (Weaver et al., 2004:1)

"The demands of analysis and information processing can strain limited agency staff, as well as limit the public's capacity to review and comment upon major regulations as they are developed." (Coglianese and Kennedy, 2004:1)

"Among the project accomplishments, efforts can be categorised into three general foci: developing ESDA methods, supporting public communication, and facilitating internal data quality review by agency staff." (MacEachren et al., 2004:1)

"The resulting massive data heterogeneity means government staff cannot effectively locate, share, or compare data across sources, let alone achieve computational data interoperability." (Pantel et al., 2005:205)

"There are a variety of institutional mechanisms that facilitate the interaction of members and their staff. Most relevant is shared committee membership, where each member belongs to several committees. Common membership creates natural interdependencies among those offices through increased collaboration and negotiation, interactions that can lead to discussions over the effectiveness of communication innovations. Overlapping caucus memberships function in the same way. (...)It is likely, therefore, that members and their staff whose offices are physically closer to each are also more likely communicate." (Lazer et al., 2005:297)

"These two applications have been developed especially for the use in the administration and are available for the staff on the Austrian government intranet." (Kocman et al., 2002:230)

"This paper applies Legal Design, a new field of inquiry, to discuss the form and contents of an E-Learning environment recently implemented by the Canton of Zurich (Switzerland) to enhance the training and development of public administration staff. It is argued that there is a need to visualise this environment more effectively." (Brunschwig, 2002:215)

"We discuss briefly in this paper the design of a knowledge-based DSS developed for supporting local government staff in the choice of energy saving projects." (Klein, 2004:97)

"Potential users (i.e., students, staff) were surveyed to determine their intent to use the system." (Alicia, 2006:82a)

The above concurrences of 'staff' reveal that although the articles refer to the relevance of staff for particular actions, they do not refer to any degree of freedom that any individual staff may have for any action. There is a recognition that staff roles differ, yet the roles are not specified, nor are individual degrees of freedom in the execution of the roles. This implies that there is insufficient information on the content of 'discretions', and the locus of discretions.

In sum, from the review of grey literature it is clear that the term 'discretions' does not occur sufficiently enough in the GI and Egov domain to extract a well-defined definition or to infer a set of crisp characteristics on 'discretions.' This implies that practitioners either do not discuss this issue directly, or that they do not explicitly review what kind of discretions have what kind of influence on

their views, products, results or processes.

Indirectly however, the issue of 'discretions' can be derived from how practitioners refer to the terms 'decision' and 'staff' and how they relate 'staff decisions' and 'decision-making processes' to 'uncertainty'. From these indirect derivations, 'discretions' in relation to geoICT and geoICT coordination may still be assumed to be personal judgments of staff members (in line with the starting point of the search and the definitions of Davis (1969 and Davis (1976)). More specifically, however, and adding to the starting point definition, the personal judgments relate to the roles and rules of the geoG2G staff members. Furthermore, 'discretions' relate to different types and different levels of staff. As these roles and rules differ in the respective levels and functions within geoG2G organisations, discretions differ at various levels within an organisation. Uncertainty also plays a role in the emergence of discretions. At the respective levels of organisations, staff members make personal judgments when faced with uncertainty.

3.2.2 Results of viewing discretions practice- through verbal statements

The conclusion from the grey literature analysis that staff discretions differ per staff role and staff rule also resonated during the interviews. From the interviews with the 14 key interviewees it was clear that staff roles within geoG2Gs differ, and that personal discretions may differ according to the staff roles, and to the staff level rules. The interviews identified three types of staff roles and associated staff rules: strategic, alignment and operational. For each of these staff member types, the interviewees could expand on the staff member roles, and on associated staff member rules.

Strategic (geoG2G) staff consists of strategic managers dealing with long-term interests of the cooperation and of the geoICT technical endeavour. Interviewees referred to strategic staff members as those who have executive power in making decisions and who formulate 'strategic discretions' in relation to the institutional environment of geoG2G. The functional roles to which the interviewees referred when profiling strategic staff included: (executive) director of a geo-information organisation, chief executive officers, and senior policy and strategy advisors

Similarly, alignment staff members (sometimes referred to as 'system staff' or 'information management staff') were identified as a particular group of internal staff, with a particular role to formulate alternatives on business alignment and information alignment. Some interviewees indicated that the absence of clear institutional rules or organisational function descriptions (other than generic strategic guidance) for this internal alignment process could be one of the reasons why 'alignment discretions' could emerge. Such alignment discretions

could for example relate to the introduction of new IT, or the introduction of new business processes.

A third kind of staff involved in geoG2Gs which the interviews revealed was the 'operational' staff. 'Operational staff' is the large group of remaining employees in geoG2Gs, who are primarily taking orders from managers, yet are working at the forefront with customers or clients. In line with the other two groups of staff, interviewees acknowledged that operational staff might have certain 'operational discretions'. Yet whereas for the first two types of staff the interviewees could (indirectly) provide examples of what these discretions consist of, for the latter (operational discretions) the interviewees could not indicate what this involved. They indicated, however, that operational discretions existed, yet suggested that the actual content of these operational discretions would require further investigation among a larger number of operational staff (this part is further addressed in section 3.2.3).

Table 3.2 provides examples which the interviewees mentioned on the issue of staff types, staff roles and staff rules.

Staff type	**Examples of geoG2G staff roles (functions)**	**Examples of geoG2G staff rules**	**Discretions possible in**
Strategic staff	Chief executive officer; director; senior policy and strategy advisor	Set by board of governors; steering committees; laws	Choice of partners; budget allocations
Alignment staff	Geo-Information system manager; geoICT project and policy advisor; coordinator ICT; information and architecture manager; section head GIS; project leader	Set by cooperation agreements; set by projects	Choice of new (geo)ICT; choice of internal employees for operational activities; introduction of new business and/or operational processes;
Operational staff	Cartographer; GIS user; land surveyor; GI sales officer	Set by working contracts; performance measures	Choice of operational materials

Table 3.2: Examples of different staff types, staff roles and staff rules

From the initial 14 interviews the difference between strategic and alignment discretions became visible through the associations that the interviewees made while addressing the issue of personal judgments and reaching individual decisions. Staff in strategic management jobs associate 'discretions' with (organisational and personal) risk arising from the external world. Such risks include the impacts which the developments in technology may have on the role

of the organisation, and the job functions in the organisation. The following excerpt from an interview (Interview excerpt 3.1) with a strategic staff member clarifies how and where discretions arise for strategic staff:

Q:
And when do you look for more influence, or more discretionary space, or do you say…let it just happen?
A:
No, what you have to do I think, is ... to be very conscious that the outside world is much more on a revolutionary path, than on the evolutionary path of the government. But you have to pick the components that you need for your public function in good time. You should not have the illusion that you have … whether these are Google's or whatever … that you have any influence on that.
Q:
And what does this mean for you? Do you seek more discretionary space, or look for a smaller task, where you have complete control?
A:
That depends. A smaller task ... essentially you would like to have a small task where you have complete control … but then you become a very small organisation. Where you want to go to eventually, is that you differentiate yourself from all the other worlds. (…) Only ... previously ... you would make everything yourself ... and you could manage all the channels … you did it with your own technology ... now you have to be more open. Both within the public sector, and outside ... that you co-evolve faster with all the revolutions which occur in the outside world. You have to become much more adaptive as an organisation. Because you have to maintain your institutional task, which you cannot neglect.

Interview excerpt 3.1 – Origin of discretions among strategic staff

The quote *"You have to pick the components that you need in good time"* from the interview excerpt 3.1 shows that strategic staff have certain discretions and that (the need for) discretionary space is closely associated with the uncertainties and changes in the institutional and organisational environment. Furthermore, the comment "*Because you have to maintain your institutional task"* indicates at the same time that the boundaries for discretions may be tight, and require continuous balancing with the institutional environment.

Staff in alignment functions refer to discretions when starting up or ending new contracts, and when taking the 'professional' decision to act and interfere in on-going work processes. In 'aligning', there is the process of reaching a particular discretion. Typically, alignment staff prepare certain decisions by seeking support at different levels within the organisation. Although it would seem that such decisions do not rely on an individual discretion of the alignment staff, in fact in this case the discretion is hidden. The discretion precedes the seeking

support process, because the alignment staff have a professional, yet individual, appraisal of a current situation to start the process of interfering. The discretion is thus part of the longer process of seeking support among higher or political levels on the one hand, and among operational staff on the other. Examples of such hidden discretion are the statements in the following interview with a geoICT alignment staff member at a municipality for example, working in various geoG2Gs:

Q:
So, what is seeking support? What is it in practice, I mean?
A:
Well. Exactly. To me personally, I have something … if I am enthusiastic about something, and you can make sure that from the management side they say ... yes, we aim for that … then you can ask them to show their support ... to the extent that they say ... OK ... we use so many resources for this ... so many hours, for this and that. That to me is support. It is supported by management … this is what we want ... this is what we aim for, and we allocate this for it. Then you have support. The same applies to people in the organisation. That's where it starts … support stops with the 'wanting.' They simply don't want to.
Q:
And you can see that by what people do, or do not do, or are quick in …?
A:
Yes, what they do not do, or simply do not listen, or just have a negative attitude from the start ... not being motivated, trying to defer tasks, that sort of thing. That is not support.
Q:
But, that is thus recognising certain behaviour, or a particular part, of which you say ... wait a minute ... here is…?
A:
Yes, because if you have support, then people of a particular department say ... OK ... we see that we have an indirect interest, we just do it. Just tell us how to do it. Or, we want to have a say in how to do it.(...)That's why I find it important that in the development, or the implementation of a certain project, you make sure, as much as possible, that you involve people, who will later execute the maintenance.

Interview excerpt 3.2. – Hidden discretions among alignment staff

In the interview excerpt 3.2 the 'to me personally' in the first answer does not necessarily reflect a single personal view of the specific staff member to the specific question, but reflects a regular reaction that the individual staff member may have towards situations of uncertainty and of opportunity. Indeed, it reflects that the staff member can and does have a certain degree of freedom to react to a particular situation with a distinct personal touch. As it is a typical quote from an alignment staff member, and not from an operational or strategic

staff member, the degree of freedom reflects the freedom related to the specific role of the staff member, namely the discretion related to the alignment role. The discretion in this role is obvious from how the staff member refers to other staff members and complete departments, and the need to retrieve support from all levels of staff members and departments. Discretions of alignment staff, in other words, relate to where and how they can influence activities of staff members in other organisational roles.

Furthermore, almost all interviewees indicated that they were working in a hierarchical manner. Such a top-down organising structure predetermines which geoICT coordination types are most commonly known by staff members. For example, professionals working in spatial planning are historically accustomed to working in hierarchical planning structures. The Ministry of Housing, Spatial Planning and the Environment (VROM), for example, has the authority to transpose certain rules of planning and planning maps to lower levels of government. This corresponds to LOCUS geoICT coordination types, which also has as its objective to align geoICT activities at lower administrative levels to higher administrative levels. In line with this historical and organisational cultural tradition, the key registers coordinated by VROM are thus a typical example of LOCUS geoICT coordination. VROM organised the key register activities at a central level, and aims to transpose the geoICT requirements from the central level to the lower one – usually the municipalities. Such a traditional coordination practice may however not be accepted fully in organisations which are traditionally more autonomous, and whose staff are accustomed to working more independently. GeoG2Gs which operate on the basis of agreements with flatter rules are unlikely to adhere fully to central LOCUS coordination types. Many staff members are working in an environment of consultative (such as working groups on standards) and representative professional relations (such as associations of municipalities). Although participation in these professional relations does not directly imply having to execute specific work tasks, or being responsible for specific work output, individual staff members still attach value to these professional relations. As a result, many staff members indicated that the beliefs and activities of the professional relations exercise influence on daily activities, and influence the extent to which they adhere to LOCUS type of coordination. Indirectly, the professional relations of individual staff members may therefore influence the individual staff discretions.

When asked about the influence of technology, practitioners indicated that any decision to opt in or opt out of a working agreement did not depend on the choice of a specific technology. The interviewees at municipal level indicated that open source geoICT technology, for example, did not influence any of their decisions for their daily activities. Hence they would not reach any specific discretions. This contrasted the expectation expressed by respondents at national level, who expected that open standards might result in autonomous discretions

of alignment and operational staff members. However, the respondents working at municipal level did not regard open source applications and opportunities develop in practice, nor did they perceive any influence of open source in their daily operations. Within municipalities few operational practitioners are using open source geoICT. With regards to open source, the majority of staff members are not even aware of any standpoint of their organisation with regards to open source software. Hence, open source has little influence in their daily decisions, and might have little influence on reaching discretions.

In sum, the verbal statements show that discretions differ depending on the roles and rules under which respective staff member groups have to work within geoG2Gs. Strategic staff members operate under the rules set by governing boards or geoG2G steering committees; hence their discretions may arise when these rules are unclear or incomplete. Their discretions tend to relate to changes within the institutional and organisational environment of the geoG2Gs. Alignment staff members operate under the rules of geoG2G agreements. They are likely to exercise personal discretions in the absence of clear rules on internal alignment of geoICT business processes. Their discretions are visible through actions of seeking internal support. Operational staff members usually follow the rules set by individual contracts. They might exercise discretion if the work tasks and performance rules are insufficiently tight. The interviewees did not perceive that within geoG2G, operational staff has much freedom to manoeuvre. They could give few tangible examples of operational discretions.

The professional relations of individual staff members affect the degree to which staff members exercise certain discretions, and the degree to which such discretion coincides or conflicts with certain geoICT coordinating types. Staff members working in historically strongly hierarchically organised working relations (such as spatial planning), perceive that there is little room for individual discretions. In these work relations LOCUS geoICT coordination types are dominant, because they follow the traditional way of coordination and management of resources. Staff members at lower administrative levels are accustomed to these hierarchies, and tend to adhere to rules formulated by higher levels. However when staff members are actively involved in professional groups outside these hierarchies (such as through consultative or representative groups) than they become more receptive to other ideas and beliefs about what is ‘good’ geoICT management. Accepting centrally formulated and transposed concepts of geoICT (characteristic of LOCUS geoICT coordination) in such cases may become less appropriate in the eyes of staff members at lower administrative levels. They may thus exercise individual, autonomous discretions, or may become more receptive to other geoICT coordination objectives. For example, the individual decisions taken by alignment staff members when searching for alternative business processes reflects that the staff member is adhering to MODUS types of coordination.

This MODUS type is the coordination among staff members to aim for the alignment of chains of geoICT activities across organisations. The individual decision of the staff member to adhere to the MODUS type of coordination is at the same time a staff discretion, because they are not adhering to the LOCUS type of coordination.

This brings about the issue of 'uncertainty', namely uncertainty as a result of different geoICT coordination types. Staff members who accept working for a particular geoG2G are also accepting working under the particular geoG2G rules. If this geoG2G is strongly receptive to the LOCUS type of geoICT coordination, because the geoG2G is completely embedded in hierarchical organisational settings, then the regular staff activities and coordination aims are likely to coincide. However uncertainty may arise once the hierarchies are changing, while the geoG2G rules remain the same. In such cases, the geoG2G staff member will become uncertain as to which rules to follow (those of the new hierarchical work relations, or those of the geoG2G). Staff members may also become uncertain of their work tasks if geoG2G agreements change over the course of time, as a result of new product specifications for example. In this case, the coordination activities and instruments arising from the new product specifications (which is a typical characteristic of the EVENTUS type of coordination) conflicts with the work specifications arising from the 'regular' work specifications. They may opt for either one or none. In both cases, they exercise personal decisions, hence discretions, as a result of the uncertainty arising from the conflicting objectives.

Finally, the interviewees were most familiar with the uncertainties arising from different geoICT coordination objectives at strategic level, i.e. arising from negotiating contracts and cooperation agreements, for example. Uncertainties at operational level were unclear to most interviewees (for example when having to address various technical requirements originating from different coordinating actors). The review of discretions at operational level thus required further data collection.

3.2.3 Results of viewing discretions practice – through a survey

Due to the limitation in the number of examples and viewpoints on the extent, reasons and content of operational discretions staff from the analysis of the grey literature and interviews, there was a need to extend the view from practice by collecting data from practitioners through an exploratory survey. Such a survey could determine how and where discretions of operational staff differed from discretions from other types of staff.

The initial findings on discretions in practice were the basis for the design of an online questionnaire. The grey literature analysis recognised that there is a

differentiation of roles of staff members within geoG2Gs, but could not reveal the actual differences between these roles. Thus it was not clear enough from the grey literature analysis how these differences affected the possibility of individual staff discretions. So there was a consideration of the need to firstly relate the activities of staff members within geoG2Gs to the degree of freedom they currently have. This generated two specific survey questions: one related to the perceived role of staff members and one related to their perceived discretions. The verbal statements in the interviews also showed that the organising structures play a role in the degree to which discretions may emerge. But how the structures affect discretions of operational staff did not become evident during the interviews. Two specific additional questions were thus included in the questionnaire: one related to the internal structures, and one related to external structures.

The survey questionnaire was created using the free SurveyMonkey[10] software. The survey consisted of the five questions derived from the grey literature analysis and the verbal statements analysis. Table 3.3 shows the questions of the online survey.

The distribution of the survey occurred in three steps. The first was to make an inventory of contact email addresses of professionals working at operational levels, i.e. working in direct contact with clients or customers of geo-information products and services, and/or working directly with the geoICT technology to make such products and services. As such operational activities occur primarily at lower administrative levels, the inventory focused on compiling contact persons from all 443 Dutch municipalities, all 27 water boards in the Netherlands and all of the country's 12 provinces. The inventory also included the 10 e-government advisors and coordinators, contracted through ICTU, working for the implementation of e-municipality projects. It was expected that all contact individuals could provide details of operational activities, and the possible discretions of operational staff members, even though not all contacts were operational staff.

[10] www.surveymonkey.com

Issue	Questions
Perceived role / level of staff within geoG2G	1. How would you qualify your actual work?
Extent of discretions	2. To what extent can you make your own decisions on your work tasks?
Degree of influence of internal geoICT coordination staff	3. Do you have an internal geoICT coordinator?
Degree of influence of organisational structure on discretions	4. What organisational structure influences your discretions? 5. What representative or autonomous structure do you rely on in your discretions?

Table 3.3: Questions in survey

All those on this long list of potential respondents received an email requesting their participation in the survey. Within two weeks 99 people had responded to the questionnaire, although not all respondents responded to all questions. Thus the total number of responses to each reported question is not constant. Table 3.4 provides the response rate for each question.

Question	Number of responses
1	99
2	94
3	94
4	94
5	63

Table 3.4: Response rate per question

A total of 63 respondents responded to all five questions. Overall, this heterogeneous response rate did not allow a rigorous statistical analysis, as the number of responses was too low to be conclusive and the completeness of responses was heterogeneous. However the reliability of results was validated through personal telephone calls to 10 questionnaire respondents, who were willing to provide further details. For an explorative analysis, emphasising differences in qualities of discretions rather than quantities of discretions, the results were therefore considered appropriate and sufficiently reliable.

Question 1 – qualification of actual work
When asked about their role in geoG2Gs, 47 (roughly half) of the respondents indicated seeing themselves as a GIS operator, GIS designers, GIS programmers or a GIS manager. These labels refer to operational activities, and their role within geoG2Gs therefore reflects an 'operational' geoICT staff profile. Similarly, the responses of GIS/geoICT department heads and organisational process managers reflected an internal management or internal alignment role. Twenty-one of the respondents regarded themselves as internal

organisational managers or alignment staff. Finally, 31 of the respondents saw themselves as strategic advisors or (organisational) policy advisors. Table 3.5 provides these details. None of the respondents regarded themselves as a politician or decision-maker. Note that the question was not addressing the current function within their organisation, but the role which they play – by their own estimation – in the geoG2Gs.

Answer Options	**Response number (n=99)**	**Aggregated groups**	**Response number**
GIS/(Geo)ICT operator/user	8	Operational staff	47
GIS/Geo)ICT designer/programmer	5		
GIS/Geo)ICT manager	34		
GIS/(Geo)ICT department head/manager	14	Internal staff/alignment managers	21
Organisational process manager	7		
Strategy and/or policy advisor	23	Strategic staff	31
Organisational manager/advisor	8		
Politician or decision-maker	0		
Total	99		99

Table 3.5: Perceived role/level of staff within geoG2G

Question 2- Ability to make autonomous decisions
In answer to the question regarding the extent of possible discretions, the responses were as in Table 3.6. Overall, the responses indicate that most people feel they have influence over their decisions related to geoICT, yet it is also obvious that many decisions require a lot of internal and external communication. The majority (approximately 75%) of all respondents indicate that there is room for individual discretions, but in combination with internal communication. A far lower number (15%) of respondents indicate that they rely on communication with external actors for their decisions. There is no significant difference between the staff categories. This may indicate either that the content of the decisions of different staff members relates to or coincides with each other, or that the way in which staff members exercise discretions is very similar. In either case, it would suggest that the discretions of different staff members mutually constitute each other. This indicates that staff address uncertainties jointly with other staff inside and outside the organisation, and that individual staff discretion therefore relates to those communications.

Answer Options	Total (n=99)	Operation-al staff (n=47)	Alignment staff (n=21)	Strategic staff (n=31)
I decide everything myself	9	4	3	2
I decide myself, but need a lot of internal communication	74	37	17	20
I decide myself, but need a lot of external communication	14	6	3	5
I do not decide myself, but this is done by someone within my organisation	4	1	1	2
I do not decide myself, but this is done external to my organisation	1	0	0	1
Skipped question	5	3	1	1

Table 3.6: Extent of discretions

(NB: Some respondents provided two answers – which is why the totals do not correspond with the number of staff)

Question 3 - Internal geoICT coordinator
Sixty-four respondents indicated that within the organisation in which they worked there was no formal internal coordinator (Table 3.7).

Answer Options	Response Count (n=99)
Yes, we have appointed a specific coordinator to streamline cooperating with geoICT (with other organisations)	30
No we do not have a specific coordinator for cooperating with geoICT (with other organisations)	64
Skipped question	5

Table 3.7: Degree of influence of internal geoICT coordination staff

The fact that fewer organisations have specific staff to handle the multiple geoICT coordination strategies simultaneously implies that throughout those organisations there is considerably greater potential for staff discretions.

Question 4 – Influence of own organisational structure on discretions
Table 3.8 provides a general insight into the influence of organisational relations on individual staff discretions. The table makes a distinction between various types of relations. Firstly, staff members may be functionally related to nationally operating agencies or Ministries, such as the Ministry of Housing, Spatial Planning and the Environment (VROM), or Dataland. In this case usually, the result of a geoICT activity at an operational level is required by the national agency, such as the ministry. An example would be spatial plans. Secondly, staff members may have working relations with representative agencies, such as the association of municipalities (VNG). In this case, the geoICT activity is not directly required by the representative association, but the association acts as an intermediary for operational problems and challenges. As such, it performs a coordinating role. A third type of external working relation may be with individual partner organisations, and/or an individual department.

Total n=99	**Considerable influence (n)**	**No influence (n)**	**No response (s)**
Ministry of Housing, Spatial Planning and the Environment (VROM)	63	23	13
Ministry of the Interior and Kingdom Relations (BZ)	26	50	23
Implementing departments	9	63	27
Executing agencies for Egov (ICTU)	14	60	35
National data collection organisations	49	33	17
Representative associations	25	48	26
Steering committees of partnerships	53	26	20
Individual partners	50	36	13
Individual (Geo)ICT departments	52	29	18
Skipped question			5

Table 3.8: Degree of (perceived) influence of organising structure on geoG2G

This question was relevant because some of the external working relations may determine the preference and acceptance for certain geoICT coordination types. One would expect that institutional relations with ministries and national coordinating bodies would be reflected in the LOCUS type of coordination strategies, because LOCUS coordination strategies reason from transposing centrally-created ideas to implementation with local agencies. Similarly, in relations with executing agencies, such as the one with ICTU, one would expect reliance on the EVENTUS type of coordination strategies, because ICTU primarily aims at the practical implementation of results in E-government and the EVENTUS type of coordination is characterised by reasoning from results. Representative relations are also likely to emphasise MODUS coordination types, because MODUS reasons primarily from aligning business processes.

And finally, relations with individual partners are likely to draw on CAUSUS coordination types, because in CAUSUS the primary emphasis is on setting out activities which optimally adapt to local context and local problems.

Despite these general expectations, it was notable in the responses in Table 3.8 that there is a difference between the degree of perceived influence of the BZ and the influence of VROM. Both Ministries reflect an institutional working relation, yet overall the geoG2G staff felt less influenced by the institutional relations with the Ministry of the Interior and Kingdom Relations than by the relations with the Ministry of Housing, Spatial Planning and the Environment. This implies that, in general, actors are more likely to formulate their own discretions when it comes to coordination actions from the Ministry of Interior, than when it comes to the Ministry of Housing. As the expectation was that both ministries relied on the potential success of the LOCUS type of coordination strategies, apparently there is still a difference in which LOCUS geoICT coordination strategy is applied. Table 3.8 shows that although certain organising structures use similar coordination strategies (both Ministries primarily rely on LOCUS coordination strategies), in general staff members perceive different kinds of influences and are therefore likely to exercise different kinds of discretions. The difference in perceived influence implies that staff members tend to prioritise one coordination type over the other. This prioritisation is at the discretion of the respective staff members.

How the different types of staff members act out this difference is shown in Table 3.9. Table 3.9 provides the results of Table 3.8 classified by the type of respondents. The percentage shows the ratio of responses compared to the total number of staff type. For example the 72% indicates that 72% of the total number of respondent operational staff (47 respondents) found that the organising structures (and hence the associated coordination types) of the Ministry of Housing were influential in their daily work.

The responses in Table 3.9 show a remarkable difference between how the operational staff looks at the influence of the Ministry of Housing, Spatial Planning and the Environment (relying primarily on LOCUS coordination) in comparison to how the alignment staff considers the influence of this same Ministry. The alignment staff feels that the biggest influence on geoG2G comes from professional relations of steering committees and individual departments and the local relevance of individual partners (relying primarily on MODUS and/or CAUSUS coordination) rather than hierarchical relations and structures of the Ministries and executing agencies (relying primarily on LOCUS and/or EVENTUS coordination).

The difference in responses per staff type may be crucial. The results show that operational geoICT staff members perceive a much closer link to their work and

the various external agencies than do the alignment staff. The alignment staff perceive a much closer link to individual partners, and individual contracts. This seems to indicate that operational staff are much more receptive than alignment staff for coordination strategies in line with hierarchical relations, than with coordination strategies based on bilateral or multilateral contracts. Alignment staff are also far more receptive to individual work relations than to institutional work relations. All in all, the results show that it is not always the content of the work relations which may have an equal effect on the discretion of all staff types, but the degree to which one perceives the importance of the work relations itself.

Total n=99	Operational staff (n=47)	Internal/ alignment staff (n=21)	Strategic staff (n=31)
	Consider-able influence %	Consider-able influence %	Consider-able influence %
Ministry of Housing, Spatial Planning and the Environment (VROM)	72% (34)	46% (10)	65% (19)
Ministry of the Interior and Kingdom Relations	23% (11)	27% (6)	31% (9)
Implementing departments (like DID/RWS)	8% (4)	5% (1)	14% (4)
Executing agencies for Egov (ICTU)	8% (4)	14% (3)	24% (7)
National data collection organisations	53% (25)	46% (10)	48% (14)
Representative structures	30% (14)	14% (3)	28% (8)
Steering committees	61% (29)	41% (9)	52% (15)
Individual partners	47% (22)	59% (13)	52% (15)
Individual (Geo)ICT departments	51% (24)	59%(13)	52%(15)

Table 3.9: Degree of (perceived) influence of organising structure on geoG2G per respondent type

Question 5 – Influence of representative or consultative relations on discretions
When specifically considering the representative work or consultative relations, such as the work relations through associations or cooperative structures among municipalities, provinces or water boards (such as VNG, IPO, UWV), then the responses are as in Table 3.10.

Although not conclusive, the responses in table 3.10 indicate that staff members feel more affinity with internal relations than with relations which are based on representative or consultative relations. In particular, few respondents had any affinity with the work relations with IPO. This might result in disregarding the geoICT coordination strategies formulated and coordinated by IPO. The perceived influence of these representative work relations on their daily work is

thus minimal.

	This works best for us	Not good, not bad	This does not work for us	Response count (s)
VNG (association of municipalities)	10% (6)	65% (38)	24% (14)	59
IPO (association of provinces)	5% (3)	26% (14)	67% (36)	54
UWV (assoc. of regional water boards)	4% (2)	14% (7)	82% (41)	51
Provinces	10% (6)	39% (22)	50% (28)	57
Ministries	9% (5)	61% (34)	29% (16)	56
Own municipality	44% (25)	44% (25)	10% (6)	57
Inter-municipal consultative structures (e.g. WGR+)	20% (11)	50% (28)	29% (16)	51
Special cooperation agreements	34% (18)	49% (26)	17% (9)	54
Programme E-municipalities (EGEM)	29% (17)	50% (29)	19% (11)	58
Skipped question				36

Table 3.10: Degree of influence of representative organising structure on discretions

When combining the responses in Tables 3.5 to 3.10, the survey reveals that the perceived degree of freedom to exercise individual discretions on individual work tasks differs per staff type. Secondly, staff members exercise discretions both by existing institutional work relations and work relations which rely on consultative structures. This affects the degree to which staff members are receptive for certain types of geoICT coordination strategies. Strategic staff and operational staff find the institutional hierarchical work relations with the Ministry of Housing, Spatial Planning and Environment more influential in their daily work, whereas the alignment staff are influenced more strongly by professional partnerships and local individual relations. This implies that strategic and alignment staff might be more receptive to coordination strategies which are closely associated with these hierarchical relations. The LOCUS type of coordination fits this, because the aim in LOCUS is transposition from national to local. Contrastingly, alignment staff may be more receptive to CAUSUS coordination, where the relevance of immediate context is much more prominent.

3.2.4 Constructing a conceptual view on discretions from practice

Conceptually, the analysis view from practice through grey literature derived that discretions constitute personal judgments, which are different at three different levels of organisation: strategic, alignment and operational staff member level. The interviews with practitioners also revealed that the personal

judgments relate to uncertainties, which differ at each level at which staff members operate. Finally, the survey revealed that staff members exercise discretions both by existing institutional work relations and work relations which rely on consultative structures.

3.3 Conceptualising discretions by a view from theory

The conceptualisation of 'discretions' from theory relied on the documentary analysis of two types of article sets:

1) The technological-instrumental and socio-organisational sets of articles related to geoICT coordination in Chapter 2.3. These also included some insights into how coordination actions result in discretions of individual staff members. However, these articles primarily dealt with problems of geoICT coordination, and did not deal specifically with 'discretions.'
2) A complementary set of articles, where 'discretions' were the key issue (albeit not within the context of geoICT).

Combining these two sets of articles generates a view on 'discretions' from theory. This conceptualisation starts by inferring from the first set of articles what the effect coordination could be on discretions, starting from the coordination types as identified in Chapter 2. The inference leads to two contrasting effects in discretions. The analysis of the second set of articles starts by identifying the variance in discretions and aims at providing more insight into the broader set of causes of the variance of discretions and in the distinction of discretion types.

3.3.1 Results of viewing discretions from theory

The article set of Chapter 2.3 shows that each coordination type generates different conditions for possible discretions. The technological-instrumental stream of articles emphasises MODUS geoICT coordination types, where through technology one can engineer technical solutions with organisational effects. In MODUS coordination types, actors seek solutions through standards. However the solutions require enforcement and control across organisational boundaries. Such enforcement and control result in the confinement, or even deletion, of individual operational discretions (on data structures, data processing, or data dissemination types for example). In this view, geoICT coordination becomes just a matter of enforcing a technological solution, and a gradual, consensus-based, alignment process between activities and actors. Instead, decisions are prescribed through technological solutions, and discretionary space dissolves. The technological view, the MODUS coordination, therefore propagates the minimisation (or deletion) of any discretionary space through technological solutions. Ultimately, the values maintained in this technologically evolving process disqualify the discretionary space of individuals, since they have to wait for the next standard to be agreed

upon.

In the socio-organisational stream of articles, representing the CAUSUS geoICT coordination types, it is apparent that geoICT development and problem-solving depends on the degree to which actors relate to social networks. In these networks staff members from different organisations exchange ideas in problem-solving of particular societal or organisational problems. The benefit of being a partner in such networks is that the access to experience of others extends the palette of possible decisions and alternatives to solve certain problems. Joining the network has the advantage of having access to alternative insights into solutions for local problems. This access opens up the possibility of alternative views, and staff members may use the alternatives in the formulation of their own decisions. Thus their personal discretionary space may increase. In this case, it is not the production processes themselves, but the CAUSUS type of geoICT coordination which triggers the emergence of discretions.

To summarise: the set of geoICT-related articles reasons that each type of coordination may have its own effect on discretions. The technological stream of articles reveals that MODUS coordination types are likely to decrease the number and extent of discretions, given the emphasis on standards and standards production processes. Contrastingly, the socio-organisational set of articles highlights the content and implications of the CAUSUS coordination types, which emphasise embedding actions in local context and explaining actions in relation to the social networks in which actors operate. These actions are likely to increase the adaptive behaviour of actors and increase the number and extent of their discretions. Common in both cases is the deterministic view that a certain type of discretion follows from a certain type of geoICT coordination. A change in coordination type is likely to trigger or to precede a change in discretion type.

The set of additional articles on the issue of discretions in the public sector reasons not so much from the effects of coordination strategies on discretions, but from the variation of discretions, and from the possible conditions for such discretion variations. Finkelstein and Hambrick (1990) expand on three sets of factors which determine the variation in discretions of individual actors:

1) Organisational environment
2) Available resources
3) Ability to envision alternatives

The first factor concerns the degree to which the environment in which actors operate allows the actors variety and change in their daily work. In most cases many regulations and resource limitations exist, which prevent actors from deriving any personal discretion. Yet most actors are also aware of the space

'granted' by the environment. Hay and Wincott (1998) refer to the existence of cognitive filters within actors. Cognitive filters are:

"the perceptions [of actors] about what is feasible, legitimate, possible and desirable in the institutional environment in which they find themselves and existing policy paradigms and worldviews." (Hay and Wincott, 1998; 956)

It is through such cognitive filters that actors exercise certain discretions. The discretions are in line with the degree of freedom that they perceive to have within their environment.

The second factor concerns the degree to which the organisation is amenable to an array of possible actions and empowers the executive to formulate and execute those actions. Andersson et al. (2008) claim that not the technological solutions themselves, or the enforcement of the technological solutions (such as standards) lead to the confinement of discretionary space, but the limitation in actors' resources to implement the technological solutions which lead to this. Even if staff members were willing to seek personal discretions for their work, the constraints in resources (and capacity) prevent them from doing so. If on the other hand there are unforeseen resource opportunities, it might lead to personal discretions.

The third factor concerns the degree to which the staff are able to personally envision or create multiple courses of action. A possible reason why staff may prefer not to have discretions may be that operational staff prefer to work under routinised procedures than to have freedom to interpret procedures for themselves. Quane et al.(2009: 31) find that operational staff at the front end of service delivery were *"more comfortable with a rigid approach to service delivery when it relieved them of having to make difficult judgment calls."* Indeed, Lens (2006) found that even if operational staff have the opportunity for more discretionary space, they would prefer to rely on routine processes.

In sum, the cognitive filter to the environment, the access to resources and the ability to personally envision courses of action are conditions under which discretions may emerge. These discretions may however differ in their operationalisation. Maynard-Moody and Musheno (2000) differentiate two contrasting perspectives on how operational staff (front line officers) may have discretions and how they would use their discretions. On the one hand, operational staff could employ individual discretions as a way to simplify their own tasks and/or to handle ambiguous policies. Although almost every aspect of operational work relies on multiple rules and instructions, the extent to which all these rules are applied depends on the ability of supervisors of operational staff to enforce those rules (Lipsky, 1980). Yet in practice even this direct link from operational staff to supervisors has little constraining influence over

operational staff decisions and actions (Brehm et al., 2003).

On the other hand, operational staff could seek discretionary space when acting as engaged advocates for their deserving clients. Maynard-Moody and Musheno (2000) note that operational staff have a different relation with customers and clients than any other staff in an organisation and in a public administrative hierarchy. The relation with the external environment is thus based more on personal acquaintance and may even be based on personal sympathies:

"A defining characteristic of street-level work and what distinguishes it from other work at the bottom of bureaucracies is the street-level worker's direct contact with citizens. Unlike elected and other top government officials they do not see citizens as abstractions but as individuals: as clients, students, criminals, suspects, victims and so on. Their relationships with these various citizen clients are personal and emotional, rarely cold and rational." (Maynard-Moody and Musheno, 2000: 334)

Quane et al. (2009) extended the two perspectives by adding that trust with clients or citizens on the one hand and trust as individual staff within the bureaucracy on the other is an important element in the extent of operational staff discretions.

3.3.2 Constructing a conceptual view on discretions from theory

The analysis of scientific papers showed that the view from theory on discretions adds possible causes and effects of discretions to the view from practice. The analysis of the first set of articles provided insight into a process model view of discretions. In this view different discretions result from different geoICT coordination types. For example, a reduction in operational discretion is likely to result from a coordination type which is actively transposing external views to local settings, which would discourage operational discretions. Similarly, a geoICT coordination type which emphasises embedding in a local environmental context would open up the possibility for discretions by staff which relate closely to the environmental context (such as the strategic and operational staff).

The second set of articles showed that the variation in discretions relates to the degree of freedom that the environment grants to actors, the access to resources and the ability of individual actors to seek and benefit from this freedom. There are two contrasting perspectives regarding how staff use this freedom through their discretions: the first and most prominent expression of discretion is in the simplification of their own tasks and/or in the handling of ambiguous tasks. The prioritisation process found in the view from practice is in fact also the handling of ambiguous tasks. A second expression of discretions is when actors modify

their prescribed tasks to cater for the needs of clients and/or other actors external to their organisation. The first promotes self-interest; the second promotes interest of others.

Although a lot of research on discretions has focused on the extent of discretions and the reasons why discretions emerge, there are only few publications that make discretions the core subject of a conceptual study, or even formulate a theory of discretions. The publication of (Migué, Bélanger, & Niskanen, 1974) aimed at such a "grand theory", however they focused primarily on managerial discretions only. Similarly, the classic work of (Lipsky, 1980) primarily focuses on street-level discretions. So, the larger context of any kind of discretions and the conceptualisation of interrelated or inter-dependent discretions in an organisational context has remained underdeveloped. (Evans & Harris, 2004) express part of this critique, with the argument that in practice there are often gradations in discretions which have to be evaluated on a case-by-case basis. Still, in order to evaluate such case-by-case discretions, some form of conceptual basis, which acknowledges the existence and the variety of discretions within an organisation, is required. This can be derived from combining the theoretical insights with the practical examples.

3.4 Conceptualising discretions through interpretation

The views from practice and from theory provide further reference to the questions of what discretions are, who has discretions, what discretions staff members exercise, why and when staff members exercise certain discretions, and which geoICT coordination types target which discretions. Each follows in separate sections.

Defining discretions
The analysis from practice revealed that discretions refer to personal judgments, and that personal judgments differ at the respective levels at which staff work. The analysis from theory also found that personal judgments are not entirely personal, but can relate on the one hand to the relations in the environment (such as the links that individual actors may have to hierarchical networks and representative networks), and on the other to resource limitations and opportunities. Combining both views makes discretions actions by individual staff members, which rely on a personal appraisal of what is appropriate, given the socio-organisational circumstances and preferences of that particular staff member. Discretions, as a result, are a kind of regulatory agency, which result in a change of organisational behaviour and/or structure. Ultimately, discretions can change the stability of geoG2Gs.

Differentiating discretions per staff
The view from practice derived that discretions are different at three specific

levels of organisation: strategic, alignment and operational levels. The survey among practitioners also revealed that at each staff level actors perceive coordination types and organising structures from the environment of the geoG2G differently. The view from theory identified that environmental conditions confine actors in their discretions, yet the extent to which they can benefit from these environmental conditions is also up to the actors themselves. Combining the views from practice and theory induces a categorisation of actors and their discretions in geoG2Gs. This categorisation can start from the different discretions at different organisational levels in a conceptual model of organisations. A stereotypical public organisational structure follows a pyramid structure with few strategic staff at the top (of authority) and many operational staff at the bottom. Figure 3.1. provides a schematic view of such a pyramid. A reasonable number of alignment staff are usually in the middle of these two levels, and usually have authority and accountability towards both levels. The role of strategic staff members in geoG2Gs is primarily to steer and guide the geoG2G and to decide on strategic decisions. Operational staff members carry out routine activities, and interact on a regular basis with customers, clients and citizens external to the geoG2G. Alignment staff members align strategic decisions with what is operationally possible.

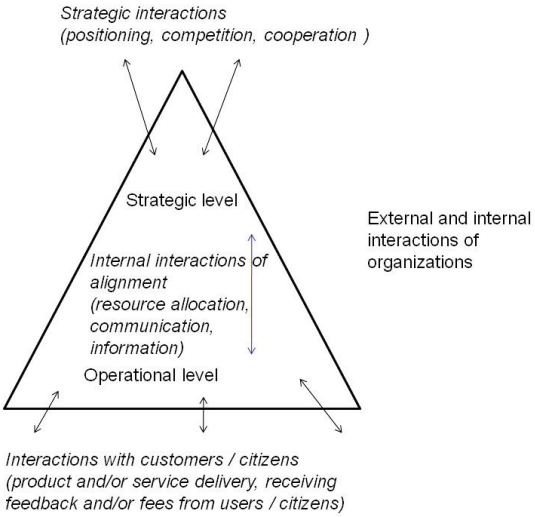


Figure 3.1: External and internal interactions of organisations

Discretions in relation to uncertainty

Both the view from practice and the view from theory find that discretions follow from uncertainty. The interpretation section of Chapter 2 indicated that uncertainty may arise from within the geoG2G and from the external environment in which the geoG2G operates. A second step of model abstraction follows from the interactions of staff, as a reaction to geoICT coordination, and

as a reaction to uncertainty. The views from practice and theory found that there is a difference in actor interaction internally with actor interaction with the external environment. Strategic staff interact with the external actors with strategic importance. These are actors who shape the institutional environment, such as those who make up the rules under which the organisation needs to operate. This also includes actors who can influence the position of the organisation, such as actors who determine the structural environment, where decisions need to be made with regard to economic, human and social resources for the whole organisation. At the operational level, staff members interact at the front end with customers, clients and citizens, who receive the services and products generated by the geoG2G. This may be in the form of a front desk, or of operational physical or electronic transactions. In between the two levels are alignment staff members, who align the strategic with the operational activities, through the management and coordination of resources, information and communication. At this level, system managers and process managers (of activities, work flows, product lines) play a crucial role.

In a world where the relation of such an organisation with its environment remains relatively unchanged the pyramid is relatively stable. The environment can be described by two ideal types of stability: market stability and stability through hierarchy (Williamson, 1983). In a perfect market, stability between atomic partners is achieved through market transactions and bargaining. No strategic dependency relations exist between the atomic partners, hence at the strategic level the main emphasis is on positioning the organisation within the market. Since the market is fully transparent, no uncertainty exists at this level. As a result, the relations of atomic partners within a perfect market are stable. The operational level focuses on measuring, recording and detecting changes in the market, and perfect information exchange exists within the organisation between the different levels. In a perfect hierarchy, stability is achieved by assigning responsibility to a given organisation and by regulating each transaction between organisations perfectly. The environment is designed completely transparently and organisations follow this design. Operational staff follow instructions from top-level staff. This situation is perfectly stable and no uncertainty exists (Williamson, 1996).

The reality of practitioners shows a grey area, where a multitude of interactions create uncertainties for individual staff members, because they cannot rely on particular outcomes of each interaction. This reality is in between the ideal, stereotypical types of stability. Different kinds of uncertainties emerge. Actors of geoG2Gs cannot control their complete environment and consequently make choices under uncertainty. These ‘discretionary’ choices relate to how much the environment allows them to change, how much the organisation is amendable, and how much the staff member is able to envision or create a possible course of action.

Practically, at the strategic level, staff exercise discretions when handling strategic uncertainty on (Hay and Wincott, 1998; Pfeffer and Salancik, 1978):

- How to address redefined institutional relations and new policies.
- How to apply and benefit from new regulatory prescriptions.
- The responsibility and accountability under newly-defined or new types of governance structures.

These types of discretions are of a strategic nature. They emerge once policies and institutions in the environment change, once the socio-economic environment changes, and once the socio-economic opportunities on which the geoG2Gs depend, change.

At the other end of the pyramid, operational staff members encounter different types of uncertainty of an operational nature. Operational uncertainty may follow from unwilling clients in e-government (Nitzan and Romano, 1990), effects of price uncertainties (Brown et al., 2000) , and effects of price changes and fee raising from a customer perspective (Koopmans-van Berlo and de Bruijn, 2004), which include:

- Change of technical means of customers, clients or citizens in how they interact and transact; this may for example imply a change of certain preferences in how products or services are delivered. Such a change fosters uncertainty among operational staff as to how and when to make such changes.
- Reduction of budgets to create products and/or changes in fees for products and services. Often the decisions on either of these items are made outside the operational level, yet they have an immediate impact on how operational staff will have to communicate these changes to the public. Therefore, it creates uncertainty among operational staff.

Both types of uncertainty, which arise out of the interaction with the environment, create uncertainty within the organisation. The questions here are (following the components of alignment by Benbya and McKelvey (2006)):

- How and when and who should communicate either type of environmental change within the organisation;
- Which internal procedures need to be in place to handle this ('locus of responsibility');
- Which information systems strategy to employ to cater for strategic needs.

Benbya and McKelvey (2006:21;22) describe an alignment process as the alignment of *"external complexity – including 'disturbances' or uncertainty – managed or 'destroyed' by matching it with a similar degree of internal complexity."* If the external complexity generates the strategic uncertainty and operational uncertainty, matching this complexity with internal complexity will

infer internal alignment uncertainty. Internal alignment uncertainty is therefore the uncertainty for actors within the organisational structures of geoG2Gs. The uncertainty arises from not having complete information of the external environment, and not having sufficient resources to handle all possible external demands.

Combined this leads to three types of uncertainty that staff members at different levels within geoG2Gs face (as pictured in Figure 3.2):

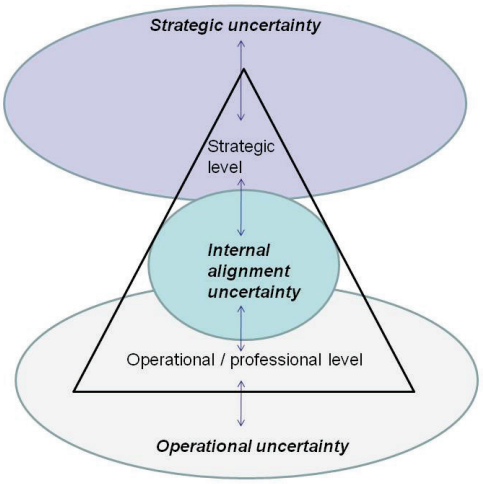


Figure 3.2: Different staff members faced with different kinds of uncertainty

The handling of these different types of uncertainty reflects the different types of discretions (Figure 3.3). With reference to the theory finding in relation to the article of (Hay and Wincott, 1998), the strategic discretions consist of the opportunity set of decisions that strategic managers have to enforce inter- or intra-organisational changes, start-up or end inter-organisational coalitions, reallocate internal and external resources, in response to a changing environment. The alignment discretions consist of the range of decisions which internal staff (may) create or appropriate to change workflows, re-design internal activities, revise budget and revenue allocations, or change information and communication channels, in response to either the organisational strategy changes, operational activities changes, or the combination of both strategy and operations changes. The operational discretions consist of the set of decision opportunities and degrees of freedom which operational staff may create or appropriate in the delivery of products and services to external customers or citizens.

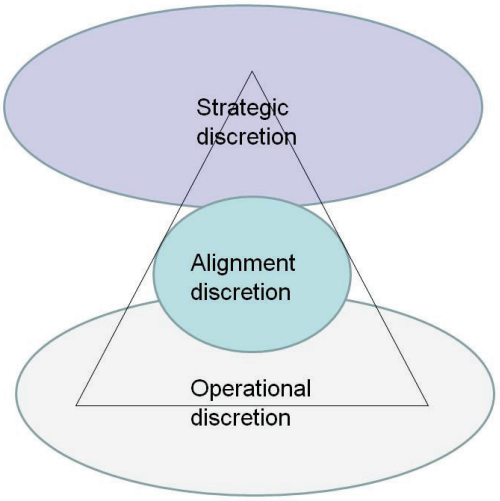


Figure 3.3 Types of discretions

Conceptual framework of discretions
The two contrasting perspectives on how operational staff members come to discretions (found in the view from theory part) is relevant to further distinguish discretions types and to relate discretion types to geoICT coordination types. Where the theory found that operational staff would formulate operational discretions to either simplify work processes or to facilitate client interest, the survey showed that alignment staff tend to exercise discretions in alignment with steering committees and local relationships (hence to facilitate interest of joint groups). Conceptually this introduces two contrasting perspectives on how different staff members exercise different discretions:

1) For self-interest – personal formulation of discretions as a way to simplify tasks and handle ambiguities. Strategic discretions to simplify strategic work could relate to reporting and accounting, for example. Similarly, alignment discretions to facilitate alignment work could relate to resources and workflow management, and operational discretions could relate to complex operational work tasks.
2) For joint or external interests – to facilitate, comply to or adhere to interests of others. The others in this case could be clients/citizens (for the operational staff), professional working groups and professional societies (for alignment staff) or steering committees, board of governors (for the strategic staff).

Combining this dichotomy of autonomous/self-interest versus joint/external interests with the types of discretions at different levels leads to six possible discretions, as shown in Table 3.10. Discretions aimed at self-interest can be labelled ‘autonomous’ discretions, and discretions aimed at supporting joint or

external interests can be labelled ‘joint’ discretions.

	To facilitate own/ autonomous (self-) interest	**To support joint or external interests**
Strategic discretions	Autonomous strategic discretions	Joint strategic discretions
Alignment discretions	Autonomous alignment discretions	Joint alignment discretions
Operational discretions	Autonomous operational discretions	Joint operational discretions

Table 3.10: Types of discretions

Examples of what each type of discretion would change or would support are given in Table 3.11. This table can be derived from combining the examples of staff types (Table 3.2) with the findings in the survey (Tables 3.5 to 3.10).

As strategic staff are accountable to a board of governors, a steering committee, or a ministerial executive, the rules and discretions are related primarily to these accountabilities. Facilitation of such accountabilities for self-interest would be in the personal freedom on how to report and account. Discretions in satisfying external interest could relate to satisfying interests of a specific governing board of steering committee members, or in response to an urgent ministerial request. In such cases, strategic staff might defer from common rules and find autonomous discretions.

For alignment staff, the discretions were primarily possible in the choice for new geoICT, while for internal employees they are for operational activities and the introduction of new business and/or operational processes. In their choices, they could be guided by satisfying internal needs, which would satisfy and facilitate their own work, or by satisfying ideas from external relations, such as those emerging in professional working groups or consultative arrangements. In the latter case this would support the dominance of external agency.

For operational staff, the scope for individual discretions can be found primarily in the choice for operational materials and resources, and the sequence of work tasks. The choice for a particular sequence in work activities to satisfy certain required internal performance indicators (such as the number of products to handle per day) could potentially facilitate their own work, whereas the priority setting in customer handling (which customer first; which product first; etc.) could be an example to satisfy external needs.

	To facilitate own work	To support joint or external interests of
Strategic discretions	Reporting and accounting	Board of governors, steering committees
Alignment discretions	Resources and workflow management	Professional groups, working groups
Operational discretions	Complex operational work tasks	Clients, citizens

Table 3.11: Examples of what which type of discretions may be about

The relation of the six discretion types to the geoICT coordination types can be made through extending Table 2.4 (Characteristics of geoICT coordination types) and Table 2.5 (Type and location of possible uncertainties arising from geoICT coordination types) and inferring from the discretion type characteristics (Table 3.10 and 3.11). Table 2.4 summarised the characteristics of the four types of geoICT coordination, in terms of primary aims, type of goals, underlying assumptions and approach to geoG2Gs. For every coordination type Table 2.5 added its relation to the type and location of possible uncertainties. And finally, Tables 3.10 and 3.11 could add the result in terms of discretions.

First of all, the characteristics of LOCUS coordination are that central ideas are transposed to local environments. Actions in LOCUS coordination thus emphasise extending higher administrative level agreements to lower administrative levels. In this process, the scope for lower level discretions is reduced to a minimum. In other words, the effect of LOCUS coordination is that it aims to decrease or even delete joint alignment discretions. At the same time however, local levels have to deal with a multiplicity of hierarchical relations. Table 2.5 indicated that the result of this is that uncertainty arises at the intersection of geoG2G actors with the external environment, especially in what to report and how to account for the local implementation towards higher levels. Given this uncertainty, autonomous strategic discretions may emerge.

Secondly, EVENTUS coordination emphasises aligning production steps by formulating and evaluating through end results. This emphasis implies that there is little scope for autonomous operational discretions on alternative end results. Yet at the same time it opens up the possibility that alignment staff decide on relatively greater freedom on how to achieve these end results. Both autonomous and joint alignment discretions may thus increase.

Thirdly, MODUS coordination accentuates alignment of chains of geoICT-related activities. Such chains often end by delivering to customers and clients. If the chains need to be harmonious, then client-oriented (joint) operational discretions – suiting individual client needs – are targeted to decrease. At the

same time, Table 2.5 showed that aligning business processes may result in uncertainties on aligning portions of the chains which could rely on different standards. Such a situation would require flexibility in internal resource allocation and work process alignments. In other words, it would require space in autonomous alignment discretions.

Finally, CAUSUS coordination types emphasise adaptation to local contextual needs. This coordination type stimulates the possibility for strategic level staff to exercise strategic discretions. Yet at the same time the multiplicity of environmental demands may result in operational difficulties. To simplify their tasks operational staff may therefore formulate operational discretions.

Table 3.12 provides a summary of the relations between geoICT coordination types, staff types and staff discretion types. The issues by which one can differentiate the discretions concern the level of staff members which are targeted by each of the geoICT coordination types, and the kind of discretions that each of the geoICT coordination is likely to trigger. For clarity's sake the Table 3.12 also lists the type of uncertainties that each coordination type is triggering. From the connections between the uncertainties and the discretions it becomes clear that uncertainty because of multiple hierarchical relations may lead to autonomous strategic discretions, uncertainty because of multiple demands may lead to autonomous and joint alignment discretions, uncertainty on standards may lead to autonomous alignment discretions, and uncertainty in the demands of overlapping social networks may lead to autonomous operational discretions.

Issue	geoICT coordination type			
	LOCUS	**EVENTUS**	**MODUS**	**CAUSUS**
Possible origin of uncertainties	Multiplicity of hierarchical relations	Multiplicity of demands; conflicts between agreements	Conflicts on standards	Multiplicity of social networks and unwillingness to change
Location of uncertainty	At intersection of geoG2G actors with external environment	Close to work processes internal to geoG2Gs	Close to work processes internal to geoG2Gs	At intersection of geoG2G actors with external environment
Targets to:	Decrease autonomous or joint alignment discretions;	Decrease autonomous operational discretions;	Decrease joint operational discretions	Stimulates strategic discretions
Results in	Emergence of autonomous strategic decisions	Autonomous and joint alignment discretions may increase	Autonomous alignment discretions	May results in autonomous operational discretions

Table 3.12: Summary of the relations between geoICT coordination types and staff discretion types.

3.5 Conclusions

The research question '*Whose discretions are affected by geoICT coordination in the Netherlands, and how are these affected?'* was addressed through a document analysis of grey literature, an interpretation of verbal statements during interviews with key respondents, a survey among practitioners, a review of scientific literature and an interpretation of the practice and theory conceptualisations of discretions.

Discretions are first of all personal judgments by individual staff members, based on a personal appraisal of what is appropriate, given the socio-organisational circumstances and preferences of that particular staff member. Discretions are a type of regulatory agency, resulting in a change of organisational behaviour and/or structure. Ultimately, discretions can change the stability of geoG2Gs. The discretions relate to uncertainties, which differ at each level at which staff members operate. Addressing these uncertainties occurs through a process of choosing and prioritising among simultaneously-available organising structures and coordination types. The choices and priorities rely on the degree of freedom that the environment grants to actors, and the ability of individual actors to seek and benefit from this freedom.

The analysis showed that the geoICT coordination types in the Netherlands

cause two types of discretions for three types of staff within geoG2Gs. The two contrasting types of discretions constitute discretions to simplify one's own tasks and/or to handle ambiguous tasks ('autonomous' discretions), and discretions which modify prescribed tasks to cater for needs of clients and/or other actors external to their organisation ('joint' discretions). Whereas the first promotes self-interest, the second promotes the interests of others. The three types of staff who may have different discretions relate to the respective functional levels of geoG2G organisation: strategic, alignment and operational staff levels (hence 'strategic', 'alignment' and 'operational' discretions). The combination of these two categories leads to six types of discretions, which may emerge as a result of the four geoICT coordination types.

The effect of LOCUS coordination is that it aims to decrease or even delete joint alignment discretions. This results in uncertainty at the intersection of where geoG2G actors interact with the external environment, resulting in autonomous strategic discretions. EVENTUS coordination restricts autonomous operational discretions, yet as a result may support the rise of both autonomous and joint alignment discretions. MODUS coordination accentuates the decrease of joint operational discretions, yet may result in the increase of autonomous alignment discretions. Finally, CAUSUS coordination stimulates autonomous strategic discretions, yet may simultaneously foster autonomous and joint operational discretions.

The variation in discretions extends the exploratory model of Chapter 1. Figure 3.4 provides this extended explorative model. Certain types of discretions emerge as a result of or succeeding certain types of geoICT coordination. In the variance logic, the variation in certain discretions is more likely to co-occur with the variation in geoICT coordination. Each of these discretion types is visible through changes that individual geoG2G staff members make at their respective levels in favour of their own work or in favour of external groups or external arrangements.

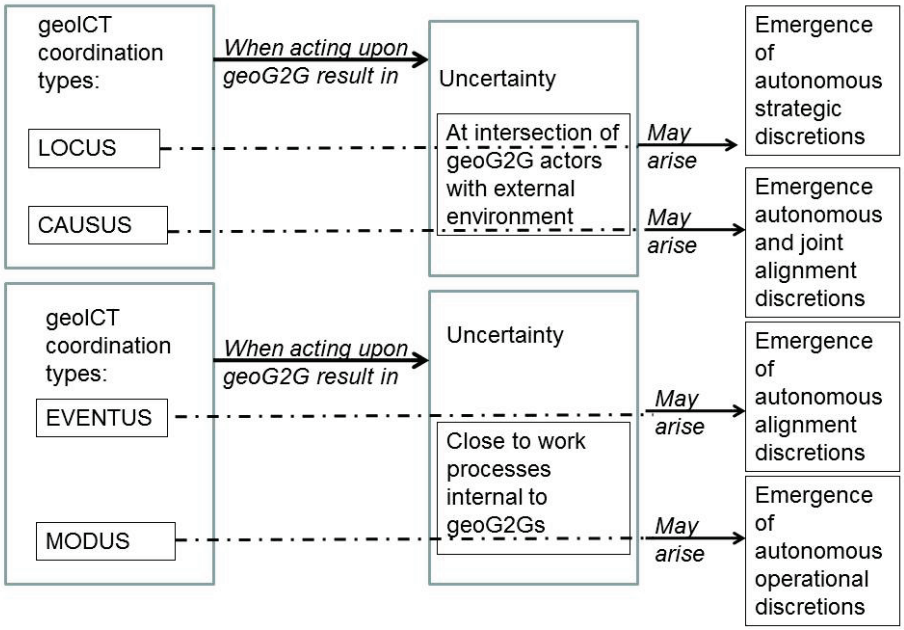


Figure 3.4: Relation of geoICT coordination types with discretion types.

Having identified the variation in both geoICT coordination (Chapter 2) and discretions (Chapter 3), the assumption is that these variations either have an effect, or correlate/coincide with changes in the stability elements of geoG2Gs (power, economic rules, conformity and collectivity). While Chapter 2 and Chapter 3 have further identified how to conceptualise and categorise possible triggers for change, the next step in the research – in Chapter 4 – is therefore to identify how to describe and observe these changes in stability elements. This conceptual description enables the analysis of the links between the four geoICT coordination and six discretion types on the one hand, and the changes which occur on the stability elements on the other.

Chapter 4

Describing and evaluating changes in geoG2G stability elements

4.1 Introduction

Chapter 4 addresses research question 3: '***How to describe and evaluate changes in each of the geoG2G stability elements?'*** Whereas the research questions of the previous Chapters 2 and 3 helped to conceptualise and categorise possible triggers for changes in geoG2Gs, this chapter aims to describe and evaluate what can be considered a changes in any of the geoG2G stability elements. The purpose of finding out how to describe changes in stability elements is to have a better understanding of what the stability elements are, which theories can be used to describe and explain each of the stability elements, and which factors are influencing any of the stability elements. With this more in-depth understanding of each of the stability elements it is possible to derive a set of characteristics which will enable the evaluation of changes. These characteristics provide the basis to assess what can be considered a significant change in a stability element, and which artefacts would qualify as evidence of a change in stability elements in geoG2Gs. The evaluation characteristics of stability changes provide the basis for evaluating whether changes occur as a result of certain geoICT coordination types and certain discretion types, or whether they occur idiosyncratically. In addition, understanding the changes in stability elements is necessary to compare the triggers for change (geoICT coordination and discretion types), with the resulting changes (in stability elements). If the triggers for change are known for a number of cases, and if stability changes in these cases can be observed, it should be possible to find whether the relations between the triggers for change and the stability changes are consistent or coincidental.

The approach to addressing question 3 is to draw from both practitioners' views and theoretical views to generate a set of characteristics which describe and explain stability elements. The view from practice relies on an inventory of practitioners' perceptions on what constitutes each of the geoG2G stability elements (power, economic rules, conformity and collectivity) and what could change and to what degree in each of the geoG2G stability elements. The view from theory starts by qualifying the concepts of 'change' and 'variation', and continues by identifying theories which qualify and quantify changes and variation in each of the geoG2G stability elements. The section on how to evaluate changes combines the results of both views, resulting in a pragmatic way to recognize artefacts and characteristics which would indicate changes in any of the geoG2G stability elements.

Both views from theory and practice start with the explorative findings on stability elements in Chapter 1.3. In Chapter 1.3 a geoG2G was considered stable if, over a period of time, the geoG2G partners consistently adhere to a given power and authority distribution and to mutually-agreed economic rules on production. The stability extends to a common perception of conformity, collectivity and partnership/membership rules. Stability, in other words, is a value that geoG2G staff members assign to the geoG2G of which they are part. Staff members value a geoG2G as 'stable' if in their perception the internal power relations, economic rules, conformity, and collectivity do not cause uncertainty. A change in stability was expressed as a situation of 'instability', manifesting itself as uncertainty.

Section 4.2 deals with the desctiption of stability elements by a view from practice. Section 4.3. provides the description of stability elements and their changes by a view from theory. Section 4.4 integrates both views to derive a set of change characteristics which would enable an evaluation of changes in stability elements. Section 4.5. concludes on the overall research questions, and links to the next chapter.

4.2 Describing changes in geoG2G stability elements by a view from practice

The practice-based conceptualisation of the concepts 'stability', 'stability elements' and 'changes in stability elements' relied on how practitioners use language and refer to these concepts in both grey literature and during interviews. In light of this need, the subsequent section 4.2.1 describes the methods to collect written language manifestations of practitioners in grey literature. Section 4.2.2 summarises the verbal comments and responses from practitioners during interviews. Section 4.2.3 uses the results of these two sections to compare and synthesise the two forms of language manifestations of practitioners on the concepts 'stability', 'stability elements' and 'changes in stability elements.'

4.2.1 Results of viewing stability elements – through grey literature

The data source is the same grey literature as in Chapters 2 and 3. Investigation of the grey literature began with the derivation of the concurrences of words and word forms in the entire grey literature corpus. The investigation concentrated on the word 'stability', and the words which seemed closest to the stability elements (power, economic rules, conformity and collectivity).

An initial scan of the grey literature corpus reveals that the combined GI and Egov corpus contained 24 instances of the word 'stability', and 305 instances of the word 'power'. The words 'conformity' and 'collectivity' do not appear. The term 'economic rules' appears in the grey literature, but is used with respect to

macro-economic rules, rather than internal or inter-organisational cooperation rules. The initial scan of word frequencies shows that a direct word frequency analysis can only provide some general characteristics on how practitioners refer to 'stability'. Characteristics of each stability element need to be induced from these general characteristics. The first step of this induction is distinguishing the different contexts in which authors use the term 'stability'. The 24 concurrences of 'stability' provide various contextual characteristics of 'stability'. 'Stability' is used in association with, respectively, the legitimacy of government actors (Gronlund, 2005; Muhlberger, 2006), trust in political and governance process and political interest (Murgia et al., 2002; Stoltzfus, 2005), confidence in efficiency and cost savings (Kafeza et al., 2005), the presence of bureaucratic procedures and processes (David et al., 2005; Schildt et al., 2005), the presence of an adequate legal framework and the enforceability of rules (Zwahr et al., 2005b), the belief in rationality in decision-making resulting in the perception of simplicity and predictability (Hjort-Madsen, 2006), and the dependence on technological choices for longer time spans (Keith et al., 2005).

The following categorised quotes (Table 4.1) are examples of how different authors refer to stability in these different contexts:

Issues characterising 'stability'	**Concurrences**
Legitimacy (Grönlund, 2005; Muhlberger, 2006)	*An important aspect of Hibbing and Theiss-Morse's position is normative. Their overarching concern is with insuring the stability and legitimacy of the political system. Consequently, in their chapter of prescriptions, they do not recommend ways to reverse political disinterest or conflict aversion, which they do not see as injurious to system legitimacy.(Muhlberger, 2006:54)* *Obviously, there also needs to be a strong element of stability in society, and this comes from three aspects of the political system. (Grönlund , 2005:5)*
Trust in political and governance process and political interest (Murgia et al., 2002; Stoltzfus, 2005)	*Implementing e-government necessitates the evaluation of the following risk factors: political stability, adequate legal framework, trust in government, importance of the government identity, the economic structure, the government structure (centralised or not), levels of maturity within the government and citizen demand.* (Stoltzfus, 2005:334) *Political interest and institutional stability and genuine interest for interinstitutional cooperation will add much to the success of this process.* (Murgia et al., 2002:1)
Efficiency and cost savings (Kafeza et al., 2005)	*The idea underlying UETA is the enforceability of electronic transactions at the same level as at the paper transactions without changing the substantive rules of law that applies. In that way the Act provides stability and significant efficiency and cost savings. UETA applies to transactions in which parties have agreed to*

Issues characterising 'stability'	Concurrences
	conduct transactions by electronic means. (UETA, Section 5(b)) - (Kafeza et al., 2005:4)
Dependence on technological choice over long time spans (Keith et al., 2005)	*Every respondent mentioned the difficulties in dealing with the perceptions of the constant flux of technology, 'we need this now' rationalisations, individual fear of technological change, and the ever-increasing rate of obsolescence. One of the key factors in this area is the historical stability of the industry in question. Utilities have historically been on a 30-50 year change plan; new technology has significantly impacted that timeframe. What was once a very stable sphere has now given way to an extremely dynamic one. In essence, the technology sphere expands when the manager can quantify the outcomes.* (Keith et al., 2005:6)
(The presence of) bureaucratic / procedural processes (Coursey, Welch, & Pandey, 2005) (Schildt et al., 2005)	*Moreover, a bureaucratic culture does not seem to affect perceived outcomes, although excessive rules in the form of red tape are clear inhibitors. This indicates that cultural norms of rule-based decision-making and stability do not, by themselves, hinder technology implementation unless the culture turns self-serving and pathological . (Coursey et al, 2005:3)* *The second sphere contains organisational or bureaucratic processes, which tend to be stability-oriented and generally procedural in nature. This organisational sphere includes the employees of the municipality and the administrative processes.* (Schildt et al., 2005:3)
Rules /adequate legal framework and enforceability (Zwahr et al., 2005b)	*There is both an urgent need to regulate some aspects of ICTs' development and to use some ICTs to reinforce regulation capabilities of the State. (...) However, governance systems are not stable but are in a continuous development and change process.* (Zwahr et al., 2005b:56)
Rationality (Hjort-Madsen, 2006)	*The assumption in rational institutional theory is that the organizational structure can create certain incentive structures for individuals [19] while sociological institutional theory builds on the incorporation of bounded-rational and social aspects of decision-making such as concerns of legitimacy, stability and enhanced survival prospects, i.e. logic of appropriateness. (Hjort-Madsen, 2006:3)*
Simplicity/ predictability (Hjort-Madsen, 2006)	*Externally, the need for interoperability has grown due to increased environmental complexity and instability surrounding CUH.* (Hjort-Madsen, 2006:6)

Table 4.1: Examples of concurrences of 'stability'

This first step in inducing the characteristics of each stability element shows that although 'stability' in itself appears to be a container issue with different meanings in different contexts, each of the characteristic associations of 'stability' provides further insight into how to characterise the stability elements.

The second step of the induction is grouping the general characteristics in relation to each stability element, and seeking further concurrences of terms relating to each stability element. The stability element 'power' can encapsulate the characteristics 'legitimacy' and 'trust' of the above table 4.1, because both terms express the efficacy of 'power'. Power exists if the actors and the environment in which actors operate accept the cooperating actors for who they are, and accept the arrangements as valid (Muhlberger, 2006). In other words, power relates to legitimacy. Furthermore, accepting other people's actions and ideas and abiding by them, is also deeply rooted in the ability and willingness to trust (Tan et al., 2005). Hence, trust is also a characteristic of power.

When expanding the meaning of the term 'power' based on the concurrences in the grey literature, the evaluation is complex. Although 'power' appears 305 times in the corpus the word 'power' also appeared in other word forms, such as 'empowerment', 'empowering', 'powerful' and 'manpower.' In several publications authors also use 'power' as a technical term (e.g. electrical power), as a co-noun ('the power of this is...'), or in the sense of 'capability' (e.g. 'giving users the power to...'). A further scanning of the use of 'power' in the grey literature was thus necessary, to verify where 'power' was used in direct relation to organisational or institutional power, or in relation to individual staff members exercising power when cooperating with (geo)ICT. This resulted in 13 instances where authors used the term 'power' in a context of inter-organisational relationships with ICT. In these instances authors associate 'power' with 'authority' (Janssen and Cresswell, 2005; Zwahr et al., 2005b), 'ownership' (Andersen and Henriksen, 2006) and 'control' (Scholl, 2005a). In these cases 'power' also has an element of 'exclusivity', implying that certain people have it, while others do not, or only have it to a limited degree (Park, 2005; Scholl, 2005a; Wolber, 2006). In relation to ICT the exclusiveness relates more specifically to the control and authority of the 'process' and the 'system' of data exchange and resource access. The control involves the decision with whom to share. In sum, characteristics of 'power' in the context of inter-organisational relationships with ICT include legitimacy, trust, authority, ownership, control and exclusiveness.

In relation to the other stability elements (economic rules, collectivity, conformity), the analysis could not rely on word occurrences in grey literature, but had to rely on the second induction step only (i.e. grouping of stability characteristics per stability element). The stability related to efficiency and cost savings (Kafeza et al., 2005) and the presence of bureaucratic and procedural processes (David et al., 2005; Schildt et al., 2005) are characteristics of economic rules stability. Actors perceive stability in economic rules if they foresee or expect a cost saving in the near future. In such a case, they are not likely to engage in economic rules negotiations, because they would expect an emerging benefit from the current economic rules. Similarly, the presence of

bureaucratic and procedural rules is likely to provide stability on economic rules. As stated by Schildt et al. (2005), the objective of bureaucratic and procedural rules is indeed to create stability for partners in a cooperation. The rules are often accompanied by economically and financially oriented performance indicators (Janssen and Cresswell, 2005), hence they are characteristic of economic rules stability.

The presence of an adequate legal framework (Zwahr et al., 2005b), and a belief in simple and predictable rules for decisions (Hjort-Madsen, 2006) are a characteristic of conformity stability. Actors are likely to comply with formal rules, if those rules are simple and if they lead to predictable results. In such a situation, the conformity stability consists of the consistent and continuing perception that those rules are adequate and beneficial for their mutual relation. Hence, conformity stability then exists.

Finally, the dependence on choices of technology for longer time spans relates to a need for collective stability. A collective of actors has a benefit if the technology remains stable, so that they do not need to investigate which technology to use, and do not have to invest in developing and learning new technologies. The values and practices related to that technology will be promoted by the collective, and the contingencies of a technology (certain work processes, standard views on solutions for given problems, etc.) are an indicator of the collective stability. If on the other hand technologies change fast, and uncertainties increase with regard to who is going to choose which technologies resulting in unknown impacts, this has an immediate effect on the sense of stability for the collective actors. Hence the contingencies of technological choices are a characteristic of collectivity stability.

Table 4.2 provides a first summary of the above considerations found in grey literature. It lists how characteristics of stability relate to, and describe the characteristics of, the geoG2G stability elements.

Although the analysis thus far has focused on characterising ‘stability’ and stability elements, implicitly such a characterisation also characterises the antonym ‘instability’, if we assume that ‘instability’ is the opposite of ‘stability’, and if we assume that there is a range of possibilities (a variation) between a situation which is ‘stable’ and one which is ‘unstable.’ By investigating the concurrences of ‘instability’ and associated terms related to ‘instability’ (such as ‘unstable’, ‘lack of agreement’, ‘lack of consensus’, ‘illegitimate’, ‘inefficiency’ etc.), the characteristics of the possible variation and/or change in ‘stability’ can achieve a more concrete form. The grey literature corpus included two occurrences of ‘instability’ (Hjort-Madsen, 2006; Lourenco and Costa, 2006), two of ‘unstable’ (Harrison et al., 2006; Zwahr et al., 2005b), two on ‘illegitimate’ (Gundars, 2005; Magnusson and Nilsson,

2006), three on 'inefficiency' (Ni and Bretschneider, 2005), one on 'non-compliance' (Natasha, 2005), three on 'lack of consensus' (Chen et al., 2005; Irani et al., 2006; Moon et al., 2005) and 150 on 'complexity' (Cushing et al., 2005; Janssen and Kuk, 2006; Lau et al., 2004; Regner et al., 2004; Xenakis and Macintosh, 2005) .

Stability element	**Issues characterising 'stability element' in grey literature**
Power	Legitimacy; trust; authority; ownership; control; exclusiveness
Economic rules	(confidence in) efficiency and cost savings; (presence of) bureaucratic / procedural processes
Conformity	Presence of adequate legal framework; enforceability of rules; (belief in) rational decision-making; Simplicity/ predictability
Collectivity	Dependence/contingency on technological choices over longer time spans

Table 4.2: Grey literature characterisation of stability elements

On the issue of power instability, (Magnusson and Nilsson, 2006) note that any inter-organisational change involving inter-organisational information architectures is a process whereby legitimacy changes in the eyes of the constituents. As long as the partner of the partnership is perceived as illegitimate, there is continuing power instability. Lourenco and Costa (2006:3) also find that a transition in power may result from the "*deployment of rhetoric through the alteration of the terms of political discourse, by creating worries about political instability, and by arguments being heard by public officials*." Whereas a characteristic of power stability is 'trust', a characteristic of power instability is thus the existence of doubts or mistrust in governance and political processes. Remarkable from this quote is that creating mistrust may be a deliberative action to foster change. The findings on 'power' and 'lack of power' further identify the characteristics and the variation of the power stability element. In addition to the lack of legitimacy and trust, the power instability can be characterised by the ability of individual partners to 'operate freely', without any prescribed regulations of 'ownership' or 'rights' (Cushing et al., 2005), or without any single partner priority rights (Oliveira et al., 2006). The terms characterising 'power' versus the terms characterising the antonyms of 'power' jointly provide the characteristics of the possible variation and change in power, and hence the degrees of power stability and power instability.

If 'efficiency' and 'the presence of bureaucratic processes' reflect the characteristics of economic rules stability, the antonyms of economic rules stability are 'inefficiency' and 'establishing ad hoc procedures' in the cooperation. These antonyms are partly a paradox. Ni and Bretschneider (2005) find that many government agencies contract out their ICT work with the motivation that contracting out would improve efficiency and reduce

bureaucratic procedures and government monopolies. Hence, ad hoc procedures of establishing a temporal relation with a contract partner would theoretically improve efficiency. However the survey of (Ni and Bretschneider, 2005) also pointed out that in many contracting-out decisions political logic is more prevalent than economic (efficiency) logic. Political considerations such as shrinking government, reducing taxpayer burdens, sponsoring instate businesses and creating job opportunities are far more influential in contracting out decisions than organisational efficiency motivations. This means that while 'inefficiency' would destabilise the economic relations between partners, political motivations may prevail in maintaining such inefficiencies. As Ni and Bretschneider (2005:3) argue, *"It is no surprise that government agencies are inefficient when public policy makers de-emphasise efficiency as a goal of the public sector. The issue is not inherent inefficiency but rather a failure to understand that political goals and motivations often typically drive governmental decision processes.*"

With regard to conformity, the grey literature analysis identified 'enforceability of rules', 'rationality in decision-making' and 'simplicity / predictability' as characteristics of stability in conformity. The prime emphasis in the same grey literature when discussing the opposite of conformity is on 'complexity'. This complexity encapsulates complex rules (Lau et al., 2004), complex problems and therefore complex decisions on possible solutions (Janssen and Kuk, 2006), and complex (inter)organisational processes (Regner et al., 2004; Xenakis and Macintosh, 2005). If these complexities exist, or if partners perceive that these complexities exist, then the conformity with (simple, rational) rules is likely to decrease.

In relation to collectivity, David and John (2005) describe the issue of 'free riding'. 'Free riding' means benefiting from others without one's own input. This reflects a situation where partners do not have the burden of having to choose the technology in the past, yet were simply 'free riding' on the benefits of this choice. In other words, there may be an individual benefit, but there was not a collective choice. 'Free riding' can have the adverse effect of contingency dependence, if the benefit is more individual than collective, and if the collective is not the basis for the choice for the technology. In any case, free riding is likely to disfavor the collective feeling, and hence create some form of instability in the collectivity. Additionally, collectivity is unstable when partners have the ability to change their preferences at any given time. Zwahr et al. (2005a) find that ICT has the ability to transform governance mechanisms from purely hierarchic to hybrids. In these hybrids, partners are free to choose any technology and any licence they would want. This changes the collective view towards the technology, and changes the stability in collectivity.

While the concurrences together lead to the characteristics of 'stability' and

implicitly to characteristics of stability elements, they also define what 'instability' means, and what characteristics are of 'instability' elements. By synthesizing the antonyms it ecomes possible to list instability characteristics (as shown in Table 4.3), and this provide the spectrum of variation in each of the stability elements. A fundamental change from one or more of the stability characteristics to one or more of the instability characteristics thus reflects the variation and change in stability.

Issues characterising 'stability' in grey literature	**Instability characteristics (reflecting a state of uncertainty)**	**Describing a variation of stability element**
Legitimacy	Illegitimacy	Power
Trust in political and governance process and political interest	Mistrust/doubts	Power
Authority	Operating freely	Power
Ownership	Unregulated ownership	Power
Control	No single partner priority rights	Power
Exclusiveness	Inclusiveness	Power
Efficiency and cost savings	Inefficiency and overspending	Economic rules
(the presence of) bureaucratic/procedural processes	The absence of bureaucratic/procedural processes – ad hoc procedures	Economic rules
The presence of adequate legal frameworks and the enforceability of rules	Multiplicity of rules, and non-compliance	Conformity
Rationality in decision-making	Bounded rationality	Conformity
Simplicity/predictability	Complexity/uncertainty	Conformity
Dependence/contingency on technological choices over longer time spans	Ad hoc/flexible choices in technology; free riding	Collectivity

Table 4.3: Variation in stability elements by inferring from stability antonyms

The 'variation' of stability is in the extent to which each of the stability characteristics can vary. For example, the amount of funds in fixed or secured budgets can vary over time. Yet as long as the security of a budget for geoICT activities, or as long as the type of budget is not changing, there is no fundamental change in the stability itself. Conversely, if fixed budgets are no longer guaranteed, there is a fundamental change in stability. Similarly, a legal framework may be adapted gradually, yet as long as actors adhere to those gradual changes there is no fundamental change. Yet as soon as other rules start to dominate, or actors no longer know which rules apply, than there has been a fundamental change in the stability.

In sum, the investigation of grey literature provides a set of general characteristics of each of the stability elements, and the possible variation and change in each of the stability elements.

4.2.2 Results of viewing stability elements – through interviews

In addition to the general characteristics of stability elements derived from grey literature, interviews with 14 practitioners provided the opportunity to further investigate the characteristics of stability within geoG2Gs and to contrast these findings with those obtained from grey literature. The collection of verbal statements on stability relied on questions related to stability and changes in stability put to the same interviewees as in Chapters 2 and 3. The list of interviewees is in Annex 1. Not only did the interviewees represent their respective organisations, but they also represented multiple geoG2Gs, because sometimes they were working in different geoG2Gs simultaneously. For example, the interviewees from municipalities were responsible for the implementation of several key registrations in different geoG2Gs. This includes the geoG2G Netherlands Cadaster with municipalities related to parcel-based geo-information, and the geoG2G related to supra-municipal real estate information (Dataland). As a result, their responses do not necessarily reflect their take on the degree of stability within a specific geoG2G, but reflect their views on geoG2G stability in general. Despite this limitation, the specific interview sections on stability aimed at describing what geoG2G 'stability' entailed in practice, and on exploring which variation and/or change occurred in each of the geoG2G stability elements.

Even though the responses may have been heterogeneous, overall the collective of interviews and responses provides a number of specific details on each of the stability elements. The following shows these details for each of the stability elements.

Stability element: power
Interviewees associate stability in power with the ability and the capacity of geoICT managers to exercise pressure and to mobilise resources. Mobilisation depends on the potential ability to assign qualified people and have access to financial and technical resources to work with (geo)ICT at short notice. If each of the partners have the ability to mobilise resources, ther eis likely power stability, and partners do not have to exert pressure on each other. If the ability to mobilise resources does not exist, or if this ability decreases, then the power stability may decrease, because certain claims may then be difficult to follow up. A decrease in mobilisation ability may thus result in power stability change, and will be expressed in exerting pressure of one partner on the other.

In addition, interviewees refer to 'authority' as an element of power stability.

Authority is the natural and/or enforced support for a particular idea or particular staff members. If staff members within a geoG2G accept the authority of another specific staff member, there may be power stability in the entire geoG2G. Such authority is therefore also implicitly an ability to mobilise resources.

In relation to the ability to mobilise resources the interview excerpt 4.1 from the interview with the IOG-Geo representative is exemplary:

"From our point of view, from the experience of recent years ... even if you want ... and even if you have excellent insights into the technology ... and know exactly how it works ... but if you do not mobilise the management and executives in some way … then you don't get far in practice. Especially not when you're dealing with inter-provincial cooperation. The only inter-provincial cooperation which was realised practically is one where the executives and management forced the cooperation. For example risk maps. When the disasters in Volendam and Enschede occurred ... then the commissioners said ... and now we want the data on a risk map through cooperation. And then something happens. If you do not know how to mobilise such forces ... then it may look nice, but … the cooperation will not succeed."

Interview excerpt 4.1 Ability to mobilise as an example of power stability in geoG2Gs (from discussion with IOG-Geo)

The interview excerpt 4.2 provides an example of how interviewees refer to mobilising 'support.'

"Within some municipalities you can see lack of support. You can address this by speaking to actors in terms of their (direct or indirect) interest; in addition, by exerting pressure on the managers of work processes. At the political level you can exercise pressure by pointing to their commitments to higher authorities ('Shall we let the Ministry come here?') but also by pointing to interests for citizens and businesses."

Interviews excerpt 4.2 Example of creating power stability by mobilising support (from the Municipality of Boxmeer)

Comparing the interview excerpts 4.1 and 4.2 reveals a crucial difference with regard to 'change' in power stability. The excerpt 4.1 exemplifies that a change can occur suddenly, i.e. as an urgently-required reaction to a problem in the environment. In this case, staff members need to mobilise resources at short notice, thereby bypassing the existing power relations and agreements on resources access. This leads to a fundamental change in power stability. In excerpt 4.2 the change is more gradual. Staff members exert pressure over a longer time span, yet the pressure aims for the same result: commitment.

Commitment provides the basis for power stability.

Stability element: economic rules
The interviewees associate stability in economic rules with financial security in terms of budget security, and with the ability to agree on the distribution of cost and benefits.

The geoG2G related to the national large-scale topographic map of the Netherlands, GBKN, provides the example of the need for long-term financial security. Historically, the GBKN faced different stages of stability (and instability) with regard to economic rules. The interviews show that access to and ownership of financial resources provided long-term, or potentially long-term, stability for the economic production of large-scale topographic maps. This stability was deemed necessary among GBKN participants in case of map production failure or risk in data acquisition. The stability of economic rules thus depends on long-term financial security. The following interview excerpt 4.3 provides an example of how actors were reaching such long-term financial security.

"*Because that corporation which was then established in 1992, on the basis of such a national cooperation agreement ... that one also received funds from the Ministry of Spatial Planning ... they received 10 million guilders ... and the funds were targeted to stimulate regional cooperation. So, in case a mapping project was initiated, while some of the finding was still lacking, because a municipality or utility company did not participate ... in such cases a temporary loan could be given, to secure the financing."*

Interview excerpt 4.3 Financial security as a reason for economic rules stability

The interview excerpt 4.3 shows that in-built mechanisms for the continuation of economic production in the event of financial changes or financial difficulties provide a certain degree of economic stability. Hence, such financial security mechanisms are characteristic (or even conditional) for stability in economic rules. By contrast, financial insecurity may give direct rise to instability. An initial reaction may be to seek cooperation with others, and/or to modify existing geoG2Gs. In particular at local levels, such as within municipalities, such budget or financial insecurity may occur frequently. As a result, municipalities are more likely to engage in cooperative agreements to share the burden of not having sufficient financial resources to address certain requirements. Some find this a sub-optimal situation. The interview excerpt 4.4 is an example of how the cooperation is referred to as a sub-optimal solution.

"Because municipalities ... as they do not want to admit that they are incapable of adhering to the requirements ... then they start to group with each other to address this jointly. But it remains sub-optimisation, because actually every

municipality should be able to fulfil their tasks individually, and they should have sufficient financial means to do so. Because capacity is also simply a matter of having financial resources."

Interviews excerpt 4.4 Example of economic rules stability as a suboptimal solution (from VNG interview)

Stability element: conformity

Interviewees associate stability in conformity with how successful internal actors are at avoiding repetition by using standards solutions and in reaching similar deals for multiple activities. The ability to reach similar agreements strongly depends on consistency and internal communication and alignment.

The interview excerpt 4.5 is an example of how the Cadaster is trying to foster similar agreements as a solution to manage geoG2G relationships with multiple municipalities. Standard contracts are preferred. Such standard contracts would underscore stability in conformity.

"If you look ... for example for the geoICT ... you have to deal with all municipalities ... with the key registrations ... the large scale topography. But at a certain point we have to make an agreement with VNG, or KING, and also Dataland. How will you do that? If you regard key registration topography ... there are a few municipalities who do this themselves. And we make individual deals with them, because that is convenient ... but them ... there are maybe ten in the Netherlands which maintain their own middle scale topography ... and then ... you have to reach individual agreements, so you try to reach ten similar agreements. Only then, it is still feasible ..."

Interview excerpt 4.5 Example of conformity stability through fostering similar agreements (Cadaster)

In addition to the practical issue of aiming for standard contracts, one of the underlying changes that may occur in the conformity change is the change from the dominant more vertical, top-down and external communication activities of geoG2G actors, to an increase in more horizontal, internal communication within the geoG2Gs. The interviews excerpt 4.6 provides an example from the point of view of municipalities.

"Municipalities and Cadaster ... at least within our domain ... that was always a tension. And it was really from our past that ... talking about peers ... the Cadaster decides and municipalities follow. Well ... there has been a change. It is such that they communicate more often, but this did not occur in the past. But there you see some tension."

Interview excerpt 4.6 Example of internal communication as a characteristic of conformity stability (from municipality)

The interview excerpt 4.6 is an indication that the influence of 'peers', i.e. peers from the same (geo) domain, has started to outweigh the influence of traditional hierarchical relations. The 'change' reflects the shifting from hierarchical to 'peer' influence. The shift reflects the trend towards more horizontal interactions, and hence a change in the conformity stability.

Stability element: collectivity
Interviewees associated stability in collectivity as the result of integration. They referred to integration activities in terms of joining up of people and departments, surpassing differences and joining forces. Once joined and integrated, both people and departments behave collectively. Interviewees associated the notion of collectivity and stability in collectivity strongly with rules applying equally to all staff members.

A second association referred to avoiding, handling and/or managing 'free-rider' problems. A clear example of this was given in relation to the partnership for the creation of the large-scale topographic maps of the Netherlands (GBKN). The GBKN geoG2G includes a complex set of partners and agreements, and one of the challenges for the GBKN managers concerned distilling a joint view among partners on the completeness of topographic geo-objects in the geodatabase and the financial contribution needed to reach such completeness.

The two interview excerpts 4.7 and 4.8 provide examples of how the interviews expressed these two fundamental associations.
"In the beginning it was really … we did things which simply ... we didn't really belong anywhere ... there was no policy ... it all went through back doors. And now you see that departments are integrating. With us ... and with the others ... you see that geo and ICT are converging and becoming one information thing. And with us for example, teams are integrated."
Interview excerpt 4.7 Example of integration as a characteristic of collectivity stability
(IOG Geo)

"Because the utility companies found it simply too expensive to map. So you see that they continuously steer on economic grounds. So economic motives and objectives. Free riding problems. And yes ... they have to do that ... but at that time it wasn't even obligatory legally to have a registration. That is different later with the new law on information about our networks … then there is also a legal obligation for utility companies to have a registration, where one can trace all cables and pipes which they own. Eventually the utility companies took their responsibility, and set up a good registration. Because they had a stake in knowing what they owned themselves."
Interview excerpt 4.8 Example of addressing free-rider problems as characteristic of collectivity stability

The excerpt 4.8 hints at the issue of 'free riding' as an element of collectivity stability. 'Free riding' affects the collectivity stability, as it undermines a collective interest. As a result, those actors, who do contribute, may become less interested in contributing to the collective interest, and may opt in the long run for pursuing private or individual interests.

In sum, the interviews provide additional insights (as compared to the grey literature) into what the stability elements comprise. Power stability depends on the ability of partners to find support and to mobilise resources and people in their respective organisations to cooperate with other partners with (geo)ICT. Economic rules stability relates to perceived and/or assured financial security on the basis of assured budgets. The economic rules are laid down in agreements on distribution of costs and benefits. The conformity stability is perceived when partners agree to using standard solutions and when they can agree on similar arrangements for multiple activities. Collectivity stability is perceived as the ability to find joint solutions and as having a sense of integration. This sense of integration implies that no partner is free-riding on the agreements of the partnership.

4.2.3 Characteristics of changes in stability elements by a view from practice

Both the grey literature review (4.2.1) and the interviews analysis (4.2.2) provided insights into how practitioners deal with the issue of stability, and how these insights can be translated into characteristics for each stability element.

Table 4.4 provides a summary for each of the geoG2G stability elements by a view from practice, combining the original exploration of Chapter 1 with the findings from 4.2.1 and 4.2.2.

The findings from grey literature and from the interviews provided a richer picture of stability elements than the exploration in Chapter 1.3. Chapter 1.3 found that geoG2G stability elements are visible through a set of agreements. Agreements on responsibility and authority express the power stability; arrangements on production benefits and resource allocations express the economic rules stability; agreements on geoICT use the procedures of internal communication and data exchange relates to the conformity stability; agreements on common views, membership models and collective behaviour express the collectivity stability.

The grey literature review confined this view by identifying legitimacy, trust and exclusiveness as characteristic of power, efficiency and presence of bureaucratic procedures as characteristic of economic rules, legal adequacy, rational decision-making and predictability as characteristic of conformity, and

contingency choices as characteristic of collectivity. An antonym analysis of each of these characteristics in grey literature also showed the extent to which each stability element could vary, and which characteristics could qualify as instability elements. The interview results partly confirm the results of the grey literature analysis, but also extend these results. Power stability depends on the ability to mobilise capacity and resources; economic rules stability on financial security and arrangements on distribution of costs; conformity on repetition and standards; collectivity on integration and the ability to address free-rider problems.

In addition to the expansion in relation to the characteristics of each of the stability elements, both the grey literature and the interviews provided insights into the concepts of 'change' and 'variation.' First of all, the antonyms of the characteristics of the stability elements offer the range of change of each of the stability elements. The grey literature analysis shows that in some instances the changes within the stability elements of geoG2Gs were not fundamental. For example in the case of conformity stability, the changes of contractual agreements of the Kadaster with different municipalities merely reflect a kind of 'variation.' In other cases, such as the reaction to disasters in the case of power stability, the change was much more abrupt and discrete. This leads to the notion of two kinds of changes: 'variation' and (fundamental) change.

geoG2G stability characteristic	**Power**	**Economic rules**	**Conformity of mode of conduct**	**Collectivity and partnership rules**
Is expressed through agreements on (Chapter 1.3)	Distribution of responsibility and authority	Production benefits and resource allocations	GeoICT use and procedures of internal communication and data exchange	Common views, membership models and collective behaviour
Is characterised by (from grey literature)	Legitimacy, trust, authority, ownership, control, exclusiveness	Efficiency, cost savings, bureaucratic procedures, secured budgets	Legal adequacy, enforceability, rationality, predictability	Dependence/ contingency on technological choices over longer time spans
Depends on (from interviews)	Ability and capacity to find support and mobilise resources and people in relation to cooperation with (geo)ICT; wield/exert/ exercise authority	Financial security and agreements on distribution of costs and benefits	Avoiding repetition by using standards solutions and in reaching similar deals for multiple activities	Integration, addressing free-rider problems

Table 4.4: Summary of characteristics of each of the stability elements by a view from practice

Variation can be expressed by the degree to which temporary changes are possible and the degree of flexibility in arrangements. The variation includes temporary changes in operational arrangements, such as temporary changes in prices and revenues, temporary changes in resource allocations, changes in human resources without changes in contractual agreements, changes in partners without changes in overall agreement and changes in use of software.

'Change' on the other hand, is a fundamental shift from stability to instability (and possibly visa versa). 'Change' is occurring when one or more of the stability arrangements alters fundamentally, and when one of the stability element antonyms is emerging. The interviews identified the emergence of support and mobilisation problems as an indication of change in power, the emergence of budget insecurity as an indication of change in economic rules stability, internal communication problems as an indication of change in conformity stability, and the emergence of free-rider problems as an indication of change in the collectivity stability.

4.3 Describing changes in geoG2G stability elements by a view from theory

The theory-based description of 'stability', 'stability elements' and 'changes in stability elements' relied on how the scientific literature addresses these concepts. This literature review induces a theoretical view of each of the stability elements. The subsequent section 4.3.1 describes how different theories model the stability of power, economic rules, conformity and collectivity. This section starts with an inventory of theories which relate to the respective stability elements, and selects the theories deductively based on three criteria. The subsections 4.3.1.1 to 4.3.1.4 describe the basic tenets of each of the theories in relation to the stability elements. Each of these sections also include a description of how the theories express 'change'.' Section 4.3.3 uses the results of these two sections to compare and synthesise 'change' with the theoretical notions of each of the stability elements. This results in the theory-based description of 'change in stability elements'.

4.3.1 Method to derive theoretical views on each stability element

The description of geoG2G stability elements from a theoretical point of view started with an investigation into how scientific publications in the field of organisation, information and public administration sciences describe and define each of the stability elements. Having compared different theoretical descriptions and views also supported selecting those theoretical elements, which could describe the characteristics of each of the stability elements, and each of the changes in stability elements.

As there are numerous theories dealing with the characteristics and reasons for stability in relation to power, economic rules, conformity and collectivity, a strategy was required to select among theories. The review of theories started with the review of meta-studies on theories. Although a number of scientific publications provide selective results of such meta-studies (Hevner et al., 2004; King and Lyytinen, 2006; Orlikowski and Iacono, 2001), examples of practical and extensive results of such meta-studies include the wiki on 'theories used in information systems research': http://www.fsc.yorku.ca/york/istheory/wiki/index.php/Main_Page and the list of theories used in behavioural and communication studies: http://www.utwente.nl/cw/theorieenoverzicht/Alphabetic%20list%20of%20theories/. Both wikis are the result of a series of meta-studies on theory use in information sciences, including primary references to key authors of each theory. The York University (Toronto, Canada) wiki contains a short description of close to 100 theories and associated primary scientific book and peer-reviewed article references, and is therefore useful when searching for theoretical frameworks. It is also linked to the Theoretical Approaches to IS Research mini-track at HICSS, is regularly maintained, and is regularly referred

to in scientific and conference articles (Lim et al., 2009; Schneberger et al., 2009; Schneberger et al., 2007; Tams, 2010). Hence, the wiki itself has become a reliable source for meta-studies in theories used in information studies. The University of Twente list includes the basic tenets and primary references to approximately 50 theories.

The selection among theories followed three deductive selection steps. The first selection criterion was to verify in all theory descriptions in both wikis whether there was any mention of one or more of the stability elements (power, economic rules, conformity, collectivity). If any theory description, quote or reference in the theory description referred to any of the stability elements, then the theory was selected.

The second selection step was to look for any relation and explanations in the description and the listed key publications to 'inter-organisational relations' and 'ICT.' This second criterion was deemed relevant as geoG2Gs originate from organisations cooperating with geoICT, hence a relation with theories explaining inter-organisational ICT processes was considered appropriate. The explanation and reach of each theory needed to be relevant in the context of inter-organisational ICT arrangements and processes. The second selection step reduced the number of candidate theories.

The third selection step was to review the key references of the remaining theories for explanations or models of 'change. As the objective of this chapter was to find theories explaining change, the publications had to include explanations for change in the respective 's tability' elements. Whereas the previous sections identified that it is possible to deduce whether a stability element is 'stable' or 'unstable', it did not identify or explain the process of change towards either stability or instability. There are two contrasting theoretical views on what 'change' entails: a punctuated process, with a sudden, revolutionary departure from a stable situation in the past (Gersick, 1991; Sastry, 1997; True et al., 2007; Wollin, 1999), or a gradual, constant process without any clear sudden, linear stages of stability or instability (Lichtenstein, 2000; McBride, 2005; Styhre, 2002) . In this logic the question is not why and when 'change' occurs, but why and how 'stability' emerges (Stevenson and Harmeling, 1990).

This third step resulted in a selection of eight theories, namely: Resource dependency theory (Oliver, 1991; Pfeffer and Salancik, 1978; Ulrich and Barney, 1984) and social exchange theory (Cook, 1977; Emerson, 1962; Homans, 1958) to describe 'power'. Transaction cost theory (Coase, 1937; North, 1990; Williamson, 1983) and the theory of administrative behaviour (Simon, 1955; Simon, 1976) to describe and study stability and changes in 'economic rules.' Isomorphism theory (listed under institutional theory),

drawing on publications of (DiMaggio and Powell, 1983), and social network theory (Granovetter, 1973; Travers and Milgram, 1969) to describe and study stability and changes in 'conformity'. Collective action theory (Olsen, 1965; Searle, 1990) and social capital theory (Bourdieu, 1986; Coleman, 1988; Woolcock, 1998) to describe and study stability and changes in 'collectivity'.

The eight theories relate to three selection criteria in the following way.

Both resource dependency theory and social exchange theory formulate how power and power differences emerge. This is documented in (Pfeffer and Salancik, 1978) for resource dependency theory and in (Emerson, 1962; Homans, 1958) for social exchange theory. Both theories refer to one of the stability elements, namely power (first selection criterion). Power is the result of mutual dependency relations Both theory descriptions include the issue of inter-organisational relations and include references on power in inter-organisational ICT (this meeting the second selection criterion). For example, the publications of (Kern and Willcocks, 2000; Tillquist et al., 2002) describe this issue of power in inter-organisational ICT. Finally, based on the principles of both theories, many subsequent research publications (Cook and Emerson, 1978; Lee and Kim, 1999; Silva, 2007) have evaluated how and why 'change' in power occurs (third selection criterion).

Transaction cost theory and the theory of administrative behaviour both describe how economic rules emerge (Simon, 1976; Williamson, 1983), namely as a way to manage and reduce transaction costs or as a way of economic 'satisficing' (first criterion). The references lists of both theories refer to several publications researching inter-organisational ICT from the respective theoretical perspectives (Islamoglu and Liebenau, 2007; Lamb and Kling, 2003; Wareham, 2003) (second selection criterion). With regard to inter-organisational relations, both theories stress that in economic relations there are always inequalities and asymmetries. As result of the inequalities and asymmetries, partners start to exhibit certain expectations and behaviour which leads to the economic rules. Finally, various publications draw from either of the two theories (Ciborra, 1983; Clemons et al., 1993; Leiblein, 2003) to address the changes of economic rules over time (third selection criterion).

The basic descriptions in the wikis on isomorphism theory and social network theory address the issue of 'conformity'. The wikis refer to conformity as a kind of institution (social schema, rule, norm, or routine), which becomes established as an authoritative guideline for social behaviour. The references of (DiMaggio and Powell, 1983) on the one hand and (Granovetter, 1973; Travers and Milgram, 1969) on the other set out the basic tenets of the theories underlying the social behaviour (first selection criterion). Several references in the wikis include the issue of inter-organisational ICT from the respective theoretical

perspectives, such as (Orlikowski and Barley, 2001; Tingling and Parent, 2002; Wade et al., 2006) – (second selection criterion). From the reference lists, it is also clear that (Weerakkody et al., 2009) uses institutional and isomorphism theory to describe the research challenges in the field of inter-organisational information systems, and Meyer (1994) uses social network theory in explaining inter-organisational information use (second criterion). Finally, various publications (Burkhardt and Brass, 1990; Robey and Boudreau, 1999) draw from either of the two theories to address the changes in social behaviour and conformity over time (third selection criterion).

Finally, from the review of both wikis it can be deduced that collective action theory (Olsen, 1965; Searle, 1990) and social capital theory (Bourdieu, 1986; Coleman, 1988; Woolcock, 1998) both refer to elements of collectivity (first selection criterion). (Wasko and Faraj, 2005) and (van den Hooff, 2004) make use of the respective theories in the context of inter-organisational ICT (second criterion). Finally, publications such as (Gächter and Fehr, 1999) and (Yuan et al., 2006) deal with the issue of change in the context of collective action or social capital.

The basic tenets of each set of theories in relation to the stability elements are elaborated further in sections 4.3.1.1 to 4.3.1.4. Section 4.3.1.5 provides a summary of all theoretical perspectives on each stability element and on how changes occur.

4.3.2 Theoretical view of power stability and change

In the explorative model of Chapter 1, ***Power and authority*** distribution was related to (stable) dependency relations, with the reasoning that geoG2Gs lay a claim on structural resource allocations for each partner. This claim refers to the use and allocation of their internal resources (human, financial, etc.). So, any geoG2G arrangement contains agreements on power distribution on the one hand (given the new or revised control and access to resources) and a dependency distribution on the other (given the distribution of resources). Both *resource dependency theory* and *social exchange theory* explain the problems of inter-relational power and dependency. Whereas resource dependency theory emphasises power differences as a result of resource access differences, the social exchange theory emphasises power differences as a result of resource control differences. Each theoretical view can be further clarified.

Resource dependency theory and power stability
The basic tenet of resource dependency theory is that organisations will seek to establish relationships with others in order to obtain the resources that they lack. As a result they become dependent on each other. Yet in the realisation that

dependency also implies the loss of control and freedom to pursue their daily business, organisations will endeavour to minimise their dependence or to increase the dependence of other organisations on them. This pursuit leads organisations to adapt their structure and behaviour to optimally acquire and maintain the needed resources. Acquiring the external resources comes by decreasing the organisation's dependence on others and/or by increasing others' dependency on it, i.e. modifying an organisation's power with other organisations (Pfeffer and Salancik, 1978; Ulrich and Barney, 1984).

With the lack of resources, dependency behaviour is the result of organisational survival strategies (Pfeffer and Salancik, 1978). Dependency behaviour results in inter-organisational power struggles over the resources, because no single organisation owns or controls the access to all possible resources. The negotiations over the resources therefore reflect power differences (Pfeffer and Salancik, 1978; Pfeffer and Salancik, 2003). Actors balance power interests through negotiations and through their ability to mobilise their resources and constituents. Once differences are solved by negotiations, then there is power stability.

To keep control over the dependence one needs to negotiate strongly on the immediate source of the dependence. Inter-organisational agreements reflect the security of resource access, and reflect the power stability. Stability is achieved in case of a predictable inflow of vital resources for all partners (Oliver, 1991). Pfeffer and Salancik (1978:143) posits that: "*The most direct method for controlling dependence is to control the source of that dependence. One is not always in a position to achieve control over dependence through acquisition and ownership, however. (...) There are many informal mechanisms and semiformal inter-organisational linkages that can be employed to coordinate the respective interests of various social actors. Social coordination of interdependent actors is possible as a means for managing mutual interdependence. Behaviour, in this instance, is not determined by hierarchical mandate but by agreements to behave in certain ways. Some of these agreements may be tacit, taking on characteristics of social norms. Others may be more or less explicit."*

As inter-organisational power depends on inter-organisational resource relations, changes in power stability and power instability depend primarily on inter-organisational negotiation processes (Homburg, 1999; Oliver, 1990; Tarafdar and Gordon, 2007). The basis of all power stability constitutes resource dependencies, whereby partners mobilise their resources and constituents, and accept each other's authority. If negotiations are present and if mobilisation actions are problematic then there is power instability. If no negotiations are present than there is power stability. The processes of negotiation are thus the primary indicator of a change in the power stability or

instability. A theoretical view of power change must thus be based on the principles of negotiation on resources and on resource dependencies.

According to Pfeffer and Salancik (1978) negotiations on resources follow the principle of uncertainty reduction. On the one hand uncertainty in the environment is addressed through securing resource delivery of resources from other parties. On the other, organisations structure their internal organisation such that specific staff members are allocated to the continuous access to these external resources. Following this uncertainty reduction logic of Pfeffer and Salancik (1978), power differences in geoG2Gs become stable as a result of the survival strategy of negotiation (to ensure the continuation of the needed resources), and the interlocking of the behaviours of the various partners in the geoG2G. By minimising uncertainty negotiating staff members are assumed to work towards gaining power. The power lies in the control over resources and in the increase of independency and autonomy. The boundaries of the power increase are defined by the degree to which the negotiating staff members can control the actions of other staff members, and can lock behaviour of other staff members (Pfeffer and Salancik, 2003).

Social exchange theory and power stability
Social exchange theory relates inter-organisational and inter-personal behaviour and dependencies to activities of exchange (Cook, 1977; Emerson, 1962; Homans, 1958). According to Hormans (1958), the initiator of the theory, social exchange theory describes the social behaviour of people in economic activities. The fundamental difference between economic exchange and social exchange theory is the way in which each theory describes actors and behaviour. Economic exchange theory views actors (person or firm) as dealing not with another actor but with a market, responding to various market characteristics (Emerson, 1962); while social exchange theory views the exchange relationship between specific actors as "*actions contingent on rewarding reactions from others*" (Blau, 1964:91), or as Homans (1958:600) wrote: "*Social behaviour is an exchange of goods, material goods but also non-material ones, such as the symbols of approval or prestige. Persons that give much to others try to get much from them, and persons that get much from others are under pressure to give much to them. This process of influence tends to work out at equilibrium to a balance in the exchanges. For a person in an exchange, what he gives may be a cost to him, just as what he gets may be a reward, and his behaviour changes less as the difference of the two, profit, tends to a maximum."(Homans, 1958:600)*

Power differences and stabilities originate from the exchange activities. The view of this theory is that power constitutes the mechanics that can explain the relation of the actors (Emerson (1962) and Blau (1964)). According to Emerson (1962), power is the property of a relation and not of an actor, because it

"*resides implicitly in the other's dependency*." (Emerson, 1962:32). Power stability emerges in this social exchange relation, because long-term exchange raises certain mutual expectations in the long run. Cropanzano and Mitchell (2005:875) state that "*relationships evolve over time into trusting, loyal, and mutual commitments. To do so, parties must abide by certain 'rules' of exchange.*" Molm et al. (1999) also find that both negotiated and reciprocal exchange relations affect how individual actors use power and how they face risks and uncertainties. Negotiated exchange relations exist when partners negotiate the rules through communication with each other. Reciprocal exchange relations exist when actors of one partner make choices without the involvement of the other partner. Instead of negotiating the benefit, the exchange relation takes the form of a series of sequentially contingent acts. Consequently, the power relation in negotiated relations is based on joint actions, whereas in the reciprocal relations, it is based on individual actions. In the latter case, "*Actors can receive benefit from another (or multiple others) without giving anything in return; conversely, they can initiate exchanges that are not reciprocated."* (Molm et al., 1999:879).

Combined theoretical view on power stability and change
Linking the two theoretical views on power stability and change shows that both theories emphasise that power stability and power differences are the result of inter-relational dependencies on the (access to) required resources for the respective organisations. The dependencies result in a social exchange relation. As the resources are crucial for the survival of each of the partner organisations, the social exchange relation, often visible through inter-organisational or inter-relational agreements, provides for long-term predictable access to the resources. Each organisation thus has a benefit in committing to the agreements by long-term staff allocations, which maintains the inter-organisational relationship. In both theories, the stability is the result of a process of negotiations on the resources, executed by staff members of each of the partners. When negotiations are almost absent, this reflects a period of stability in power. Conversely, the presence of negotiations reflects a period of instability in power, and possible uncertainty.

The presence of negotiations thus reflects a period of instability and a possible change in power relations. Given that changes depend on negotiations, the period during which changes in power stability occur is likely to be relatively long, or even almost continuous. 'Negotiating' and 'mobilising' are both activities with unclear outcomes in terms of new inter-relational power positions. Negotiations should reduce the uncertainty in access and control over the resources. Negotiations aim at bringing the resource under the authority of a specific partner (hence reducing uncertainty), or negotiating what to exchange for the resource (hence reducing the risk associated with resource dependencies). Mobilisation actions aim at finding the support under

constituents. The artefact of change is a fundamental change in control over resources and a specific period during which the required behaviour of other individuals alters to accommodate this new control. A change in power, or uncertainty in power relations, can thus occur frequently and rapidly if negotiations are settled. However, power instability is always at the surface, as negotiations are more likely to be present than absent. As a result, the shift from power stability to instability occurs frequently.

The critiques on resource dependency and social exchange theory as an explanatory theory for the emergence or shift in power relations are twofold: first, there may be an overreliance on the concept of resources or exchanges as the main root for power and power shifts. In most studies the type of resources are usually monetary, information or infrastructural resources, but as Morris (2007:121) remarks also issues such as "age" or "earnings" can be conceptualized as sources of power, even though they are not typically seen as resources. Secondly, there may be contradictory effects of exchange and dependency relations which remain hidden if only focusing on the organization as a whole (in this research: one geoG2G). An increase of internal resources and relations may compensate and even correlate for a decrease in external relations and exchanges of the geoG2G. As a result, there may be no power shift visible in the geoG2G, because the changes in resources are not necessarily distinguishable, let alone, re-enforcing each other. In these cases, staff members may perceive a power shift, but empirical evidence may then fail to link the shift to changes in specific resources.

4.3.3 Theoretical view on economic rules stability and change

In the explorative model of Chapter 1 the stability of ***Economic rules*** was reflected through the cooperation contract, which formalises both the distribution of operational activities among partners and the required resource contributions (internal funds, staff allocations) each contract party was obliged to bring in to the cooperation. *Transaction cost theory* provides an explanation as to why and when organisations need economic formalisation, while the *theory of administrative behaviour* explains the economic behaviour in such highly formalised systems.

Transaction cost theory and economic rules stability and change
The basic assertion of transaction cost theory is that in every economic transaction between different economic actors certain transaction cost emerge, resulting from uncertainty about each other, and resulting from the inability to know all possible alternatives for that economic transaction (North, 1990; Williamson, 1983) . The uncertainty in inter-organisational relations arises if either the relation is insufficiently regulated, insufficiently enforced or insufficiently complied with (Williamson, 1998). The result of this insufficient

regulation is that each partner incurs certain cost to enforce or comply with the relation. Such costs are the transaction cost, and these costs are in theory the sum of enforcement and compliance costs for an agreement. Kumar and van Dissel (1996) refer to these costs as actual costs incurred by an organisation: *Transaction costs are "the costs of managing the interaction while keeping the opportunistic behaviour under control so that ongoing operation between the units can be sustained." ((Kumar and van Dissel, 1996: 291).*

In many publications using transaction cost theory there is little reference to actual cost, but more to the strategic reasoning why certain transaction costs appear and how to minimise these transaction costs. Benefits in the eyes of transaction costs theorists arise if transaction costs reduction relates to strategic and governance benefits as perceived by the organisations, or if the deviations from the ideal (free market) situation are reduced. Stone et al. (1996) refer to these benefits as:
"*Transaction cost economics focuses expressly on the comparative efficacy with which alternative governance structures manage transactions during contract execution (...). Central to efficiency is the low-cost availability of information needed to evaluate products being exchanged and policy and to enforce agreements*." (Stone et al, 1996:99)

A number of empirical indicators reflect the increase or decrease in transaction costs. High transaction costs occur for example in the case of a high number of agreements to regulate cooperation, complex contracts which require specialists to monitor, long periods of negotiation time or the presence of extra people to cover the risk of capacity loss (David and Han, 2004). All such increases of transaction costs are an effect of wanting to regulate and control discretions at various levels in the organisations. At the same time, they are also an indication of the perception of instability. Instability thus co-occurs with inefficiency.

The basis of economic rule stability is that actors seek efficiency in transactions through regulations. This stability relies on transactions between actors, which are concrete and verifiable. Obtaining stability excludes the possibility that actors may have diverging interests in relation to transactions. Transaction cost theory predicts that actors prefer to make transactions as efficient as possible. The assumption here is that an optimal way exists to hierarchically structure and sequentially approve work processes, such that the organisation can function optimally.

A change towards adoption of alternative regulations (leading to instability in economic rules) may not be easily visible. However a change in economic rules coincides with a sudden, yet obvious, increase in transaction costs. This may emerge as a reaction to sudden reorganisations, when actors start to mitigate the effects of economic uncertainty about the future. Carter and Hodgson (2006)

and David and Han (2004) provide a compilation of constructs to classify changes in transaction costs. Such constructs include asset specificity, uncertainty and frequency. A change (usually an increase) in any of these constructs reflects an increase in transaction cost, and therefore in instability.

Managing efficiency within the public sector does not immediately imply a change in administrative hierarchies by more influence of 'the market', and more room for staff members to engage independently with what the 'market' wants. This would be an oversimplification, as it would only use the hierarchy-market governance dichotomy. Transaction cost theory would posit that it is more likely that within the hierarchy there are alternative rules present, and that staff adopt such alternative rules as a reaction to the failing formal rules. Concretely, Levy and Spiller (1994) found that while rules and a regulatory governance structure may exist, these may not be completely adequate for the given problem, due to a loss in credibility for those who are regulated and due to insufficient capacity for the rule-makers to enforce the regulations. As a result, alternative rules may emerge alongside formal rules. Such alternative rules may relate to prevailing institutions outside the organisation, yet may appeal to individual staff members via their networks. These alternative regulations may give rise to either autonomous behaviour of staff, or to behaviour which is strongly guided by exogenous regulatory forces. In both cases there must be alternative economic rules present and staff must be aware of such alternative rules.

Theory of administrative behaviour and economic rules stability and change
The theory of administrative behaviour, according to Herbert Simon's seminal and frequently quoted work *Administrative Behaviour* from1976, starts from the basic assumption that differences in economic rationality are a direct result of administrative functional work descriptions of staff members. People attach higher value to staff decisions of staff in so-called 'higher' positions than to staff decisions of staff in lower positions. The staff in 'lower' positions, often referred to as 'administrative men', follow what the 'top' decides has to be followed as organisational goals. Activities follow a hierarchical power pattern, and can only be evaluated against what the 'top' has decided as organisational goals. 'Administrative man' blindly pursues certain organisational goals and "*becomes an instrument in the pursuit of organisational rationality*" (Denhardt and Perkins, 1976:379).

The economic rules in this case are reflected in a pattern of 'satisficing' by individual staff members. 'Administrative men' do not necessarily maximise organisational efficiency or the effectiveness of the organisation, but maximise the degree of adherence to what higher positioned staff members want. Activities of control and satisficing thus reflect a period of stability in economic rules, whereas the presence and/or emergence of individual discretions are a

clear sign of instability in economic rules. As long as geoG2G actors are still actively formulating rules and regulations, the geoG2G is incurring transaction cost, and has unstable economic rules. Staff will perceive the rule formulation process as inappropriate, wasteful and inefficient, and will incur transaction costs by activities which mitigate the effects of such inappropriateness and inefficiency. As a result, additional regulatory agency emerges, through the creation of and/or adherence to alternative rules. Stability in economic rules will re-emerge upon completion of rules and regulations, and upon acceptance and adoption of such rules as prevailing economic rules.

Combined theoretical view on economic rules stability
Comparing the two theoretical views on stability in economic rules shows that both theories explain the stability of economic formalisation in terms of the anticipated effects on efficiency. Transaction cost theory reasons that relations are stable if they incur few transaction costs. The theory of administrative behaviour finds that relations are stable in hierarchies with uniform organisational rationalities. In both the view of transaction cost theory and the theory of administrative behaviour, the emergence of behaviour (and discretions) which is not in line with the current economic rules is a sign of instability. Stability occurs when all actors adhere to the formalised economic rules, either as rules and agreements, or in uniform organisational rationality. Instability occurs when all actors stop adhering to the formalised economic rules. They may either disagree with the rules, or they may be confronted with limited information about the consequences of such rules.

The occurrence of instability in economic rules is visible through the increase in activities related to the construction of work protocols, the redefinition of performance indicators and the perception of enforcement failures. Transaction cost theory would reason that change incurs transaction costs, whereas the theory of administrative behaviour would predict that this would coincide with more autonomous decisions and work processes by ‘administrative men.’

Both theories emphasise the rational aspects of economizing behavior when dealing with transactions across organizational, departmental or hierarchical boundaries. As such the theories are appropriate when dealing with stability and change of economic rules governing a cooperation. The criticism on transaction cost theory is that it often fails to recognize the relational motives involved in economizing decisions, such as the underlying trust or legitimacy of the partners with whom they cooperate (Talman, 2009:182). In these cases the theory needs to be complemented by other theories which specifically deal with these issues. Resource dependency theory would in this case perhaps address this missing link. It would also help to show the relation between stability and change in power and in economic rules.

4.3.4 Theoretical view on conformity stability and change

The exploration in Chapter 1 led to the assumption that stability in the ***Conformity of the mode of conduct*** exists when all partners share and accept a common view on how to behave internally when working with geoICT, and when each staff member of the geoG2G partners actively perpetuates this behaviour. Two theories explain why actors may follow each other in their behaviour: *isomorphism theory* and *social network theory*.

Isomorphism theory and conformity stability and change
Isomorphism theory has its roots in the publications of Meyer and Rowan (1977) and DiMaggio and Powell (1983). The central tenet of the theory is that individuals and organisations mimic each other in organisational development and in inter-organisational cooperation. The mimicking is not only the resultant of coercing institutional rules, but also the resultant of frequent professional interaction. Through mimicking, individual staff and organisations 'fit in' and become accepted in their environment. Mimicking is a survival strategy on the one hand, and provides stability on the other. The result of mimicking is that many organisations become similar in shape and activities, and many staff members have similar professional behaviour. Organisations and staff behaviour within the organisations become 'isomorphic', meaning of similar shape. Meyer and Rowan (1977) argue that compliance with regulations and seeking legitimacy are among the causes (and indicators) of isomorphism:

"This isomorphic process promotes the success and survival of organisations. By incorporating externally legitimated formal structures and organisational practices, an organisation may increase the commitment of internal participants and external constituents." (Meyer and Rowan, 1977:349)

The texts of (DiMaggio and Powell, 1983; Hu et al., 2007) classify isomorphism into three categories: coercive, mimetic and normative. **Coercive isomorphism** occurs as a result of the formal and informal pressures exerted on organisations and decision-makers to follow or adopt certain institutionalised rules and practices by other organisations upon which they are dependent and by cultural expectations from the society within which organisations function. **Mimetic isomorphism** occurs as a result of organisations imitating other organisations and is especially evident in uncertain environments because it minimises risk. Mimetic behaviour is viewed as having a considerable economic benefit because it would reduce the cost of finding a viable solution when organisations are faced with similar problems with ambiguous causes or unclear solutions. **Normative isomorphism** is the result of professionalisation of the organisational actors, such as (alignment) managers and internal administrators. When staff are professionalised (i.e., they have similar formal education and training and participate in professional networks), they tend to

occupy similar positions across a range of organisations and possess similar orientations and dispositions in their professional activities to such a degree that they are almost interchangeable (DiMaggio and Powell, 1983; Hu et al., 2007).

The effect of isomorphism is stability in conformity. The behaviour of staff members becomes predictable, as they are likely to follow the behaviour of their peers, and organise structures accordingly. Predictability relies on finding similar examples, best practices and reducing variability. Standardisation of work routines and information management processes is increasing predictability of behaviour and of organisational outcome. Equality and similarity in organising structures and staff activities will decrease uncertainty in what people do, and what people are expected to do. Conversely, a decrease in predictability is an indicator of instability in conformity.

Given the value of predictability, conformity is strongly linked to how external partners execute their processes, and how internal staff members relate to the external partners. Conforming to values of external partners reflects the relations of individual staff members, and reflects the dominance of the external network values and principles over personal interests and endeavours of the individual staff members. It is especially those networks which generate predictability in the form of 'standards' and 'best practices' that are likely to provide isomorphism and stability in conformity. Informal connections and weaker ties in the network also influence the shape and type of standards and best practices.

A change in adoption of alternative standards or alternative best practices is thus a clear sign of a change in conformity. The change may be linked directly to alternative views and values emerging from an existing influential external network, or a change in dominance of networks. Both types of change are unlikely to occur frequently, as most professionals have historical ties with their peers from similar professional backgrounds through shared education (alumni networks), or through shared professional interests (thematic groups). However the emergence of internet-based social networks (including social media such as Facebook, LinkedIn etc.) and the disintegration or the merging between traditional historically developed professional groups (for example the discontinuation and merging of the Netherlands Association of Geodesists /Land Surveyors, and the Netherlands Association of Cartographers, and the emergence of new professional associations, such as the Netherlands Association of ICT Service Providers) may be crucial factors as to why individual staff may change their professional affiliations, and hence their professional conformity.

Social network theory and conformity stability and change
Social network theory starts from the assumption that relationships between two

people correspond to relationships between both their networks. Although there is likely to be a stronger correspondence between the networks if the two individuals have strong ties, weak ties are more likely to link different networks with each other (Granovetter, 1983; Granovetter, 1973). One of the potential consequences of such weaker ties is for example that it may bring together previously non-connected groups with different value systems. While this may lead to an (unexpected) increase of interdisciplinary work and potential innovation, it may also lead to a change in either individual or joined value systems. Given this potential, the weaker ties may influence cooperative efforts and may influence stability in shared values, hence shared conformity (Granovetter, 1985). The agency of weak ties in the social networks may be rooted in the informal connections between executive staff members, or in the informal connections between individual staff members of different organisations (Rowley et al., 2000). The effect of such ties may this be that the values developed or maintained in these networks may influence internal decision more than the values which are upheld in a single organisation, or in a cooperative of organisations.

Social networks have also been used to examine how companies interact with each other (Ahuja, 2000), characterising the many informal connections that link executives together, as well as associations and connections between individual employees at different companies. These networks provide ways for companies to gather information and deter competition. Uzzi (1996:674) finds that embeddedness in a social network within a given market increases the survival changes as compared to firms '*which maintain an arm'-length market relationships'*. Finally, social networks provide ways of innovation (Ahuja, 2000; Gilsing and Duysters, 2008)

From the social network theory perspective, it is obvious that social networks affect stability in relationships, hence also in geoG2Gs. Such stability relates both to the strong and the weak ties that individual staff members have with other people. The stronger ties are more likely in the close vicinity of staff members, hence in their immediate organisational and personal environment. Weaker ties are more likely with professional peers and acquaintances from professional environments and discussion groups, for example, whereas stronger ties relate more to the stability of internal relations. The changes emerging in the social networks of the weaker ties of geoG2G staff members influence the dominants values towards their work and work related decisions of these staff members, and thus influence the stability of conformity in geoG2Gs.

Combined theoretical view on conformity stability and change
The two theoretical views provide a similar conclusion for stability in conformity, namely that it depends on how strongly staff members of

cooperating organisations are involved in external social networks. Isomorphism theory explains the reasons for conformity stability by looking at the reasons why behaviour of different organisations may become similar over time and as a result may become stable over time. Social network theory approaches the conformity stability from the perspective of the individuals who are interacting with each other. The interactions of individuals can be mapped as strong and weak ties. Weak ties constitute relations with professional peers and acquaintances from professional environments and discussion groups. Such weak ties determine the professional views of staff members, and hence the values that staff members have when making professional decisions. The degree to which those values in the weak-tie relations are stable, determines the degree to which staff members make consistent professional decisions. As a result, the stability of professional conformity depends on the weak ties. In both the social network theory and the isomorphism theory, there is agency from an external network. In isomorphism theory the agency to form isomorphic organisations and to adapt isomorphic behaviour derives from institutional rules, uncertain environments and professional networks, while in social network theory there is agency from the networks of weaker ties. In both theories, the stability of professional decisions depends on which social-professional networks are most influential. In other words, conformity stability is the result of the dominance of network agency on individuals over personal interests and endeavours of the individual staff members. Conformity stability is strongly related to how active geoG2G staff members have affinity with and are committed to their social and professional networks. It is especially those networks which generate 'standards' and 'best practices' that are likely to provide isomorphism and stability in conformity.

Consequently, instability emerges when there are multiple influential external networks acting on individual actors at the same time, or when there is a decline in the dominance of one specific network in favour of another.
The potential pitfall when relying on either isomorphism theory or social network theory is the convenient fallacy to view organisations and social networks as arrangements between people only, instead of viewing them as arrangements around social objects, such as a technology, or a myth, idea or view (Cetina et al, 2001). To cope with this, it is important to recognize that organisations and other social arrangements (including geoG2Gs) are not necessarily isomorphic because their structures are similar, but that isomorphism occurs when objects, methods or frames with which they shape and organize their activities are similar. As a result, stability and change of conformity must be linked to such social objects.

4.3.5 Theoretical view of collectivity stability and change

The explorative model of Chapter 1 found that the AHN was stable in

Collectivity and partnership rules because all internal partners implicitly agreed to be consistent in the display of their joint AHN profile to the external world. *Collective action theory* (Barnes, 1995; Olsen, 1965) explains this collectivity stability by reasoning from why actors would consistently act in a similar fashion, whereas *social capital theory* (Bourdieu, 1986; Woolcock, 1998) would tackle collectivity stability from the angle of mutual benefits. Each is explained further below.

Theory of collective action and collectivity stability and change
The theory of collective action posits that individuals tend to follow a group in collective action if the group is working to provide public goods (Barnes, 1995; Olsen, 1965). In most cases individuals will have an incentive to 'free-ride' on the efforts of others, except when the group only provides benefits to active participants in the group. In the absence of collective incentives, the incentive for group action diminishes as group size increases, so that large groups are less able to act in their common interest than small ones. The relevance of the theory for the explanation of collectivity stability lies in particular in the sociological (rather than the economic) angle of the theory. On the sociological side, the theory of collective action posits that the individual behaviour within a collective is often steered by the collective. Tullberg (2006) argues that individualism in taking 'rational' decisions in an organisation or within a group could lead to group 'punishments'. As a result, a form of group decisions emerge, which favour the collective over the individual. Furthermore, Vatn (2009) investigated cooperative behaviour in situations where individual benefit maximisation would have created more individual benefits. Apparently the collective interests weighed higher than the individual interest. Gächter and Fehr (1999) investigated the impact of social rewards on people's behaviour in the provision of a public good. They found that approval incentives in combination with some minimal social familiarity generate a significant rise in cooperation and a reduction in free-riding.

The theory of collective action assumes that collective behaviour may change as a result of a (change in a) certain artefact. (van den Hooff, 2004) tested this assumption for a collectively-owned ICT instrument, the electronic calendar, and found that the collective behaviour of all staff indeed changed. As a result, the collectivity stability element changed, because previously staff organised themselves through conventional, analogue means, whereas later they were willing to let the electronic agenda – through others – influence their daily work and appointments. This reflects a fundamental change in the collectivity because the collective behaviour and attitudes towards work processes was altered by external influences. Standards may also be a specific artefact to which individual staff react as a collective. Markus et al. (2006), for example, describe the collective action arising from standards, and link this to the issue of uncertainty. They argue that:

"Because standards are only useful when they are generally adopted or because potential adopters are uncertain about the costs, benefits and risks of standards implementation, each participant is motivated to delay adopting until convinced that others will also adopt. Because the best assurance lies in others' actual adoption, diffusion of standards tends to be slow and uncertain." (*Markus et al. 2006:444)*

The moment at which change occurs is the moment that the collective acts as a disincentive. Disincentives to contribute are when members of the collective no longer see or obtain the immediate or direct benefit of the collective action. Bimber et al. (2005) argue that this occurs in particular in early phases of collective action: "*Disincentives to contribute in the early phase of collective action are particularly strong for many types of public goods, because returns to early contributors are deficient: early contributors must invest in the absence of investments by others and thus receive little direct, immediate benefit from their contributions"(Bimber et al., 2005:368)*. Flanagin and Metzger (2008) find that for longer-term collective endeavours it is not so much the lack of individual benefit, but the lack of credibility of the (quality of the) collective good which may act as a disincentive to contribute. If the outcomes of the actions are no longer credible, then individuals are less likely to contribute any further.

Social capital theory and collectivity stability and change
Social capital theory on the other hand starts from the broad term 'social capital'. Bourdieu (1986:248) defines social capital thus: "*Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance and recognition – or in other words, to membership in a group – which provides each of its members with the backing of the collectivity-owned capital, a 'credential' which entitles them to credit, in the various senses of the word.*" Other than social network theory, for example, which emphasises the influence in organisations of the networks in which individual staff members are active, the social capital theory emphasises the collective interests of individuals and organisations through collective networks. If staff members in an organisation or in an inter-organisational arrangement have a collective interest, then they are more likely to follow the rules and values present in the networks related to those collective interests.

Woolcock (1998:155) explains this term as the "*norms and networks facilitating collective actions for mutual benefits."* The underlying assumption of social capital theory is that social networks have the potential to generate more socio-economic benefits than the collective of individuals. The benefits, consequently, reside in the networks of relations, rather than in the attributes of the individuals in those networks (White, 2002). "*Social capital is seen as a function of size of*

networks and volume of capital possessed by networked individuals" (White, 2002:258). Again, other than social network theory, which emphasises the individual relations and weak ties, social capital theory emphasises that the collective is more than the sum of individuals. The mutual acquaintance and recognition socially obliges members of the social networks to convert their individual resource into a mutually beneficial economic resource. The effect of this social obligation is a re-affirmation of the original relationship, and hence a durable, stable set of social relations and social activities.

Stability in collectivity exists if actors comply with certain internal group norms, often through collective action and peer pressure. Coleman (1994:177) states that '*social relationships that constitute social capital for one kind of productive activity may be impediments for another'*. This implies social pressure, resulting from social networks is strong. Uncertainty arises if individual staff members defer from the collective action, and take individual actions. Instability arises if actors use multiple values and different standards for their work processes and cooperation activities with geoICT. Group sanctions and compliance are a way to restore the stability in collectivity. Compliance is intended to dissolve the uncertainty of group values among geoG2G group members.

Changes in collectivity stability occur at the moment that staff members start to question the credibility, or appropriateness, of the product which they contribute to. So when they loose faith in the jointly produced product or jointly agreed production means, they may become less willing to support the geoG2G as a whole. This willingness to support the sustainance of the geoG2G reflects the stability element collectivity. Credibility and faith in the product are thus essential for the degree of stability and change in the collectivity element, and loss in credibility is therefore examplary for collectivity change. A change in collectivity has the tendency to be abrupt, and follow what (Watts, 2002:5767) refers to as 'bootstrapping' principles and (Kramer et al., 1996; Yin, 1998) as having a 'tipping point'. Bootstapping is the idea that people wait with changing until one person is willing to start the change. At that point many people follow at the asame time. In other words, it is not gradual, but at some tipping point the whole system changes, and/or all actors follow a new principle. So the build-up to the change may be gradual, and the change itself is rapid and unpredictable. Yet as soon as a significant set of individual members of the collective change, then the whole system changes.

Combined theoretical view on collectivity stability
Combining the two theoretical views on collectivity leads to the conclusion that both theories find that stability in 'collectivity' coincides with the presence of collective sanctions and rewards or incentives, collective intentions and collective interests. Stability exists if the collective interests combined with the

sanctions and incentives outweigh the individual benefits, or outweigh the intention and decisions of individual staff members to opt for alternative actions.Instability occurs as a result once the opposite happens, namely once the individual benefits (start to) outweigh the collective benefits, and once the collective incentives or sanctions are no longer crucial for individual decisions and actions.

A critique on the collective action theory is that it lacks a "notion of causality" (Lash & Urry, 1984:46), meaning, that the reason of intention to mobilize resources behind a certain idea is not taken into account, but that it tends to focus on the type of activities employed in for example mobilizing (through sanctions and incentives from the "dominant group") or the types of results that collective action is generating (i.e. stability in this research). As a result, there is less scope for the actions of the "subordinates" and the unintended consequences of mobilisation activities. Similarly, social capital theory does not address the origin of certain capital resources (Lewandowski & Streich, 2007), and tends to focus on the consequences of it in terms of networks. Lewandowski & Streich (2007:592) raise the argument that *social capital is profoundly embedded in the hierarchies of civil society and thus is a mechanism of the (re)production*. Essentially, both theoretical frameworks place less attention to the root of the collective action. This root may be social inequality for example. However, in this research the societal root for collectivity is not researched, but the consequences.

4.3.6 Characteristics of changes in geoG2G stability elements by a view from theory

The above theoretical findings on each stability element complement the summary section 4.2.3, including the summarising table 4.3 from a practice perspective. All in all, the theoretical investigation found that the stability elements of power, economic rules, conformity and collectivity are explained respectively by inter-organisational dependencies, anticipated effects on transaction efficiency, agency of external network relations and collective interests and collective action. The stability elements depend respectively on long-term mutual expectations and staff allocations, low transaction costs and effective hierarchies, dominance of network agency over personal interests and a combination of collective interest with collective sanctions and incentives. Table 4.5 provides a summary of the four combined theoretical views on each of the stability elements.

4.4 Evaluating changes in geoG2G stability elements

The characteristics of changes differ in the way and in the reason why 'change' occurs, but not how and when to identify that a change has occurred, or how a change is visible in any way. Despite the opposite views on 'change' and

'stability', most publications that address both 'change' and 'stability' acknowledge that there are always different shades of 'change' and 'stability.' No geoG2G is absolutely stable at a given time or is in constant fundamental change at any time. There are however 4 ways in which to evaluate the changes.

	geoG2G stability elements			
Characteristics	**Power**	**Economic rules**	**Conformity of mode of conduct**	**Collectivity and partner-ship rules**
Described by theories	Resource dependency theory; Social exchange theory	Transaction cost theory; Administrative behaviour theory	Isomorphism theory; Social network theory	Collective action theory; Social capital theory
Is explained by	Inter-organisational dependencies	Anticipated effects on efficiency	Agency of external network relations	Collective interests and collective action
Stability depends on	Long-term mutual expectations and staff allocations	Low transaction cost; Strong/ effective hierarchies	Dominance of network agency over personal interests	Combination of collective interest with collective sanctions and incentives

Table 4.5: Summary of characteristics of each of the stability elements by a view from theory

First, it is obvious that some changes are more fundamental than others. 'Fundamental' change is different from 'incremental' change and from 'variation.' Whereas 'fundamental change' reflects a different set of choices and behaviour in organisation, 'incremental change' and 'variation' only reflect an adjustment within the organisation without affecting the deep structure or behaviour within the organisation (Sastry, 1997). Change in other words reflects the discontinuation of a previous kind of stability, and the transition to a fundamentally different kind of stability.

A second characteristic is that even though the reasons for change may not be clear, the effects are. Artefacts of fundamental changes must be visible in the organisation. Lichtenstein (2000:537) mentions as artefacts such as "*the emergence of a new dominant logic, a new complex attractor and organising structures."* McBride (2005:249) refers to "*a massive shift of organisational form from the old semi-stable state to a new semi-stable state. A new organisational structure was created, a new head of IT appointed, central IT*

staff numbers were increased from 12.5 to 50 and a new IS strategy was created."

A third comparative attribute of fundamental change is the period during which change occurs. Sabherwal et al. (2001) claim that ICT 'change' occurs in relatively short periods in between longer periods of stability, whereas Gersick (1991) claims that 'change' is likely to follow a pattern where a longer period of apparent stability is accompanied by 'hidden', gradually developing and emerging processes below the surface of visible and formal organisational structures. This period of apparent stability is ended by a discontinuous, often punctuated tipping point, during which fundamental changes of the organisational system occur. The consequence of the 'hidden processes' is that punctuated changes may be much harder to predict than incremental changes. Gersick (1991:20) warns that "*It should be noted that revolutionary outcomes, based on interactions of a system's historical resources with current events, are not predictable and they may or may not leave a system better off."* Yet punctuated changes may be easier to identify than gradually emerging and developing changes, given the fundamental differences between older and newer situations.

Fourthly, there are certain conditions under which fundamental changes can occur. Even when organizational cases are largley similar in structure, some may inhibit fundamental changes, whereas other may not. There are, in other words, certain conditions which foster a particular fundamental change.

The stability elements can be compared with the four characteristics of 'change.' The changes in stability elements are reflected respectively by a discontinuation of existing control over resources, adherence to economic rules, or the dominance of one specific network and credibility of the collective interests underlying one geoG2G product. The punctuated periods are also different per stability change. Whereas the period for power changes may be long, for collectivity changes it may be short. Finally, the way that changes develop is respectively unpredictable for power changes, sequential for economic rule changes, predictable for conformity changes and incongruent for collectivity changes.

Table 4.6 provides the summary of the theoretical view of changes in each of the stability elements. It list for every stability element what would be a fundamental discontinuation of stability, what would be an observable artefact of this change in stability, how quick the change would occur, and under which conditions the change would occur.

	geoG2G stability elements			
Four Change Characteristics	**Power**	**Economic rules**	**Conformity**	**Collectivity**
The fundamental discontinuation concerns	Existing control of resources	Adherence to economic rules	Dominance of one specific network	Credibility of product
Artefact of discontinuation	New control & dependency agreements	Different transaction costs	New external rules	Alternative collective interest
Extent of how changes develop in a punctuated period	Relatively long (almost continuous) with unpredictable results	Relatively short – mostly sequentially	Gradual – often with somewhat predictable results	Incongruent within short interval (tipping point)
Fundamental change occurs	When uncertainty on expectations emerges, and negotiations are required	In case of non-compliance with rules; individual discretions	When the dominant network declines, or when multiple networks emerge	When individual benefits start to outweigh collective benefits

Table. 4.6: Summary of change characteristics of stability elements

4.5 Conclusion

This chapter 4 addressed research question 3: ***How to describe and evaluate changes in each of the geoG2G stability elements?***

This question contains two parts: an description of what stability elements are and how one can see this. This depends on an assessment from grey literature, an assessment through personal interviews and a synthesis from theory. This descriptive part leads to a set of characteristics of stability elements. Based on the descriptive part the second part deals with how to evaluate change in stability elements. This leads to a set of characteristics of change.

The first part derives a summary of artefacts and views of practitioners. In grey literature authors associate 'legitimacy', 'trust' and 'exclusiveness' with 'power' in geoG2Gs; 'efficiency' and 'presence of bureaucratic procedures' with economic rules; 'legal adequacy', 'rational decision making' and 'predictability' with conformity; and, 'contingency choices' with collectivity. The interview results with practitioners partly confirm the results of the grey literature analysis, but also extend these results. Power stability depends on the ability to mobilise capacity and resources; economic rules stability on financial

security and arrangements on distribution of costs; conformity on repetition and standards; collectivity on integration and the ability to address free-rider problems.

The association of practitioners relates to a certain number of theories on stability and change, but does not completely coincide coincide with the theoretical models of stability and change. Whereas geoG2G practitioners relate stablity elements to their immediate highly dynamic and changeble work environment throughout time, most theoretical models reasons from a particular consitent logic, including a consistent dynamic from stability to change. Combining the two derives a interrelated list of characteristics which enable the description of stability and change. The stability elements power, economic rules, conformity and collectivity can be explained by respectively inter-organisational dependencies, anticipated effects on transaction efficiency, agency of external network relations and collective interests and collective action. Stability depends on their long-term mutual expectations and associated staff allocations, low transaction cost and effective hierarchies, dominance of network agency over personal interests and a combination of collective interest with collective sanctions and incentives. Table 4.5 provides an overview of the characteristics of how to describe stability and change. As ‘stability’ relates to ‘change’, a description of ‘stability’ involves a description of ‘change’ at the same time.

When evaluating the changes in stability there are four characteristics of change: ‘change’ concerns a fundamental discontinuation of previously given process and/or organisational structures; ‘change’ has clear artefacts; ‘change’ occurs in a punctuated period; and, one can identify a moment at which ‘fundamental change’ occurs. On the basis of these characteristics of change, it is possible to identify how change in each stability element is visible. Table 4.6 presents this.

The combination of Tables 4.5 and 4.6 provide a direct response to how to evaluate stability and change within geoG2Gs. Specific theories have the advantage to encapsulate both stability and change from a particular consistent point of view. This provides theoretical expectations on each of the stability elements. For example, transaction cost theory provides the logic and the condictions of changes in economic rules. Despite this advantage, the implicit assumptions and conditions within every theoretical model also has limitations. Empirical reality, already shown in chapter 1, shows that it is likely that both stability and change are highly fluid and interconnected, because within the context of a geoG2G the same actors are involved in both the stability and the changes. Theoretically, stability and change must therefore be jointly captured as a multilayered dynamic. While one element may be stable, at the same time another element may already be in change. This differs from traditional

approaches which explain stability and change in isolation. Such models either explain the reasons, causes and artefacts of stability (such as static dependency relations, established institutions or social networks), or the reasons, causes and artefacts of change (such as conflicts, transactions costs, alternative collective action).

Given this dynamic and multilayered nature of stability and change it is possible that stability and change of one element may also influence the other element . The emergence of certain artefacts of change in power may thus for example trigger or coincide with the emergence of certain artefacts of change in collectivity. This has an empirical implication, namely that the description of stability and change requires a timeline (i.e. when does which artefact emerge), a duration ((i.e. how long do certain artefacts remain), a sequence (i.e. does one artefact emerge right after the other) and a location (i.e. where do certain artefacts emerge, and where not). A combination of these artefacts makes up a comprehensive picture of geoG2G stability and change.

These empirical requirements thereby also the link to the previous and next chapters. Chapter 2 categorised 4 different geoICT coordination types as possible causes for change, and Chapter 3 identified 6 different kinds of staff discretions, as triggers for change. This chapter complements the previous chapters by formulating an evaluative set of characteristics with which to qualify change. This set needs however further exploration and testing in an empirical environment. The next step is therefore to find out how to observe the causes and triggers for change and the changes in order to seek if the artefacts of each of these link and/or correlate to each other in time, duration, sequence and location in light of this need. The next chapter 5 describes the operationalisation of where, when and how to find and observe artefacts for each of these conceptual elements. The objective of such observations are to identify whether there is any causal or coincidental relation between certain geoICT coordination types and discretions on the one hand and stability changes on the other hand, and to identify whether any variation in the stability element change types corresponds to any of the variation in discretion and /or geoICT coordination types.

Chapter 5

Research strategy

5.1 Introduction

Chapter 5 deals with the research question 4 ***What are appropriate indicators to verify the extend of relations between geoICT coordination types, discretions and stability changes, and with which techniques is it possible to determine the values of those indicators?***

The question requires constructing and applying a conceptual model with which to verify the extend of relations between the research objects geoICT coordination, discretions and stability, and choosing a set of techniques to evaluate the connections within the conceptual model empirically. Both the model and the data collection and analysis techniques are necessary to verify empirically if certain geoICT coordination types and discretion types systematically result in particular changes in geoG2G stability elements, or whether the variation in any of these research objects is coincidental.

This chapter consists of 4 subsequent sections. Section 5.2 constructs a conceptual model, showing which variables are chosen to look at each of the research objects and identifying the expected relations between variables. Section 5.3 formulates how to operationalise the empirical investigation through a case study approach. Section 5.4 describes the data collection and data analysis techniques for each case. Section 5.5 is the concluding section, which provides a summary of the practical execution of the empirical investigation, and a way to present the empirical results for each case consistently.

5.2 Construction of a conceptual model

The construction of the conceptual model starts with the main research question, namely '**How and why do different geoICT coordination types change the geoG2Gs in the Netherlands, and what is the influence of staff discretions in this process?'**

This question can be regarded conceptually as 'what is the effect of a set of actions - the actions of the geoICT coordination and the discretions - on a behavioral structure – represented by stability and change in geoG2G cooperations. Conceptually such a question seeks a relation between two variables, and requires an interrelational research (Kumar, 1996). It is a question of finding and explaining the interrelation between X and Y. The X in this case concerns the geoICT coordination and the associated discretions, whereas Y constitute the changes in geoG2G stability. The combined descriptions of each

of the components in this interrelationship, coupled with the descriptions of the concepts in the previous chapters 2, 3 and 4 lead to a conceptual model, depicted in figure 5.1, and further explained hereafter.

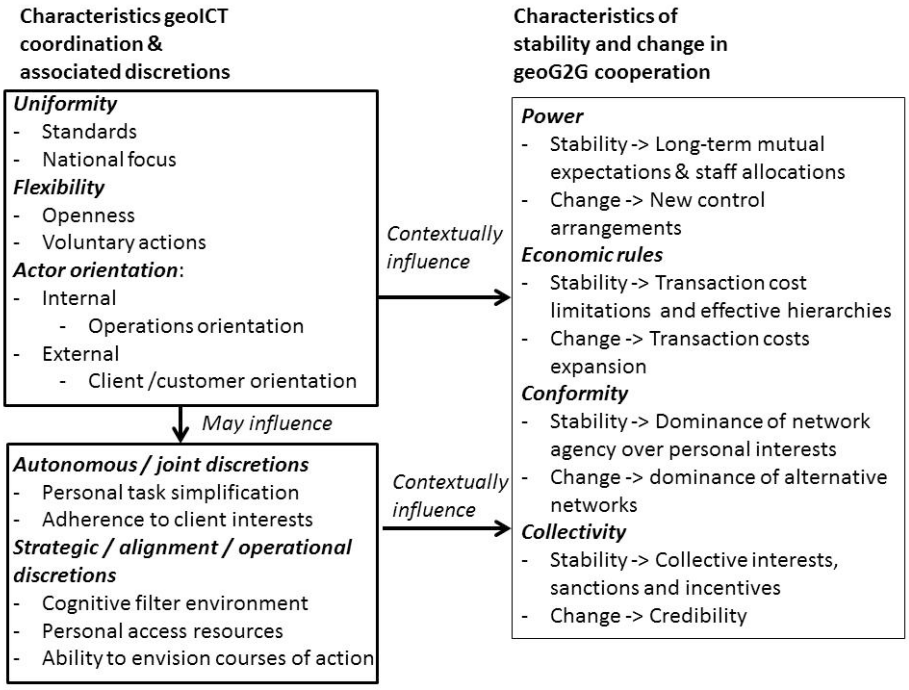


Figure 5.1: Conceptual model

The first part of the model (on the upper side of the box on the left) concerns the geoICT coordination. Chapter 2 identifies geoICT coordination as a set of intervening actions, aiming at the orientation of actors (internal or external), and at the results of what actors should create (uniform geoICT specifications or leaving flexibility to geoG2G actors). Given the variation in these two dimensions there are four different types of geoICT coordination (LOCUS, MODUS, EFFECTUS and CAUSUS), which are each likely to have their own effects. The associated geoICT coordination actions either focus on the intended relations between geoICT actors (characterized by the closeness to internal / external environment) or on the intended results (uniform / flexible). The immediate possible effects of this variation in geoICT coordination are the associated effects on discretions, described in chapter 3, and depicted on the lower side of the box on the left. An example of this concerns the issue of geoICT standards. Standards are a way to provide uniformity in geoICT data, models and processes. The action of regulating standards also involves enforcing actors to abide by the standards, so that professional actors create products and services using those standards. Individual actors may comply or

not, depending on their discretionary actions. The degree of influence that a geoICT coordination action based on standards has, is visible in the way that these discretions may emerge. This effect is not an absolute necessity, because there may also be no discretions at all (hence the arrow with caption "may influence"). If however there are any discretionary decisions it could be assumed that these arise in reponse and in relation the specific geoICT coordination. Figure 3.4 describes these relations. If geoICT coordination acts upon the geoG2G actors which work at the intersection of the geoG2G with the external environment, then autonomous strategic discretions or joint alignment discretions may emerge. Similarly, the effect of geoICT coordination, when targeting internal actors of geoG2Gs is the possible emergence of autonomous alignment and operational discretions. The discretions are thus either the result of certain geoICT coordination variations, or are independently emerging. In both cases the variation in discretions has an effect on the stability changes.

Chapter 3 also identifies that discretions can take various shapes, depending on the role of the professional actors in an organisational setting, and depending on both personal and environmental characteristics. Chapter 3 identified that discretions differ in the functional role of staff members geoG2Gs (strategic / alignment and operational), and in how individual staff members are inclined to favor individual autonomous internal or external (client / stakeholder) interests. Furthermore, discretions only emerge if individual staff have, use and/or envision their personal decision freedom. This leads to 6 types of discretions: (autonomous/joint) strategic discretions, (autonomous/joint) alignment discretions, (autonomous/joint) operational discretions. As discretions vary in each of the differentiation indicators, these variations may correspond to each of the specific variables of geoICT coordination (uniformity/flexibility; closeness to internal/external environment).

Table 2.4 and Figure 3.4 provide the details for the first part of the model, namely how the triggers for change (the way that geoICT coordination is conducted and the immediate effects of the geoICT coordination on discretions) are present in a specific context and for specific geoG2Gs. Tracing geoICT coordination characteristics requires looking at a number of aspects of these characteristics. The degree to which each of the aspects are present in reality requires to formulate indicators. The characteristic 'uniformity' is visible through how professionals strive for the aspects 'standards' and aim to provide such standards at a national level (hence the 'national focus'). Flexibility is visible through the aspects 'openness' and voluntary actions'. Similarly, the discretions are visible through the aspects 'personal task simplification', 'adherence to client interests', 'cognitive filter to the environment', 'personal access to resources' and ability to envision alternative courses of action'. The aspects and indicators for the characteristics are based on the conceptualisations in Table 2.4 and Figure 3.4. Together they provide a summary of all

characteristics of geoICT coordination and discretions, visible through a number of aspects and empirical indicators, in Table 5.1. In total there are 6 aspects which enable the empirical description of geoICT coordination characteristics, and 5 aspects which enable the description of discretions characteristics.

N.B. The indicators in Table 5.1. are all expressed as 'the perceived degree of..' rather than 'the degree of..' because the values of the indicators depend on interpretation and triangulation (of the researcher), rather than on physical artefacts which can be measured. The values of the indicators range from 'high' to 'low'. A value of 'high' is given if in the different data sources (interviews, documents, references) there is a relatively frequent and/or consistent mentioning or reference to the particular indicator. Similarly, if this is lacking or there is a systematic and consistent denying of this aspect to be present, then the value is labelled as 'low'. As a result, these aspects values are by nature qualitative and subjective, and not quantitative. They describe the intensity by which the degree is perceived by the researcher from the data at hand.

Characteristics of geoICT coordination and discretions	**Aspects**	**Indicators**
Uniformity	Standards	The perceived degree to which standards are brought forward as solutions
	National focus	The perceived degree to which the geoICT coordination actions impose implementation in all national layers of administration
Flexibility	Openness	The perceived degree to which geoICT coordination provides actors the ability to access and specify their own and others' data and process requirements
	Voluntary actions	The perceived degree to geoICT coordination provides actors the ability to take their own actions
Actor orientation – internal	Operations orientation	The perceived degree to which geoICT coordination requirements interfere in operational processes
Actor orientation - external	Client/customer orientation	The perceived degree to which geoICT coordination requirements interfere in dealing with external parties
Autonomous /Joint discretions	Personal task simplification	The perceived degree to which individual staff members modify their own tasks to facilitate their own schedules and activities
	Adherence to client interests	The perceived extent to which staff members refer to other organisations or alternative coordination mechanisms as a justification for their actions

Characteristics of geoICT coordination and discretions	Aspects	Indicators
Strategic / alignment / operational discretions	Cognitive filter environment	The perceived degree to which individual staff members – at a certain level within the geoG2G - can formulate alternatives for geoICT coordination requirements
	Personal access resources	The perceived degree to which individual staff members – at a certain level within the geoG2G - (can) start up activities to acquire additional funds, equipment, information and people to execute or to bypass geoICT coordination requirements
	Ability to envision courses of action	The perceived degree to which individual staff members – at a certain level within the geoG2G – show the ability to formulate alternative solutions for given problems

Table 5.1: Aspects and empirical indicators of geoICT coordination and discretion variables

The second part of the model (the box on the right side in Figure 5.1) reflects the geoG2G cooperations. Chapter 4 describes how to capture geoG2G stability elements jointly as a dynamic, multilayered model in order to identify stability and change in the geoG2G. The actions of coordination and discretions form together a possible trigger for change in how organisations cooperate within geoG2Gs, because as actors work within organisations their actions influence the way that these organisations cooperate with each other. Both geoICT coordination and discretions involve actions occurring in an inter-organisational context. These involve the use and usage of geoICT. Thus, they affect the inter-organisational behavior and structure. Stability can change, in whatever form and shape, by the context of geoICT coordination actions and professional actors. The context influences the behavior and actions of actors in the geoG2Gs, and therefore influences whether geoG2Gs are stable or not. As the context (the type of policy and/or set of actors the geoICT coordination is derived from) may be different from case to case, the contextual influence may be different in each case (hence the arrow with caption contextually influence). Table 4.6 in chapter 4 summarizes how to capture and how to observe these changes in stability.

How geoG2Gs are influenced is visible through the stability element characteristics of power, economic rules, conformity and collectivity. Chapter 4 identifies characteristics of the changes in each of the four stability elements through respectively inter-organisational dependencies, anticipated effects on efficiency, agency of external network relations and collective interests and collective action. Evaluating the extent of stability and change in each of these

indicators can be done by examining the extent to which the aspects of resource allocation, transaction cost, network dominance, collective interests and loss of credibility in common product remain stable or show change. Table 5.2 provides an overview of the aspects of stability and changes, and the way indicators to measure these aspects.

Tables 5.1 and 5.2 describe how to observe each variable. Evaluating the validity of the model requires an empirical collection strategy for all variables, given particular contexts of cases. Such a strategy consists of three parts. First, it is necessary to identify where each variable in the model can be observed. Section 5.3 describes the case selection and method of case comparison. Secondly, it is necessary to identify how to observe the variables. Section 5.4 describes the techniques for collecting the data, emphasizing interview techniques and documentary analysis. Furthermore, it is necessary to choose a technique of analysing and comparing data. The analysis is text-based, and that the texts concern interview transcripts and documents. Observing the variables when relying on texts is possible through a consistent coding strategy for each of the variables. The third part concerns how one can derive conclusions on the consistency of observations and text-based analysis across cases.

geoG2G stability elements	Stability/ change	Aspects	Indicators
Power	Stability	Long-term mutual expectations and staff allocations	The perceived degree to which different staff members of geoG2Gs maintain similar expectations for a relatively long term
	Change	Control over resources	The perceived degree to which staff members of geoG2Gs apply alternative mechanisms to manage their finances, information and/or staff
Economic rules	Stability	Transaction cost limitations; Strong/effective hierarchies	The perceived strictness with which staff members within a geoG2G adhere to certain agreements on the execution of operational processes
	Change	Transaction cost expansion	The perceived degree to which geoG2G staff members opt for new / alternative operational executions, which increase the overall transaction costs
Conformity	Stability	Dominance of network agency over personal interests	The perceived degree to which geoG2G staff members consistently refer to a common ideal
	Change	Dominance of alternative networks	The perceived degree to which ideas from outside geoG2G arrangements (start to) guide current decisions
Collectivity	Stability	Combination of collective interest with collective sanctions and incentives	The perceived degree to which geoG2G staff members maintain a common interests and accept and react to similar incentives and sanctions
	Change	Loss of credibility	The perceived degree to which geoG2G staff loses faith in the necessity of the current common product and jointly agreed ways of production means of the geoG2G

Table 5.2: Aspects and empirical indicators of stability element variables

5.3 Operationalisation method - Observing and comparing variables in cases

Now that we know *which* variables to observe, and *how* to observe the variables through which set of indicators, the next step is determine if there is consistency or inconsistency between the variations of the independent and dependent variables in different contexts, and if this (in)consistency can be explained by the context itself. A logical choice for the question *where* to observe and extract

the values of the indicators, and where to find (in)consistency between the variation of variables is to opt for case study methodology. Yet, this choice requires a justification. Case study methodology is appropriate when the boundaries between phenomena, context and theory are not evident (Yin, 2003). As the phenomena under consideration are the discretions and stability element changes, while the context is determined by the geoICT coordination types targeting the geoG2Gs, a case study methodology could investigate the relation of the phenomena occurring within geoG2G cases (discretions and stability element changes) with the context in which geoG2Gs operate (geoICT coordination types). Hence, the case study methodology fits the purpose of this investigation.

The choice for a *multiple* case study comparison (as opposed to *single* case studies) is relevant when the cases are either similar or dissimilar in one of the independent variables. In this research the independent variables are the variables relating to geoICT coordination and the variables related to discretions. As the research aims to find to an explanation for why in certain geoICT coordination contexts the variation in geoG2G stability changes, it is important to vary this context in the cases. Hence, a comparison of dissimilar cases in geoICT coordination is appropriate.

The comparison of multiple cases is possible through either holistic case designs (type 3 in (Yin, 2003)) or embedded case designs (type 4 in (Yin, 2003)). In holistic case designs one compares the general functioning of a case with a particular context with other types of cases with different contexts, whereas in embedded cases one compares cases which all contain similar specific units of analysis. A comparative case study methodology, using holistic case study designs (Eisenhardt, 1989; Hutjes and Buuren, 1992; Yin, 2003), is appropriate in this research. In holistic case studies both the context of geoICT coordination and the geoG2G are dissimilar. The comparison aims at explaining why a specific context of each case generates specific conditions and changes in a geoG2Gs. Relying on holistic geoG2G cases allows a general comparison of the functioning and changes in each geoG2G in reaction to, or in correlation with the context of a geoICT coordination type. Figure 5.2 shows the holistic multiple case study design in for the investigation.

Despite the relevance of case study methodology, various authors also point to potential pitfalls. It is difficult to draw general conclusions from a limited number of cases, and in the selection of 'representative' cases a researcher may introduce subjectivity and steer the generalizable conclusions to a particular subjective direction (Irani et al., 1999). Furthermore, many research efforts relying on case studies fall short in reflecting how the case study results clarify the boundaries between the phenomenon and the context (Walker et al., 2004). An iterative approach of data collection and the collection of data over a longer

period can accommodate for the potential pitfalls. The choice among cases should then be carefully described, should depend on having both access for longer periods to the case, and the techniques of data collection should rely on multiple sources.

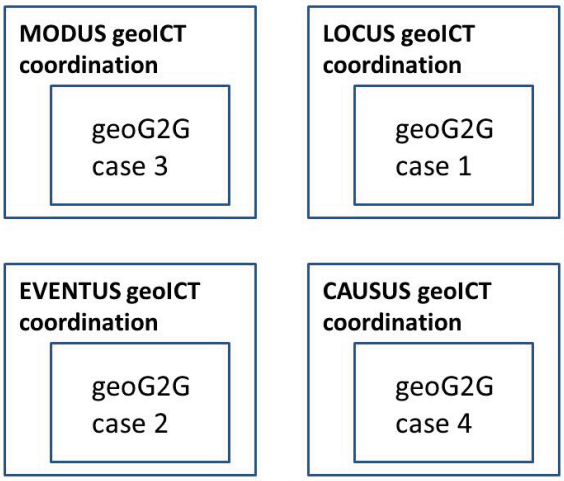


Figure 5.2: Holistic multiple case study design

The case selection process was as follows. To allow a comparison of cases it is necessary to make an assessment of which case is related to which geoICT coordination type. This assessment is necessary to make a purposeful selection of representative cases. Before constructing a set of comparative cases it is necessary to construct what really constitutes a 'case' in this research. Characteristics of a 'case' are a particular kind of actors, action, setting, time and produced artefacts (Eisenhardt, 1989; Yin, 2003). Following the characteristics of 'cases', for this research a case is represented by the following features:

- The acting persons or actors (kind of actors) – Each case constitutes of a geoG2G with strategic staff members, alignment staff members and operational staff members within all partners of the geoG2G.
- The actions: in each geoG2G, staff members make discretions in relation to geoICT related activities, decisions and operations.
- The setting: Each geoG2G is operating with an organisational structure agreed among partners. Each geoG2G is handling and/or reacting to a geoICT coordination type.
- The time: the period under consideration in this study is 2007 until 2010.
- The produced objects or artefacts in the geoG2G: Each geoG2G produces or contains stability elements, which are visible through artefacts of

perceptions and values, decisions and discretions, and individual behavior.

With this definition of 'a case' it is possible to make an inventory of cases in the Netherlands. The landscape of public sector organisations in the Netherlands committed in geoG2Gs has become increasingly wider in the past years. An inventory of Netherlands geoG2Gs in three Netherlands-based magazines (VI Matrix, GIN and GIM International) for the years 2002 until 2010 or Netherlands-oriented derived 17 different geoG2Gs. Annex 2 provides the results of the inventory in Netherlands. The inventory shows that many geoG2Gs involve local governments, and that many geoG2Gs originate from implementing geoICT activities at local municipalities. So, local governments are at the hubs of geoICT activities, and form the core of all geoG2Gs.

A second step in the review of cases is to determine how each case was different in terms of independent variables. The exploration relies on identifying in which external policy geoICT matters were embedded, and the key coordinating instruments. If the embedding of geoICT matters is at national level, and if the emphasis of the coordination strategy was on transposition of national objectives to local implementation, then uniformity can be considered high. If the embedding of geoICT matters relied on local, bilateral policies on products and instruments aimed for contextual alignment, then flexibility can be considered high. If the embedding of geoICT matters focused on ensuring that actors on local administrative levels implemented the national objectives, and on the embedding in technological standards closeness to external environment can be consider high. If the emphasis of the external coordination instrument was primarily aiming for product specifications and the external coordination instrument primarily aimed for interoperability processes, then closeness to the internal environment can be considered high.

The table in Annex 2 shows the categorisation of 17 geoG2Gs in the Netherlands by the types of partners, and the geoICT objectives of the partnership, the tangible (i.e. visible) cooperation rules, the policies/laws/strategies rules in which the geoICT coordination is embedded, and the interpretation in terms of most dominant geoICT coordination type per case. Although the inventory in Annex 2 is only a static and incomplete overview of all geoG2G cases in the Netherlands picture, as it relied on an inventory at a specific time, it provides a reasonable first insight in the differences among geoG2Gs in the Netherlands. Summarizing the inventory of cases per geoICT coordination type yields the following Figure 5.3.

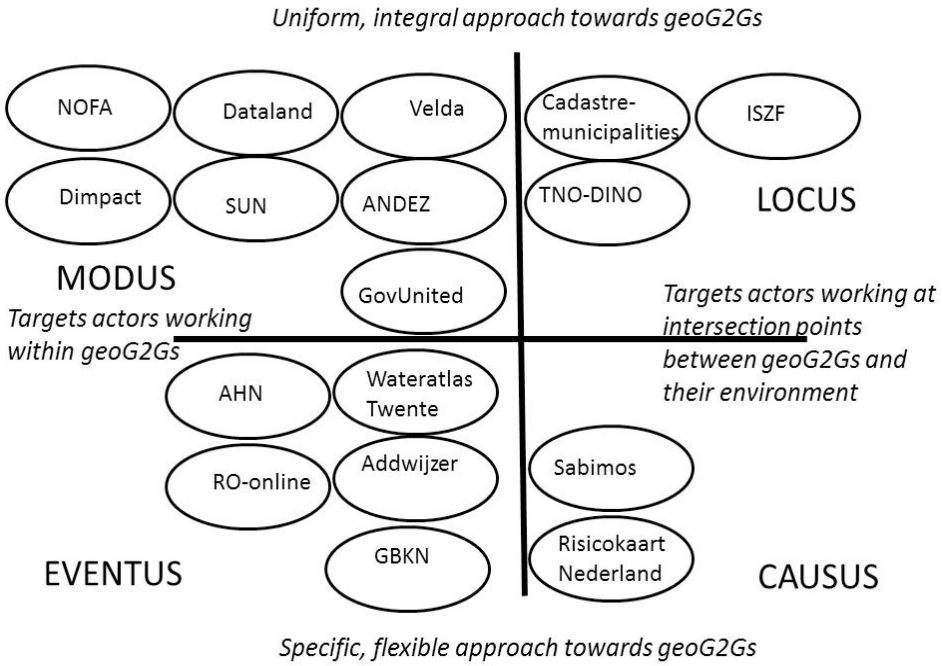


Figure 5.3: Categorisation of cases per geoICT coordination type

From Figure 5.3 it is possible to make a purposeful selection of cases. The selection of cases relies on the principle of most dissimilar cases in the independent variables. In this way it is possible to identify whether a different context of geoICT coordination also generates a different effect in stability elements.

The first step of selecting cases is to choose cases which are representative of a specific geoICT coordination type. In this way one can compare cases which differ in one particular aspect. One case from each category of geoICT coordination types was chosen. The step relies on the access that one can have to a case. Hence, choosing a representative case which would be information-rich, and with access to the people and documentation in the cases is preferred. Using these two criteria, I selected the following cases in the Netherlands:

1. Cadastre-municipalities (Cadastral G2G) – This geoG2G case of is targeted by the LOCUS geoICT coordination strategy to implement BAG nationally (national policy of key registrations of addresses and buildings). A lot of information on this case was available through many publications in Netherlands based professional magazines and regularly maintained websites and newsletters of the Dutch Kadaster and the VROM Ministry.

Access to the people working in this case could be assured by institutional relations of my institution to the Dutch Cadastre.

2. AHN – This case is targeted by an EVENTUS geoICT coordination strategy relying on height data product specifications. The AHN maintained regular newsletters and publications on the developments and progress in AHN. This provides most of the required information. Access to this information was possible through personal relations with RWS and the Waterschapshuis.
3. Dataland – This geoG2G targeted by a MODUS geoICT coordination strategy relying on national 'Other government' objectives. Much of the information on Dataland was available through regular newsletters and Dataland congresses. Access to this information was possible through registration to both, and personal contacts with the Dataland actors.
4. Sabimos – This geoG2G is targeted by a local CAUSUS geoICT coordination strategy relying on regional mobility. Although there is little information available through publications, access to the information was possible through the relative short geographic and personal distance to the responsible actors in this geoG2G.

Figure 5.4 summarizes the selected multiple holistic cases. The replication logic (theoretical / literal) depends on which cases are compared. The cases Dataland and AHN are likely to have similar effects in certain stability changes because the geoICT coordination types exhibit similar orientations on actors (i.e. close to internal environment'). In contrast they are likely to differ in stability change effects from the cases Cadastre and Sabimos, because the geoICT coordination context in these cases is determined by emphasis on a different actor orientation, namely 'closeness to external environment'. At the same time, any difference in the stability change effects in the Dataland and AHN case can then be attributed to the difference in uniformity and flexibility.

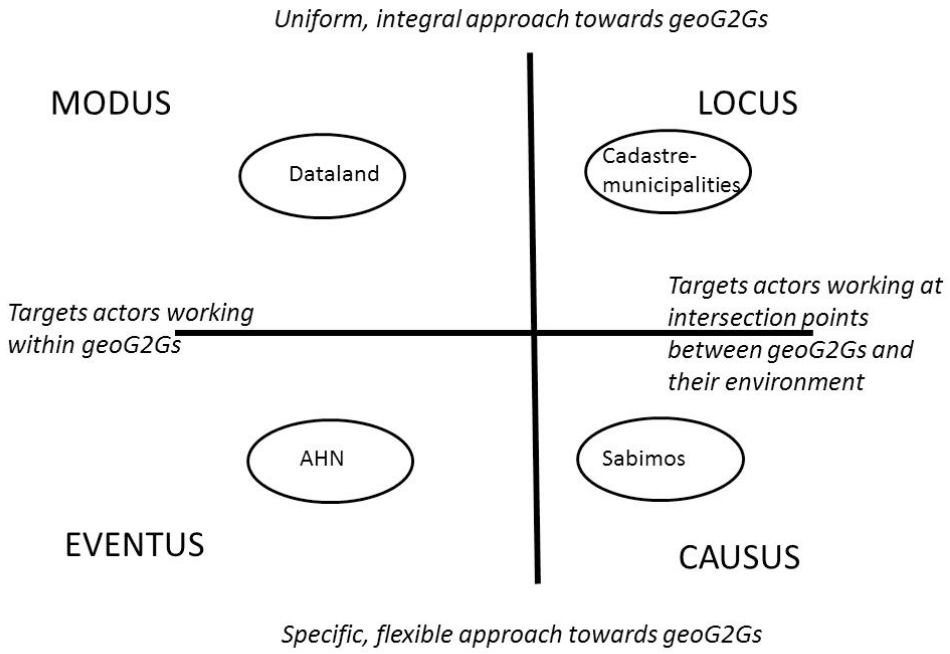


Figure 5.4: Selection of multiple holistic cases

In a similar way, it is expected that the stability changes in the cases of Dataland and Cadastre are alike, given that they both emphasize the element of uniformity, whereas AHN and Sabimos underline the element of flexibility. If however certain stability changes do not occur, or are not apparent, then the elements of uniformity and flexibility are likely not to relate to these specific stability changes.

In order to be able to compare the cases comprehensively, i.e. to verify whether certain empirical data are present or absent in the cases, or to qualify the extent of certain empirical data, it is useful to present the cases in a systematic and consistent way. This is possible through a similar description of the indicators of the aspects of stability and change per case. The findings in each case contribute to answering research question 5 for each case, i.e. *Which variations in geoICT coordination and discretions (in each case) actually influence which changes in stability elements in (each) geoG2G?* Ultimately, the comparison of the findings in each cases leads to a more generic answer to the question.

The complete list of indicators to be evaluated in each case is presented in Table 5.3:

Section on	Results per case
1. General description of the case. Positioning and description of the case, and its environment	
2. **Empirical results of the geoICT coordination variables.**	- Standards, national focus - Openness, voluntary actions - Operations orientation - Client/customer/orientation
3. **Empirical results of discretions variables.**	- Personal task simplification - Adherence to client interests - Cognitive filter - Personal access - Ability to envision action
4. **Empirical results on changes in stability variables.**	- Long term mutual expectations and staff allocations - Control over resources - Transaction cost limitations and strong/effective hierarchies - Transaction cost expansion - Dominance of network agency over personal interests - Dominance of alternative networks - Combination of collective interest with collective sanctions and incentives - Loss of credibility
5. Discussion and overall assessment of the case with respect to research question 5.	- Summary of results - Description of relations and patterns - Explanation of relations or patterns between variables in the context of the case

Table 5.3: Subsections of results per case

5.4 Techniques of data collection and analysis

Within the selected cases, it is necessary to formulate a composite strategy to execute the data collection process. In cases studies based on dissimilar cases it is common to rely on multiple data sources, which provide a rich understanding of the patterns of behavior practitioners, and the decisions that they make, within a given context (Yin, 2003). At the same time, such data sources also provide a rich information of the geoICT coordination context, and the interpretation of the geoICT coordination by practitioners in the form of their actions.

The first step in the data collection is to acquire data on the variables through in-depth interviews with practitioners working in the respective cases and through collecting the textual artefacts produced within each case, so that these can be complemented by a qualitative, text-based analysis. Annex 1b provides the list of interviewees and the dates of the interviews. The strategy of choosing and requesting for interviewees within each case was to include staff members working at each level (strategic, alignment and operational), in order to seek relevant data of the different types of possible discretions. In practice the functions of staff members are often not labelled as strategic, alignment or operational, so within each case there had to be some initial discussion on what type of roles and functions different staff members had. Depending on these discussions, I categorised each interviewee as either a strategic, alignment or operational staff member.

The necessity within in-depth interviews is to remain sensitive to the nuances that people make in their responses (Strauss and Corbin, 1998). This can be addressed by a longitudinal data collection strategy. Given the time span of the research period, 2007-2010, a choice was made to conduct interviews with the same respondents at two different times during the research period within each case, complemented by an analysis of documents and other textual artefacts over a the entire period of study. Interviewing the same people twice makes it possible to extract evidence of changing views among respondents (Creswell, 1994; Gummesson, 2000; Jonker and Pennink, 2000; Lee, 1999; Strauss and Corbin, 1998).

A crucial requirement of in-depth interviews is to approach each respondent in an informal and open way. As van Thiel (2007) notes, an interviewer must act as the measuring instrument during interviews. Although the atmosphere of informality is important, it is also required to use an interview protocol and follow a similar sequence of steps during every interview. The protocol includes a general introduction of the interviewer and interviewee; an explanation of the research objectives, and research approach; a request to voice-record the interviews with an explanation why this would help; a general introduction to the position and tasks of the interviewee; an open discussion on the activities and perceptions on the relevant the geoICT coordination policy, and the variables representing the discretions and stability element. Annex 1c provides the interview protocol and the interview questions. During the interview, the interviewer monitors whether all required variables are dealt with. The interviews are not only voice recorded, but also contain a personal observation of the behavior during the interviews. This includes documenting individual reactions of interviewees and group discussion participants, but also references which interviewees make to other staff, documents, posters, maps, etc. One could argue that these are reactions at more or less random moments in time, but it is relevant for the complete picture to describe the context in which

arguments or statements are made.

In addition to deriving the direct transcriptions of the interviews, it is necessary to make a summary of each interview, containing the main points of the discussion, and a number of personal observations. All interviewees receive a summary of the interview, in order to check the validity of the content. Before every second round of interviews, interviewees receive the transcript of the first interview. This enhance the possibility to derive in-depth information. In order to be able to compare cases it is necessary to collect data for the same period. Both rounds of interviews are reflect therefore opinions and artefacts of the period 2007-2010. The two rounds and the time interval between the two rounds allowed for a reflection on the results of the first interview during the second interview and allowed to reflect on the processes of change.

As the empirical data collection relies on in-depth interviews and documentary artefacts, the starting point of the data analysis (upon completion of transcribing the interviews) concerns large volumes of text-based data. To handle the amount of textual data, it is possible to make use of a qualitative software package. Lewins and Silver (2007) explain why software can be beneficial for qualitative research. One of the most prominent justifications is that use of software has the potential to open up a black box within a collection of documents (Sin, 2007). Besides the advantage of qualitative software packages to manage and store all data (including transcripts, personal observations, background documents, photo's video's, recordings, draft documents, memos, etc) relevant for your research in one place, the analytical capabilities of software packages arise when codes are assigned in the various textual documents and other sources. These codes, stored in a relational database make searching for and deriving patterns easier than having to rely on codes written on numerous sets of paper.

ATLAS.ti and NVIVO are examples of software packages which are frequently referred to in qualitative research. Lewis (2004) made a comparative analysis between the two, and concluded that both products have similar capabilities. Both products enable researchers to assign codes or labels to pieces of text derived from interview transcripts or documents, (audio and video) recordings or pictures. Both are flexible programs that allow import and export of other files. Both also Microsoft Windows-based products, and have a familiar (outlook-like) interface.

The choice to NVIVO has two practical reasons. First of all, the documentation of Richards (2005) was available at the time of the research. This publication describes in detail how NVIVO can be used throughout a research process, and as a result the learning cur was relatively short. A second practical reason was that a license and maintenance contract could be arranged at the time of the

research. The choice has some methodological implications. As Woods and Wickam (2006) argue, once a particular software package is chosen, it has retrospective implications for the way in which data is collected, transcribed and managed. Particular to NVIVO is the way in which documents act as nodes of research, the way in which the software assigns codes to sections of documents and the way in which the software executes queries. The choice of software is however not preventing or limiting the retrieval or formulation of indicators and induction of conclusions.

5.5 Conclusions

This chapter deals with the research question 4 ***What are appropriate indicators to verify the extend of relations between geoICT coordination types, discretions and stability changes, and with which techniques is it possible to determine the values of those indicators?***

The subsequent sections of this chapter provide the choices of indicators and a method to operationalise these indicators through empirical data collection. A description and assessment of the aspects 'standards', 'national focus', 'openness', 'voluntary actions', 'operations orientation' and 'client/customer orientation' provide an indication of how the geoICT coordination aims and activities in a particular case are executed. The degree to which the aspects 'personal task simplification', 'adherence to client interests', 'cognitive filter to the environment', 'personal access' and 'ability to envision alternative courses of action' are or have been present provide an indication of the presence and significance of discretions. An assessment of the aspects of 'long term mutual expectations and staff allocations' and 'control over resources give an indication of a change in the power stability of a geoG2G, the aspects of 'transaction cost limitations' and 'transaction cost give an indication of a change in the economic stability of a geoG2G, the aspects 'dominance of network agency' and 'dominance of alternative networks' give an indication of a change in conformity stability, and the aspects of 'combination of collective interests with collective sanctions' and 'loss of credibility' give an indication of a change in collectivity stability.

With a case study methodology it is possible to compare the actual values of the indicators. Determining the values relies on text-based analysis (using coding, interpretation and inductive inference logic). The data can be collected in a selection of geoG2G cases in the Netherlands. The choice to opt for text-based data collection and analysis obviously has a number of implications, advantages and limitations. The implication is that one has to rely on different sets of in-depth interviews and documentary artefacts. Furthermore, it helps to apply a coding strategy to analyse these texts.The advantage of this approach is with the help of qualitative research software packages it is currenlty possible to handle

large amounts of text-based data. The limitation is that the coding results may remain subjective interpretations, and as a result one is obliged to validate results extensively (through multiple interviews, multiple document). This is a labor intensive exercise. The operationalisation requires an iterative approach of both data collection and case comparison. Crucial in the analysis of data is that the operational plan needs to include iterative steps, and the data sources ensure validation and triangulation. The software package NVIVO support this coding and analysis process and enables the packaging of all data under one roof.

The selection of cases relies an inventory of cases in the Netherlands which are each confronted geoICT coordination. Through comparing 4 geoG2G cases in the Netherlands, the 'Cadastre-municipalities', AHN, Dataland and Sabimos, it is possible to explore if a variation in coordination associated with a variation in discretions coincides or even results particular changes in geoG2G stability. As the number of cases is limited, the results are more explorative then confirmative. Still, the comparison aims at making a first step to recommend a further strategy of exploration and testing of relations between geoICT coordination types to a discretion types and stability element changes. If this step can be made, then it becomes possible to adapt current geoICT coordination strategies, given the knowledge of what changes a certain choice in coordination might cause.

The actual collection and analysis of results for every case draws on the data collection strategy provided in this chapter 5. Table 5.3 is therefore the guideline for the results description per case. These follow in chapter 6. The analysis, i.e. drawing conclusions on dependencies, correlations or associations of variables across cases follows in chapter 7.

Chapter 6

Results

6.1 Introduction

This chapter addresses the research question 5 ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?*** Addressing this question follows from executing the data collection strategy presented in chapters 5. The chapter contains 4 subchapters for each of the 4 geoG2G cases (Cadastre-municipalities, AHN, Dataland and Sabimos), and 6 subsections in each case subchapter. Out of these 6 subsections 3 subsections provide the results of the indicators in each case, whereas the other 3 subsections describe respectively the data sources used per case, a general description of the history, partners and objectives of the geoG2G case, and a discussion of the results per case (containing a summary of the indicators and the immediate conclusions which can be derived from these).

Section 6.2 describes the results of the Cadastre-municipalities case (LOCUS); section 6.3 of the AHN case (EVENTUS); section 6.4 of the Dataland case (MODUS); section 6.5 the Sabimos case (CAUSUS). Finally, section 6.6 provides the summary of the results of all cases, and a number of conclusions based on these results.

6.2 LOCUS Case: Cadastre-municipalities (Cadastral geoG2G)

The "Cadastral geoG2G", based on the effective partnership between the Dutch Kadaster and all municipalities in the Netherlands, relates to the collection and maintenance of national parcel-based and real-estate related (geo-) information.

6.2.1 Description of case

The cadastral geoG2G has a long history, and has seen various phases of stability and instability. In 1973 they jointly started the Cooperation Kadaster-municipalities ('Samenwerking Kadaster Gemeenten (SKG)') (de Kruif, 2008), yet various historical accounts refer to a series of partnerships and various specific upheavals in the partnership. These often related to new organisational structures, budget allocations and public sector reforms and to introduction of new technologies (Kockelkoren et al., 1991; VRO, 1982). In April 2007 the Kadaster and the Association of Netherlands municipalities (VNG) discussed new avenues of cooperation in the field of geo-information and real estate information management (Terz@ke newsletter, April 2007). Despite their differences they agreed to start negotiating how to jointly organize their public services, their data exchange and the key registrations. In addition, they noted

the need to review the financing of the provision of geo-information and real estate information, the relation between large scale and small scale topography, and the special constraints of smaller municipalities with limited resources.

In the past 20 years, three major changes have influenced the partnership:

1) The change of the Dutch Kadaster from a fully public and publicly funded (budget) organisation to a ZBO – an independent, financial autonomous, organisation operating under the mandate of the ministry of spatial planning (van Thiel, 2004; Kickert, 2001). This change in 1994 required the Dutch Cadastre to recover their operational costs, and resulted – urged by efficiency requirements - in a dramatic decrease of staff members (from some 5000 in 1994 to approximately 1500 in 2010). Economically, the Dutch Kadaster became financially autonomous, while the municipalities continued to operate under a budget system. The change within the Kadaster also resulted in a dramatic shift in type of staff employed (a dramatic increase of ICT staff as compared to land surveying or geodetic engineering staff – in 2008 almost one third of the Kadaster had an ICT related function), while within the municipalities in the period 1994-2000 little changed with regards to the staff diversity and staff requirements.

2) Since 2004 the historically independent Topographic Survey (Topografische Dienst – located in Emmen) became part of the Dutch Kadaster. Until 2008 this survey operated fairly independently within the Kadaster, yet in 2008 a re-organisation within the Kadaster formulated a new department Geo-information. Topographic production became a part of this new department. The topographic maps had served as an additional link between Kadaster and Dutch municipalities. In the period from 1 October 2009 until 1 December, the office from Emmen gradually moved from Emmen to the regional Kadaster office in Zwolle (Terz@ke, September 2009). This implied discontinuing the Emmen office.

3) The introduction and formalisation of a system of ‘key registers’ in 2009. The idea behind ‘key registers’ is that society and government need to have a basic set of objective and unique data to have trustworthy and consistent interactions. These key registers are national databases on persons, land, buildings, addresses, parcels, businesses, for example. The Ministry of the Interior and Kingdom relations (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties) became responsible for the coordination of all key registers in the Netherlands. With the system of key registers all public sector organisations are required to use the key registers as only authoritative sources of public information, and to base any of their decisions on no other public database than the information provided by the

key registers. The 'Stelselhandboek' [11] specifies the objectives of the registers. The key registers which involve geo-information and geoICT include [12]: The Ministry of Housing, Spatial planning and environmental management (Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer - VROM) coordinates the implementation of these registers. The objective of these geo-related key registers is to provide uniformity in the collection, exchange and distribution of geo-data.

The first change (the change of the public sector subsidized Kadaster to a financially autonomous - a ZBO) had resulted in a fairly stable partnership by 2007. In 2007 there existed a fair amount of consensus within both the Kadaster and the municipalities that the primary objective of this geoG2G partnership was to support both local goals of local land management, as well as national goals of transparency and uniformity in land transactions. The Kadaster used most of the geoICT in their daily processes to maintain the national administration and the mutations of parcels, buildings and addresses. The cooperation extended between a single National Kadaster organisation and 443 individual municipalities in 2007. In 2010 there were 431 municipalities[13], due to public sector reforms in which municipalities were merged. The partnership between the Kadaster and the municipalities had for long been based on long-standing, formal agreements, and historically long-term use of GeoICT. The partnership had developed highly institutionalized, historically built-up practices and long-established values on how to maintain the parcels, buildings and addresses data, and who should maintain which data how and when.

The second change resulted in a re-organisation of the Kadaster. First of all, in 2006 the topographic products became part of the Kadaster products, and hence became part of the fee charges arrangements of the Kadaster products (regulated by the Kadaster Law). Later, in 2008 the Kadaster re-arranged its internal structure, and the former Topographic service merged into a new department called 'Geo-information', as part of the Directorate Geo of the Kadaster (together with the departments cartography, preparation and delivery, GIS, large scale topography and cables and pipes information.

Concerning the third change, both the Kadaster and individual municipalities saw their national geo-information maintenance responsibilities increase gradually. Several consecutive annual reports of the Kadaster (2007-2010) mark this change as fundamental. The Kadaster became responsible for the maintenance of the national geo-information provision facility, in particular the

[11] https://wiki.noiv.nl/xwiki/bin/view/Stelselhandboek/
[12] http://www.rijksoverheid.nl/onderwerpen/basisregistraties/overzicht-basisregistraties
[13] http://www.cbs.nl/nl-NL/menu/themas/dossiers/nederland-regionaal/publicaties/artikelen/archief/2010/2010-3008-wm.htm

information related to BAG (Kadaster annual report 2008). A number of project working Group tasks of the Ministry VROM - those dealing with BAG – were gradually transferred to the Kadaster. For the municipalities, the BAG was a major new task. Many smaller and medium sized municipalities decided therefore to start regional cooperation programs with other municipalities to prepare them for the implementation of these new responsibilities. Examples include Boxmeer (regional cooperation in 'het land van Cuijk), Katwijk (regional cooperation with Noordwijk amongst others), Culemborg (regional cooperation in 'Rivierenland'), Almelo (regional cooperation in 'Regio Twente').

In 2007, the situation was that the National Kadaster collected and distributed the parcel data. They were operating through a Kadaster law. With municipalities the Cadastre had developed several intertwined ICT related agreements. Data on geometry of parcels were collected by the Kadaster and provided to municipalities. Data on people were collected by municipalities and shared with the Kadaster for the purpose of ownerships, heritance, etc.. Data on buildings were the responsibility of municipalities, but collected by the Kadaster on behalf of the municipalities. Data on addresses were collected by municipalities, but managed by the Kadaster. Data on public rights needed to be registered by municipalities, but were in fact registered in the Kadaster.

6.2.2 National LOCUS coordination through BAG

The analytical model formulated in chapter 5 posits that the choices of a geoICT coordination strategy influence which discretions emerge and which changes take place in the stability of the cooperation. In the Cadastral case the BAG is a LOCUS type of geoICT, which can be characterised as one that emphasizes the alignment of geoICT choices and outcomes for every public administrative level. The cadastral geoG2G operates at different levels. The Kadaster is a national organisation with regional offices, while municipalities operate in an hierarchical public administrative system with provinces and national (ministerial) authorities.

The introduction of BAG with the associated targets and responsibilities provided new challenges to both Kadaster and municipalities. Moreover, the targets of BAG had direct implications for the degree of uniformity and flexibility on the one hand, and the new responsibilities directly and indirectly affected the actors in the Cadastral geoG2G. The BAG geoICT coordination activities affecting the Cadastral geoG2G derived mainly from ministerial actors who had become employed to implement the key registers, such as BAG, BGT and BKR. Their educational background is a mix of engineering, ICT and public administration professionals. All of these professionals found each other through a number of consecutive and simultaneous activities and instruments

related to key (basic) registers. Indeed, the term or abbreviation 'BAG' encapsulates more than a data model only. It is synonymous to a large variety of activities and instruments, which are directly affecting the geoICT relationships between the Kadaster and all municipalities. These activities and instruments include: a BAG law, a BAG data model, a BAG website, a BAG newsletter, several BAG working groups, a BAG team from VROM, a BAG email address, a number of local and regional cooperation agreements dealing with the implementation of BAG, local BAG coordinators, BAG advisors and BAG teachers.

Uniformity - Standards
The first part of the analytical model to evaluate the variation in the LOCUS geoICT coordination choices concerns the assessment of uniformity. The aspects of 'standards', measured by the perceived degree to which standards are brought forward as solutions, provides an indication for how uniform the geoICT coordination is. For BAG, the uniformity is already visible in the multitude of activities and instruments associated to BAG. In its origin, BAG is a model of capture, storage and linkage of addresses and buildings geo-data. The BAG law specifies exactly which addresses and buildings data municipalities should include (articles 19-21 for addresses; article 22-25 for buildings). The address data comprise of the attribute data on residential area (name of the area and geometry of the area), public space (official name of the public space, type of public space), and the number indication (including house number, house letter, addition to house number, address object type and postal code). The building data include attributes of an object identification number, and attribute data on the properties (building year, geometry and status), type and location of residential objects (address, purpose of object, area, coordinates / geometry, status) and the type and location of movable building / housing objects (address, geometry and status). All these data can be connected through X and Y coordinates.

Ellenkamp and Rietdijk (2010) prescribe the BAG maintenance processes through a process handbook, justifying that a standard process increases uniformity among municipalities. The process handbook of the BAG prescribes how municipalities have to execute the BAG maintenance processes. The handbook justifies this prescription by referring to the need for national uniformity:
At the moment that maintenance processes are different in different municipalities, then there is no longer a national uniformity.
Document excerpt 6.1 Quote from (Ellenkamp and Rietdijk, 2010) on uniformity of BAG maintenance

The handbook prescribes the object registration process and process sequence, how to maintain the 'life cycle' of geometric objects, and the data exchange

regulations. The handbook, in other words, is clearly written as a prescribed standard solution for geoICT related processes in the Cadastral geoG2G. Hence, the degree to which the aspect of 'standard' is associated to 'solutions' by the BAG geoICT coordination can be considered *high*.

Uniformity - National focus
Evaluating uniformity is not only visible through how it offers standard solutions, it is also visible through how it aims at making these standard solutions applicable to all levels of administration nationally. The aspect of 'national focus', measured by the perceived degree to which the geoICT coordination actions impose implementation in all national layers of administration, provides an additional indication for how uniform the geoICT coordination is. This national focus of BAG is visible by the fact that all municipalities and the Kadaster are obliged to follow the BAG rules and standards. The BAG law clearly stipulates these rules (Ellenkamp and Rietdijk, 2010):
Starting on 1 July 2009 all municipalities are obliged – based on the Law of key registers – to set up and maintain a key register on addresses and buildings
Document excerpt 6.2 Quote from (Ellenkamp and Rietdijk, 2010) on constitution of BAG

VROM has been very active in developing and implementing nation-wide BAG coordination activities. VROM developed a complete coordinating project team for BAG, mounting up to 39 staff members in November 2010[14]. The BAG project team comprised of 4 streams: BAG content, account management, ICT, planning and monitoring. Every stream was managed by a project leader, responsible for activities and sub projects in the stream. The project coordination VROM employed many ways to promote BAG as part of the BAG coordination. Besides formulating the specifics of the BAG law, they set up a special web page related to BAG (http://bag.vrom.nl/), set up a ranking list of municipalities to showcase first and later adopters, set up a series of workshops for municipal staff, developed an information pamphlet [15], and developed a short advertising movie to explain BAG[16].

Given that the BAG rules stipulate standards in data and in procedures, and given that BAG rules apply for all partners and all real-estate data held by the municipalities (hence a national focus), the required degree of uniformity nationally promoted by the BAG coordination is assessed as *high*.

[14] http://bag.vrom.nl/over_bag/project_bag
[15] http://bag.vrom.nl/ufc/file2/bag_sites/unknown/172dfa081ce56952d14f5320d2c8577f/pu/Algemene_folder_BAG.pdf
[16] http://www.youtube.com/watch?v=UjNsGua_E3E

Flexibility - Openness

In addition to assessing the extent of uniformity (through standards and national focus), the analytical framework to evaluate the variation in geoICT coordination further include an assessment of the degree of flexibility. Despite the overall high degree of uniformity promoted by BAG, BAG still provides for some room of flexibility. The aspect of 'openness', visible in the perceived degree to which actors can specify their own data and process requirements, is still present, but in a very limited extent. The degree to which municipal staff members could specify their own process requirements during the formulation of BAG objectives and BAG related data models was limited in the eyes of respondents from smaller and medium sized municipalities. During the interviews in 2008 some of these respondents clearly referred to this limited influence, and to the heavy dependence on external and intermediate persons to seek this influence, as the following interview excerpts 6.3a, 6.3b, 6.3c from 2008 show.

Well…it is all very nice what they come up with, but…I can sense it with the BAG..the documents originating from VROM..you really have to push them..because otherwise these are only written for the realities of bigger municipalities. It is absolutely unusable for smaller and medium sized municipalities

Interview excerpt 6.3a Quote from alignment staff member of municipality on their influence on BAG – 2008 (Boxmeer- 2008)

I'll tell you..most of the municipalities of this size..and most are still smaller..are only struggling to adhere to BAG regulations. And that itself is quite an effort. Let alone that anyone can bring the discussion on geo-information to any higher level.

Interview excerpt 6.3b Quote from alignment staff member of municipality on their influence on BAG – 2008 (Culemborg – 2008)

It was not cooperative, but really hindrance. That was not only due to that department, but also due to a merger in our organisation..we have bad experiences with external parties. For example for BAG and those sort of things…when the external person left..than we found all sorts of things in the drawers, which we had to arrange with the Kadaster..they had simply left those..

Interview excerpt 6.3c Quote from alignment staff member of municipality on their influence on BAG – 2008 (Katwijk - 2008)

With the exception of the larger municipalities (Coumans, 2007a), in the period 2007-2010, most municipalities sought cooperative efforts to 'deal' with BAG (Blankema, 2009), usually with the support of external consultants or larger agencies. This implies that they did not perceive to have a big say in the BAG

requirement themselves, but only saw room to decide how to implement the BAG requirements. The internal staff of the municipalities were often not available for the development of BAG data models and/or for the development of generic BAG implementation strategies. Given this limited degree to which both the Kadaster and the municipal staff were able to specify their own data and process requirements, the flexibility aspect of 'openness' can be considered *low*.

Flexibility - Voluntary actions
Another aspect of flexibility concerns 'voluntary actions', measured by the perceived degree to which actors can take their own actions. In relation to this ability to initiate voluntary actions, the Kadaster staff indicated during interviews being at the receiving end of BAG related decisions on data standards and implementation strategies, even though they were more aware of the possible consequences of BAG than most municipal staff. Given this awareness, in 2008 they prepared scenarios for the BAG technical requirements, because they had not been so much involved in the decisions on technical details. During the interviews they indicated furthermore, that as a result of these scenarios in 2010 they had become more pro-active in accommodating their internal staff and processes for the possible effects of the key registers, and were actively seeking cooperation with other major geoICT organisations. They also realized that the implementation of BAG was slowly changing the relations of the Kadaster with all other organisations in the domain of geoICT. The interview excerpts 6.4.a and 6.4.b show examples of how staff perceived the consequences of the upcoming BAG regulations in 2007-2010 and how they adopted the BAG regulations.

So, I know that we have arranged things from our side. We are now, I think in a week of so, connecting the first municipality. And then we'll see what we'll run into. So..this system was built by VROM ATOS, which has been transferred to us. This transfer was difficult, because they build the system without our involvement, and now we have to take over the maintenance. We would not like to be in such a situation again. Actually we would have liked to be involved form the start. Then you know what they build, and then it fits better with what you are used to, which techniques they use, and so forth. That would make maintenance much easier. This didn't occur with the BAG. So now we have an internal program to align all these things.

Interview excerpt 6.4a Quote from strategic staff Kadaster on BAG - 2008

What you see now with the big job like key registers..this changes all relations in the domain..of who is doing what..how information flows …eventually ..it will change the organisation. So far..this has not happened, but it will change at some point.

Interview excerpt 6.4b Quotes from strategic Kadaster staff member on BAG - 2010

Given the limited degree of influence that both the Kadaster and the municipal staff claimed to have had, the degree of influence in the formulation of BAG standards and implementation strategies, the ability to take voluntary actions could be considered limited. So, overall the flexibility to defer from the BAG coordination objectives can be considered *low*.

External actor orientation - client/customers
The second dimension with which to evaluate how the geoICT coordination is executed concerns the way and location where the coordination targets the actors within the geoG2G. In relation to this actor orientation of geoICT coordination, the 'external actor orientation' is visible in two aspects: the kind and degree to which the coordination sets requirements for actors working with clients and/or customers and the kind and degree to which it sets requirements for actors working in operations. When reflecting on the targets of BAG, the BAG coordination is primarily oriented toward actors working at the intersection of different organisations given the emphasis on inter-organisational processes. The BAG law is specific for both the how each municipality and the Kadaster have to organize the inter-organisational information management, and which specific staff members need to be appointed within each municipality. The BAG law states that the entire collection and determination of data is the responsibility of municipal governments (article 2-17). Articles 26-28 specify only that the Kadaster is the sole manager of the national data base, however the subsequent articles 29-30 indicate that '*a representation of municipal governors'* can specify specific needs to the Kadaster, and that the representatives from municipal governors should hold regular discussions and evaluations on the execution of the national BAG register. The BAG law thus targets primarily staff at the intersection of organisations. The given articles make that the degree to which geoICT coordination requirements interfere in dealing with external parties is high. The articles stipulate the responsibilities to work with external parties. Hence the aspects of client/customer orientation can be said to score *high* in this case.

Internal actor orientation – operations
The aspect of 'operations orientation' reflects the degree to which the BAG interferes in operational processes. With regards to individual staff duties and internal process, the BAG law articles 6 and 10 specify that individual municipal staff members carry the responsibility to generate create core documents for the key data, and article 8 specifies for example that the local government should appoint a local staff member with the authority to establish geometric boundaries.

BAG law article 11 provides the freedom to individual municipalities to set standards for additional data which municipalities may link to the addresses data. Municipalities are free to decide which staff members have which tasks

and responsibilities regarding BAG registration, and are even free to decide whether they appoint specific BAG coordinators. This creates both uncertainty and discretionary space for municipalities, and for municipal staff members. The discretionary space lies in the choice of how to organize the data generation process and choice for the type of ICT to handle the local data bases, for example. These choices differ per municipality, and hence several interviewees in municipalities and VNG mentioned the resulting discretionary space. One of the VNG interviewees already in 2008 referred to this discretionary space, as a result of not creating a specific job function or task for a specific staff member within the municipalities (interview excerpt 6.5):

Each municipality has its own administrative organisation. But if you assure that in every municipality there is one person which maintains the data cording to the norms and regulations..then it is good. We advised this to VROM, to appoint one manager [wdv: in the law] . But it is not there, so it becomes a problem for everyone. If there is a mistake, it becomes nobody's problem. VROM is not willing to think about what municipalities want.

Interview excerpt 6.5 Quote from strategic municipal staff member on BAG

The report of (Ellenkamp and Rietdijk, 2010) confirms that the VROM ministry does not check appointments of individual staff responsibilities, but only checks whether the implementation processes are in line with the law, whether municipalities maintain administrative quality processes and whether municipalities achieve implementation progress milestones. The practice within municipalities also confirmed the situation of BAG uncertainty within municipalities in 2010. Email correspondence in 2010 with 3 municipal GIS officers indicated that according to their knowledge and experience a general trend during 2007-2010 was that most municipalities had only hired in temporary staff to build up the data bases compliant to BAG. Few municipalities in their opinion had able to permanently appoint specific staff members responsible for BAG only. The various articles on the implementation of BAG confirm that municipalities are indeed progressing in implementing BAG, yet they all have their own way of how to implement it (Blankema, 2009; Capelleveen, 2008; van Tiggelen, 2008).

Given that municipalities are free to choose their own internal managers and internal processes, BAG does not target specific internal staff members, and as a result scores *low* on the aspect of operations orientation.

Summary geoICT coordination variables

GeoICT coordination through BAG is indeed a LOCUS type of geoICT coordination, as the degree of uniformity and the closeness to external environment can be considered *high,* and the degree of flexibility and closeness to internal environment *low*. BAG entails a nationally-led operation, involving

many actors, instruments, strategies and techniques to transpose nationally developed ideas of geo data capture, storage and management to local geo data collectors, storagers and managers within the Kadaster and within each municipality. The practice shows that both Kadaster and municipalities are often at the receiving end of the decisions organized by VROM, although the Kadaster staff seems to have been more involved in many of the BAG discussions, and the Kadaster organisation formally maintains a key role in the technical maintenance. The comprehensive BAG operation is in particular interfering in the geoG2G and adding work of alignment and operational staff between the Kadaster and the municipalities. These staff members are tasked internally to execute the data collection and activities needed to maintain or change the necessary information infrastructure.

6.2.3 Empirical indicators for discretions

Five aspects reflect the variation in discretions: cognitive filter to the environment, personal access to resources, ability to envision courses of action, personal tasks simplification and adherence to client interest. The extent of these aspects are further elaborated hereunder. With regards to the extent, content and evidence of actual discretions in reaction to the BAG coordination in the period 2007-2010, it is first important to remark that the expectation before the data collection was that strategic uncertainty had grown in this period. The BAG law fundamentally challenged both the funding model of the geo activities of both the Kadaster and municipalities. Furthermore, the BAG law fundamentally challenged the monopolist role of the Kadaster as key geo data provider. Much more than before the Kadaster's role in the BAG became a servicing role towards the Ministry and the municipalities. The expectation was that the uncertainty arising from these fundamental changes would have an effect on the extent and type of discretions.

Cognitive filter to the environment
The first aspect of discretions concerns the cognitive filter to the environment, expressed through the degree to which individual staff members in the given case are able to formulate alternatives for the BAG requirements. The interviews showed that indeed the fundamental changes resulting from the BAG law was indeed felt by in particular the strategic cadastral staff. The various interviews with strategic staff members of the Kadaster show that they have been searching for new avenues of cooperation, in order to sustain their role in the future. They indicated that they would see themselves acting in larger cooperative arrangements, such as with and within the national organisation Geonovum, the cooperation with Dataland under the name Geoz, and the broad cooperation project PDOK. On the initiatives of the Kadaster to seek cooperation in PDOK one of the strategic staff members indicates (interview excerpt 6.6):

If you say…where are the headaches with something like PDOK..then I say they lie in the fact that PDOK will inflict a number of choices rapidly on how you organize your ICT, your shared service centre, and how you attach services to that. And the question is..how will you finance that? And what you see is that these projects rapidly inflict choices which may be very crucial for our organisation in the future. So..PDOK is a sort of..although it is not a small project..yet is still a sort of project which will show us what kind of questions the Kadaster needs to address in the future…and the switches we make now will largely determine our future activities.

Interview excerpt 6.6 Quote from strategic Kadaster staff member on seeking new forms of cooperation

Given the awareness among strategic staff members that the BAG law fundamentally changes their organisation vis-à-vis the environment, and fundamentally changes the autonomy of the Kadaster, the strategic staff members (of in particular the Kadaster) have actively investigated preferable scenarios. This shows that in particular strategic staff members are cognitive of the changes in the environment. The aspect of 'cognitive filter to the environment' is thus *high* for strategic staff members. For other types of staff members the value of this aspect is much less prominent (hence: lower).

Personal access to alternative resources

The aspect of personal access to resources refers to the degree to which any staff member can bypass the BAG coordination and start up activities to acquire additional funds, equipment, people and other resources. In relation to the cadastral geoG2G the activities undertaken by both the Kadaster and a number of municipalities to investigate new cooperation endeavors are evidence that the strategic staff of the geoG2G became more uncertain about their own future role in the period 2007-2010. A strategic staff member of the Kadaster organisation referred to 'sleepless nights' when reflecting on the implications of the key registers, including the BAG (document excerpt 6.7):

Although the Kadaster depends on the fees it charges for its services, Burmanje has had sleepless nights of the public sector use of key registers. These registers are obligatory, hence need to be provided free of charges. But still the Kadaster accepts, although it would like to see the VROM, the mother ministry, to act as a general purchasing bureau for the public sector (article Binnenlands bestuur (BB) – December 2007)

Document excerpt 6.7 Quote from strategic staff from Kadaster on implications of BAG for Kadaster - 2007

This quote shows that the BAG decreases the manoeuvering space for the Kadaster. Any additional resources furthermore is limited by the additional Kadaster law. Article 13 of the Kadaster law states that starting or ending any

long-term cooperation with other rightful parties will require approval of the board of governors if the cooperation may have a fundamental effect on the organisation. The personal judgment of the strategic staff members navigates between the new demands of BAG, the potential changes of future developments and the room to manoeuvre within the boundaries of the Kadaster law.

From the municipal perspective the only room for discretions relates to the choice of software vendors in ICT tendering procedures supporting the BAG implementation. Interview excerpt 6.8 shows this relation to software vendors.

We are going to buy software for example. We are thinking of buying one for the environmental license for example. We have seen modules for that from another software provider than we have now. These are the dilemmas every municipality have. If you make the wrong choice, then you can no longer service the citizens as well as making the right choice.

Interview excerpt 6.8 Quote from municipal staff on alignment discretions when choosing software vendors

So, while there is awareness of what is desirable, the feasibility of accessing alternative resources is strongly limited. The potential to personally access alternative resources is thus extremely limited. Even in cases where municipal staff were able to decide on the choice of software vendors themselves, often the municipality was already de facto tied to a particular vendor by other overarching long-term cooperation agreements, or contingencies of information systems. Hence, the personal access to alternative resources was practically limited, so can be interpreted as *low* .

Ability to envision courses of action

The third aspect of discretions concerns the ability to envision alternative courses of action, expressed in this case through the degree to which the cadastral geoG2G staff members can formulate alternative solutions to their problems. In relation to this aspect, the interviews with strategic staff members of the Kadaster indicated that they felt BAG had affected their discretionary room to manoeuvre. The annual reports of the Kadaster and other Kadaster internal policy documents show that the strategy of the strategic staff members of the Kadaster in 2007 was to maneuvre the discussion about BAG to the topic of '*the danger of topdown approaches'* and to propagate in these discussions the role of executive agencies for the benefits of users and citizens. The strategic discretions thus consisted of influencing the agenda of national discussions on BAG by consistently raising this issue. This contrasted the top-down implementation emphasis of the VROM coordinators. The following quote 6.9 is exemplary for this strategy:

The BAG is very supply driven, a private circle of key register organisations which map out their customers separately, and not as common client and beneficiary of the system. The influence of customers needs to increase. ((article Binnenlands bestuur (BB) – December 2007)

Document excerpt 6.9 Quote on strategic staff from Kadaster on implications of BAG for discretions - 2007

In contrast to the Kadaster strategic staff who envisioned alternative courses of action through shifting the agenda on BAG implementation discussion, the alignment and operational staff of municipalities do not envision any alternative course of action. Instead they were more than willing to abide by the BAG rules, which also simplify their activities. The reactions from the municipalities in November 2010 confirm this perception (excerpts 6.10a,b):

Our municipality has experienced, and is still experiencing large organisational changes since 2008. I don't want to expand on that, but in any case there is a decreasing space for own initiative. So, yes, we are increasingly straitjacketed. The law has definitely played a role, but I also see an advantage, because we can now follow a standard, and do no longer need to customize. (Boxmeer – November 2010)

Interview excerpt 6.10a Quote from municipality on alignment and operational discretions resulting from BAG

There is certainly not more freedom. Especially the key registers ensure more standardisation. Also the compulsory connection to these registers limit your discretions. But that is a good development. (Enschede – November 2010)

Interview excerpt 6.10b Quotes from municipality on alignment and operational discretions resulting from BAG

So the degree to which staff members envision feasible alternative courses of action can be regarded as *high* for strategic staff members, and *low* for alignment and operational staff members.

Degree of personal task simplification

In contrast to the differentiation in origin of discretions (expressed through aspects of cognitive filter to the environment, personal access to resources and ability to envision courses of action), the purpose of discretions can be expressed through the aspect of 'personal task simplification' and 'adherence to client interests'. For the cadastral case the fact that municipal geoICT staff towards the end of 2010 became increasingly satisfied with the standardisation process resulting from BAG , even though it decreased their ability for discretionary decisions, implies in retrospect that their earlier alignment and operational discretions within municipalities had been to facilitate and simplify their internal work processes. So, there was a shift in purpose of discretions. Before BAG the regular activities gave rise to alignment and staff discretions

for the sake of personal tasks simplification. Now that the BAG standard procedures make their working life easier, they are more willing to accept the new BAG regulations, including the implication that this decreases their room to manoeuvre.

For the strategic staff members, the BAG rules have decreased their room to manoeuvre, yet did not necessarily lead to more complex or more simplified tasks.

All in all, the degree to which in 2010 discretions still existed with the intention to simplify their personal tasks can be considered as *low*.

Degree of adherence to client interests
For the second aspect related to the purpose of discretions, the aspect of adherence to client interests, the finding was somewhat different. As stated earlier, the clients' interests have been prominent in the documents of the Kadaster. From the Kadaster perspective the client focus is confusing as well, because with the BAG implementation the municipalities are both a partner in the geoG2G and a client of the geoG2G. Strategic discretions therefore relate to the role the Kadaster strategic staff sees given a particular situation. The strategic staff members within the cadastral geoG2G seek room to manoeuvre in their negotiations on how to cooperate with each other on all sorts of geoICT products and services. Yet, at the same time they are also required to abide by BAG rules when dealing as BAG clients of each other. This dilemma comes forward in how the Kadaster agrees on geoICT operational principles with either one or more municipalities. Interview excerpt 6.11 is an example of how a Kadaster strategic staff member voices this dilemma.
Eventually what you want is ..when looking at the clients, and client movements..is that I ...I would eventually like to cooperate with a partner who speaks on behalf of all municipalities, and with whom I can arrange things. And most customers simply want a product they can rely on, across all municipalities. That you can..very concretely..extract data from a national data provider..regardless of with which specific municipality you are dealing with.

Interview excerpt 6.11 Quote from Kadaster staff member on strategic discretions regarding cooperation with municipalities

Furthermore, the interview excerpt on the choice of software vendors (*If you make the wrong choice, then you can no longer service the citizens as well as making the right choice.)* also indicated that client interest play a role in the decisions of municipal staff members. Hence, overall the degree of adherence to client interests in the Cadastral geoG2G can be valued as *high.*

Summary on discretion variables
In sum, given that the cognitive filter to the environment and the ability to

envision courses of alternative actions are high for strategic staff members, there have been and there are still discretions present among the strategic staff members. For alignment and operational staff members, the discretions were present in the past – before the extensive influence of BAG, but given the limited degree of alignment and operational influence it is fair to say that most of these discretions gradually disappeared, and that most alignment and operational staff – in particular those working within municipalities - felt satisfied with the clarity and certainty on operational processes provided by the BAG coordination. BAG thus resulted in a personal task simplification for those staff members. Finally, the client/ external interests are a motivation to reach to discretions for all staff members.

6.2.4 Empirical results on changes in stability elements

The four stability elements of geoG2Gs are power, economic rules, conformity and collectivity. Each of these elements can remain stable or can change. Eight aspects reflect the variation in stability elements and the changes in stability: long-term mutual expectations, control over resources, transaction cost limitations, transaction cost expansion, dominance of network agency over personal interests, dominance of alternative networks, collective sanctions and incentives and credibility. The following sections provide further evidence of the variation in stability elements.

Power stability – long-term mutual expectations and staff allocations
The aspect of long-term mutual expectations reflects the degree of stability in power relations. In the period 2007-2010 this aspect in the Kadaster-municipalities geoG2G changed. Whereas historically (before 2007) the Cadastre law and the SKG had determined and maintained a stable relation between the Kadaster and the municipalities, the introduction of BAG overruled some of the agreements between the two, and hence changed the long-term expectations and associated staff allocations. As a result, the relation became less stable by the end of 2010. There are several indications which show this decreased degree of power stability.

First of all, the Kadaster staff expressed a concern over predictability of the Cadastre. The change of the financing system of key registers as a result of the BAG leads to the free provision of key data, and hence challenges the cost recovery and market driven strategies of the Kadaster. This change challenges the predictability of the Kadaster with regards to market-oriented activities.

Secondly, as the Kadaster is searching for possibilities to increase their predictability to customers, the Kadaster is actively searching a way to re-position themselves in relation to their external environment, including the municipalities. This active search is an artifact of instability in power. Hence,

predictability influences the stability element power in the Cadastre geoG2Gs in the eyes of the Kadaster. The following interview excerpt 6.12 from 2010 with a strategic Kadaster staff member shows the loss of predictability sentiment.

There you are at the boundary of market and government. That's where we try to search for a new cooperation. In the sense that..what can we do together? And also, the limitation of….to be as predictable as possible. We call that on our new strategic notion: strategic dialogue. In order to become predictable, of which geo activity we do, and which geo activity we don't do. The question is…where is our position, what is our role? To become as predictable as possible. With that we try to decrease the uncertainty for our stakeholders as much as possible.

Interview excerpt 6.12 Quote from strategic Cadastre staff in 2010 on predictability as condition for (power) stability

Thirdly, in 2010 one of the municipal staff indicated in e-mail correspondence that the relation with the Kadaster changed given the new role of the Kadaster in the management of the new national data provision facility. The new role did not change so much the responsibility distribution of the Kadaster and municipalities for the key register activities, but provided – in the eyes of the municipalities – a new role of the Kadaster in the national landscape of geo activities. In 2010 this new role still needed to be crystallized according to the municipalities. The fact that this process of crystallisation was still on-going in 2010 reflects a continuation of changing expectations in 2010, hence a continuation of a a decrease in power stability.

Given the three abovementioned points, the aspect of long term mutual expectations was perceived to be *high, but* has been gradually *decreasing*.

Power change – control over resources

A change of power stability is visible with the aspect of 'control over resources'. This aspect reflects the degree to which staff members indicate to apply, or intend to apply, a different allocation of their resources than what the BAG coordination requires. In relation to this aspect, within the municipalities the internal control over resources has changed since the introduction of BAG. As the municipalities are required to implement the BAG key registers within their organisations they have to re-organize their internal IT structures. This is leading to new relations between departments within the municipalities, and new staff members who are in contact with the Kadaster. These new nodes in the cadastral geoG2G challenge the previous partnership relations, because they create overlapping agreements and requirements to structure and to manage the data. The overlapping requirements create uncertainty about which resource to allocate to execute which requirement . In 2008 the Kadaster staff noted this change already in one of the interviews (excerpt 6.13):

And what plays a role within municipalities is that they have to implement the BAG registers. It is obligatory in 2009 to have only one address register within a municipality, instead of 30. Currently every department has their own address database..because they perceive from the perspective of their own application their own address data base the most appropriate. But this changes the trust…it requires a complete culture change. Trust is the key.

Interview excerpt 6.13 Quote from alignment Kadaster staff in 2008 on changes within municipalities affecting the Kadaster-municipalities relation

With the changes in departmental structures, the budget allocations and budget control mechanisms change as well. These changes make that staff members of municipalities may adhere to alternative resource management mechanisms than what the BAG requires if these alternative lead to internal data maangement optimisation or other internal efficiencies. Hence, the aspect of 'control of resources'is *high*. There are thus internal power changes within municipalities, but also inter-organisational power changes between the Kadaster and the municipalities.

Economic rules stability – transaction cost limitations

Economic rules stability exists if geoG2G staff members strictly adhere to the agreements on the execution of operational processes. In such cases the transaction costs are limited. Any increase in transaction costs reflects an increase in uncertainty about the rules, and thus a change in economic rules stability. For the cadastral case the economic rules guiding the cadastral geoG2G changed in the period 2007-2010. The biggest change resulted from the financing system underlying of the key registers, including the BAG. In 2007 the Kadaster relied in 2007 on a cost recovery financing model, whereby approximately 95% of their revenue relied on their income through fees for their products and services. The financing model of the key registers imposed however a uniform budgeting system for all organisations involved in the key registers. VROM coordinated this budgeting system. The idea behind this central budgeting coordination was to limit transaction cost for data sharing and data exchange. For the Kadaster by 2010 this implied at the same time having rely on two types of financing models: one budgeting system coordinated through VROM, and one relying on fee generation. Hence, while BAG introduced a new mechanism with the aim to limit the transaction cost related to sharing, at the same time it introduced a new kind transaction cost related to financial management. Hence, the degree to which the aspect of transaction cost were limited can be regarded as *low.*

Economic rules change – transaction cost expansion

If transaction costs increase and the kinds of transaction costs expand, there is instability in economic rules. For the Kadaster the dual budgeting system increased the transaction cost of internal financial management. For the key

register products in 2010 the Kadaster no longer has a direct relation with their clients, but has to send their bills to VROM three times a year for the provision of key register products. So, there has been a change in budgets and a change in financing. This changed the way in which transactions between Kadaster and municipalities were funded.

From the perspective of municipalities, the economic stability also changed. Most the municipal staff refers to the additional requirements resulting from BAG law. This expanded their operational costs. An example is the statement 6.14

I wouldn't say that it costs less. No. It simply costs money. By cooperating [with other municipalities] we had lower costs, because we jointly bought an application for example. There you can justify a decrease of costs. But in general, the law has only forced more costs on us.

Interview excerpt 6.14 from municipal staff in 2008 on extra cost due to BAG

In other words, while transaction cost for cooperating with data decreased, internal costs to ensure cooperation expanded. Hence, the score for transaction cost expansion was *high* at the start of BAG implementation. Both the new budgeting logic and the extra costs in municipalities are artefacts of new transactions which both Kadaster and the municipalities had to comply to. At the start of the BAG implementation not all municipalities or the Kadaster itself were entirely ready or in agreement with the new rules. As a result, adhering to these new rules created continuing uncertainty over these economic rules, which could be qualified as instable economic rules for the cadastral geoG2G. Once the BAG became more forcefully into place, the transaction costs of data sharing decreased, but the transaction cost of internal financial management increased. Hence, overall, there was this a shift of transaction cost type due to the BAG implementation: from costs incurring from uncoordinated data sharing to cost incurring from enabling coordinated data sharing. So, overall, the aspect of transaction cost expansion can be assessed as '*high, but decreasing*'.

Conformity stability – dominance of network agency over personal interests
The aspect of 'dominance of network agency over personal interests' reflects the degree to which geoG2G staff members refer to an ideal situation for all staff members which is more valuable than individual interests. For the cadastral case this common ideal presented by BAG was originally not shared by many staff members, but this increased during the period 2007-2010. In 2007, most respondents were aware of BAG, but were not directly confronted with implementation of BAG. As a result, most respondents referred to their own ideas on improving data sharing within their organisations and in between organisations. However, by 2010, all respondents had direct involvement in BAG implementation, and especially within municipalities, hardly any other

option for improving data sharing was considered viable. Hence, the consistency by which staff members referred to a common ideal – formulated through BAG objectives - had increased. So, the aspect of 'dominance of network agency over personal interests' scores *high*, reflecting that the conformity was stable.

Conformity change – dominance of alternative network
The degree to which ideas from alternative networks outside the geoG2G starts to play a role inside the geoG2G is an indication of conformity change. For the cadastral case the alternative networks would be the networks of organisations and of professionals where the issue of cadastral data would also be part of information management discussions. When comparing the standards used in 2007 with those of 2010 it is clear that there has been a major change in the standards the cadastre and municipalities are adhering to. In 2007 the Cadastre dominated the decisions on most of the data and process standards of cadastral and parcel data, and the municipalities were more guided by the local operational systems with inherent spatial data standards and processes, such as the systems and standards required for spatial planning (DURP amongst others). Various subsequent articles and interviews show that in 2007 and 2008 most municipalities were still testing and starting up all sorts of ICT project pilots in relation to BAG and E-government programs. Most received help from commercial firms and/or VROM of BZ funded projects. (Ovaa, 2007) remarked in 2007 that the municipality Roosendaal was linking the administrative data to the geographic data, aligning BAG objects with GBKN objects, and aligning the BAG data model with the WOZ data model. (Capelleveen, 2008) wrote that in 2008 the municipality Zwolle was setting up a new information architecture to cope with the '*single storage, multiple usage'* ('eenmalige opslag en meervoudig gebruik'), and (van Tiggelen, 2008) indicated that in 2008 the municipality Helmond was 'synchronizing' older data bases with newer source data to meet the requirements of BAG. In other words in 2007-2008 most municipalities were in the process of standardizing databases and aligning work processes.

By 2010, however, both the respondents from municipalities and from the Kadaster indicated that in 2010 the BAG law and BAG organisational requirements made sure that many municipalities had replaced most local standards by those from the key register. Most had replaced their old data conversion strategies with those suggested by BAG managers. The Kadaster and the municipalities gradually became followers of the BAG standards decisions – made through the key registers platforms organized by VROM and the E-government programs, rather than crucial contributors or implementers of those decisions.

So, there has been a change in the conformity stability in the period 2007-2010.

The change reflects an increasing degree of a single dominating standard, hence an increasing conformity stability. By 2010 BAG became the single standard which both municipalities and Kadaster are adhering to. Both the Kadaster and the municipality are currently 'happy' with the new standards, and conformity to the BAG ideas is stable. Hence, it appears that the aspect of dominance of alternative networks scores *low*.

Collectivity stability – combination of collective interest with collective sanctions and incentives
The element of collectivity is stable when geoG2G staff members maintain a common interest and accept mutually agreed incentives and sanctions. As soon as individual staff members staff to lose their faith in this commonly agreed set of rules than the collective changes and becomes instable. In 2007 the collective image of the cooperation between the Kadaster and municipalities was rather negative. Several publications pictured a long-term love-hate relationship based on diverse interests rather than collective interest (Coumans, 2007a). Each organisation responded to different incentives and sanctions. As a result, the degree of collectivity stability could be pictured as rather limited.

However, this conflict gradually decreased throughout the period 2007-2010. This had to do with the fact that the diverging collective image was actively addressed (de Kruif, 2008). The increase in a collective image was partly visible in the similar way in staff from the Kadaster and municipalities started to refer to geoICT standards, geoICT technology, and the role and purpose of the BAG. Reports and interviewees from both partners consistently referred to the changes as a gradual process of ICT integration in operational processes. Their joint fate in the implementation of the large scale topographic map- the GBKN – was indirectly a crucial incentive. Although the implementation had for a long time been highly debated (because of a complicated distribution of responsibilities between public and private parties) there was a common narrative which ultimately inspired both parties, namely: the creation of a single seamless map (Koerten, 2011). Many staff members in municipalities who were responsible for the implementation of GBKN were also responsible for the implementation of BAG. Various reports and newsletters refer to GBKN as a pilot of integrating Kadaster and municipal datasets. The Terz@ke newletter of the Kadaster mentioned in July 2006 already that the municipalities could use the web portal of the Kadaster for their own maps. This was the predecessor of the national geo-information portal needed for the BAG, maintained by the Kadaster and drawing upon the BAG data from the municipalities.

This experience in geo-data exchange and integration created a mutually understandable technical jargon, understandable for both parties. This mutual jargon created a similar starting point for both sides for the subsequent technical discussions to implement BAG. Hence, the aspect of 'collective interest with

collective sanctions and incentives' *increased* when the activities were associated to GBKN, and the common narrative through which GBKN developed. This made that the stability in collectivity became higher.

Collectivity change - loss of credibility
A change of collectivity stability is visible through the aspect of 'loss of credibility', the degree to which geoG2G staff loses faith in the necessity of the current common product and jointly agreed ways of production means of the geoG2G. For the cadastral case, the credibility was at stake once the geoICT production processes, coordinated through BAG, had to be integrated with other types of ICT. The integration of geoICT is indeed mentioned by both respondents from Kadaster and municipalities, but each partner views this from a different angle. Whereas the subsequent Kadaster annual reports of 2007-2010 often make the link to the international developments such as INSPIRE, which also aims at integrating geoICT and related geo-information within one country to similar types of geoICT and related geo-information in other countries, the municipalities usually reason from the integration of geoICT with regular ICT management issues. Their functional processes, i.e. provision of municipal services and facilitator of interactions among citizens, have started to act much more as incentives for their integration of geoICT than their commitment to the cooperation with the Kadaster. This could potentially affect the collective image of the Kadaster-municipalities geoG2G. Overall, the aspect of 'loss of credibility' was *high* at the introduction of BAG, but decreased gradually.

In sum: the degree to which the geoG2G staff members acted as a result of common incentives was limited in 2007, hence the collectivity was unstable. Only when associated to GBKN activities staff members could see a common ideal. Towards the end of 2010 most staff members within the geoG2G had a common view on the relationship Kadaster-municipalities, referred to similar purposes of geoICT within and for BAG, and accepted each other's roles in the geoG2G. Hence, the collectivity was more stable in 2010. At the same time, the aspect of loss of credibility was relatively high. The increased attention on internal functional requirements, and the diverging requirements for the integration of geoICT with other types of ICT were exemplary for that. This could potentially decrease the collectivity stability once again.

6.2.5 Conclusion Cadastral case

The above findings contribute to answering the research question ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?*** This question has three components:

1) The influence of variations in geoICT coordination on variations in discretions;

2) The influence of variations in geoICT coordination on changes in stability elements; and,
3) The influence of variations of in discretions on changes in stability element.

Each of these three are described hereunder for the Cadastral case.

1. The influence of variations in geoICT coordination on variations in discretions

Table 6.1.1 clusters the high (or increasing) and low (or decreasing) scores in the geoICT coordination and in discretions of staff members of the Kadaster and the municipalities in the period 2007-2010.

The results expose that the BAG geoICT coordination emphasises uniformity, in particular through the enforcement of standards. The increase in BAG coordination instruments and BAG coordination bureaucracy made the strive for uniformity increasingly persuasive. Increased uniformity in information exchange processes and responsibilities decreased the space for staff members of both Kadaster and municipalities to design and implement parcel and building information management in a flexible way. For municipalities this perception of uniformity was strongest felt, and as a result the discretions of alignment and operational staff members, which were present in the past, gradually disappeared. When municipal staff were actively confronted with BAG implementers in their offices they perceived a strong increase of external influence and a strong diminishing role for themselves. Most alignment and operational staff – in particular those working within municipalities - felt however satisfied with the clarity and certainty on operational processes provided by the BAG coordination. BAG thus resulted in a personal task simplification for those staff members, and hence, there task simplification was no longer a reason to opt for discretionary decisions.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Uniformity	Standards	High
		National focus	High
	Actor orientation – external	Client/customer orientation	High
	Flexibility	Openness	Low
		Voluntary actions	Low
	Actor orientation – internal	Operations orientation	Low
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	High (for strategic staff)
		Ability to envision courses of action	High (for strategic staff)
	Autonomous / joint discretions	Degree of adherence to client interests	High
	Strategic / alignment / operational discretions	Personal access to alternative resources	Low
		Ability to envision courses of action	Low (alignment &operational)
	Autonomous / joint discretions	Degree of personal task simplification	Low

Table 6.1.1: Scores in geoICT coordination and discretion aspects

Despite the high value given to uniformity, the BAG coordination is primarily oriented toward actors working at the intersection of different organisations. Given that municipalities are free to choose their own internal managers and management decisions, BAG does not target specific internal staff members or work allocation, and as a result scores *low* on the aspect of operations orientation. Furthermore, it remains up to both the Kadaster and the individual municipalities deal with their clients. This explains why despite the stringent regulations on BAG standards, the motivation of serving 'client interests' for strategic discretions by Kadaster staff members increased.

Given the variations in geoICT coordination and discretions there are two types of influence:

First, the uniformity in the BAG coordination, in particular through the enforcement of standards, has two opposite effects in discretions: it triggers (and thus increases) discretions among strategic staff members, yet it diminishes the discretions among alignment and operational staff members. From the fact that strategic staff members of the Kadaster started to explore other forms of cooperation in reaction to, and possibly in anticipation of the vast majority of BAG coordination activities it is clear that the aspect of 'ability to envision

courses of action' is high among strategic staff members. It is likely that without the extensive BAG activities, the strategic staff members would have been less threatened on their own role.

In contrast, the interviews with municipal staff members revealed that the discretions of alignment and operational staff members of municipalities decreased after the introduction of the BAG. All respondents confirmed that the discretions of municipal staff members were much less in 2010 than in 2007, and that the room for discretions was directly linked to the increase of more intensive coordination activities (the 'BAG bureaucracy'). With the emergence of the 'BAG bureaucracy' the opportunity for any individual discretions became increasingly limited. This is visible in the low scores of the aspects of cognitive filter to the environment' and 'personal access to alternative resources'. Although initially they had the feeling that they had not been sufficiently involved in the formulation of the BAG requirements, once the BAG came into power, and the execution of BAG was accompanied by a huge effort of BAG advisors, BAG regulation and BAG administration, the room for any discretions gradually decreased. It is therefore fair to state that the amount of discretions of municipal staff members decreased proportionally with the intensity and persuasiveness of the BAG bureaucracy.

Overall, this dual effect (both the increase of strategic and the decrease of alignment and operational discretions) confirms the theoretical expectation in chapter 3, which states that the risk when pursuing LOCUS type of coordination is that uncertainties may arise among strategic staff members about their extent of influence, and that as a result they would tend to resort to autonomous discretions. In terms of discretion theory one could explain this activity of seeking additional alliances in terms of the cognitive filter vis-à-vis the environment. The BAG limits this cognitive filter by offering one closed solution. The reaction of seeking of alliances aims to scan the possibilities within the environment and increase the cognitive filter.

In sum:

- BAG standards and the BAG national focus increase strategic discretions. The reason is that it increases their uncertainty about their strategic role. As a result they tend to seek strategic partners. This is in line with the expected result.
- BAG standards and national focus decrease alignment and operational discretions because it helps them to simply their tasks and thus reduces their discretion rationale of personal task simplification.
- The BAG orientation towards geoG2G actors working at the intersection with the environment coincides with an increase in strategic discretions derived from client interests.

- A theoretical explanation from discretion theory is that discretions arise because of uncertainties of influence in the sector's development. Uncertainty is reduced by seeking alliances which spreads the risk of possible negative outcomes linked to the future resources and technical choices of one particular partner.

1. *The influence of variations in geoICT coordination on variations on changes in stability elements*

Table 6.1.2 gives a grouped summary of the high and low scores in the geoICT coordination and stability aspects for the Cadastral case. The grouped high scores seem to imply a relation between uniformity and client/customer orientation and power and economic rule changes. In addition, the uniformity and client/customer orientation coincide with stability in conformity and collectivity. The grouped low scores show a similar picture but reversed relations. Low flexibility aspects coincide with decreasing stability in power and economic rules, and decreasing change (hence increasing stability) in conformity and collectivity.

Both the uniformity of the BAG specifications on parcel and address data and the national focus of the implementation immidiately affected the aspects of power, economic rules and collectivity. The situation whereby intertwined ICT related agreements had historically grown until 2007 provided a reasonable degree of power stability (in the form of long term mutual expectations) between the Kadaster and the municipalities. Power was distributed through the Cadastre law, and the intertwined agreements. Economic rules stability related on the one hand to the rules under which the Kadaster has been operating since 1994 (as a financial autonomous public sector agency – ZBO), and to the rules provided by the Municipal law and dedicated municipal budgets. The standards on how to collect parcel data had historically relied on the HTW Cadastral handbooks (Baarda et al., 1956; Polman and Salzmann, 1996), while the standards on buildings and address data had been left to municipalities individually. The collective image (hence collective rules) was stable, to the extent that the Kadaster and the municipalities (often represented by the Dutch association of municipalities VNG) both referred to their relations as a permanent 'love-hate' relation. The core of the partnership was hardly challenged, as most of the partners relied on the technical expertise and rules presented by the professional staff of the Kadaster.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Uniformity	Standards	High
		National focus	High
	Actor orientation – external	Client/customer orientation	High
	Flexibility	Openness	Low
		Voluntary actions	Low
	Actor orientation – internal	Operations orientation	Low
Stability elements	Power change	Control of resources	Increased (getting higher)
	Economic rules change	Transaction cost expansion	Increased (getting higher)
	Conformity stability	Dominance of network over personal interests	High
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	Increasing when associated to GBKN
	Power stability	Long term mutual expectations and staff allocations	Was high, but decreased (getting lower)
	Economic rules stability	Transaction cost limitations	Decreased (getting lower)
	Conformity change	Dominance of alternative networks	Low, because of increasing conformity to BAG standards
	Collectivity change	Loss of credibility	High, but decreasing due to diverging ICT integration strategies

Table 6.1.2: Scores in geoICT coordination and stability elements aspects

As a result of the BAG activities changes in long term mutual expectations of the cadastral geoG2G, and the redistribution of financial resources occurred in the period 2007-2010. Whereas previously the 'power' debate between Kadaster and municipalities often concerned the near private sector status and the cost recovery fees of the Kadaster, the new debate concerned the new role of the Kadaster, as manager of the national data distribution facility. This role provided a new kind of responsibility for the Kadaster in the national landscape of geo-information, and an authority to request certain data from municipalities. Reversely, it provided the municipalities more autonomy over their own data sources and data collection processes.

Theoretically the BAG goals corresponds to a deliberate change in resource dependency relations. This introduces a power asymmetry between the BAG coordinators – who determine the rules – and the BAG implementers – being the Kadaster and the municipalities.

The transaction costs in the cadastral geoG2G were relatively low in 2007. However, in the period 2007-2010 the Kadaster has been hesitating to fully agree to the new budgeting rules of BAG. This increased the transaction costs on this issue, and this caused a certain degree of instability in economic rules. In 2010, the rules for budget re-distribution were accepted, yet still under some protest by the Kadaster. The transaction costs thus increase in the form of cost needed to enforce BAG, and in the form of 'resistance' and seeking alternative solutions by the Kadaster.

The conformity changed from low to relatively high. Increasingly partners use a common narrative – that of a single base map – when referring to the need for the BAG standard. The single geo-data distribution facility – created by BAG – supports this single narrative.

The collectivity has roots in other long-term projects, such as GBKN. Towards the end of 2010 most staff members within the geoG2G had a common view on the relationship Kadaster-municipalities, referred to similar purposes of geoICT within and for BAG, and accepted each other's roles in the geoG2G.However, the diverging requirements for ICT integration could potentially affect the collectivity in the future. Implementing BAG simply attracts new actors – in particular commercial IT companies, and commercial geoICT consultants. These newer actors are not necessarily influence or affected by collective interests and collective sanctions. As a result, alternative interests may arise.

Overall, the LOCUS coordination is effectively changing the stability elements within the Cadastral geoG2G as a result of the high number of actors and activities involved in the coercion of BAG coordination objectives, and due to the uniformity in which the implementation standards are applied. The BAG coordination strongly emphasizes the hierarchical relations between national agencies as principles and local municipalities as agencies. The BAG coordination can thus only remain effective if the 'implementation bureaucracy' remains systematically present. In the event of public sector re-organization, or the emergence of more autonomy within the municipalities, there is likely to be counter-effects in the geoG2G stabilities. The results in the larger municipalities reveal such counter-effects.

In sum:

- There are reverse simultaneous effects of geoICT coordination: uniformity and client/customer orientation coincide with power and economic rule

changes. In addition, the uniformity and client/customer orientation coincide with stability in conformity and collectivity. Reversely, low scores in flexibility in coordination coincide with opposite effects.

- The BAG emphasis on standards and national focus change the stability in terms of long term mutual expectations, transaction costs and collective interests. The BAG creates stronger dependency relations between the Kadaster and municipalities, and between the national BAG coordinators on the one side and the Kadaster and municipalities on the other side. As BAG needs to be implemented the degree of transaction cost – in the form of cost needed to enforce BAG, and in the form of 'resistance' and seeking alternative solutions - increases.
- A consistent association with a single narrative – such as that of the base map – supports the implementation of BAG standards and the national focus. The effect of this single narrative is conformity stability, i.e. adhering to a single image. However, maintaining this single image also requires additional activities, hence increases the transaction costs (thus reducing the economic rules stability).
- A national focus is likely to attract new actors from other professional backgrounds and adhering to other professional (and/or economic) rules. This may thus decrease the stability in collectivity.

3. The influence of variations of in discretions on changes in stability element.
Table 6.1.3 gives a grouped summary of the high and low scores in the discretion and stability aspects for the Cadastral case. The grouped high scores seem to imply a relation between discretions of strategic staff and increasing changes (hence instability) in power and economic rules on the one side, and increasing stability in conformity and collectivity on the other side. Reversely, the grouped low scores seem to imply a relation between low discretions of alignment and operational staff with decreasing stability in power and economic rules, and increasing stability in conformity and collectivity.

Concepts	Characteristics	Aspects	Indicator
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	High (for strategic staff)
		Ability to envision courses of action	High (for strategic staff)
	Autonomous / joint discretions	Degree of adherence to client interests	High
	Strategic / alignment / operational discretions	Personal access to alternative resources	Low
		Ability to envision courses of action	Low (alignment &operational)
	Autonomous / joint discretions	Degree of personal task simplification	Low
Stability elements	Power change	Control of resources	Increased (getting higher)
	Economic rules change	Transaction cost expansion	Increased (getting higher)
	Conformity stability	Dominance of network over personal interests	High
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	Increasing when associated to GBKN
	Power stability	Long term mutual expectations and staff allocations	Was high, but decreased (getting lower)
	Economic rules stability	Transaction cost limitations	Decreased (getting lower)
	Conformity change	Dominance of alternative networks	Low, because of increasing conformity to BAG standards
	Collectivity change	Loss of credibility	Decreasing due to diverging ICT integration strategies

Table 6.1.3: Scores in discretion and stability elements aspects

A possible empirical explanation for the simultaneously occurring yet diverging effects in stability (decreasing stability in power and economic rules and increasing stability in conformity and collectivity) is the expanding number of actors in the field of geoICT. The discretions are in particular high for strategic staff members who seek new alliances and new partners with similar geoICT interests. Establishing new partnerships such as PDOK is only possible if such partners have similar ideas and geoICT interests. The change for new partnerships to succeed is thus only present if the degree of conformity within

among the partners is also increasing.

A theoretical explanation from discretion theory is that the origin of discretions lies in the risk mitigation of strategic staff members. The risk mitigation is in the form of seeking additional alliances, hence spreading the risk with a broader network. This explains why the need for a collective image becomes larger. Sharing the risk in a broader network automatically also means sharing the power in a broader network, thus reducing the power stability, and increasing the transaction cost to maintain the network relations.

In sum:
The LOCUS type of BAG coordination - with the emphasis on applying standards and aligning geoICT standards across all levels of public administration (national focus) has a dual effect on discretions: it increases the strategic and decreases the alignment and operational discretions. A theoretical explanation from discretion theory is that discretions arise because of the uncertainty that adhering to new – and what is felt as a 'foreign' - strategy brings about. The staff member which are most up to date with the possible implications, and who are viewing these implications with their own cognitive filter are the strategic staff members. One could argue that their cognitive filter is guided by their own personal network, with whom they seek alliances to spread the risk of the possible negative outcomes of the external (BAG) intervention. As soon as they realise that the BAG intervention is unavoidable their discretions decreases.

The risk mitigation discretions of strategic staff reflects the activation of weaker ties in the social network theory. The reaction to the external change, with potential external values, is to seek alliances with professional peers of the strategic staff members with similar values and ideas about geoICT alignment. The theory would predict that strategic staff members would do this in view of creating and fostering more stability in conformity, i.e. more support for the values in their peer network. The empirical data on the aspects of conformity show however that the values of BAG are relatively quickly accepted and regarded as unavoidable, and that the return to conformity stability strongly relates to the acceptance of BAG rules. At the same time, there is a gradual change in control of resources and transaction costs. This would suggest that is the main –longer term and more fundamental - impact of the LOCUS coordination is not so much a change in conformity (resulting from strategic discretions), but a change in power and economic rules stability. The BAG is indeed fundamentally changing the funding structure of geoICT production activities, and thereby fundamentally intervenes in the financial resource dependencies of both the Kadaster and the individual municipalities. For the Kadaster this even implies an additional financial dependency, thus decreasing their power base (following the resource dependency logic). Moreover, the

BAG regulatory structures create additional transaction cost of regulatory enforcement which decrease the stability in economic rules.

6.3 EVENTUS Case: AHN

The case of '*Actual Hoogtebestand Nederland* '(AHN) is a case of geoICT coordination to maintain a national height database in the Netherlands. The coordination activities, undertaken by the AHN managers, emphasizes the need to obtain the resulting height database product (hence an EVENTUS type of coordination). In the AHN newsletter of September 2010 the chairman of the AHN steering committee states on the AHN history that the AHN organisation has succeeded in making the AHN product a nation-wide data set. He stresses that the organisation has prevented fragmentation in data standards and data quality, although he considers this self-evident, because *'public sector organisations are only cooperating to achieve the best possible service, with efficiency and quality'*. He concludes that the reality in many other ICT projects is very different, but emphasizes that *'the power of AHN is that we deliver a beautiful product for all of us through an intensive cooperation of the past 15 years, a stable organisational basis and a demand-driven approach'*.

As reported in chapter 1 the purpose of the AHN partnership was to have national information system of heights in the Netherlands, to support the protection of the low lands of the Netherlands from floods of all sorts.

6.3.1 Description of case

The AHN partnership developed out of historical contacts between various public agencies. The AHN initially relied on a cooperative working relation between three partners, namely the public water department (RWS) – under the ministry of housing, planning and environment, the union of water boards UWV(on behalf of the water boards), and the inter-provincial consultative body IPO (on behalf of the provinces). RWS was responsible for the implementation of water protection and water related engineering activities in the whole of the Netherlands, the water boards had been responsible for the implementation of the 'peilbesluiten'. Through a first covenant (of 1997) between these partners, a steering committee was established, which would take the daily management. This steering committee consisted of representatives from all partners. The steering committee had the task to subcontract the height data acquisition. In the course of this process, the partners started to realize that the actual work was largely managed by one party of the steering committee, namely the RWS. They had historically the staff capacity to carry out such projects.

Chapter 1 starts with a report of some of the problems in the period 2003 -2006. In 2003, with the completion of the height data collection approaching a number of discussions started for a second, more accurate, round of data collection.

RWS commissioned a feasibility study in 2003, which advised on a business plan for the period 2003-2006. As reported in chapter 1, this resulted however in a broader discussion, while at the same time many internal changes took place. The UWV were interested in continuing the AHN partnership for different reasons. As the main public agency to raise water taxes they saw they found legitimacy in participating in the next round of AHN in the field of e-government and e-services. Moreover, they saw an increasing role of water boards in managing local water affairs. The IPO, on the other hand, had a policy of reducing their involvement in operational partnerships. They labelled AHN as operational and decided therefore not to engage in developing and signing a new AHN cooperation agreement. But this was not the only change as compared to the original plans in 2003.

In 2005 both RWS and the water boards decided to transfer the day-today management of the AHN activities to the 'Waterschapshuis', an agency under the UWV responsible for ICT. The water boards considered the Waterschapshuis at that time a logical choice to coordinate national programs which affected all water boards. This could have been the responsibility of one program manager in one specific water board, but the idea was to coordinate for all 26 water boards at that time. The AHN steering committee agreed to test this idea of sustaining this project management in one new organisation through a pilot project in Zeeland. Since 2009 the Waterschapshuis executed officially the implementation of AHN projects.

A number of additional organisational changes occurred since 2007. Since 2007 the AHN steering committee actively worked on external publicity and information provision by publishing regular AHN newsletters (in VI Matrix). In April 2007 the chairman of the AHN steering committee reported (April newsletter):

'*the AHN.2 pilot is not only about technology. It should also culminate in what the new organisational partnership should look like. That's why the pilot in Zeeland is under the direct responsibility of the steering committee. We are curious whether the division of tasks within the projects that the AHN is undertaking should not lead to a change in the role of RWS. It is not unlikely that the pilot will show that the water boards will gain a more evident role; they constitute indeed the customers for which the AHN is the most important* '

Document excerpt 6.15 Quote from strategic staff member AHN - 2007

In 2010, the AHN partnership had evolved into a new operational structure, with new staff members in executing positions. The AHN newsletter report of a growing number of staff appointments within the waterschapshuis in the period 2007-2010. In mid 2008, the managers of all water boards had already agreed with the proposal for a new management and operational structure of AHN.2 for

the period 2008-2012. In 2009 it had a permanent program manager, responsible to organize a meeting of steering committee (with 4 members) every 6 weeks. Early 2010 an additional permanent AHN program manager was appointed within the Waterschapshuis. The educational background of the consecutive programme managers was consistently rooted in (geodetic or civil) engineering sciences. The strategic manages of the AHN partners had educational and professional careers in public administration.

In addition to the organisational staff directly employed by one of the partners, the AHN program managers also erected a user group, visible through and at the annual user congresses. Since 2009 there has been intensified focus on activities for and towards the users. Previously, contact with users relied on regular meetings with user groups. This did not seem to work properly. As a result, from 2009 onwards the AHN managers decided to increase communication channels through web contacts, diversify the kinds of use during the annual user days.

With regards to the geo-information products of the AHN.2, already in 2007 the AHN partnership was able to deliver new AHN.2 data for the provinces of Drente and Overijssel (newsletter April 2007). The processes to create these data were much faster than before, and the areas for which to create these data sets were much larger than before. In 2008, the AHN project management team tendered projects for an area of 750,000 hectare at once, whereas the biggest project up till that moment had only been 500,000 hectare at once (the pilot in Zeeland only covered 114,000 ha). The chairman reported in 2008 (excerpt 6.16):

'*we have to show that we can also handle big projects'* .
Document excerpt 6.16 Quote from AHN chairman – AHN newsletter January 2008

In 2009 the project size went up to 820,000 ha. Early 2010 almost one fifth of the territory of the Netherlands had been captured with the new AHN.2 product specifications, while in mid 2010 even the area around Schiphol airport (approx. 1100 ha) could be captured.

In addition to the production of data, the AHN program management decided to create an online (web) viewer, to look at portions or examples of the data sets (available since 3 October 2007). Already two months after the availability of this viewer, it had received many hits (AHN newsletter December 2007). In 2009 the Waterschapshuis improved the online facilities and image. One of the program managers of AHN acknowledges the relevance of this online facility (excerpt 6.17).

I find it very important that the website has been improved. The site now look

fresher, more '2010', which fits the AHN.2. AHN-2 is indeed a different product than AHN.1. This does not only affect the content, but also the desired profile. The logo has been adapted as well; something which we will adapt in the newsletters in VI Matrix as well. It is nice that the content management system behond all this is easier to handle. The site should not be a site for technological nerds. People should just take a look without having to be a GIS expert. That's why it has a google-like feel-and-look and the presence of approachable information in addition to the technical information.

Document excerpt 6.17 Quote from alignment staff member of AHN – AHN newsletter December 2009

The technology for AHN.2 developed out of the requirement to collect data about smaller dams, which was a specific requirement of water boards. This requirement needed more accurate height data than AHN had provided so far. In the period 2005-2006 a number of internal studies translated this requirement into end terms, and the idea emerged that commercial market parties should discover how to achieve the product end terms. This involved laser altimetry technology. When the AHN partners started to develop their pilot with laser altimetry in 2007 in Zeeland, the WGL (Working group large-scale implementation project laser altimetry) of STOWA approached them to cooperate. STOWA established WGL to streamline the fragmented knowledge on laser altimetry for dam management. The discussions between WGL and AHN led to new height data specifications in order to enable the maintenance of sea, river and polder dams, and dunes. The requirements included more reliable height measurements and a denser network of height measurements. In 2009 (AHN newsletter April 2009) the WGL reported that the new AHN.2 data were suitable for at least 85% of all dams.

6.3.2 EVENTUS geoICT coordination in AHN specifications

The analytical model to understand which geoICT coordination activities played a role in which way in the AHN case zooms in to three key elements: the degree to which the activities emphasize uniformity in geoICT, the degree to which the activities allow for flexibility in how to handle geoICT and the degree to which the activities aim to influence activities working a the back office (internal) or working at the client/customer interface (external). Each element is further assessed through a set of aspects.

Uniformity - standards

The aspects of 'standards', measured by the perceived degree to which standards are brought forward as solutions, provides an indication for how uniform the geoICT coordination is. The standards in the AHN specifications originally concerned the entire data collection process, but gradually reduced to only the product specification. The two most crucial coordination instruments

underlying the original geoICT product oriented coordination are the 'Peilbesluiten' (Water level decisions) and the 'Waterwet' (Water law) law. The Water Law -article 5.2. states that a water manager is compelled to determine the water levels for the surface and groundwater levels under its responsibility, and that in the water level decisions the water managers determine the water levels or margins of water levels which they will maintain for a period which they indicate. The water level decisions ('peilbesluiten') constitute the regulatory decisions of the water boards which indicate which water levels the water boards is aiming for. These water levels concern the levels in main watercourses and ditches. The levels are indicated with respect to the 'Normal Amsterdam Level' (NAP). The current accuracy needed for the data underlying appropriate water level decisions has increased, given the increased urgency of accurate water management. This resulted in more accurate height product specifications from water managers to AHN staff, but not in more specific and uniform data collection and quality checking processes. Where previously the AHN product specifications consisted of process / production standards, such as the number or the distribution of height points per m^2, and the statistical chance distributions of mistakes, currently the specifications are much more qualitative and less uniform (excerpt 6.18):

We do no longer specify in resolution or chance distributions. We ask an AHN.2 product specified in user's terms..in end terms..as we call it. This means that the data must be fit to map certain objects with a certain accuracy, and must have a certain height accuracy. This means that the collection party ..the market..is free to seek a combination of point distributions and planimetric precision.

Interviews excerpt 6.18 Quote from AHN alignment staff - 2010

Given the freedom for market parties to decide on their own production process, the degree of required uniformity in standards for AHN data collection processes - from the AHN coordination angle - has gradually decreased. Hence, the significance that is given to the aspect of standards for the AHN case can be considered *high, but decreasing*.

Uniformity - national focus

The aspect of 'national focus', measured by the perceived degree to which the geoICT coordination actions impose implementation in all national layers of administration, provides an additional indication for how uniform the geoICT coordination is. For AHN the national focus has always been undisputed among the AHN managers. This is visible in how the AHN managers refer to terms such as 'national coverage', 'nation-wide' implementation (see quotes from AHN newsletters 6.19.a,b).

The results of AHN-2 have made beneficiaries very enthusiastic and show innovative applications. That's why the 2008 user's day of AHN focused on the new possibilities of the second version of a nation-wide height database

Document excerpt 6.19a - AHN newsletter December 2008

We have succeeded in creating a nation-wide AHN. We have prevented that it would become a patchwork with different standards and uncertain quality
Document excerpt 6.19b - AHN newsletter September 2010

The association that the AHN managers make through this newsletter is relating the term 'national coverage' and 'nation wide' is with accuracy and with sophistication of the database. With this association they seem to express the intention to produce subsequent upgrades of the AHN database until it includes height data of the entire country at a similar degree of standard accuracy for the entire country. The upgrade of AHN to AHN.2 is not only an improved upgrade in accuracy and data collection methods, but also an improved upgrade from a first country-wide data collection coordination process, to a second country-wide data collection coordination process. Hence, the 'national focus' represents a starting and ending point of the entire coordination process. All coordination efforts aim at completing the data for the whole country. Only when this is completed, a next phase, with a new data collection method, or with alternative coordination processes, can start.

Finally, the AHN newsletters of September and December 2007 and September 2009 refer to AHN members contributing to INSPIRE-related panEuropean height models. All these publications refer to INSPIRE as a fundament for international data standards, which would enable international data exchange. The need for a nationally uniform height standard is this seen as part of the development towards a panEuropean height system.
In sum, the degree to which AHN coordinators value uniformity is *high*, given the emphasis of standard data accuracy and standard data collection processes as solutions for irregularities in AHN data, and the focus on completing nation-wide cycles of data collection and project management activities.

Flexibility - openness
The aspect of 'openness', visible in the perceived degree to which actors can specify their own data and process requirements, is *limited, but increasing*. Characteristic in the discussions on the construction of AHN.2 products is that the AHN program managers decided to specify AHN.2 products in 'end terms' (i.e. what should the product be at the end), and not in AHN data production specifications (i.e. how should the product be produced). The AHN chairman reported in 2008 (newsletter January 2008) – excerpt 6.20:

' we evaluate and coordinate on end terms, and do not, like in the past, prescribe [technical production] processes'.
Document excerpt 6.20 Quote from AHN chairman – AHN newsletter January 2008

This change implied that a producer of data gained influence in how to collect the data and how to produce the product. This implies that the company which collects the data thus has a larger responsibility in the delivery of quality and in the validation process to assure the quality. The controlling party controls on the basis of the provided quality parameters and takes samples. This results in a quality report. An evaluation team, consisting of staff from both RWS and the water boards, appraises – on behalf of AHN program managers – the work of both the controlling team and the data collection team. In 2009 there were three companies collecting the data through laser altimetry, in 2010 there were only two (Fugro Aerial mapping and TerraImaging). In addition there were two companies controlling the quality of the data (Geodelta and NEO).

Flexibility – voluntary actions
Another aspect of flexibility concerns 'voluntary actions', measured by the perceived degree to which actors can take their own actions. In relation to this ability to initiate voluntary actions, the degree to which staff members of the AHN geoG2G could undertake their own actions outside the AHN coordination has been limited. During the interviews with the staff members of the RWS and the water boards, all interviewees expressed they wished to stay close to the original AHN requirements (interview excerpts 6.21a,b).

Only in the beginning we saw it as new technology. So there were a couple of beginners' mistakes. But, ..despite a few exceptions …we have considerable support for the new AHN

Interview excerpt 6.21a – Quote from strategic staff - water board association staff - 2007

The Water boards…together they have the…waterschapshuis. They really cooperate well. That's because they only have one domain. That is easier. Their concern is 'water'. That is a big advantage. And they have a much bigger stake in AHN. Provinces like to use AHN, but have less specific demands for it. Water boards have specific demands for AHN. The whole vision of AHN comes from there. We do not have specific demands like the water boards.

Interview excerpts 6.21b – Quote from alignment staff – Province Noord Brabant

Despite the fact that several waterboards experimented with alternative height data collection methods, in most cases these experiments were conducted in close contact with the AHN managers and the Waterschapshuis. Therefore, the extent to which the AHN managers permitted a certain degree of 'voluntary actions' is *low* for the AHN case.

External actor orientation - client/customers
In relation to the actor orientation of the AHN geoICT coordination, the 'external actor orientation' is visible in two aspects: the kind and degree to

which the coordination sets requirements for actors working with clients and/or customers and the kind and degree to which it sets requirements for actors working in operations. For the former it is fair to say that, except for the organisation of user congresses, the AHN coordinators are not specifically targeting actors working with the AHN data. There is for example no obligation to work with AHN data for the water boards or for the RWS. The degree to which the coordination influences users or influences usage of AHN products is thus limited. Hence, there is only a *low* degree the which the aspect of 'client/customer orientation' of geoICT production is present in the AHN case.

Internal actor orientation - operations
Whereas the client/customer orientation of AHN coordination is limited, the operations orientation, measured by the perceived degree to which geoICT coordination requirements interfere in operational processes, is substantial. The AHN coordinators find accuracy and quality control crucial for the success of AHN. The practicality of this is visible in the choice to focus on quality in end terms by extensive quality checks of both commercial and academic partners. Hence the AHN coordination targets in particular the actors close to the internal production processes (excerpt 6.22).

After the quality control of Fugro-Inpark, there was another quality control by DID/RWS, ITC and Geodelta. Also the working group large-scale laser altimetry of the STOWA has judged the pilot data. The result is a high-quality dataset, which meets the requirements by far. Now the water boards have drawn the conclusion that the quality is fit for their applications, and even beyond their applications: spatial planning, archaeology, culture history, education, management of cables, and even maintenance of large scale topography, buildings and addresses and flight simulation.

Document excerpt 6.22 Quote on quality control process – AHN Newsletter January 2009

Still, many staff members consider the process towards new innovative products important in reality. The December 2008 newsletter reports (excerpt 6.23):
you can question what top innovation is worth without a good process. It is just how much value you attach to good innovation. And the path towards it. In the course of the year – the climb itself, the team spirit, the preparation - have become for me increasingly important. You are only a short time at the top, but you are busy for weeks to climb and even months in the preparation. Not really unimportant therefore..this path.

Document excerpt 6.23 Quote from alignment staff AHN - AHN newsletter December 2008

In sum, by emphasizing the AHN product requirements the coordination strategy targets to influence the actions of actors executing the internal, operational, processes. Hence, the balance of coordination activities leans more

towards operational processes than it does towards influencing any strategic or alignment processes within any of the partners. Hence, the aspects of internal actor orientation can be considered *high* for operations, and *low* for client/customers.

Summary of AHN coordination
The current EVENTUS geoICT coordination of AHN has been historically enshrined in the way that height data had been managed in the past. Although managing a technical product (as in AHN.2) is different than managing a technical process (as in the previous AHN) the practice of coordinating height data collection, storage and distribution of the Waterschapshuis has replaced a similar type of geoICT coordination by the RWS in the 90s. Crucial is still the coordination through technical requirements, and as technology is progressing, so are the technical requirements. Whoever delivers the technology is not so crucial in the eyes of the geoICT coordinators, as long as the technology is valid and leading to the required output standards. The standards are set and checked by a small scientific community. Furthermore, the coordination practice provides freedom to technology producers, and technology controllers.

6.3.3 Empirical indicators for discretions

Five aspects reflect the variation in discretions: cognitive filter to the environment, personal access to resources, ability to envision courses of action, personal tasks simplification and adherence to client interest. The extent of these aspects are further elaborated hereunder.

Cognitive filter to the environment
The aspect 'cognitive filter to the environment' is expressed through the degree to which individual staff members are able to formulate alternatives for the AHN coordination requirements. In relation to this aspect, there have been some indirect means of expression of opinions. The regular newsletter columns dedicated to developments in AHN in the magazine 'VI Matrix' provided for example an opportunity to influence the discussions on the AHN environment and direction of new AHN developments. This column enabled the AHN chairman to distribute his news and ideas. Indirectly, he thereby also created the discretionary space for his own ideas about AHN developments and possible, feasible or desirable changes. Hence, the degree to which individual staff members were able to formulate alternative coordination requirements in public can be considered relatively *high*.

Personal access to resources
The second aspect indicating the presence and extent of discretions is the aspect of personal access to resources, measured by the degree to which AHN staff has access to alternative resources. Overall, the score for this aspect has been *rather*

limited. All staff in the partnership are strongly bound to the respective organisational budgets of each partner, and additional funds or other resources to execute AHN activities hardly exist. None of the interviewed staff indicated that additional fund raising (other than securing yearly government budgets) is among their job contracts. So, there is no direct motivation for individual staff members to pursue additional funds personally.

A complicating factor is also that the number of staff changes in the AHN organisation since the inception in 1996 has been relatively large – with the exception of the chairman of the AHN. For the period of the data collection (2007-2010) the number of staff dedicated to AHN activities has grown. Various subsequent AHN newsletters (September 2008, December 2008, April 2009) reported about departing staff and new staff - such as project management staff - and also reported about new members of the steering committee. The chairman of AHN has however been one of the few continuous factors in AHN development.

Ability to envision courses of action
The ability to envision alternative courses of action is another aspect of discretions. It is expressed by the degree to which discretions are present The degree to which AHN staff is able to imagine alternative courses of action has been *high*, in particular regarding the prices for AHN products. Although the AHN agreement is very specific about the AHN product requirements, and the staff is consistently stating that they are reasoning from the user perspective, the current prices are not directly derived from user analyses. Many users of AHN products are still public sector organisations, and as a result, some argue that the AHN products should be for free for public users. This creates internally diverging opinions within the AHN geoG2G about alternative courses of action . At the strategic level the debate is about whether to seek more users through cheaper prices or through free dissemination versus or whether to maintaining prices to maintain co-funding of production. If the AHN geoG2G would have more partners and contributors than the prices of AHN product could decrease (assuming all new partners would equally contribute financially to the AHN management). Yet, maintaining prices could potentially prevent certain usage and adding new users. To overcome this dilemma pragmatically, alignment managers have been seeking ways to distribute the AHN products freely to academic and educational institutions, with the intention to broaden the potential user group and the widen the breadth of usage to more application domains. In addition, they have been showcasing unexpected usages during yearly congresses (such as the use of AHN products in archaeology). In this way they are seeking discretionary space to bypass the formal rules of AHN product distribution, in order to generate an increase in use, and hence an increase in customers. A side effect in the eyes of alignment managers is that an increase of use of AHN data could lead to more customisation of AHN product,

and an increase of individual discretions bypassing uniformly defined product specifications (excerpt 6.24).

It's impossible to imagine all applications which can emerge out of using AHN.2 data. You impede the applications development if you do not provide access. So, the discussion is whether we should provide free access…of whether we aim to look for mutual funding with other public sector organisations. So at this moment we will have to make a strategic choice. Are we broadening our budget through seeking additional funding of other public sector partners for AHN? If we achieve that then we could achieve more commitment around this theme. That would be beneficial for AHN.3.

Interview excerpt 6.24 Quote from alignment manager on seeking alternative funding for AHN - 2010

Given the internal discussions on alternative funding and customisation possibilities, the ability to envision alternative courses of action is *high*, in particular for alignment managers.

Degree of personal task simplification

In contrast to the differentiation in *origin* of discretions (expressed through aspects of cognitive filter to the environment, personal access to resources and ability to envision courses of action), the *purpose* of discretions can be expressed through the aspect of 'personal task simplification' and 'adherence to client interests'. For the AHN case there was no direct evidence found of any discretions of staff members aimed at simplifying their own tasks. However, especially the managers of the first AHN felt the potential for alignment and operational discretions in the period towards the set-up for AHN.2. The April 2007 AHN newsletter reports that although the "old" AHN agreement established a steering committee responsible for the execution, the chairman of the AHN could not call anyone from the steering committee to account. Hence, even the members of the steering committee could reach any discretionary decision in the period of the first AHN data collection and provision (1997-2003).

Some of the influence of alignment managers did not change in the AHN.2 activities. It is still up to the AHN.2 project manager to decide on which company can collect the data, and which company can validate the quality of the data. The December 2009 AHN newsletter shows (excerpt 6.25):

The data collection is reduced to two contractors only, and not three as now. The control work remains distributed to two contractors. The AHN-project leader experienced: handling 5 contracts was too many; it also requires five times more management and communication attention, whereas we were only trying to coordinate activities. You spread risks of higher prices and non-timely

data collection if you engage with more parties, but you also get more risks. We are going to change that.

Document excerpt 6.25 Quote from AHN alignment staff showing discretions for individual goals (AHN newsletter December 2009)

The quote shows that the AHN project manager, an alignment staff member, decides to decrease the number of potential contractors, with the motivation that it would simplify the selection process (hence facilitate the execution of his job). This reflects a individual oriented discretion, as a reaction to the geoICT product oriented coordination. By making the production process more flexible, the alignment staff gains more choice in the data collection processes and the agents collecting the data. This choice also involves the number of contractors involved in the implementation.

Still, the influence of individual staff members on the AHN courses of action discretions in the AHN.2 period decreased. Possibly this is the result of peer-pressure. The staff members operating under the new rules are in much closer contact than ever before. While this increased communication lines, and clarity of tasks, it has also increased internal peer-pressure. This results in a decrease in individual discretions.

Joint discretions on data standards and data collection processes may however still be possible due to pressure from the commercial companies executing the data collection and quality control. However, no specific evidence was found to substantiate this possibility. Therefore, it is fair to say that the aspect of personal task simplification appears *low*.

Degree of adherence to client interests

For the second aspect related to the purpose of discretions, the aspect of adherence to client interests, the finding was similar as for the personal task simplification. The presence of rather strict production requirements of the AHN agreement implied that staff could hardly adhere to any other external interest. For a long period (during 2007 and 2008) the customer/user group of AHN data did not convene for any meeting, and their requirements were not systematically collected. Moreover, the group of users of AHN data is rather diverse. They do not only include users from the water sector, but also include users in the environmental and disaster event management sector . Hence, discretions in favor in particular clients external to the AHN geoG2G partners were not only absent, but simply hardly possible.

In sum: there are few clearly identifiable reasons why any of the staff should have discretions. The scores for personal tasks simplification and degree of adherence to clients' interests are both low. Still, the potential for discretions is present, as the ability to envision alternative courses of action, in particular for

the alignment staff, is relatively high. In other words, the discussions on the direction of the AHN coordination is far from closed. This has to do with the continuing discussion on funding mechanisms, broadening the range of stakeholders, and the wish to align the AHN database to other databases.

6.3.4 Empirical results on changes in stability elements

The four stability elements of geoG2Gs are power, economic rules, conformity and collectivity. Each of these elements can remain stable or can change. Eight aspects reflect the variation in stability elements and the changes in stability: long-term mutual expectations, control over resources, transaction cost limitations, transaction cost expansion, dominance of network agency over personal interests, dominance of alternative networks, collective sanctions and incentives and credibility. The following sections provide further evidence of the variation in stability elements.

Power stability – long-term mutual expectations and staff allocations
The aspect of long-term mutual expectations reflects the degree of stability in power relations. In the AHN case the long-term mutual expectations of partners related in particular to the satisfaction of building or regaining of 'trust' (in Dutch: 'vertrouwen'). "Trust' was a crucial and frequently mentioned word in many of the AHN related documents and interviews throughout the period 2006-2010. The staff members see trust as a success factor. In the period 2003-2006 the narrative of AHN steering committee members and the AHN chairman frequently associated the cooperation dilemma to 'mistrust', but gradually they shifted their publications and presentations by more frequently including phrases such as 'trust in the AHN organisation' and 'trust in the individual staff member of AHN'. The following quotes (excerpts 6.26a,b,c,d,e,f) in subseqeunt AHN newsletters and AHN presentations are exemplary for this process.

This process resulted in low trust levels of customers in the quality of AHN.
Document excerpt 6.26a Quote from alignment staff member RWS - (Alkemade, 2006)

Cooperation is also having trust in each other. This is a very important factor.
Interview excerpt 6.26b Quote from AHN strategic staff - March 2007

We have to show that we can also scale up. But I trust that we can do that; the new method has proven itself.
Document excerpt 6 .26c Quote from AHN strategic staff member - AHN newsletter January 2008

Imagine that the AHN contributes to a quality increase of 1 % in water safety, spatial planning, archaeology, geomorphological base maps, serious gaming, trust in the government etc. Try to express that in money terms. Probably the year 2008 will become a shifting point in our thinking and acting.

Document excerpt 6.26d Quote from strategic staff member AHN - AHN newsletter june 2008

The result of the project generates a good AHN database, relying on a good cooperation between the AHN organisation, the firm executing the data collection and the firm executing the quality control. We can only trust such a client oriented staff member.

Document excerpt 6.26e Quote from alignment staff member AHN - AHN newsletter March 2010

That was an important reason to continue with the steering committee at that moment. So the steering committee regained the trust of that particular water board to continue their work.

Interview excerpt 6.26f Quote from AHN alignment staff June 2010

Despite the regular hesitation to trust the all AHN coordination activities fully, the aspect of power stability can be considered *high, but is perhaps somewhat decreasing.*

Power change – control over resources

A change of power stability is visible with the aspect of 'control over resources'. This aspect reflects the degree to which staff members indicate to apply, or intend to apply, an alternative allocation of their resources than what the AHN coordination requires. The degree to which staff members looked for alternative mechanisms to manage staff and other resources was clearly reflected in the efforts of AHN managers to mobilize the AHN partners and their constituents for the AHN.2 project. The AHN managers had various scenarios investigated by different management consulting companies, yet in all cases the scenarios did not anticipate strategic behavior of the respective AHN partners. In 2007 this strategic behavior was visible in the different viewpoints expressed by the partners. The interview excerpts 6.27a,b show how the water boards had different interests than the IPO (provinces):

It is very different within the water boards. Water boards need the data daily. So, their voices are much louder, to the extent that the Union hears the voices. And, it also depends on individuals. Water boards attracted certain staff members..we mobilized people with a lot of energy..and repeatedly said..we have to do this. I didn't see that within provinces. It is not to boast, or to congratulate my colleagues within the water boards. But I didn't see the same drive within provinces. You need these sort of people, otherwise it will never happen.

Interview excerpt 6.27a Quote from AHN strategic manager – 2007 – reflecting on situation in 2005/2006

We discussed in general terms. Broadening our scope..not only from the

perspective of water…but also geo-information..you have to regard geo-information from a broader perspective...you have to position AHN in a broader perspective

Interview excerpt 6.27b Quote from IPO strategic staff in 2007

Essentially, these quotes are evidence that the partners had different views on how to utilize their own resources in future cooperative endeavours. Water boards aimed at building the AHN activities into their own organisational activities, including internal budget and staff allocation. Provinces considered the AHN activities as something external to their daily activities, and would only accept investment in AHN activities if it were part of broader policy objectives.

This different views preceded a fundamental change in the AHN management for AHN.2. The management responsibilities were re-organised within the AHN.2 geoG2G. A concern in 2007 the AHN partners was in 2007 that the steering committee, comprising of alignment and operational staff, would have too much discretionary power. As a result, the partners added a 'Regieraad' (governing council) to control and possibly re-direct the activities of the steering committee members (excerpt 6.28).

But regarding the discussion on the distribution of costs, the project plan or the accelerated construction of a nation-wide database with higher specifications the question remains: who is the steering committee, who decides? It would be preferential if the steering committee collects considerations, experiences and proposals for actions, and let the governing council decide. The governing council is now installed. As soon as there is a new agreement, this becomes permanent.

Document excerpt 6.28 Quote from AHN newsletter April 2007

Despite the many formal and informal changes in the period 2007-2010, towards the end of 2010 the degree to which staff members of any AHN partner aimed for alternative AHN management mechanisms had decreased. So, the power change was *high at first, but gradually decreased.* Hence, power stability returned by 2010.

Economic rules stability – transaction cost limitations

Economic rules stability exists if geoG2G staff members strictly adhere to the agreements on the execution of operational processes. In such cases the transaction costs are limited. Any increase in transaction costs reflects an increase in uncertainty about the rules, and thus a change in economic rules stability. In the AHN case several artefacts show a major change in economic rules stability in the period 2007-2010, but eventually the AHN geoG2G relied on stable economic rules in 2010. In 2007 the rules for funding the AHN were

still under discussion. One of the major discussion points were the financial contributions of each partner. (Coumans, 2007b) remarked in 2007 that much of the uncertainty of steering committee members concerned the budgets of individual water board members. The agreement was that for every data collection project all water boards and/or provinces needed to allocate a specific amount in their yearly budgets to start up and complete the data collection tendering process. This required a lot of staff input to communicate and negotiate with each individual funder, and as a result delays in the data collection process. The differences among partners in how and budgets complicated such tendering procedures even more. In this light the AHN chairman indicated in 2007 on this funding uncertainty (excerpt 6.29):

Every year this is a lot of trouble, but this will change probably. In the new construction the Waterschapshuis has a central role. All water board participate automatically by yearly budget allocations. This will end the yearly moaning of credit gathering and will ensure gradual payments. In this way, you do not longer need yearly consultations, but you'll have a fixed amount on yearly budgets. Mid 2008 this should be agreed, so that we can include this in the AHN budget for 2009.

Interview excerpt 6.29 Quote from AHN chairman on difficulties of AHN funding in 2007

Yet, by the end of 2010 the rules of funding and revenues for the data collection for the AHN.2 had been agreed through the covenant. The interviews and AHN user day presentations in 2010 confirmed that all partners agreed to adhere to these rules, so the economic rules could be considered stable by 2010. Hence, the degree to which the aspect of transaction costs are limited is *high*.

Economic rules change – transaction cost expansion
If the aspect of transaction costs within the geoG2G increase and the kinds of transaction costs related to cooperation activities expand, there is instability in economic rules of the geoG2G. For the AHN case were no direct artefacts found which hinted at a transaction cost expansion within the AHN geoG2G. Hence, the score for the aspect of transaction cost expansion is *low*.

Conformity stability – dominance of network agency over personal interests
The aspect of 'dominance of network agency over personal interests' reflects the degree to which geoG2G staff members refer to an ideal situation for all staff members which is more valuable than individual interests. For AHN The mutually agreed need for particular quality standards of AHN data represents stability in conformity among partners. The original formulation of AHN standards by AHN partners was expressed in terms of minimum resolution of point clouds per area during the data collection. This formulation resembles the style of the Kadaster quality standards (Polman and Salzmann, 1996). The

emphasis of quality evaluation in the first AHN was on mathematical geodetic quality, resembling the style of the quality handbooks for Kadaster measurements and other types of data collections. The kinds of required standards changed with the change in technological capabilities and the requirements of the users in water boards. The standards in AHN.2 were formulated in usage requirements, rather than geodetic reliability of certain point clouds. The data collection quality evaluation reflects a shift from geodetic data quality measurements (in the style of RWS and Kadaster) to usage quality evaluation (in the style of the Waterschapshuis and E-government programs).

Despite the change in formulating which standards were required for the AHN data all partners are consistent in their expressions for the need of standards. Hence, throughout the period 2007-2010 there is consistently a common ideal among partners that a particular type of standards need to be achieved, expressing that the dominance of network agency over personal interest is *high*. The degree of conformity stability is considerable.

Conformity change – dominance of alternative networks
The degree to which ideas from alternative networks outside the geoG2G starts to play a role inside the geoG2G is an indication of conformity change.
The degree to which alternative ideals among AHN partners emerged in the period 2007-2010 seems limited. There was only a minor change in the kinds of required data standards which would hint at a change in conformity: from replicating geodetic standards to replicating user quality standards. This change took place in the period 2007 -2008. As partners accepted these newly formulated standards after having seen the results in a pilot project in 2008, the need to investigate alternative standard arrangements quickly vanished. Therefore, the partners were not hesitant to sign the new agreements which formulated these new standards in 2010. There was a renewed stability in conformity by 2010. Hence, the score for dominance of alternative networks was *low / limited*.

Collectivity stability – combination of collective interest with collective sanctions and incentives
The degree to which partners maintained common interests through incentives and sanctions was fairly stable in the period 2007-2010. The collective image displayed to outsiders by AHN partners for almost a decade in the AHN publications is without a doubt the image of having “national coverage”. The consistent emphasis on ‘national coverage” data reflects a joint and collective view of all partners, to which AHN individual staff members hardly disagree. The subsequent interview excerpts 6.30a,b,c,d,e,f and quotes from publications in the period 2003-2010 show this consistency.

2003:
The AHN covers almost the complete country. In the spring of 2003 it will deliver the final section in Zuid-Holland

Document excerpt 6.30a Quote on national coverage (Twynstra Gudde, 2003)

2006:
The AHN concerns surface level data, where all non surface level data have been filtered. The AHN data are uniform and the databases has national coverage.

Document excerpt 6.30b Quote from alignment staff RWS (Alkemade, 2006)

2007:
The rumor was that Fugro would develop a nation-wide height database with better specifications. (..) On the question whether the AHN wants to compete, the AHN chairman answers: "If Fugro sees a market for a database besides the AHN then they can do that. But I think that the chances will be smaller if we deliver a database with the same specifications. Fugro also sees cooperation possibilities with us. After that I haven't heard from them anymore."

Document excerpt 6.30c Quote from AHN chairman on alternative nation-wide height databases (Coumans, 2007b)

2008:
The results of AHN.2 are so good that the stakeholders are enthusiastic, and see many innovative applications. That's why the users day in 2008 addressed the possibilities of the second version of a database with national coverage.

Document excerpt 6.30d Quote from AHN chairman on national coverage of AHN.2 data - AHN newsletter December 2008

2009 :
We have succeeded in developing a nation-wide AHN. We have prevented that it was fragmented, with different standards and unknown quality.

Document excerpt 6.30e Quote from alignment staff member AHN on national coverage and standards - AHN newsletter September 2009

2010:
The data collection for AHN started in 2008. During 2013 we will have a database with national coverage.

Document excerpt 6.30f Quote from report AHN congress October 2010

The frequent reference to the nation-wide data implies that all partners consistently found that only a 'nation-wide' dataset would provide value. Intrinsically height data do not need to be available nation-wide in order to be valuable. So, it seems reasonable to assume that the need for nation-wide data is replicating values and/or practices propagated in other cooperation settings. The nation-wide interests of the association of water boards and the waterschapshuis

and the historical practices of collecting nation-wide data by the RWS were referred to by interviewees as drivers for this choice. This implies a *high* score in collective interests.

Collectivity change - loss of credibility
A change of collectivity stability is visible through the aspect of 'loss of credibility', the degree to which geoG2G staff loses faith in the necessity of the current common product and jointly agreed ways of production means of the geoG2G. No evidence of alternative interests or rules from outside the AHN geoG2G was found. All in all, the joint view on having the data available nation-wide reflects high stability in collectivitiy in the period 2007-2010. All partners agreed to having that the AHN partnership should portray this image. In sum, the aspect of 'loss of credibility' is *low*.

6.3.5 Conclusion EVENTUS case AHN

The above findings contribute to answering the main research question ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in the AHN case?*** This question has three components:

1) The influence of variations in geoICT coordination on variations in discretions;
2) The influence of variations in geoICT coordination on changes in stability elements; and,
3) The influence of variations of in discretions on changes in stability element.

Each of these three are described hereunder for the AHN case.

1. The influence of variations in geoICT coordination on variations in discretions
The variation that occurred in the AHN geoICT coordination in the period 2007-2010 included is a gradual change from aligning data collection processes to aligning on end product requirements. Table 6.2.1 gives a grouped summary of the high and low scores in the geoICT coordination and stability aspects for the AHN case.

The grouped high scores seem to imply a relation between the aspects of national focus, openness and internal actor orientation on the one side and strategic discretions based on their strategic cognitive filter to the environment and alignment discretions based on their ability to envision alternative courses of action on the other side. Contrastingly, the grouped low scores seem to imply a relation between a decreasing emphasis on standards, limited scope for voluntary actions and limited client orientation on the one side, and few discretions originating from personal access to resources, personal task simplification or adherence to client interests on the other side.

While the aspect of national focus scores high as a result of the strong emphasis on nationally available AHN end product requirements which relate to a national database of key register / base data, the degree of standard for AHN data collection processes gradually decreased. There is an increasing flexibility for commercial companies to decide how to collect the data. This changed the emphasis of AHN coordination activities. The reason for this change was the result of a deliberate change of strategy from the AHN coordinators in the course of the research period to steer more on output than on input. This strategy followed a tendency of public sector reform which was already present within one of the partner organizations, RWS. That this change causes different kind of discretions simultaneously (both strategic and alignment discretions) at the same time is most likely the result of the uncertain prospect of the role and influence that RWS may have in the AHN partnership. The emergence of alignment discretions can be explained by the fact that the alignment staff members are in regular contact with private companies who promote new and alternative of data collection. As a result the alignment staff becomes more aware of such alternatives, and may therefore favor such alternative solutions over the centrally agreed end product descriptions.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Uniformity	National focus	High
	Flexibility	Openness	Low, but increasing
	Actor orientation – internal	Operations orientation	High
	Uniformity	Standards	High, but decreasing
	Flexibility	Voluntary actions	Low, as most actions are communicate with AHN coordinators
	Actor orientation – external	Client/customer orientation	Low
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	Low, but increasing (for strategic staff)
		Ability to envision courses of action	High (for alignment staff)
	Strategic / alignment / operational discretions	Personal access to alternative resources	Low
	Autonomous / joint discretions	Degree of personal task simplification	Low
		Degree of adherence to client interests	Low

Table 6.2.1: Scores in geoICT coordination and discretion aspects

Given the low scores for the aspects of personal access to alternative resources, and little scope for personal task simplification or adherence to adapt products to specific client interests, there is no need for operational discretions. Even though the decrease in production process control opened up the possibility for discretions to collect and assemble the AHN database per water board or per data collector (hence not in a uniform way), the operational staff members agreed to operate according to the centrally guided principles. This seems to suggest the presence of an invisible set of group incentives and sanctions for operational staff members.

With regards to the strategic and alignment discretions these were legitimized by referring to professional and academic quality studies and references. This resulted in separating the checking of data collection from the quality controlling of end product specifications. Whereas the accuracy and resolution requirements made the product process very rigid, and did not allow any deviation from this product process, the end user product specifications provided more space for individual decisions and interpretations. The change in the kind of EVENTUS coordination resulted in strategic and alignment discretions with regards to alternative choices for employing new companies with new technologies. Therefore, for the case of AHN there appears to be a sequential relation between the change in EVENTUS type of coordination and the change in discretions. However, as this did not occur in all tendering contracts there is not a significant proportional relation between the increase in coordination flexibility and the increase in discretions. So, this does not prove any proportional change relation between any of these aspects.

2. The influence of variations in geoICT coordination on variations in stability
Table 6.2.2 gives a grouped summary of the high and low scores in the geoICT coordination and stability aspects for the AHN case.

The grouped high scores seem to imply a relation between the aspects of national focus, openness and internal actor orientation on the one side and limited transaction costs, a dominant network and a strong combination of collective interests and collective sanctions on the other side. Contrastingly, the grouped low scores seem to imply a relation between a decreasing emphasis on standards, limited scope for voluntary actions and limited client orientation on the one side, and decreasing long term mutual expectations, control of resources and limited changes towards alternative values or credibility.

Specifically, the establishment of the Waterschapshuis helped to increase the national focus of the AHN coordination. With the Waterschapshuis the water management interests and required data collections had an additional organisation, but one with hierarchical relations towards individual water boards. This allowed more central coordination between water boards and more

central interaction with the partner RWS and other potential partners at national or local level. This is visible in high score for the internal orientation.

This internal orientation of the geoICT coordination resulted in a decrease in transaction costs for AHN data collection and distribution, because it made streamlining of water boards interests and alignment of existing datasets easier. The increase in human resources made available in the waterschapshuis allowed more capacity within the water boards as partners to work on AHN. This also provided the capacity to ensure a more stable economic rules and less transaction cost to monitor and align the separate water boards.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Uniformity	National focus	High
	Flexibility	Openness	Low, but increasing
	Actor orientation – internal	Operations orientation	High
	Uniformity	Standards	High, but decreasing
	Flexibility	Voluntary actions	Low, as most actions are communicate with AHN coordinators
	Actor orientation – external	Client/customer orientation	Low
Stability elements	Economic rules stability	Transaction cost limitations	High
	Conformity stability	Dominance of network over personal interests	High. Rooted in Kadaster traditions
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	High, using the image of national coverage as silver thread.
	Power stability	Long term mutual expectations and staff allocations	High, but decreasing
	Power change	Control of resources	High at first, but gradually decreasing
	Economic rules change	Transaction cost expansion	None
	Conformity change	Dominance of alternative networks	Limited
	Collectivity change	Loss of credibility	Low

Table 6.2.2: Scores in geoICT coordination and stability aspects for the AHN case

An explanation for the changes in power stability, visible through the decrease in long term mutual expectations is that the changes occurred alongside the organisational changes within the water boards. The establishment of the Waterschapshuis and the reform of the RWS together changed the role that each partner saw for one another in the national water information management. This changed the mutual long term expectations.

3. The influence of variations of in discretions on changes in stability element. Table 6.2.3 gives a grouped summary of the high and low scores in the discretion and stability aspects for the AHN case. The grouped high scores seem to imply a relation between discretions of both strategic staff and alignment staff on the one side, and limited transaction costs, a dominant network and a strong combination of collective interests and collective sanctions on the other side. Contrastingly, the grouped low scores seem to imply a relation between few discretions originating from personal access to resources, personal task simplification or adherence to client interests on the one side, and decreasing long term mutual expectations, control of resources and limited changes towards alternative values or credibility on the other side.

It is remarkable that the presence of both strategic and alignment discretions coincides with a relatively broad stability. Apparently the coordination prescriptions, emphasizing product output requirements are not sufficiently corresponding to certain work practices. The discretions therefore follow the values and conventions from the relations that the staff members have of their professional networks. From the choices to emphasise a national focus and to possibly extent the AHN partnership to include municipalities it seems as if the AHN staff members follow the Kadaster working traditions. This isomorphic behavior is visible in the empirical evidence that the stability conformity relates to the long standing historical cooperative work, and similar professional backgrounds that the respective staff members have. As a result, the values of this relation strongly enshrined in the professional attitude and preferences. The discretions are thus not based on simplifying work, but on extending the values of professional networks to their own work practices.

In general one could conclude that the discretions in the AHN case are a way to re-enforce certain historically accepted work practices. Opting to choose for known work practices decreases uncertainty about these work practices and thus decreases transaction costs. At the same time, the individual discretion reconfirm a set of work values, thus reconfirm conformtiy stability. Finally, the consistent narrative that having an AHN with a national coverage provides a better quality and trust in the data acts as a sanction and incentive mechanism to stick to this one belief that a national coverage is ‘sacred’. This acts as a glue within the cooperation. Thus any discretion is likely to favor this image. As a result there is a high degree of stability in collectivity.

Concepts	Characteristics	Aspects	Indicator
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	Low, but increasing (for strategic staff)
		Ability to envision courses of action	High (for alignment staff)
	Strategic / alignment / operational discretions	Personal access to alternative resources	Low
	Autonomous / joint discretions	Degree of personal task simplification	Low
		Degree of adherence to client interests	Low
Stability elements	Economic rules stability	Transaction cost limitations	High
	Conformity stability	Dominance of network over personal interests	High. Rooted in Kadaster traditions
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	High, using the image of national coverage as silver thread.
	Power stability	Long term mutual expectations and staff allocations	High, but decreasing
	Power change	Control of resources	High at first, but gradually decreasing
	Economic rules change	Transaction cost expansion	None
	Conformity change	Dominance of alternative networks	Limited
	Collectivity change	Loss of credibility	Low

Table 6.2.3: Scores in discretion and stability aspects for AHN case

In sum:
The maintenance of a national focus combined with a change in emphasis on standards in the AHN case coincides with the presence of both strategic and alignment discretions. The strategic discretions are rooted in their cognitive filter to the environment, and the alignment discretions in their ability to envision alternative courses of action. The latter is strongly rooted in their daily interactions with private companies collecting data in alternative ways.

The geoICT coordination strategy in AHN to focus on the internal actors more than the external actors and/or clients resulted in a decrease in transaction cost for AHN data collection and distribution. The discretions in the AHN case are a way to re-enforce certain historically accepted work practices within their professional networks. This leads to a re-conformation of the conformity and

collectivity stability. The explanation for this is the fact that most of the AHN strategic and alignment staff have a similar professional background, which causes isomorphic behavior. The individual staff members are more likely to enact the values of their professional networks than to enact the values of new, alternative coordination strategies. Investing in these alternative values can also be regarded as additional transaction cost which staff members are trying to avoid. So, both the discretions and the re-enforcement of stability can be explained from both transaction cost theory and from isomorphism theory.

6.4 MODUS Case: Dataland

The geoG2G Dataland effectively exists since the inception of Dataland on 13 December 2000. The foundation administration office Dataland ('Stichting Administratiekantoor Dataland') began on 29 March 2001, and the corporation Dataland (Vennootschap Dataland BV) began on 25 April 2001. Various partners started Dataland, including a number of representatives from municipalities, the association of Netherlands municipalities (VNG), and the Bank of Netherland municipalities (BNG). The bureau Dataland carries out all the activities on behalf of the foundation Dataland, managed by management team ('bestuur Dataland). The management team comprises of six (elected) representatives from municipalities (mostly medium to larger sized municipalities), and a representative from VNG. Dataland is owned by the member municipalities. Municipalities can join the partnership on a voluntary basis. The mission of Dataland, set in 2005, is: '*to make real estate information and related information held by municipalities broadly accessible and available to government, citizens and the private sector*.' (Dataland Annual report 2005).

6.4.1 Description of case

The geoG2G Dataland contains rules for members. As contributing members municipalities both constitute Dataland (set the rules) and also comply with Dataland (live by the rules). Once a municipality becomes a member there are however implications of the membership. They have to submit their geo-data periodically to the Dataland bureau. Dataland in turn agrees to pay 5% of the revenue generated based on the data from the associated municipality, to cover for the cost made by the municipality to make the delivery in order. The minimal frequency of delivery is twice a year, but occasionally this happens more often, for example when there are many recent data mutations. The number of municipal members has grown steadily since the inception of Dataland: 310 in 2007, 330 in 2008, 385 in 2009.

The staff changes within the Dataland office have been considerable. The bureau Dataland comprised of 5 staff members in 2005, and grew to 10 staff members in 2010. Except for the Director, none of the staff members in 2010 were already working for Dataland in 2005. Similarly, the management team

(bestuur) in 2009 was completely different from the management team in 2005. The educational and professional background of the Dataland program managers was (geodetic) engineering and ICT, while the municipal staff members were either gradually upgraded (on-the-job) in ICT in their or had a degree in ICT.

The Dataland bureau takes responsibility for the accreditation of the quality of municipal real estate data. They check the data on completeness, accuracy and actuality (in total 41 criteria), and publish these validation results through a quality monitor. According to the bureau director this quality monitor aims to serve two purposes:

- It provides the individual municipalities with the possibility to correct or update their data and/or underlying work processes, if wanted.
- It increases trust by third party customers, because of the existence of a quality process.

In 2008 Dataland had made 300 million building data with address attributes available, in 2009 this was approximately 450 million data. The consecutive annual reports show a steady increase in data volumes. The data provided by Dataland include 6 groups of data: address data and address attributes, geometric location data, building data, land use data, financial data on buildings, environmental data. The users of Dataland data include primarily actors in the building and real estate domain, such as real estate agents, banks and insurance companies, utility companies, project developers, housing corporations, spatial planning bureaus.

The Dataland bureau and management does not prescribe the application of a particular technical tool or internal municipal data models. However, the bureau has contributed in evaluation projects on the implications of various national data model, such as the implication of migrating Dataland data to the RSGB (reference model municipal key registers; in Dutch – referentiemodel stelsel gemeentelijke basisgegevens) handled by EGEM (E-municipalities), and IMGeo (coordinated by Geonovum). IMGeo is part of the model of key geo-information registers, dealing with large-scale topography, objects of buildings and addresses and territorial areas.

6.4.2 MODUS geoICT coordination strategy relying on ICT integration objectives from 'Other government' objectives

The analytical model to understand how the ICT integration activities play a role in the Dataland case zooms in to three key elements: the degree to which the activities emphasize uniformity in geoICT, the degree to which the activities allow for flexibility in how to handle geoICT and the degree to which the activities aim to influence activities working a the back office (internal) or

working at the client/customer interface (external). Each element is further assessed through a set of aspects.

Uniformity – standards
The aspects of 'standards', measured by the perceived degree to which standards are brought forward as solutions, provides an indication for how uniform the geoICT coordination is. With regards to Dataland standards the quality process of the Dataland bureau ensures that the quality of all the distributed data is fairly harmonious. The head office applies a quality monitoring system to check all the data delivered by municipalities using 41 validation rules (Dataland newsletter, Sept. 2007). These validation rules include for example the use of consistent addresses when referring to buildings (Dataland newsletter, February 2007). As such, the presence of these quality processes and the active implementation of systematic validation rules is an indication that standards are brought forward as solutions to interoperability issues. This employment of systematic quality procedures makes the perception of the need for standardized procedures, hence the aspect of 'standards' *high*.

Uniformity – national focus
The aspect of 'national focus', measured by the perceived degree to which the geoICT coordination actions impose implementation in all national layers of administration, provides an additional indication for how uniform the geoICT coordination is. Crucial for Dataland are the coordination of geo activities through the national policies 'Andere Overheid' and the subsequent NUP. The 2008 NUP report states (excerpt 6.31):

The NUP makes the choice to oblige the usage of a basic infrastructure for e-government by naming the key facilities which will be part of that. Those key facilities are facilities which need to be implemented and used by all public administrations before the end of 2010, and need to be facilities which act as building stones of all key services or projects before the end of 2010.The key facilities which receive priority include e-access to government, e-authentication, numbers, key registers and information exchange.
Document excerpt 6.31 Quote from NUP report on main objectives of NUP

The NUP report states further that ministries, provinces, municipalities and water boards developed a joint statement in 2008 indicating how the infrastructure of the e-government could be realized in the subsequent 4 years. This 4-party NUP realisation statement emphasized improved service delivery to users, decreased administrative burden on citizens and firms, focus and prioritizing in egov implementation projects, and program coordination.

The coordination actions are largely prescriptive. These include the NUP prescription of BZ, the geo-information model descriptions of Geonovum, and

the organisational (financial and administrative) prescriptions (through the 'letters', such as the 'Betere dienstverlening begint bij betere informatievoorziening' letter) of VNG.

The main actors of the geoICT coordination activities intervening in the Dataland geoG2G are the BZ – through the program of Egov - , VROM – through the program of geo-information key registers, Geonovum and last but not least the VNG. The role of VNG is crucial in the coordination activities acting on Dataland. The role of the association is apparent and the various Dataland (annual) reports and newsletters frequently emphasized the role of the association. The Dataland actors consider the issue of 'one voice' crucial. The organisational set-up of Dataland mirrors (almost replicates) the set-up of the association VNG itself.

The national character pursued by VNG also reflects the activities of Dataland when cooperating with other organisations. Dataland aims to work as a central office, coordinating all municipal geo activities. By having access to all member municipalities, they can represent these municipalities to external contact. In doing so, they seek partnerships with other organisations working at the national level. They cooperate with other national coordinators such as:

- Geonovum on standards for geo-information objects
- Dutch Cadastre on exchanging data

Given the national character and the nation-wide standards which the NUP and 'Andere Overheid' are aiming for, the approach applies equally for all members in the Dataland geoG2G. Hence, the both the aspect of standards and the aspect of national focus can be considered *high* for the AHN case.

Flexibility – openness

The aspect of 'openness' is visible in the perceived degree to which actors can specify their own data and process requirements. One factor which affects the processing of geoICT information at municipalities (as members of Dataland) is the different national roles that municipalities play in the execution of e-government strategies. This is a complicating factor for Dataland, and for Dataland members. Whereas VROM is responsible for many of the geo components of the E-government programs, the Ministry of Interior is responsible for many of the other E-government programs. In 2009 VROM specially stated that the NUP should not be extended to include geo components, even though many of the NUP objectives have relevance for the geo-related activities. While this aim to exclude overlapping policy interests fosters the image of a clear uniform stand on who is responsible for which activities and which standards, it also transmits an image of flexibility because some of the information domains are not entirely geo or entirely non-geo. The niche for Dataland is such a domain. Real estate data has a clear geo

component, but real estate information users are not necessarily interested in the spatial components of the information. The provision of building permits may be an administrative activity being part of an e-government program, yet may also rely on maintaining building maps. Therefore, it is unclear from a municipal point of view whose coordination objective prevails for such a process. This uncertainty indirectly fosters the degree to which Dataland members can execute their own data processing. Thus, while the national E-government requirements are rather specific and applicable to all municipalities (and as a consequence the degree of openness is low from the regulatory perspective), in the implementation of e-government requirements there are overlapping requirements and municipalities have to make prioroties in whose requirements to execute first (hence there is an increase in openness in reality). The simultaneous low openness (from regulations) and high openness (in execution) increase of 'openness' creates room for Dataland to profile themselves as national partners on any real-estate data (excerpt 6.32).

We'll have to encourage smaller municipalities to seek cooperation. And we as VROM should keep dialogues open, integrate processes and provide the overviews. I like to seek connections through all organisations such as BZK, VNG, IPO and the Union of water boards. For most of the regulations we have suspended the deadlines. And the important thing is – we will not start up new projects in the near future. The transformation of GBKN to BGT will start, but any expansion of NUP with geo-information – I have said 'no' to this option

Document excerpt 6.32 Quote from VROM geo manager Article VI matrix 2009

The overlapping objectives of the different national coordination strategies in the field of e-government thus increasingly provides room for municipal staff members to specify their own data and process requirements to adhere to Dataland requirements. Hence, this increases the degree to which flexibility for the municipalities. Therefore, the aspect of 'openness' can be assessed as *low* originally, but currently *strongly increasing*.

Flexibility – voluntary actions

Another aspect of flexibility concerns 'voluntary actions', measured by the perceived degree to which actors can take their own actions. The degree to which municipalities - individual members of Dataland - can take their own actions of formulate their own strategies of data standards, of data quality requirements is limited. Despite the fact that the staff members have the freedom to make operational decisions, the requirements posited by the central Dataland bureau, combined by the requirements stipulated by the different ministries strongly limit voluntary actions of municipalities in the domain of geoICT. Therefore, the aspect of 'voluntary actions' can be considered as *low*.

External actor orientation - client/customers
In relation to the actor orientation of the geoICT coordination acting upon Dataland, the 'external actor orientation' is visible in two aspects: the kind and degree to which the coordination sets requirements for actors working with clients and/or customers and the kind and degree to which it sets requirements for actors working in operations. All in all, the geoICT coordination acting upon Dataland is targeting actors working at the strategic level of Dataland, with the assumption that members of the Dataland association can comply with centrally agreed standards on geo data collection and data provision requirements. This compliance is not only considered self-evident through the membership rules in Dataland. The Dataland head office is however stimulating compliance actively. This active promotion of compliance is for example reflected in the assigning of the yearly 'Chapeau price' – a price stimulating members to adhere to centrally agreed rules. Every year, one municipality receives this price. The price is given on the basis of a series of data quality parameters, which they do not enforce, but which they monitor within municipalities. The purpose of the monitoring is to develop gradually a list of best practices, and a list of best municipalities adhering to these practices. The Dataland head office accredits data quality through organizing a price for the best municipality. The accreditation thus relies on the promotion of this price by peers, and the positive image for municipalities attached to this price.

The price winner becomes an example for other municipalities. The price however also acts as 'marketing mechanism' for the specific municipality. Especially municipal politicians are susceptible to achieving such a price for their municipality. Therefore, the degree to which the coordination activities target clients and customers external to the Dataland is *high*.

Internal actor orientation - operations
Whereas the client/customer orientation of Dataland coordination is considerable, the operations orientation, measured by the perceived degree to which geoICT coordination requirements interfere in operational processes, is *low*. The NUP and Andere Overheid are not specifically targeting actors or actions of specific municipalities or even specific staff members within the Dataland geoG2G. Hence, there is little evidence of direct interference with operational processes of individual municipalities, so the orientation towards operational processes is *low* .

Summary
On the one hand the NUP and Andere Overheid are clear MODUS coordination strategies, because they focus on aligning the information processes within different organisations. However, whereas the objectives of NUP and Andere Overheid promote uniformity they indirectly also foster flexibility, because in the execution of the coordination strategy they create uncertainty who has to do

what. This makes this particular MODUS coordination less effective. It creates ambiguity in the organisation and in the expectations of both Dataland and the municipalities.

6.4.3 Empirical indicators for discretions

Five aspects reflect the variation in discretions: cognitive filter to the environment, personal access to resources, ability to envision courses of action, personal tasks simplification and adherence to client interest. The extent of these aspects are further elaborated hereunder.

Cognitive filter to the environment
The aspect of 'cognitive filter to the environment' reflect the degree to which individual staff members - at a certain level within the geoG2G - can formulate alternatives for the geoICT coordination requirements. For the Dataland case, municipalities have relied historically on their own data collection and data processing models. This resulted in certain operational practices. The requirements from Dataland were deemed new. As a result, the alignment and operational staff from municipalities did not easily accept the alternative or additional requirements of Dataland, even though the strategic staff had agreed on behalf of the entire municipality to become Dataland member. Compliance to Dataland requirements was thus a practical problem for alignment and operational staff.

Some of the interviews revealed the hesitation of compliance. In 2008 one of the respondents from a municipality indicated (excerpt 6.33):

And if the data derived from elsewhere, then you have to execute more operations to get it delivered to Dataland in the right format. Besides that, it doesn't bring in anything. Because it is useless to us. It looks nice, but then I think..it is simply not at the right place. But that is progressive insight. You enter the partnership, and a t a certain moment you think..this was not the right choice. We shouldn't have done this. We should have pursued our original position… municipalities are the node for real estate information. Not any other organisation.

Interview excerpt 6.33 Quote from a municipal alignment staff member on wishing to stop with Dataland

This sentiment of having to do extra work without clear benefit was also confirmed in some subsequent interviews with alignment staff of other municipalities. Overall, the impression was that staff members of smaller municipalities considered it more difficult to comply than staff members of medium sized and larger municipalities. The result of perceived difficulties could be a decision not to join Dataland, or to stop the membership of Dataland.

In 2010 the same municipal staff member as above indicated (excerpt 6.34):

Our municipality stopped with Dataland completely. I still maintain the position as I had before. Possibly in the future there will be changes within Dataland, making participation attractive again. I never say never. But at this moment we can easily do without.
Interview excerpt 6.34 Quote from municipal alignment staff member on having stopped with Dataland

The decision to leave Dataland for this smaller municipality was initiated by the alignment staff in this municipality. So, this alignment staff relied on a professional assessment of organisational capacity to reach a discretion that the Dataland membership was not fruitful for this specific municipality. So, the Dataland coordination resulted in alignment discretion. Given this individual assessment however, one can state that the cognitive filter to the environment was *high,* even when at the same time, staff members of most municipal members of Dataland, especially from medium sized municipalities, did not see Dataland membership as problematic.

Personal access to resources
The aspect of 'personal access to resources' is expressed in the degree to which individual staff – at a certain level- can start up activities to acquire additional resources to execute or bypass the geoICT coordination requirements. Although the municipal respondents indicated that the Dataland requirements needed additional work and additional resources, none of the surveyed municipalities could attract additional funds or human resources for the specific Dataland tasks. The respondents of municipalities indicated that the Dataland requirements provides no significant additional revenue for the municipalities. Interview excerpt 6.33 also shows that the municipal staff member argues that 'Dataland doesn't bring in anything', implying that there is extra costs for very little additional revenue. Although this doesn't apply for each municpality, it does for some.

In addition, municipal staff members who work with geoICT do not have extra fund generation in their individual performance contracts. At a personal level therefore there is little or no incentive to look for additional funds, or to decide – based on a personal judgment – to look for additional resources to execute their own tasks. Hence, access to additional resources, or re-allocation of available resources was not a reason to reach to any discretions on Dataland activities. The value for personal access to resources is therefore *low*.

Ability to envision courses of action
The degree which individual staff members - at any level within the geoG2G – show the ability to formulate alternative solutions for given problems reflects

another aspect of discretions. The interview excerpts show that municipal staff members motivate the decision to discontinue Dataland membership with the wish to discontinue the additional required work processes. The additional work made the geoICT operations within municipalities complex. The individual (alignment) discretion to discontinue – out of line with the geoICT coordination to standardize and harmonize for all municipalities - resulted from a gradual process of practical experience. While on the one hand there was not a problem with the standardisation as such, the execution through centralizing this standardisation was not deemed practical. So, municipal staff members responsible for geoICT alignment say ‘ yes’ to standardisation, but want autonomy in the execution of standardisation. With autonomous standardisation trajectories, they consider it more feasible to make the standardisation work (excerpt 6.35).

Deregulation and standardisation are absolutely a choice. The data exchange..works with messages eventually. These are national standards, that we use, and you see that individual municipalities are having problems with these. But through cooperation, we are able to convince market parties to show what is necessary to create those messages. These are long-term trajectories, but you foster particular standards to the market.

Interview excerpt 6.35 Quote from municipal staff member on implementing standards

So, overall , this aspect of ability to envision alternative courses of action is *high* for alignment staff. For other levels within the geoG2G it is much less.

Degree of personal task simplification

In contrast to the differentiation in origin of discretions (expressed through aspects of cognitive filter to the environment, personal access to resources and ability to envision courses of action), the purpose of discretions can be expressed through the aspect of ‘personal task simplification’ and ‘adherence to client interests’. For the Dataland case, the municipal staff members regularly expressed their hesitation in complying to the Dataland data requirements. The requirements frequently imply having to conduct additional tasks. For those municipalities who did not become member of Dataland, avoiding such additional tasks was a main reason not to join Dataland. In these cases, task simplification could be seen as a reason to decide not to join. For most municipalities, however, Dataland requirements are not problematic and complying to the requirements was not complicated for the alignment and/or operational staff.

A certain degree of personal task simplification is reflected in how certain municipal staff members are attracting new resources. Even though accessing new alternative resources is complex, most municipalities have actively sought additional staff members for all the different geoICT related requirements. In all

interviews with municipal staff members they expressed the need to have dedicated geoICT specialists. In many occasions such dedicated staff members are operating for consortia of municipalities, as the following interview excerpt 6.36 shows.

We want more responsibility. We have attracted one project leader with 4 municipalities to map out all processes and standards. And on the basis of that, we can make a choice how and where to support which application..

Interviews excerpt 6.36 Quote from municipal alignment staff member on executing standards

So, municipal staff members are able to seek additional resources, even though it is often in inter-municipal constructions. This facilitates their personal tasks. So, the score for the aspect of personal task simplification is assessed as *high*.

Adherence to client interests

For the second aspect related to the purpose of discretions, i.e. the aspect of adherence to client interests, the finding was dissimilar as for the personal task simplification. Both the Dataland head office and the municipal staff were not disputing the client interests. The most common clients are usually the small and medium sized business or citizens requiring real estate data, and they did not need to accommodate any of their data for any particular clients. Moreover, the variety in objectives of these small and medium businesses is rather large, as they operate in many different sectors. So adhering to one specific interest would also be difficult. In other words, the discretions did not originate in the wish to adhere to specific clients. Hence, the score on 'adherence to client interests' is *low*.

In sum: Discretions are present among some strategic and alignment staff members of municipalities, and concern the decision to become Dataland member, or stop being Dataland member. The makes the presence of strategic influence and alignment influence (concerning decisions on membership) high. Tasks simplification is hereby the main motivation to reach discretions. On the other hand, the amount of operational discretions can be considered as *low*, because there was no evidence of any operational staff member who aimed to diverge from the operational requirements in favor of his or her own technical solutions.

6.4.4 Empirical results on changes in stability elements

The four stability elements of geoG2Gs are power, economic rules, conformity and collectivity. Each of these elements can remain stable or can change. Eight aspects reflect the variation in stability elements and the changes in stability: long-term mutual expectations, control over resources, transaction cost

limitations, transaction cost expansion, dominance of network agency over personal interests, dominance of alternative networks, collective sanctions and incentives and credibility. The following sections provide further evidence of the variation in stability elements.

Power stability – long-term mutual expectations and staff allocations
The aspect of long-term mutual expectations reflects the degree of stability in power relations. The degree to which staff members of Dataland (directly or indirectly involved) maintain a similar expectation of the outcome of Dataland coordination is relatively high. The Dataland management largely discusses and pursues the geoICT coordination objectives centrally. There is a strong national and uniformity emphasis, and the style of activities and publications is one which emphasizes national uniformity, and transposition towards member organisations. The Dataland bureau translates these national prescriptions in prescriptions for the Dataland members on the quality of data, and the process of delivery of data. The prescriptions are predominantly operational. Participating in Dataland implies having to comply to very strict data conditions and data delivery conditions (indicated through the membership contracts and published on the Dataland website under heading 'gegevenslevering'). These include data definitions, StuF-DL-gem standard exchange formats, bi-annual data delivery moments, amongst others. Therefore, mainly strategic staff members influence the operational direction of Dataland. Alignment staff members (mainly in municipalities) can only exert influence by the advising on the decision to join or leave the Dataland association. Throughout the period 2007-2010 few Dataland members have disputed the internal structure and role of Dataland. Hence, the aspect of long-term mutual expectations and staff allocations has been *high*, so the power distribution has been relatively stable.

Power change – control over resources
Despite the overall stable power distribution in the geoG2G, there are some instances of power instability in the period 2007-2010. Changes in the aspect 'control over resources', measured by the degree to which staff members rely on alternative mechanisms to manage their finances, information and staff, reflect changes in power stability. In relation to this aspect it is first important to note that by 2010 not all municipalities had joined Dataland as members. This fact indicates that the position of Dataland in the landscape of national geoICT actors remains uncertain, and that certain geoG2G members may want to opt for other coordination mechanisms for real estate information than Dataland. The 2002 annual report of Dataland already remarked that Dataland aimed to position itself as a national distribution point of municipal real estate data, but as long as not all municipalities are member Dataland is not a full national coordination point for such data. The Dataland head office continues therefore to negotiate with individual municipalities, while at the same time member municipalities can influence and change the Dataland rules through their

membership rights. Membership negotiations are this on-going.

Secondly, the municipalities have increased the internal negotiations on their operational relation with other organisations and coordination strategies which produce or rely on real estate data. One of such organisations concerns the Kadaster. As a result, in 2008 the Dataland head office was actively seeking collaboration with the Kadaster to establish more power and potential to 'enforce' membership for all municipalities. This effort could be seen as a power imbalance between the Dataland head office, the Dataland members and the Kadaster. This reflects insecurity where to position Dataland versus other national organisations, such as the Kadaster (excerpt 6.37a), and the role of municipalities versus the EGEM programs (excerpt 6.37b).

Lack of trust? Possibly. There is a kind of defensive thinking. If you really want to cooperate, then you have exchanged objective sand most important starting points. If however you want to cooperate because you have a second hidden agenda…yes..then your position is very different in the cooperation. Essentially..Dataland and Kadaster..the mid-office and the front office of the Kadaster..and the mid-office and the front office of Dataland..are doing the same thing twice. The only difference is…the data are different. Wouldn't' it be logical to combine these two?

Interview excerpt 6.37a Quote from strategic Dataland staff on relation with Kadaster - 2008

Yes, there is EGEM. The EGEM e-teams go to primary municipalities. And we hear from municipalities..the EGEM e-advisor has been here..how are we supposed to position our information provision within this? So, we are a kind of knowledge centre for the municipalities. And we have contact with EGEM about RSGB..the national model streamlining municipal base data. That is important for the municipal data maintenance. And we are active, together with EGEM, to promote RSGB to municipalities.

Interview excerpt 6.37b Quote from strategic Dataland staff on relation with EGEM - 2008

The coordination requirements from the ministries provide the Dataland constituents, the municipalities and their staff members, many challenges. They have to cope with many requirements simultaneously. The effect of these multiple requirements are delays in meeting deadlines from coordinating ministries, and an increase of dependency on third parties. Within VROM this sentiment was also visible in 2009.
Upon a newly appointed position, the VROM manager geo noted in 2009 (excerpt 6.38):
We have many programs and wishes from the ministry point of view. I'm however concerned how local municipalities are organizing these elements

carefully. Wabo, nWro, BAG, NUP and later BGT are all examples of projects which target the same people. I see how much frustration and resistance this is generating, and also the delays they are facing as a result of this. The small and medium sized municipalities will have to insource and that increases their dependency of third parties. Their elasticity will end at some stage.

Document excerpt. 6.38 Quote from VROM manager on dependency increase as a result of an increase in data processing requirements (Article VI matrix 2009)

Given these considerations on trust and the reliance on multiple sources the staff members have to seek alternative resources. Hence, the aspect of control of resources appears to be *increasing*.

In sum: The extent of long-term mutual expectations on the Dataland principles has been relatively high in the investigated period. At the same time, however, the role of Dataland and its position in the Egov activities was increasingly disputed. As a result, especially municipal staff members have to consider alternative resources, resulting in an increase of possible power change. Perhaps this has to do with the ambiguous position Dataland is in. Although Dataland represents most municipalities, it does not yet represent all municipalities. Moreover, it is a geoG2G developed by municipalities, and not by one of the national ministries. Furthermore, the geoICT coordination from the various ministries targeting Dataland activities has not been coherent. These three aspects have made the position of Dataland somewhat unclear for both individual municipalities, and for external parties.

Economic rules stability – transaction costs limitations
The kind and extent of transaction costs is an indicator for economic rules stability. Economic rules are stable if transaction costs are low, or if the transaction costs are kept low through several instruments or rules. In the case of Dataland, the yearly validation reports of Dataland indicate that most member municipalities adhere to the Dataland central bureau requirements once they become a member. Most of the rules (mainly relating to the format and frequency through which data must be delivered to the central Dataland bureau) are extensively explained by the central Dataland bureau to the municipal staff members, so the degree of limiting transaction costs is *high* when only regarding the Dataland –municipal interaction for data transfers.

Economic rules change – transaction costs expansion
If transaction costs increase and the kinds of transaction costs expand, there is instability in economic rules. The historical legacy in ICT activities within municipalities is one reason why gradually transaction costs expanded. Historically, the member municipalities were highly heterogeneous in the way they produced the required data for Dataland. Many individual municipalities had outsourced a part of their ICT activities to ICT private companies. At the

moment that they joined Dataland these heterogeneous private sector legacies became apparent. Each municipality had their own way of ICT management. Harmonizing these technical legacies with the required tasks and services of Dataland maintains complicated for individual municipalities. They are used to their own ways of data management and storage, which differs from the Dataland requirements. As a result, they have to seek individual technical solutions to cater for multiple requirements simultaneously. It is in this search that private ICT companies play a crucial role again. These companies usually provide individual municipalities with standard ICT solutions (usually their own standards), which have both technical and operational implications. Private companies thus continue to exercise considerable influence on the economic rules which apply for the local level of implementation, even though it is not their final responsibility to work themselves with the ICT results. This prolongs operational heterogeneity among municipalities, and therefore prolongs instability in the economic rules of the Dataland members.

In sum: as many municipal Dataland members are increasingly dependent on choices made in their ICT projects, they have increasing difficulties to comply to all Dataland requirements. In some cases these technical requirements are no longer compatible to their internal ICT management solutions. This requires finding additional internal solutions and additional dependencies on external - usually private ICT – companies to derive these technical solutions. Hence, there are additional transaction costs. The transaction costs are *expanding*.

Conformity stability – dominance of network agency over personal interests
The aspect of 'dominance of network agency over personal interests' reflects the degree to which geoG2G staff members refer to an ideal situation for all staff members which is more valuable than individual interests. The common ideal to which most Dataland members adhere is that formulated by the municipalities themselves, namely through the association of municipalities. In the practical organisational set-up the Dataland organisation is replicating practices of VNG. This concerns the organisational membership structure of VNG. Also the VNG advises on how to implement Egov programmes are visible in the Dataland execution of Egov requirements. In most Dataland annual reports and strategic documents, the VNG vision are brought forward, and the VNG is also member in the governance of Dataland.

Given the influence of VNG in the management style and structure of Dataland, it is fair to say the VNG values on organisation and management are replicated, and the most prominent, in the Dataland organisation and management. The degree to which the VNG networks dominates the discourse within Dataland is thus high, making the aspect of dominance of network agency over personal interests score *high*.

Conformity change – dominance of alternative networks
The degree to which ideas from alternative networks outside the geoG2G starts to play a role inside the geoG2G is an indication of conformity change. For Dataland the central idea behind Dataland activities remains sharing of data dealing with real estate. Few staff members debate this central idea, as producing sharing of real estate data is one of the core activities of most geoICT related departments in municipalities. With regards to the execution of Dataland requirements the respondents of municipalities did not perceive a significant influence in their activities for Dataland from other agreements or professional relations. Although most staff members indicated being involved in activities of professional organisations (such as the association of information architects, or professional surveyor associations) , they did not perceive that these professional organisations influenced any of their work for Dataland. Hence, the degree to which there is dominance of alternative networks can be considered *low*.

Collectivity stability – combination of collective interest with collective sanctions and incentives
The degree to which partners maintained common interests through incentives and sanctions, a measure for the collectivity stability, was *high* for the investigated period. The yearly 'Chapeau price' is one of the incentives of the Dataland bureau to steer their members in a similar direction. They give a 'Chapeau price' to the municipality which adheres most to the Dataland requirements in terms of the criteria actuality, correctness and completeness. Each year the Dataland bureau makes a ranking list of the member municipalities on these criteria. The decision for this price incentive was taken in 2007. In 2008 the municipality Dordrecht received the price, in 2009 the municipality Almere, and in 2010 the cooperative SVHV – essentially a geoG2G consisting of 23 municipalities in the province Zuid-Holland (Alblasserdam, Albrandswaard, Barendrecht, Bernisse, Bergambacht, Binnenmaas, Boskoop, Brielle, Cromstrijen, Dirksland, Goedereede, Graafstroom, Hardinxveld-Giessendam, Hellevoetsluis, Korendijk, Liesveld, Nederlek, Nieuw-Lekkerland, Oud-Beijerland, Ouderkerk, Schoonhoven, Strijen en Vlist), the water board 'Holandse Delta' and the regional waste disposal service (RAD - 'Regionale afvastoffendienst') Hoeksche Waard **.** This price and the ranking lists steer the members in maintaining a similar interest.

Collectivity change - loss of credibility
A change of collectivity stability is visible through the aspect of 'loss of credibility', the degree to which geoG2G staff loses faith in the necessity of the current common product and jointly agreed ways of production means of the geoG2G. For the Dataland coordination the credibility is considered crucial, yet it has been difficult to achieve. While the interest of the central Dataland office is to achieve a nation-wide uniform database ('landsdekkend') individual

member municipalities are perhaps less motivated by this. Dataland uses hereby the 'mantra' of other national players in geo-land (such as Kadaster, GBKN, VROM, Geonovum) to be 'landsdekkend". The interview excerpt 6.39 is exemplary for this :

Looking at the short term, we want to have national coverage. We want that all municipalities become members. That is really necessary in the short term. What I notice is that that there is a big communication gap between the national government and the local government when referring to nation-wide government geo-information. Look at Gideon, look at such projects, even the Geonovum projects. You often see that national levels initiate geo-information projects, whereby local governments, even when represented by an organisation like Dataland, are not included.

Interview excerpt 6.39 Quote from strategic staff Dataland 2008

This does not however reflect stability of the collective interest. The nation-wide interest is less relevant for individual municipalities. They rather cooperate regionally, such as within regional shared services centres (such as in Boxmeer, Culemborg). So, there is a difference between the collective value "nation-wide the same standards and practices' promoted by Dataland and promoted through the NUP and Egov programmes, and the municipal values, which rely much more on practicality of organizing the standards given the available resources. This makes the degree emerging alternative interests high. As a result, the collective interest of members is somewhat unstable. Moreover, Dataland did not succeed in making all municipalities members of Dataland by 2010. As long as this statistic remains, there is no nation-wide standard on real-estate data.Thus, the aspect of 'loss of credibility' scores *high*.

6.4.5 Conclusion MODUS case Dataland

The above findings contribute to answering the main research question ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in the Dataland case?*** This question has three components:

1) The influence of variations in geoICT coordination on variations in discretions;
2) The influence of variations in geoICT coordination on changes in stability elements; and,
3) The influence of variations of in discretions on changes in stability element.

Each of these three are described hereunder for the Dataland case.

1. The influence of variations in geoICT coordination on variations in discretions

Table 6.3.1 gives a grouped summary of the high (or increasing) and low (or

decreasing) scores in the geoICT coordination and stability aspects for the Dataland case.

When comparing the perceived scores for geoICT coordination aspects to scores for the discretions aspects it is first of all remarkable that the uniformity aspects of 'standards' and 'national focus' are high together with the discretions aspects of 'cognitive filter', 'ability to envision alternative courses of action' and 'individual discretions related to the degree of personal task simplification'. All of these aspects changed gradually. The coordination in the Dataland case changed gradually in the period 2007-2010. While the origin of coordination came from the basic idea that electronic governance of real estate information should rely on the same quality data in any place in the Netherlands, there was a natural tendency to emphasize uniformity in data construction processes and data quality standards. The 'chapeau' price emphasizes uniformity by rewarding municipalities with high compliance and this implicitly shaming municipalities with low compliance. This behavior is in line with social capital theory, which predicts that individual members of a social network follow social peer pressure to re-affirm their social relations. Through installing the Chapeau price the Dataland coordinators hinted at the benefits of a social collective, and implicitly used a method of blaming and shaming. In theory this would enhance compliance and dissolve any discretions.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Uniformity	Standards	High
		National focus	High
	Flexibility	Openness	Low, but Increasing
	Actor orientation – external	Client/customer orientation	High
	Flexibility	Voluntary actions	Low
	Actor orientation – internal	Operations orientation	Low
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	High
		Ability to envision courses of action	High (for alignment staff)
	Autonomous / joint discretions	Degree of personal task simpification	High
	Strategic / alignment / operational discretions	Personal access to alternative resources	Low
	Autonomous / joint discretions	Degree of adherence to client interests	Low

Table 6.3.1: Scores in geoICT coordination and discretion aspects in Dataland case

The results also show a gradual increase in the openness aspect, due to a gradual increase in uncertainty about the relevance of process requirements. This increases the flexibility. The frequent changes of actors within municipalities and increase in complexity of various simultaneous e-government strategies had a couple of effects on strategic and alignment staff working within municipalities. The distribution of E-government activities over the different ministries made the overall E-Government coordination for municipalities less uniform. The effect of this was that municipal staff members perceived the coordination as less coherent. The lower degree of uniformity in e-government objectives however also provided more flexibility for Dataland and the constituent municipalities to implement geoICT standards and procedures relating to real estate information in their own way.

Given the criticism that alignment staff members in municipalities expressed towards nationally organised geoICT coordination it is fair to conclude that the discretions of alignment staff in smaller municipalities increased as a result of the flexibility in geoICT coordination. The changes in alignment discretions clearly followed in time after the requirements of Dataland. Hence, the occurrence of discretions in smaller municipalities can be contributed to the changes in geoICT coordination through Dataland. The reason for this occurrence is that the additional tasks resulting from the Dataland requirements seem to overshadow the perceived (financial or strategic) benefits of Dataland membership. This is in line with social capital theory. As soon individual members within a social network start to question a certain measure then the rationale for the social network may gradually dissolve. Individual members may then start to adhere to values of other networks, and may thus increase their discretions. The high score for the aspects of ‘cognitive filter to the environment’ and ‘ability to envision alternative courses of action’ are exemplary for this.

In sum: Because of pluriformity of national requirements Dataland had to gradually change the geoICT coordination towards allowing more openness and voluntary actions. This resulted in moderate increase in discretions of alignment staff in particular concerning the decision to become Dataland member, or stop being Dataland member. Tasks simplification are the motivation to reach such discretions.

2. The influence of variations in geoICT coordination on changes in stability
Table 6.3.2 gives a grouped summary of the high and low scores in the geoICT coordination and stability aspects for the Dataland case.The grouped high scores suggest a relation between the geoICT coordination aspects standards, national focus, openness and client orientation the one side, and increasing stability in all stability elements on the other side. Reversely, the grouped low scores seem to imply a relation between few voluntary actions and little internal orientation

with a limited increase of transaction costs and limited influence of alternative networks. These grouped scores represent several patterns.

First of all the high scores in the uniformity aspects of 'standards' and 'national focus' coincide with the relatively high scores in most of the stability aspects ('Long term mutual expectations and staff allocations' , 'Transaction cost limitations' , 'Dominance of network over personal interests', and 'Combination of collective interest with collective sanctions and incentives'). This suggest a relation. The standards and national focus oblige the geoG2G partners to align their resources, transactions and collective interests. As long as municipalities had no reason to question the added value of Dataland, and had no significant additional work from Dataland requirement, the alignment of their resources, transactions and collective interest is relatively easy. The Dataland requirements do not create power asymmetries or opportunistic behavior and the fact that a significant number of other municipalities adopted the Dataland requirements made many municipalities follow each other. This behavior is in line with Markus et al. (2006), who argued that diffusion of standards depends on other's adoption.

In addition, the relatively high score in the conformity stability aspect 'Dominance of network over personal interests' has to do with the historically role of the VNG narrative, which is to promote the interests of municipalities. The consistent mentioning that Dataland is a geoG2G for and of municipalities underlines the collective interest and as a result the collective image. The coordination are actively promoting this collective image, which is in line with social capital theory.

However, there are also changes in stability elements. These are in particular prominent for the collectivity change aspect of 'loss of credibility' and partly for the power change aspect of 'control of resources'. While the stability in power seems high in the period 2007-2010, there is a decrease in mutual long term expectations and an increase in negotiations over resources. The Dataland head office has gradually manoeuvred itself in an ambiguous position. In their strive for standards and national focus they are indirectly challenging the role of the Kadaster as collector and provider of real estate data, yet are at the same time cooperating with the Kadaster to streamline these collection and distribution processes.

The increase in power instability followed after the increase in flexibility (or decrease of uniformity) of the geoICT coordination. The decrease in long term mutual expectations resulted in the perception that the coordination activities were less coherent. This implies that overemphasizing process requirements may increase and complicate the requirements for recipients of the coordination strategy, and effectively starts to go beyond the capacity of municipalities. A

pragmatic solution is then to prioritize among the varying process requirements. Certain requirements may be set aside, including those from Dataland. The ultimate consequence of this may be to opt out of the Dataland geoG2G – as witnessed in some municipalities. In other words, the benefit of Dataland is then no longer outweighing the additional effort and capacity needed to maintain the geoG2G agreements. This is in line with the strategic and alignment discretions that emerged in these cases.

A similar trend appears for the decrease of transaction costs limitations. The transaction costs were relatively low, but increased due to the increase of variety of third parties who implement the technical systems and architectures within individual municipalities As the criteria for the Chapeau price emphasized the (standard) technical process requirements there was less attention for who carries out these processes. Hence, this coordination choice provided space for individual municipalities to investigate alternative organisational structures to handle the technical process requirements. The emergence of alternative organisational structures can increase transaction costs, and thus decrease the stability in economic rules.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Uniformity	Standards	High
		National focus	High
	Flexibility	Openness	Low, but increasing due to uncertainty
	Actor orientation – external	Client/customer orientation	High
	Flexibility	Voluntary actions	Low
	Actor orientation – internal	Operations orientation	Low
Stability elements	Power stability	Long term mutual expectations and staff allocations	High.
	Power change	Control of resources	Low, but increasing
	Economic rules stability	Transaction cost limitations	High
	Conformity stability	Dominance of network over personal interests	High, Mainly through VNG narrative
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	High. The Chapeau price is clear incentive, and the ranking acts as sanction.
	Collectivity change	Loss of credibility	High
	Economic rules change	Transaction cost expansion	Low
	Conformity change	Dominance of alternative networks	Limited.Little influence of other professional networks

Table 6.3.2: Scores in geoICT coordination and stability aspects in Dataland case

The following observations summarise the findings on the possible relations between geoICT coordination and stability elements in the Dataland case:

- In the Dataland case the geoICT aspects of 'standards' and 'national focus' cause high scores in most of the stability aspects ('Long term mutual expectations and staff allocations' , 'Transaction cost limitations' , 'Dominance of network over personal interests', and 'Combination of collective interest with collective sanctions and incentives'). This can be explained by mimicking behavior.
- The changes in stability in the Dataland case, which take place in a limited number of municipalities, are the direct result of the multitude of geoICT

requirements. Certain municipalities are unable to cope with the requirements because of undercapacity.

3. The influence of variations of in discretions on changes in stability element
Table 6.3.3 gives a grouped summary of the high and low scores in the discretion and stability aspects for the Dataland case. The grouped high scores seem to imply a relation between discretions of alignment staff and discretions for personal staff simplification on the one side, and increasing stability in all stability elements on the other side. Reversely, the grouped low scores seem to imply a relation between limited discretions on the basis of client orientation with limited transaction cost expansion and limited influence of values alternative networks.

While the discretions aspects of 'cognitive filter', 'ability to envision alternative courses of action' and 'the degree of personal task simplification' are high, the changes in stability elements are prominent for the collectivity change aspect of 'loss of credibility' and partly for the power change aspect of 'control of resources'. Discretions are present among some strategic and alignment staff members of municipalities, and concern the decision to become Dataland member, or stop being Dataland member. Tasks simplification is the motivation to reach discretions.

However, this relation between high scores in discretion aspects and decrease in stability aspects is not always taking place, as there are still many examples of municipalities where this didn't happen. Therefore, the relation is only one-directional. If there is any increase in discretions, it may cause a decrease in power stability on the part of certain municipalities. This affects the overall image of Dataland. If one municipality drops out, the credibility of Dataland as a representative for all municipalities is at stake. It is not so that with every Dataland coordination activity or with every drop out a particular type of instability occurred. The fact that the alignment discretions did not emerge in all municipalities is evidence that Dataland coordination does not cause alignment discretions per se. It depends on the resources of the municipalities and the priorities that municipalities make in this. So, discretions only emerge if the resources are limited, but when they emerge it increases the loss of credibility of the partnership.

The high scores for cognitive filter to the environment and ability to envision alternative courses of action exhibits that both strategic and alignment staff regularly interact with other professional and commercial organisations. This is needed to cope with the multitude of requirements imposed on municipalities. The effect of this is that discretions occur which favor the values and needs of a professional community, that these discretions re-enforce these values and that this re-enforcement leads to stability in conformity and collectivity. Discretions

which favor new clients or new external partners are not occurring. It is a closed system.

The findings on the grouped high and low perceived scores in discretion and stability aspects show that in the Dataland case discretions only emerge if the resources of a particular municipality are limited, but when they emerge it increases the loss of credibility of the entire partnership. If the resources of a municipality are limited the discretions emerge out of the need to simplify the tasks.

The discretions in the Dataland case only relate to the decision whether or not to join the Dataland geoG2G cooperative. After joining Dataland the partners agree to follow the central rules and are therefore do not exhibit many discretions. One could also explain this as adhering to a shared set of values – in particular to the instruments through which the geo-data on parcels and buildings are maintained. This shared belief and trust in this set of values reflects a re-enforcement of stability in both conformity and collectivity, which is upheld by a central story from the VNG – namely that all municipalities united are a stronger force is they share their operational processes. The geoICT coordination values from the central Dataland coordination actors have relatively limited impact if they do not match the values of the professional community working with the geoICT.

Theoretically one could explain the relation between discretions and stability in conformity and collectivity with the theory of isomorphism. Essentially the conformity is rooted and stimulated by mimicking. Mimicking is a survival strategy on the one hand, and provides stability on the other. The result of mimicking is that the municipalities are leaving their judgment to adhere to Dataland to their trust in other similar municipalities. As a result, they gradually have similar geoICT activities, and many staff members exhibit similar professional choices. In other words, the behaviour within the organisations becomes ‘isomorphic’ with regards to parcel and building information. Following Meyer and Rowan (1977) the compliance to the Dataland requirements and placing value to the Chapeau price is a form of seeking legitimacy for their judgment to join Dataland or not.

Concepts	Characteristics	Aspects	Indicator
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	High
		Ability to envision courses of action	High (for alignment staff)
	Autonomous / joint discretions	Degree of personal task simplification	High
	Strategic / alignment / operational discretions	Personal access to alternative resources	Low
	Autonomous / joint discretions	Degree of adherence to client interests	Low
Stability elements	Power stability	Long term mutual expectations and staff allocations	High.
	Power change	Control of resources	Low, but increasing
	Economic rules stability	Transaction cost limitations	High
	Conformity stability	Dominance of network over personal interests	High, Mainly through VNG narrative
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	High. The Chapeau price is incentive, the ranking acts as sanction.
	Collectivity change	Loss of credibility	High
	Economic rules change	Transaction cost expansion	Low
	Conformity change	Dominance of alternative networks	Limited.Little influence of other professional networks

Table 6.3.3: Scores in discretion and stability aspects in Dataland case

6.5 CAUSUS Case: Sabimos

Sabimos is a local geoG2G in the Twente Region dealing with public transport information in Twente. The partners in the cooperation are the member municipalities of the Regio Twente, who are the municipal road authorities, the transport companies as main users, and Keypoint consultancy as a contracted party to design and operate the Sabimos system.

6.5.1 Description of case

The Sabimos geoG2G emerged out of converging needs of the regional government of Twente, several municipal governments in Twente and the public transport companies operating in the Twente region. These needs included more accessible and transparent public transport information and one public transport company management information. Based on these needs the regional authority, Regio Twente, contracted a private company, Keypoint Consultancy, to develop and manage a technical system for dynamic travel information. Sabimos became the name of the system. After a preparation of 8 years, in 2006 Sabimos became an operational dynamic travel information system (DRIS), which incorporated real-time spatial information of vehicles, passengers, routes and bus stops.

The actual start of the Sabimos ideas rooted in the technical reconstruction of a regional bus station in Almelo, one of the municipalities of the Regio Twente. A municipal council member of Almelo had the idea to use GPS for more efficient use of public space needed for such a station. If buses were equipped with GPS, then the arrival and departure time could be better regulated. With this original idea of compact and dynamic bus stations in mind the technical system, a pilot project in Almelo developed a pilot system based on integration of GIS road data, traffic control data and exact positioning of buses. As a result of the exposure of this pilot system, gradually several municipalities joined in the pilot development and finally the regional government, Regio Twente, took the initiative to develop the pilot for the whole region. The development relied on the management through a set of technical and management agreements between the partners.

A crucial factor which required a change in the technical design was the changing technical requirement of the major road users, i.e. the buses. Based on a changing national policy on transportation every bus was required to be equipped with chip card possibilities for passengers. The chip card would become a standard in tickets, such that any passenger in the whole of the Netherlands could travel with any bus in the whole of the Netherlands using the same ticketing system. The chip card requirement implied that any bus company needed to change their on-board computer system. This change had however a disturbing effect on the GPS based system on the buses, and as a result the functional requirements set by the regional government were changing in 2008.

In 2010, the Region Twente requested Keypoint again to upgrade the technical system of Sabimos. The request included an upgrade in the ability of the system to link better to the on-board computers of the transport (mostly:bus) companies, and an improvement in the generation of management reports from all the continuous streams of collected data. Last but not least, the new Sabimos

(referred to as Sabimos 3) had to relate better to other systems of real-time travel information, in order to enable a link to a national 'standard' system. Such national systems have in under discussion through various working groups, in which the Sabimos managers (mostly Keypoint staff) had also been involved. The Sabimos managers had an educational backgorund in civil engineering and business ICT. The Regio Twente managers in policy sciences and public administration.

6.5.2 Local CAUSUS geoICT coordination strategy relying on regional mobility policy

The analytical model to understand how the geoICT coordination activities play a role in the Sabimos case zooms in to three key elements: the degree to which the activities emphasize uniformity in geoICT, the degree to which the activities allow for flexibility in how to handle geoICT and the degree to which the activities aim to influence activities working a the back office (internal) or working at the client/customer interface (external). Each element is further assessed through a set of aspects.

Uniformity – standards
The aspects of 'standards', measured by the perceived degree to which standards are brought forward as solutions, provides an indication for how uniform the geoICT coordination is. For Sabimos the degree to which standards are applied and enforced by the coordination activities is limited. The original design of the Sabimos system combined existing datasets with a newly designed information architecture (Keypoint Consultancy, 2005; Regio Twente, 2007) . There were no predefined data or data processing standards used, because from the onset the idea was to gradually upgrade the system, and to test additional components first before including these in the system functionality. The system gradually expanded, as explained in the Keypoint newsletter November 2010. While the information on the displays in the buses and at bus stops needed to be uniform for the region of Twente, the data processing depended on the choices made by the system managers. Given the gradually expansion of the system, and the gradual design and testing information architecture, there was never a standard solution foreseen. Hence, the aspect of 'standards' can be assessed as *low*.

Uniformity – national focus
The aspect of 'national focus', indicated by the perceived degree to which the geoICT coordination actions impose implementation in all national layers of administration, provides an additional indication for how uniform the geoICT coordination is. For Sabimos the partnership did not aim for national uniformity in transport information from the onset, but for uniformity of the transport information and the transport licenses in the Twente region. There is not a

national coverage of the system and the associated transport information. The guidelines for the routing information is not uniform for all transportation modes. The road transport information is derived from the road authorities and how they provide routing information on major roads; the train companies provide information to train passengers; the tourism offices provide transport and navigation info to tourists, amongst others. In other words, the standards on transportation are not uniform and are not determined by any specific geoICT standards. During the first interviews with the Sabimos representatives in 2008 the respondents indicated that the project management team originally wanted to keep the routing standards of the local municipalities, but later in the project they started to hint at a gradual implementation of some national routing. standard. (excerpt 6.40).

We are now in the project preparation phase for the construction of Sabimos 3, as we call it. This means that we have to convert to national standards, which we also develop ourselves. This enables the information exchange between the [systems of the] transport companies and the Sabimos system. And also between the Sabimos and the display system. We do not envisage to adopt the national standards, because our local system is already operational. We will manage the display…at a national level. But only at the front end.

Interview excerpt 6.40 Quote from alignment staff Sabimos on change of standards - 2008

At a later stage, in 2010, following the request of Region Twente to revise and update the system, the management team decided to investigate how to link the discussions of national standards of travel information systems to operational system of Sabimos. The management team members had themselves been involved in the development of these standards, so there had already been actively promoting and complying to these national travel information standards. The personal acquaintance with the national discussions then started to influence the discussions on how to develop Sabimos further. Overall, however, the degree to which national standards on travel information have this been dominant throughout this project is relatively limited. Hence, the degree to which the aspect of 'national focus' is stimulated can be considered *low*.

Flexibility – openness

The aspect of 'openness' is visible in the perceived degree to which actors can specify their own data and process requirements. For the case of Sabimos, all respondents expressed during the interviews that the information output requirements needed to be flexible, as it would need to apply for all bus companies who might be using different systems. To accommodate for this requirement the technology underlying the information processes was diverse. Given the need for multi-nodal information - information displayed in different formats, in different technologies, in different transport types - the information

system requirements needed to be flexible from the onset. Hence, the aspect of openness scores *high*.

Flexibility – voluntary actions
Another aspect of flexibility concerns 'voluntary actions', measured by the perceived degree to which actors can take their own actions. Given the in-built flexibility for actors to make their own choices on technology, there has been freedom for transport operators to take their own actions in terms of where and how to display the information in their buses, and for individual municipalities in terms of where and how to display the information at the bus stops. Hence, the aspect of 'voluntary actions' scores *high*.

External actor orientation - client/customers
In relation to the actor orientation of the coordination acting upon Sabimos, the 'external actor orientation' is visible in two aspects: the kind and degree to which the coordination sets requirements for actors working with clients and/or customers and the kind and degree to which it sets requirements for actors working in operations. The score for the former aspect (client/customer orientation) was *high*, given the constant alignment of technical details of the systems to emerging policy interests. Roughly speaking, one can say that the coordination between actors is the resultant of the interest differences between three types of actors who cooperate in this geoG2G.

As one of the project managers said in 2007 (excerpt 6.41):

' the project is a complex game – balancing different perspectives and interests '.
Interview excerpt 6.41. Quote from Sabimos project manager on managing Sabimos

The interests include the regional mobility of citizens, managed by the regional authority Regio Twente, the operational efficiency of the transport companies, and the effective management of the road network by the municipal road owners (the municipalities). The coordination is thus the results of activities related to a three overlapping perspectives.

The first and foremost concerned the public policy on mobility, in particular the mobility policy of the Region Twente for the period 2007-2011. This policy stated that the public transport system should provide a comprehensive alternative to (part of) the private car movements in the region of Twente. The components of this policy were the introduction of new faster bus routes, a better connection between train and bus services, and the introduction of high-quality public bus transport lines ('hoogwaardig openbaar vervoer'). The policy underlined that the quality of better public transport in Twente increases the value of the 'brand' Twente. A memo from the municipality Enschede in June

2007 [17] is exemplary for this focus on the 'brand' Twente (excerpt 6.42) :

Since 11 December 2005 the new public transport concession 'Twente" started. This public transport product received a quality boast by:

- *Higher frequencies*
- *More travellers information*
- *New bus fleet*
- *1 product brand (Twente)*
- *A tariff specific for Twente only.*

Both supply (frequencies) and reliability, and information provision lead to a uniform and easy tariff. The tariff for Twente is especially easier given the rounded tariff and accessibility in the buses. It is not cheaper than the regular tickets. Even so, there is an increase of bus use.

Document excerpt 6.42 A memo from the municipality Enschede in June 2007

The second perspective concerned the fleet management of the buses by the transport companies. The fleet management relies on the operational efficiency of buses, bus drivers, bus vehicles, routes, etc. The third perspective, combining both previous perspectives is the perspective of managing and allocating public funds, through the licensing of public transport licenses. The Region Twente provides licenses on the basis of performance. Checking the performance draws on continuously monitoring departure and arrival time of buses at bus stops, availability of buses for the number of passengers, frequency and type of delays of buses and complaints of passengers.

The technical result of combining the three perspectives was the Sabimos coordination through a technical integration model, which integrated various types of data collection and provision possibilities into one system. Figure 6.1 provides the Sabimos coordination schematically.

[17] http://cms3.enschede.nl/gemeente/politiekenbestuur/00003/00004/12755_notitie_evaluatie.doc (last access 15 November 2010)

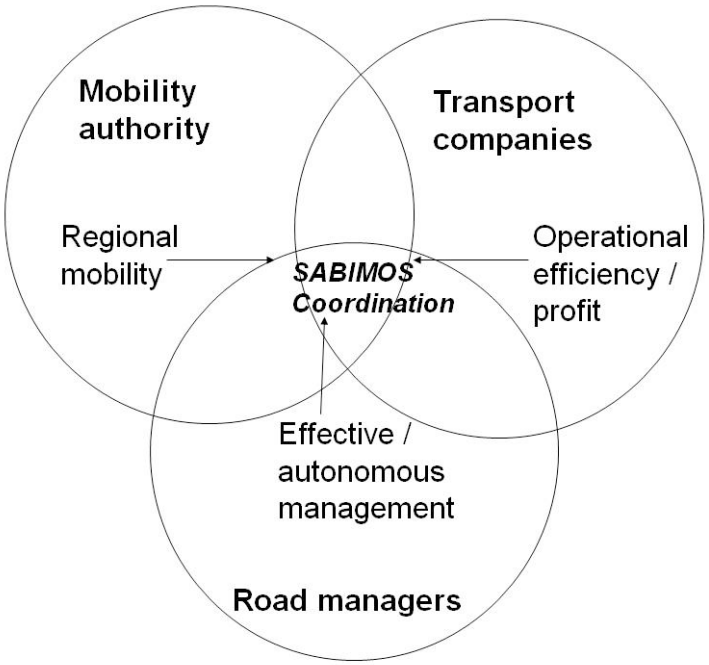


Figure 6.1: Sabimos Coordination as resultant of overlapping and diverging interests of actors in dynamic public transport information management

Given the emphasis in the coordination activities on incorporating the client/customer needs, the aspect of ‘ client/customer orientation can be considered as *high*.

Internal actor orientation - operations
Whereas the client/customer orientation of Sabimos coordination is considerable, the operations orientation, measured by the perceived degree to which geoICT coordination requirements interfere in operational processes, is *low*. For individual staff members working with the geoICT technology the Sabimos coordination strategy had primarily regulating implications for the alignment and operational staff members. At the strategic level of the partnership there was no discussion on any of the geoICT details, such as the choices of geo data collectors, or the required precision of data collections. The primary interests of the strategic managers were making this partnership a success in the broader sense. This would legitimize that investing in a technical system was worthwhile to the public. The alignment managements, and in particular the system developers, had to make sure that the system could satisfy all three types of perspectives and the interests related to these perspectives. The operational systems designers and bus board workers received detailed instructions by the system managers how to construct the software and the

machinery in the buses, the roads and the bus stops.

The coordination within Sabimos relied on short lines of communication. Keypoint is a relatively small private company in Enschede, whose staff members were directly acquainted with the staff members of the Region Twente office in Enschede, and with the transportation / mobility government officials of the respective municipalities within the Region Twente. The larger municipalities such as Enschede and Almelo within the Region Twente were most active in this partnership. In addition, only few bus companies in the region applied for the transport tendering process set out by the Region Twente. As a result, most of the communication needed for system development decisions could often be reduced to communication between a few people. The objective in this communication was always how to make the Sabimos system work as optimal as possible.

Summary of geoICT coordination aspects
Summarizing the above: the geoICT coordination was clearly a CAUSUS type of coordination policy, because most of the coordination activities drew directly on the specifications for 'product' or 'service' of local mobility. These specifications are very flexible and contextual. The aspects of 'standards' and the 'national focus' score relatively low. At the same time, the internal alignment was also high, indicating that the coordination activities did not reflect a pure CAUSUS strategy, but inclined towards an EVENTUS strategy. As the product focus (normal in EVENTUS strategies) was not on the information itself, but rather on the product of local mobility, the geoICT coordination is not effectively EVENTUS.

6.5.3 Empirical indicators for discretions

Five aspects reflect the variation in discretions: cognitive filter to the environment, personal access to resources, ability to envision courses of action, personal tasks simplification and adherence to client interest. The extent of these aspects are further elaborated hereunder.

Cognitive filter to the environment
The aspect of 'cognitive filter to the environment' reflect the degree to which individual staff members - at a certain level within the geoG2G - can formulate alternatives for the geoICT coordination requirements. For the Sabimos case the requirements only do became apparent in the course of the development process. As a result, the system developers had to operate with some precaution, because some the output that that the Sabimos system could provide would have immediate consequences for monitoring decisions of the Region Twente. If for example the information on delays of buses would be immediately transparent to all stakeholders, the Region Twente could be immediately obliged to execute

considerable sanctions to the bus companies. Very specifically, the transport requirements set by the Regio Twente were that 98% of all buses needed to be 'on time'. 'On time' implies that buses cannot arrive one minute too early, or 3 minutes too late. When the system became operational the data showed that only 65% of the buses were 'on time' given the 'on-time' specification. As a result, the system developers decided to make such output not immediately available. While the system requirements were set to enable these output possibilities, being confronted with actually reaching these requirements also revealed information which was previously unknown. This was partly the result of previously unknown data, but also partly the result of the calculations within the system (comparing the estimated time from the timetable to actual time of the bus at a particular location). As this result appeared far to accurate, and would have far too many implications, the accuracy of the system was only gradually increased. In this way, both the Regio Twente and the bus companies could gradually get used to a culture which relied on having such accurate data with the potential (bonus/malus) implications.

In other words, the system managers (alignment staff) reached to alignment discretions with regards to the system capabilities and output products. They did so because they were aware of the implications for the bus companies and other partners. Their discretionary decisions facilitated a smoother and more gradual adaptation of the partners to the system. The degree to which the aspect of cognitive filter to the environment is present in this case can thus be assessed as *high*.

Personal access to resources
The aspect of 'personal access to resources' is expressed in the degree to which individual staff – at a certain level- can start up activities to acquire additional resources to execute or bypass the geoICT coordination requirements. For Sabimos it is fair to state to the short-lived history of the project and the presence of a relatively small group of stakeholders did not need bypass the core coordination activities in any way. Moreover, it was clear that there was only one main source of resources to execute the project, so there was no evidence of alternative resources that individual staff members could tap into. Hence, the aspect of personal access to resources can be assessed as *low*.

Ability to envision courses of action
The degree which individual staff members - at any level within the geoG2G – show the ability to formulate alternative solutions for given problems reflects another aspect of discretions. This ability to envision alternative courses of action was *high* in the Sabimos case in particular for alignment staff members. This has various reasons. Although there were several policies in place within the Region Twente on the choice and usage of certain geoICT technology and geo-information products, during the Sabimos system design the system

developers opted to develop their own geoICT, rather than to rely on geoICT used in the Twente Region municipalities. Two types of geoICT policies were in place in Regio Twente. On the one hand, some of the municipalities in particular Enschede) had adopted an open source policy. This implied that users of municipal data would have access to the source codes of the municipal system. This option was however not used by the system developers. Furthermore, while the BAG legislation also required the municipalities to use authentic geographic data when providing public information, here also the system developers (hence alignment staff members) opted to generate road data layers based on the data used by GPS navigation companies, rather than those based by the local governments. In other words, they preferred to use the data and associated technology used and distributed by the commercial vendors over the data models and associated technology required by regulation.

The system manager's decision to postpone the full operationability of the system because of interoperability problems is evidence of the presence of alignment influence in the development stage of the Sabimos system. For strategic staff members, i.e. those who would decide on the cooperation between the partners, there was no reason to doubt the partnership. Hence, they did not actively seek alternative solutions. For operational staff - mostly those who had to make the GPS system operable in the buses - it was a matter of implementing the interoperability changes.

Degree of personal task simplification
In contrast to the differentiation in origin of discretions (expressed through aspects of cognitive filter to the environment, personal access to resources and ability to envision courses of action), the purpose of discretions can be expressed through the aspect of 'personal task simplification' and 'adherence to client interests'. For the Sabimos case it can be stated that the system developers decided that the Sabimos system would not rely on the authentic topographic or parcel-based geoICT data sets maintained by municipalities (required by the BAG coordination, for example), but on locally developed and maintained line-based road datasets. The datasets are different in content and in structure than the authentic BAG data, but could theoretically be connected through the geo-referencing system. The Sabimos system does not include this potential (coordinates-based) interoperability, so it operates on its own. This decision in the design and execution process came from the Sabimos alignment staff. Their influence aimed at simplifying certain operational tasks. In other words, they deferred from a national BAG strategy and a local municipal open source strategy for the sake of simplifying the task of geo-database management. Hence, the score for the discretion aspect of personal task simplification is *high*. Relying on either authentic municipal datasets, or open sourced municipal datasets would have been complex, and introduced unreliability. Moreover, it would be more difficult to monitor that the data quality would be consistent.

Degree of client interest
There is no specific evidence of where the system design, or the information distribution design have been altered to suit specific client (= passengers and transportation companies) interests. So the degree to which client interests played a role in alternative courses of action (read: alternative to the coordination requirements) is *low*.

6.5.4 Empirical results on changes in stability elements

The four stability elements of geoG2Gs are power, economic rules, conformity and collectivity. Each of these elements can remain stable or can change. Eight aspects reflect the variation in stability elements and the changes in stability: long-term mutual expectations, control over resources, transaction cost limitations, transaction cost expansion, dominance of network agency over personal interests, dominance of alternative networks, collective sanctions and incentives and credibility. The following sections provide further evidence of the variation in stability elements.

Power stability – long-term mutual expectations and staff allocations
The aspect of long-term mutual expectations reflects the degree of stability in power relations. In the examined publications and interviews there was no evidence of extensive and long-lasting disputes on resource allocations. The distribution of responsibilities and associated resource decisions had been obvious from the start. The Region Twente decides on licenses and funds for mobility projects, although this follows after the approval of the respective individual municipalities within Region Twente. The relations of region Twente with both the consultancy company Keypont and the bus companies which receive the transportation licenses has been rather stable over the entire period 2007-2010. Similar as in the other cases, 'trust' was also an issue among Sabimos partners. However, most of the 'trust' which interviewees referred to did not relate to the trust in mutual partners, but to the trust that beneficiaries should have when relying on how well the partnership operates and how well they generate their products (excerpt 6.43).

So that is the intelligence in the system. But it is only directing the public transport vehicles. However, that information is not relevant for the people in the vehicles. They receive any vehicle, and have to trust the computer that their travel calculations are the smartest. That is a different kind of intelligence..

Interview excerpt 6.43 Quote from Keypoint staff member on trust of transport info clients in the Sabimos system - 2007

In other words, the degree of mutual expectations and staff allocations was consistently stable for the entire period of investigation. The aspect of long term mutual expectations scores *high*.

Power change – control over resources
A change of power stability is visible with the aspect of 'control over resources'. Changes in the aspect 'control over resources', measured by the degree to which staff members rely on alternative mechanisms to manage their finances, information and staff, reflect changes in power stability. In all of the interviews the Sabimos staff members indicated that there had been no serious dispute over resources or resource allocations. This would imply that the staff members do not seek any alternative resource allocation. Hence, the power relation is stable, and the score on control over resources is *low*.

Economic rules stability – transaction cost limitations
The kind and extent of transaction costs is an indicator for economic rules stability. Economic rules are stable if transaction costs are low, or if the transaction costs are kept low through several instruments or rules. In the case of Sabimos, the main regulation on internal geoG2G transactions was that the management information would be shared among partners. The sharing of the Sabimos was however initially complex, as the format in which the system delivered the data was sometimes deemed too complex and too ambiguous in the eyes of the Region Twente managers. This complicated the feedback of Region Twente to transport companies. In order to improve and extend to ability to monitor and manage transport mobility, the Region Twente requested an upgrade of the system in 2010. A reduction of the complexity of the system (by removing the redundancies in the data layers) resulted in a reduction of inefficiencies (excerpt 6.44).

Because the system is still redundant in a number of activities, and we do not have to do this. So we will change the system in such a way that it becomes 'lighter'. As a result, we expect a considerable cost reduction. With this we can better align with the national average.

Interview excerpt. 6.44 Quote from Strategic staff Sabimos on efficiency increase in Sabimos system -2007

In 2010 there was an upgrade of the system, needed to provide more multi-modal travel information (6.45) :

Sabimos, the first operating regional dynamic routing information system (DRIS) has operated in a stable way for 6 years, but needs revision. Regio Twente requested Keypoint consultancy to manage the software and hardware revision. After the revision Sabimos will be compatible with BISON standards, and will be compatible with numerous multi-modal travel information systems. In addition, the new project will improve the technical management and enable improved information management reports. The improvements are based on gradual insights of Keypoint in how to manage and generate such information.

Document excerpt 6.45 Quote from the Sabimos / Keypoint Newsletter November 2010

The ease with which the request for the upgrade was accepted implies that Sabimos partners easily complied to changes from the Sabimos coordinators. Hence, the degree to which Sabimos adhere to the rules keeping the transaction costs limited is *high*.

Economic rules change – transaction cost expansion
If transaction costs increase and the kinds of transaction costs expand, there is instability in economic rules. There was no evidence found of any drastic increase in transaction cost in the interaction between partners. Hence, the degree of transaction cost expansion was extremely *low*.

Conformity stability – dominance of network agency over personal interests
The aspect of 'dominance of network agency over personal interests' reflects the degree to which geoG2G staff members refer to an ideal situation for all staff members which is more valuable than individual interests. For Sabimos the consistency in which staff members refer to a common ideal is remarkable. It is visible in the way the interviewees referred frequently to 'pluriform ICT facilities' as a means to integrate data and to provide information through multiple channels. The technical standards underlying such pluriform ICT facilities were derived by Keypoint. The aim for different kinds of displays derived from the goal of the Region Twente to harmonize the displays with current technological tools of citizens (combining mobile and computer technology with the information provided through visual displays at bus / train stops). Given the consistency, the aspect of 'dominance of network agency over personal interests' scores *high*.

Conformity change – dominance of alternative networks
The degree to which ideas from alternative networks outside the geoG2G starts to play a role inside the geoG2G is an indication of conformity change. The degree to which ideas external to the Sabimos geoG2G started to guide the internal decisions within Sabimos was limited. Respondents of both the Region Twente and the Keypoint managers indicated that the regional mobility discussions were indeed political at times, but this did not affect the internal relationship of the Sabimos partners. Throughout the whole period of this investigation the purpose of the Sabimos system, i.e. to support the monitoring and management of regional transport performance and transport licenses, remained the referecne framework for any internal discussion. Hence, the score for dominance of alternative networks is *low*.

Collectivity stability – combination of collective interest with collective sanctions and incentives
The degree to which partners maintained common interests through incentives and sanctions, a measure for the collectivity stability, was *high* for the investigated period. Although the data collection showed considerable

consensus among partners on the role and need of Sabimos, it was clear for the staff members throughout the period 2007-2010 that the collective interest and public image of Sabimos was not properly communicated to the external world. As a result members of the consortium and beneficiaries - were free riding on the technical success of Sabimos. Perhaps it is also because many of the 'raw' data are not publicly accessible. Yet, there was no harmonisation necessary of the public image, and as a result the collectivity was stable (excerpt 6.46).

These are of course confidential data..because it includes failures in arrival/departure times..and we discuss this with Connexxion…on the traspont licensing contract between Connexxion and Regio Twente..the performance measures are still fine-tuned. Of course this information..the performance data the system generates.. is not publicized… But the fact that the Regio Twente is obviously managing the license well..and that is the role of the government..when speaking of legitimacy and efficiency.. even that..we do not communicate. So..it is partly the information ..this is confidential. And you have to commend or sanction Connexxion. But the fact that they actively monitor..even that is not publicized.

Interview excerpt 6.46 Quote from Alignment staff Sabimos - 2008

Despite the lack of communication, there has not been any conflict on how to portray the collective image to the external partners. Internally, the collective image has been agreed by all staff members. Hence, the degree of common interests, thus the aspect of collective interests, remained *high*.

Collectivity change - loss of credibility

A change of collectivity stability is visible through the aspect of 'loss of credibility', the degree to which geoG2G staff loses faith in the necessity of the current common product and jointly agreed ways of production means of the geoG2G. In relation to this aspect both the interviews and the documents do not show any loss of faith in the Sabimos objectives and the Sabimos partnership. Hence, the aspect of 'loss of credibility' can be assessed as *low*. There was no evidence found of alternative interests which would affect the collective image of Sabimos.

6.5.5 Conclusion in CAUSUS case Sabimos

The above findings contribute to answering the main research question ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in the Sabimos case?*** This question has three components:

1) The influence of variations in geoICT coordination on variations in discretions;

2) The influence of variations in geoICT coordination on changes in stability elements; and,
3) The influence of variations of in discretions on changes in stability element.

Each of these three are described hereunder for the Sabimos case.

1. The influence of variations in geoICT coordination on variations in discretions

The variation that occurred in the geoICT coordination and discretions of staff members of the Sabimos partners in the period 2007-2010 is limited. Table 6.4.1 gives a grouped summary of the high and low scores in the geoICT coordination and discretion aspects for the Sabimos case. Throughout the period 2007-2010 the aspects of 'standards' and 'national focus' score consistently low and the aspects of 'openness' and 'voluntary actions' consistently high. Very few changes occurred during the data collection period. Overall, the geoICT coordination objectives remained consistently flexible and the coordination activities consistently targeted the geoG2G actors who were operating closely with actors outside the geoG2G. At the same time the discretion aspects which scored high were the 'cognitive filter to the environment', 'ability to envision courses of action', and the 'degree of personal task simplification'. Apparently a certain degree of flexibility also leads to a degree of discretionary decisions.

Given the freedom due to flexibility given by the coordinators the system managers (alignment staff) reached to alignment discretions with regards to the system capabilities and output products. It is perhaps however questionable whether this is a clear result of the coordination activities per se, as it is not so much a discretions in the form of personal and alternative actions of individual staff members, based on alternative coordination objectives. In other words, the discretions do not contradict the geoICT coordination objectives, because despite the intervening actions in daily operations the partners are adhering to the new objectives of their work without much resistance or generation of alternative solutions. Given the freedom, they adhere to the coordination rules.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Flexibility	Openness	High
		Voluntary actions	High
	Actor orientation – external	Client/customer orientation	High
	Uniformity	Standards	Low
		National focus	Low
	Actor orientation – internal	Operations orientation	Low
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	High
		Ability to envision courses of action	High (for alignment staff)
	Autonomous / joint discretions	Degree of personal task simplification	High
	Strategic / alignment / operational discretions	Personal access to alternative resources	

Table 6.4.1: Scores in geoICT coordination and discretion aspects in Sabimos case

The choice for flexibility in geoICT coordination can be partially linked to the background of the Sabimos managers. These were not specifically geoICT experts, but staff members who had more professional experience in transportation engineering and ICT projects. Although partially concerned about geoICT (in particular GPS coordinates data) standards, their primary interest concerned road and transportation ICT. The only standards of interest were standards related to road and traffic management.

One explanation for the emergence of discretions is that these occur as a way to bridge the gap between two separate domains which each have their own jargon and own definitions– road/traffic management and geoICT management. This would explain the high score in personal task simplification rationale.

In sum:
- Flexibility in geoICT coordination does not exclude the emergence of discretions. It promotes an active role of each partner in the decisions, which may also be used to opt for individual discretions if considered appropriate.
- The influence of the sectors interests is large in the Sabimos case. This overrides the interest in 'pure' geoICT-based solutions.

2. *The influence of variations in geoICT coordination on variations in stability*

Table 6.4.2 gives a grouped summary of the high and low scores in the geoICT coordination and stability aspects for the Sabimos case.

The grouped high scores seem to imply a relation between the flexibility aspects openness, voluntary actions and all forms of stability. Reversely, the grouped low scores seem to imply a relation between low scores on uniformity aspects standards and national focus and the absence of change in stability.

The limited degree of changes in any of the stability elements can however not immediately draw the conclusion that flexibility results in stability. Either the stability occurs as a result of the CAUSUS type of geoICT coordination, or regardless of the coordination. However, when comparing the results of the Sabimos related GeoG2G to the previous cases, the objectives are apparently so flexible that it doesn't cause any disruption in any of the stability elements.

Another possible reason is that the geoICT is not so much on the forefront of the coordination activities. By emphasizing mobility and using sanctioning instruments directly related to the mobility (and not to the geoICT) there is room for professionals to make their choices on the geoICT. There is no national geoICT standard that any of them need to adhere to, nor is there any key register that they need to extract data from. GeoICT choices can thus become idiosyncratic.

Concepts	Characteristics	Aspects	Indicator
geoICT coordination	Flexibility	Openness	High
		Voluntary actions	High
	Actor orientation – external	Client/customer orientation	High
	Uniformity	Standards	Low
		National focus	Low
	Actor orientation – internal	Operations orientation	Low
Stability elements	Power stability	Long term mutual expectations and staff allocations	High
	Economic rules stability	Transaction cost limitations	High
	Conformity stability	Dominance of network over personal interests	High. Central narrative is transport info.
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	High.
	Power change	Control of resources	Low
	Economic rules change	Transaction cost expansion	None
	Conformity change	Dominance of alternative networks	Absent
	Collectivity change	Loss of credibility	Low

Table 6.4.2: Scores in geoICT coordination and stability aspects in Sabimos case

Theoretically, the stable relations in power can be explained by the fact that the geoICT coordination does not fundamentally alter the dependency and exchange relations between the Sabimos partners. Both the human resources and the financial resources remain within the municipalities, only the bus companies are contracted to operate the public transport. The information displays change the image of the municipalities and of the region , but do not require a change in their internal resource allocations.

Similarly, through the information supplied by the Sabimos the transaction cost of travellers who have to find information about bus departure and arrival times have decreased, but this does not alter the transaction cost to exchange information within the partnership. Only the basis to take any decisions about the overall performance is improved. This has increased the symmetry of access to information, and therefore provided stability in economic rules.
The high degree of conformity can be explained by isomorphism theory. As the

geoICT coordination fosters flexibility, the conformity cannot be a direct result coercing institutional rules, but is more likely to be the resultant of frequent professional interaction. The central narrative of the transportation sector is that only correct, multinodal and timely transport information is helping travellers. The operational processes in transport management should deliver such information regardless of how this is achieved technically. Through mimicking this central idea, the Sabimos staff members and their organisations adapt this also for the geoICT management.

3. The influence of variations of in discretions on changes in stability element
Table 6.4.3 gives a grouped summary of the high and low scores in the discretion and stability aspects for the Sabimos case. The grouped high scores seem to indicate a sequential, and possibly a causal relation between the rationale for personal task simplification underlying emerging discretions of the alignment staff in the Sabimos case and the stability in all stability elements. Reversely, the grouped low scores seem to imply a relation between limited personal access to alternative resources and the absence of changes in stability elements.

A possible reason for this specific relation of discretion and stability element aspects is the fact that the interests of the geoG2G partners were clearly separated, while the distance between the coordinators (mainly Regio Twente) and coordinated (the executors of the Sabimos system and the bus companies contributing to the Sabimos data) remained relatively small. The operations for Sabimos focused on a mobility problem in a very local situation whereby the mobility interests of each partners were clearly demarcated. As a result, the partners could easily find each other and discuss any progress. The subcontracted commercial partner (Keypoint) did not have a specific commercial interest in any specific geoICT solution or geoICT standard. This allowed the choice for any solution, and this prevented discretions of individual staff members deferring from the chosen solutions.

Concepts	Characteristics	Aspects	Indicator
Discretions	Strategic / alignment / operational discretions	Cognitive filter to environment	High
		Ability to envision courses of action	High (for alignment staff)
	Autonomous / joint discretions	Degree of personal task simplification	High
	Strategic / alignment / operational discretions	Personal access to alternative resources	Low
Stability elements	Power stability	Long term mutual expectations and staff allocations	High
	Economic rules stability	Transaction cost limitations	High
	Conformity stability	Dominance of network over personal interests	High. Central narrative is transport info.
	Collectivity stability	Combination of collective interest with collective sanctions and incentives	High.
	Power change	Control of resources	Low
	Economic rules change	Transaction cost expansion	None
	Conformity change	Dominance of alternative networks	Absent
	Collectivity change	Loss of credibility	Low

Table 6.4.3: Scores in discretion and stability aspects in Sabimos case

A theoretical explanation for the relation between the alignment discretions, rooted in task simplification by avoiding data integration, and the stability in all elements can be given by resource dependency theory. The discretions are not fundamentally altering an resource dependencies. None of the partners are affected by a different choice in technical systems or a particular format in geoICT generated data. As a result, there is little change in the dependency relation and no change in power stability occurs. Furthermore, the discretions favor solutions in support of the transport and mobility requirements and not necessarily the geoICT based solutions (they do not make use of the authentic geo datasets for example). One could see this as a behavior whereby the values of the professional values of the transportation domain are more dominant than the values and solutions of the geoICT professional domain. The discretions are thus not rooted in the interests of clients with a geoICT background or geoICT need, but in the interests of the transportation sector. These interests form the social network ties upon which this geoG2G is based. These stronger network ties explain the high conformity and collectivity.

Overall in Sabimos, the flexibility in geoICT coordination, typical for CAUSUS geoICT coordination, does not exclude the emergence of discretions. It promotes an active role of each partner in the decisions, which may also be used to opt for individual discretions if considered appropriate. The alignment discretions, rooted in task simplification by avoiding data integration, coincide with stability in all elements. The discretions favor any solutions in support of the transport and mobility requirements and not necessarily geoICT based solutions. The discretions are not rooted in client interests, but in sector interests. This explains the high conformity and collectivity.

6.6 Conclusions

This chapter provided the results of the empirical data collection in 4 cases separately, aiming to address the research question ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?*** in each separate case.

The results of the empirical data collection show that in each case there is one dominant geoICT coordination type, but that in some cases various coordination strategies are present. As a result the geoG2G stakeholders can be targeted by a variety of coordination activities simultaneously. In this research the assumption has been that the dominant coordination type has effects on both discretions and stability changes. Both the geoICT coordination and the effects in discretions and stability changes have been classified by scores in aspects. These scores are either 'high' or 'low', depicting a qualitative value of the intensity of each aspect, or the perceived presence of this aspect. The correspondence of high and/or low scores in different aspects provides an insight in the relation between certain aspects. This chapter has evaluated that per case of geoICT coordination type.

The high scores in standards and national focus aspects of the BAG coordination of the Cadastral case, LOCUS type of geoICT coordination, coincide with high scores for the discretion aspect when it concerns strategic staff and low scores when it concerns alignment and operational staff. In other words, the LOCUS coordination seems to have a dual effect on discretions in the cadastral case: it increases the strategic and decreases the alignment and operational discretions. The discretions arise because of uncertainty and consist of seeking alliances to spread the risk of possible negative outcomes. The risk mitigation is in spreads the risk with a broader network, and thereby increases the stability in conformity and collectivity. At the same time these activities imply that the partners have to change the way in which they share power, which reduces the power stability. The change in power sharing also causes a change in maintaining network relations, which increases the transaction cost to maintain the relations.

In the AHN case the EVENTUS type of geoICT coordination emphasized a national focus, and gradually adapted the emphasis of standards. This coincided with the presence of both strategic and alignment discretions. The strategic discretions are rooted in their cognitive filter to the environment, and the alignment discretions in their ability to envision alternative courses of action. The latter is strongly rooted in their daily interactions with private companies collecting data in alternative ways. The discretions in the AHN case are a way to re-enforce certain historically accepted work practices. This leads to a re-conformation of the conformity and collectivity stability. The explanation for this is the fact that most of the AHN strategic and alignment staff have a similar professional background. In general it seems that the emphasis of an EVENTUS type of geoICT coordination, which emphasizes alignment of output requirements, is likely to trigger technical output choices dominated by a certain professional group. Those who manage the output are strongly connected to this specific professional group, and their cognitive filter is geared towards the values within this group. This would explain the conformity and collectivity stability

In the Dataland case, the example of the MODUS type of geoICT coordination, the geoICT aspects of 'standards' and 'national focus' cause high scores in most of the stability aspects. This can be explained by mimicking behavior and resulting isomorphism. Only a limited number of municipalities are unable to cope with the isomorphic requirements because of undercapacity. In these cases discretions emerge which increase the loss of credibility of the entire partnership. Furthermore, the Dataland case exhibits behavior whereby discretions re-enforce stability in conformity and collectivity. The MODUS geoICT coordination values, which makes alignment of tools and instruments (in this case of Egov) a significant requirement, have thus relatively limited impact if they do not match the values of the practitioners who work in the geoG2G.

In Sabimos, the case whereby there is a CAUSUS type of geoICT coordination, emphasizing flexibility in geoICT requirements and alignment of geoICT requirements to the local needs in transport, there are only some type of discretions. The fairly open requirements enable an active role of each partner in the decisions on geoICT choices, which the practitioners may also use to opt for individual discretions (bypassing geoICT requirements of their own organisation, in this case municipality) if considered appropriate. The alignment discretions, rooted in task simplification by avoiding data integration, coincide with stability in all elements. The discretions favor any solutions in support of the transport and mobility requirements and not necessarily geoICT based solutions. The discretions are not rooted in client interests, but in sector interests. In general, this findings suggests that CAUSUS geoICT coordination provides room for individual decisions, and that practitioners then tend to favor

the type of technical decisions which are common in their own professional field. This behavior explains the persistence of high conformity and collectivity stability.

Chapter 7 provides a further cross-comparison of the aspects in all the cases and the explanation for the presence or absence of relations between the coordination types, discretions and stability changes.

Chapter 7

Comparative analysis of cases

7.1 Introduction

This chapter addresses the interpretative part of the research question 5 ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?*** Addressing this question follows from comparing the aspects in each case presented in the chapter 6 and interpreting the crosscomparison. The aim is to find patterns and explain these patterns on the basis of additional information acquired in each case.

Section 7.2 compares the aspects of geoICT coordination in each case, 7.3 the aspects of discretions in each case and 7.4 the aspects of changes in stability elements in each case. Section 7.5 compares the high and low scores of aspects to specifically address the influence of geoICT coordination aspects on discretion and on stability element aspects, and to address the influence of discretion aspects on stability element aspects. Section 7.6 summarises and concludes.

7.2 Comparison of indicators of geoICT coordination types

Chapter 2 explains that there are different ways in which actors can organize and execute geoICT coordination. The cases are different in cooperative arrangements and policy contexts. The policy context of the cases are the BAG for the Cadastral case, the water management for the AHN case, the 'Other government ' for the Dataland case and the Regional mobility for the Sabimos case. The differences between geoICT coordination types are visible in the variety in which the respective coordination objectives and activities intervene in existing cooperative arrangements. The empirical investigation of chapter 6 looks into this variety through the aspects of standards, national focus, openness, voluntary actions, client/customer orientation and operational orientation. Each of these are compared hereafter.

Uniformity – standards
In all cases the coordination actions had a tendency to emphasize the need for standards. Even within the Sabimos case, where most coordination efforts aimed at aligning the information architecture within a very local context of municipal and regional requirements, the issue of exporting the architecture as a solution to other regions (regardless of considering the specific other local context) emerged as a possible, if not desireable, option. Hence, an empirical pattern is that geoICT coordination actors quickly tend to emphasize the need for standards as a solution, or even a condition, to expand beyond a single

project or beyond a single organisation. Hence, geoICT coordinators tend to frame the geoICT problem as a standard problem for which there is a standard solution. Table 7.1 summarizes these findings in standards in all cases.

	Context of geoICT coordination	BAG	AHN specifications	'Other government ' objectives	Regional mobility
GeoICT coordination characteristics	**Aspect**	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
Uniformity	Standards	High	High, but decreasing	High	Low, but increasing

Table 7.1: Comparison of Uniformity aspect 'Standards'

From a theoretical point of view opting for standards is contrary to the expectations for EVENTUS and CAUSUS cases. The alignment to either results (EVENTUS) or context (CAUSUS) would assume a more flexible approach towards a specific solution and not a standard solution. Why would these cases then also exhibit a tendency towards standards?

Empirically, two main reasons may explain the overall tendency to rely on standards as solutions to geoICT problems. The first driver relates to what connects the coordinating actors in the cases, and the second one relates to what connects the coordination activities.

With regards to the former, the coordinating actors in all cases are similar in two aspects. In the Cadastral case, Dataland and Sabimos the common denominator concerns an input from municipal staff in a relatively small field of expertise. The municipalities are organised through VNG, which also has a long-tem relationship with the Kadaster and which is a main stakeholder in the Dataland case. Conformity to VNG solutions may thus influence the choice to opt for standard solutions. Furthermore, in the Cadastral case, Dataland and AHN the common denominator concerns the professional and/or educational background of the coordinating staff members. In all these cases there is a relatively strong presence of project managers with a geodetic engineering background. This may strongly guide the choice for standard geodetic engineering solutions (such as emphasizing positional accuracy standards).

The second connection between the cases is that geoICT standards support additional objectives. The geoICT standards do not only provide the coordinators an instrument to align geoICT related activities across administrative levels, align geoICT end products or align geoICT production processes, but it also acts as a tool for monitoring, benchmarking and sanctioning certain stakeholders for other purposes. In the cadastral case the

BAG standards give the VROM ministry an instrument to change financial resource allocations to the Kadaster and the municipalities; in AHN the standards act support the choice between external contractors; in Dataland the standards support the chapeau price and implicitly act as a blame and shame strategy; in Sabimos the standards are a mechanism to monitor and possibly sanction bus companies. Using standards are, in other words, a tool to create power asymmetries and resource dependencies. This is consistent with the resource dependency theory as explained in chapter 4. By opting to use standards, the coordinators are increasing the dependencies of stakeholders, and thus create an increased power base for other decisions.

Uniformity – national focus
The aspect of 'national focus', measured by the perceived degree to which the geoICT coordination actions impose implementation in all national layers of administration, provides an additional indication for how uniform the geoICT coordination is. The findings on the aspects of 'national focus' show that most geoICT coordination strategies have a tendency to scale up their aims (geographically and organisationally) – see Table 7.2. In all cases there are gradually actions towards having the geoICT requirements operationalised at all possible administrative, institutional or organisational levels. The Kadaster is actively pursuing national cooperation through Geonovum and PDOK, Dataland is actively engaging with national partners including the Kadaster, and is increasing the type and volume of data they can manage. AHN.2 actors refer to key registrations and national interests. The Sabimos managers want to scale up to national levels – given the discussions at national level, and given the design of a Sabimos.3 project phase to match national standards. The scaling up activities even happen when scaling up is not directly requested by the external environment, or when the project cooperation may actually be successful and relatively easy to manage because it is small and close to the direct knowledge and experience of the participating actors.

Why this tendency in all cases? One explanation could be that all cases there is a strong interest of a national Ministry (either in relation to environment and housing or in relation to infrastructure) which extends beyond a single sector and beyond single administrative boundaries. In the Cadastral case, the interest is maintaining an equal treatment for all property owners and all information stakeholders, regardless of where they live. In the ANH case, the Waterschapshuis exemplifies a national interest in integrated water management, regardles sof where the water needs to be managed. In the Dataland case, there is a strong emphasis on the interests of housing and real estate brokers, regardless of where they operate. In Sabimos there is a strong emphasis on connectivity in mobility, regardless of where this takes place. Extending beyond local boundaries is then only logical.
A second explanation is that the geoICT sector has historically not been in

competition with any other sector. Extending objectives which are agreed by a relatively small group of professionals within that sector is then not entering any other fields of expertise. The Cadastral case, AHN and Dataland case shows that the main staff members all have a similar educational background.

	Context of geoICT coordination	**BAG**	**AHN specifications**	**'Other government ' objectives**	**Regional mobility**
GeoICT coordination characteristics	**Aspects**	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
Uniformity	National focus	High	High	High	Low

Table 7.2: Comparison of Uniformity aspect 'National focus'

Flexibility – openness

With the exception of the Sabimos case, the aspect of 'openness' (the perceived degree to which actors could specify their own data and process requirements in an open debate) is relatively low (Table 7.3). However, in all cases the actors perceive 'openness' as a fluctuating aspect. At some moments they perceive to have influence on data and process requirement whereas at other moments they perceive to have little influence on specifying these requirements. The direct confrontation with law and regulation enforcement plays a significant role in the variation in perceived openness. When municipal staff are personally confronted with BAG implementers (in the Cadastral case), E-GEM units (Dataland case) , and members of the Waterschapshuis (AHN) in their offices they perceived a strong external influence and a diminishing role for themselves. This is much less present in the Sabimos case, as the managers of the Sabimos are private consultants, and not part of any hierarchical relation. When staff members from central offices were not present in their offices the perceived influence on operational processes increased. Direct and personal operational contact and communication thus influences the degree of perceived openness.

	Context of geoICT coordination	**BAG**	**AHN specifications**	**'Other government ' objectives**	**Regional mobility**
GeoICT coordination characteristics	**Aspects**	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
Flexibility	Openness	Low	Low, but increasing	Low, but increasing	High

Table 7.3: Comparison of Flexibility aspect 'Openness'

Flexibility – voluntary actions
An additional aspect of flexibility concerns 'voluntary actions', measured by the perceived degree to which actors can contribute to the coordination with their own actions. Overall, as shown in Table 7.4, this aspect scores low, even though it is relatively high in Sabimos. None of the cases exhibited however coordination strategies where geoG2G actors were given an explicit choice to pursue alternative coordination activities simultaneously. The perception among most staff members is that the given LOCUS, EVENTUS and MODUS geoICT coordination objectives are formulated so in a relative narrow domain that there is very little room to add any additional action or objective. The Cadastral case has the BAG regulations, the AHN the process requirements, and the Dataland the implementation rules of the chapeau price, which all directly relate to the geoICT data collection, geoICT process or geoICT outcome. What makes the CAUSUS of Sabimos more exceptional is that the objectives for geoICT are constructed and maintained as a result of the transportation and mobility system requirements rather than as a primary geoICT requirement on its own . In this case the choice for any specific geoICT solution is then valued less important then the choices in defining and processing the mobility parameters (travel time, stop time, waiting time, etc.).

	Context of geoICT coordination	**BAG**	**AHN specifications**	**'Other government' objectives**	**Regional mobility**
GeoICT coordination characteristics	**Aspects**	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
Flexibility	Voluntary actions	Low	Low	Low	High

Table 7.4: Comparison of Flexibility aspect 'Voluntary actions'

External actor orientation - client/customers
In relation to the actor orientation of the coordination, the 'external actor orientation' is visible in two aspects: the kind and degree to which the coordination sets requirements for actors working with clients and/or customers (external orientation) and the kind and degree to which it sets requirements for actors working in operations (internal orientation) . Comparing the external orientation, as shown in Table 7.5, shows that only in the AHN case this orientation is low. While the specific requirements of AHN data are said to have been designed in accordance with 'end user requirements' the 'end user' is often also an internal user, namely the water boards themselves. External users, i.e. users outside the water management domain, were rarely involved in the period 2007-2010. This is different than all other three cases. The relative low degree of involving extenal users can be explained by the interal struggle to find a right kind of management within the AHN partnership, something which is less

visible in all other three cases. This internal struggle prevented the AHN coordinators to extend their geoG2G partnership by involving other partners. Similarly, potential additional partners are also be hesitant to join if the coordination would not actively involve additional partners.

	Context of geoICT coordination	BAG	AHN specifications	'Other government' objectives	Regional mobility
GeoICT coordination characteristics	**Aspects**	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
Actor orientation– external	Client/customer orientation	High	Low	High	High

Table 7.5: Comparison of Actor orientation aspect 'external orientation'

Internal actor orientation - operations
Whereas the client/customer orientation of Sabimos coordination is considerable, the operations orientation, measured by the perceived degree to which geoICT coordination requirements interfere in operational processes, is only high for the AHN case. Again the explanation is similar as above for the external orientation. The internal actor orientation is a way to align the partners, rather than to ensure the use of the geoICT product.

	Context of geoICT coordination	BAG	AHN specifications	'Other government ' objectives	Regional mobility
GeoICT coordination characteristics	**Aspects**	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
Actor orientation– internal	Operations orientation	Low	High	Low	Low

Table 7.6: Comparison of Actor orientation aspect 'Internal orientation'

Summary of geoICT coordination aspects
The collective of results in geoICT coordination aspects show a significant differences across the cases. The aspect of 'standards' is high or increasing in all cases. 'National focus' is high in three cases, but low in the Sabimos case. 'Openness is low in the Cadastral case, but increasing or high in the other cases. 'Voluntary actions' is low in three cases, but high in Sabimos. 'External actor orientation is high in three cases, but low in AHN. Internal actor orientation is low in three cases, but high in AHN. This variety in geoICT coordination aspects is grounded in the following reasons:

- In all cases there is a tendency to scale up, resulting in high scores for the 'national focus' aspect. The explanation is that in all cases there is a strong additional national interest promoted by a national Ministry and a relatively small sector which has always had little competition from any other sector. Both the national interests and the single sector operate beyond single administrative boundaries.
- The degree of voluntary actions is low if the geoICT requirements are set in stone by a set of regulations, process requirements, or outcome requirements. As soon as geoICT requirements are secondary to other requirements (as in the Sabimos case), then there is more room for voluntary actions.
- As soon as staff members have direct contact with the geoICT coordinators through some hierarchical relation, the perceived openness (perceived degree to which actors could specify their own data and process requirements in an open debate) is relatively low. If this hierarchical relation does to exist, this perceived influence is much less.
- As long as internal partners are defining their responsibilities within a partnership, the coordination is likely to prevents users of geoICT products and services to become involved in the decisions of the geoICT coordination. Hence, in such cases the orientation of the coordination becomes primarily targeting actors to alignment internally. The exclusion of users has the effect that the partnerships remain unaffected by external influences.

Comparing the overall geoICT coordination types in the given cases, it is true that the LOCUS type and and CAUSUS type are opposites. The example of the LOCUS type in the cadastral case clearly emphasizes the introduction and enforcement of standards at all public administrative scales, whereas the example of the CAUSUS Type in the Sabimos on openness and voluntary actions within a given context of a local policy. The origin of this difference lies in presence or absence of an hierarchical relation between geoICT coordinators and context policy makers. This difference also highlights a potential risk of opting for either coordination strategy. The choice of opting for a LOCUS type in the cadastral cases has shown opposition in the some of the larger municipalities, showing that the hierarchical relations (whereby actros at lower administrative scales simply follow instrucitons from actors at higher administrative scales) cannot be taken for granted. Similarly, the degree of flexibility allowed by the Sabimos coordination also generated a high degree of influence of local

The specificity of the EVENTUS type as compared to the other types in the given cases is found in the aspect of actor orientation. In contrast to other geoICT coordination types emphasizing 'end results' highly corresponds on a consistent, and unchanging view on geoICT information users. The context of

production and use are disconnected in the EVENTUS case, whereas in all other types there is a much closer connection. The potential risk is therefore also inherent. The change from end result to end internal user result disconnects the geoICT information production from a clear policy context.

The case of the MODUS type is perhaps the least distinguishing in the aspects results as compared to all other geoICT coordination types. The results in aspects highly resemble the results of the LOCUS type.There is also a strong emphasis on standards, national focus, limitation of voluntary actions and an external actor orientation. However, the only aspect in which the MODUS cases is different is in the aspect of 'openness', the degree to which actors can specify requirements in an open debate. The LOCUS type clearly disallows any form of openness, yet the MODUS case reveals the emergence of openness as a result of aiming to align different information process chains of different ministries. The central idea of MODUS type of coordination is indeed emphasizing uniform process execution requirements rather than end result requirements (such as in EVENTUS), context requirements (CAUSUS), or requirements to connect information at different public adminsitrative levels (LOCUS). However, when having to implement multiple information requirements a the same time, in practice the resource availability forces municipalities to opt for certain information processing chains rather than other ones. Hence, a degree of openness is crucial to allow this flexibility.

7.3 Comparison of indicators for discretions

Discretions are personal actions of individual staff members, based on a personal judgment on what is considered appropriate. These personal actions are deferring from geoICT coordination requirements and/or deferring from given tasks resulting from geoICT coordination requirements. Five aspects reflect the variation in discretions: cognitive filter to the environment, personal access to resources, ability to envision courses of action, personal tasks simplification and adherence to client interest. With the qualifications 'high' and 'low' it is possible to describe the variation in scores, although it must be reiterated that these qualifications do not refer to exact numbers or frequencies, but to the perceived degree of occurences of discretions. The perceived degree of discretion occurences is an indication of the variation in discretions and correspondence of discretion variations across the different cases. The comparison of discretion aspect scores between the different cases is elaborated hereunder.

Cognitive filter to the environment
The aspect of 'cognitive filter to the environment', reflecting the degree to which individual staff members - at a certain level within the geoG2G - can formulate alternatives for the geoICT coordination requirements, is relatively

high in three cases, but relatively low for the AHN case (Table 7.7). In AHN it is only increasing for the strategic staff members. What makes the AHN case different from all other cases is that there are no municipalities involved, but only agencies dealing with water management. As a result, the actors of each of the partners have a relatively limited additional involvement in other sectors than water. The geoICT actors are this relatively confined in their views of alternative geoICT coordination requirements, and as a result score low on the aspect of 'cognitive filter to the environment'. Generalizing this finding: in cases where the geoICT coordination is applied to actors from a single sector it is unlikely that discretions occur on the basis of alternative geoICT requirements.

Theoretically one could explain this by isomorphism theory. It is likely that in cases where there are very similar types of actors there is a kind of professional network of peers. This professional network upholds a certain set of technical preferences which steer the network members towards certain solutions. This leads to isomorphic behavior in such cases, whereby practitioners tend to favor the technical solutions of their peers rather than possible alternative technical solutions. Hence, the emergence of discretions, rooted in a narrow cognitive filter of the environment of the practitioners, is unlikely and becomes low.

Characteristics	**Aspects**	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
Strategic / alignment / operational discretions	Cognitive filter to environment	High (for strategic staff)	Low, but increasing (for strategic staff)	High	High

Table 7.7: Comparison of discretions aspect 'cognitive filter to the environment '

Personal access to resources
The aspect of 'personal access to resources', expressed in the degree to which individual staff – at a certain level- can start up activities to acquire additional resources to execute or bypass the geoICT coordination requirements, is consistently low in all cases (Table 7.8). Apparently, those who work with geoICT perceive that they have very little influence in resource allocations. In other words, they feel distant from strategic organisational, financial and political deliberations or decisions. Reversely, those who set geoICT coordination requirements apparently do not provide enough freedom to operational staff members to alter their environment according to their own needs and wishes.
Empirically the consistent low scores in personal access to alternative relates to the findings that in all cases there is a rather tight and heavily regulated budget

available for the geoICT activities. Few of the interviewed geoICT staff members have financial responsibilities, or have finding finances or funds one of their individual performance tasks. As a result, they feel little incentive or obligation to look for alternative funds.

Theoretically one can explain this through resource dependencies. As long as actors remain dependent on few resources, they are more likely to ensure the access to these resources by complying to the rules to obtain these resources. An alternative explanation could be through theory of collective action, which posits that the individual behaviour within a collective is often steered by the collective. Individualism in taking altenative decisions in an organisation or within a group could lead to group 'punishments'. However, during the research period it was not possible to find clear examples in all cases of such group 'punishments'confining the freedom of decisions. Hence, this explanation is less plausible.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Strategic / alignment / operational discretions	Personal access to alternative resources	Low	Low	Low	Low

Table 7.8: Comparison of discretions aspect 'personal access to alternative resources '

Ability to envision courses of action
The degree which individual staff members - at any level within the geoG2G – show the ability to formulate alternative solutions for given problems reflects another aspect of discretions. The score for this aspect is high for all cases, but for different type of staff members (Table 7.9). In the Cadastral case it was particularly high for strategic staf members, whereas in all other cases there are mainly discretions of alignment staff members. A crucial difference between the Kadaster and the other organisational partners is the size of the organizational unit, which may explain the difference in aspect score. The Kadaster is by far the largest organisational partner engaging in a partnership when comparing to the partners within AHN, Dataland and Sabimos. Although in some case municipal organisations of the larger cities may be bigger in staff than the Kadaster organisation such municipal entities are not a single partner. They are part of an umbrella partnership. Therefore the one-to-many organisational relation that the Kadaster has, is unique and might therefore also explain the exception when it comes to the emergence strategic discretions. Strategic staff needs from a strategic point of view to be strongly aware of possible strategic bottlenecks. That's why in the Cadastral case they choose to be actively

involved in the PDOK developments.

The high score for discretions of alignment staff members can be related to unawareness of the technical geoICT possibilities of strategic staff members in these 3 partnerships. In contrast, in all these three cases the alignment staff members are in active contact with the technical experts in this field (such as private IT companies or universities). This active contact provides them the opportunity to manoevre around or even outside higher level coordination requirements. Theoretically this behavior is exemplary for social network theory, for example, which emphasises the influence in organisations of the networks in which individual staff members are active. These networks have the ability to make organisation opt for certain solutions.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Strategic / alignment / operational discretions	Ability to envision courses of action	High (for strategic staff); Low (alignment &operational)	High (for alignment staff)	High (for alignment staff)	High (for alignment staff)

Table 7.9: Comparison of discretions aspect 'ability to envision courses of action'

Degree of personal task simplification
In addition to the differentiation in origin of discretions (expressed through aspects of cognitive filter to the environment, personal access to resources and ability to envision courses of action), the purpose of discretions can be expressed through the aspect of 'personal task simplification' and 'adherence to client interests'. The 'personal task simplification' refers to the perceived degree to which individual staff members modify their own tasks to facilitate their own schedules and activities. The 'adherence to client interests' refers to the perceived degree to which staff members refer to other organisations or other coordination mechanisms as a justification for their actions.

Table 7.10 compares the scores of the aspect personal tasks simplification. The scores reveal that in two cases, Dataland and Sabimos, the aspect of 'personal task simplification' was the dominant justification to bypass the coordination requirements. In both these cases the task simplification actions consisted of avoiding constructing geoICT interoperability (with other exsiting geoICT systems). What makes Dataland and Sabimos different from AHN and the Cadastral case is that the partners have less resources available to construct inreroperable database, work flow and IT system models. They make their task simpler by avoiding to tackle the interoperability constraints. Instead they prefer to either maintain two parallel systems, or only utilize one of these systems

whenever it suits them. In contrast, for the staff members in the AHN and the Cadastral case interoperability of sytems is of cricual importance.

Theoretically, transaction cost theory can explain the emergence of discretions for reasons of personal task simplification. Building in and having to maintain the interoperability between systems increases the transaction cost of individual partners. By avoiding to maintain this interoperability continuously, they only incur transaction costs when needed. As long as this need is not frequent enough, the transaction cost remain relatively limited in time. They would become more inclined to invest in more interoperability if the sum of transaction costs of all incidental conversions between systems becomes higher than the transactions cost of converting the whole system at once.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Autonomous / joint discretions	Degree of personal task simplification	Low	Low	High	High

Table 7.10: Comparison of discretions aspect 'degree of personal task simplification '

Degree of client interest
Comparing the results for the scores in discretions to suit client interests reveals that only in the Cadastral case discretions emerge with client interests in mind (Table 7.11). In all other cases this aspect scores low, implying that practitioners in these cases are less willing to adapt the requirements of specific geoICT coordination in favor of the requirements of particular clients.

An obvious difference between the cases is that the client base for the Cadastral case is much more confined to a particular domain than the client base for all other cases. The results show that the clients from Cadastral data are primarily actors in the land and property sector, whereas clients in all other cases are from a larger variety of sectors (AHN data are used by actors in both water and environment; Dataland data are used by small and medium sieze entreprises; Sabimos data are used by government, citizens and transport companies). Adhering to needs of a specific client is thus easier in the Cadastral case as compared to all other cases.

Transaction costs theory could explain this discretions behavior. Adapting to a wide variety of clients implies having to adapt frequently and having to invest a lot of time and effort in acquiring information about the client's needs. Instead it would then be easier, and thus having to invest less transaction cost, to adhere to certain coordination requirements and not to opt for discretions to suit client

needs. In the exceptional case of the Cadastre, the strategic staff member already have to invest in acquiring information on a regular basis about the needs and wishes of their partners, so there is no additional transaction cost. This makes discretions favoring such needs easier and less limited by any potential increase in transaction costs.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Autonomous / joint discretions	Degree of adherence to client interests	High	Low	Low	Low

Table 7.11: Comparison of discretions aspect 'degree of client interests'

Summary of findings in discretions

The scores in discretions aspects reveal that there are are certain similarities between in the cases, but also reveal that indeed discretions occur according to the qualification of the context of individual staff members, and according to the justification which staff members utilize to reach to discretions. The qualifications 'high' and 'low' describe the variation in perceived degree of discretion occurences and discretion justifications. Comparing all discretion aspect scores across the cases provides a number of findings:

- The discretion aspect of 'personal access to alternative resources' is consistently low in all cases, while the ability to envision course of action is consistently high in all cases (at least for strategic and alignment staff). The usually tight and heavily regulated budgets related to geoICT activities prevent discretions arising from personal access to resources.
- In cases where geoICT coordination is applied to both geoICT production and geoICT users a single sector (such as the AHN case) there were no discretions perceived on the basis of alternative geoICT requirements. The single sector influence on its members may be so strong in this case that alternative judgments are either dissolved in sector discussions, or are hardly possible. Reversely, in cases where more sectors are involved, such as the Dataland case where there is a broad range of users and clients which are different from the producers of the geoICT or related geoICT data, discretions occur.
- In the cases where organisations have partnered in a one-to-many partnership (such as in the Cadastral case) strategic discretions occur. This may be due to the fact that the largest partner has a bigger strategic interest. In other forms of partnerships alignment discretions occur, possibly because these staff members are the only ones who are in direct contact with technical geoICT experts and developments. This provides them more freedom to adapt coordination requirements to their own judgements. In none of the cases there were significant operational discretions.

- As visible in the Sabimos case, avoiding the activities related to interoperability is one way of simplifying tasks. It is likely that discretions on the basis of this avoidance are symptomatic in cases where the environment of users and stakeholders is complex. It provides a pragmatic choice to make the system operational before negotiating system choices to address all possible geoICT needs.
- Discretions to suit client interests are only possible is the client base is rather confined (such as with the Cadastral case). In cases where there exists a broader client base (such as AHN, Sabimos) such discretions are more unlikely.

Comparing the results per geoICT coordination type shows that the LOCUS type of coordination is distinctive in that the discretions of strategic staff originate much more in the ability to envision alternative courses of action, and are much more often justified by a perceived need to adhere to external users or clients.The ability to envision alternative courses of action also exist in other cases, but is mainly visible among alignment staff rather than strategic staff. The LOCUS coordination thus precedes in particular a perceived need of strategic staff to act with their own judgment.

Specific of the results related to the EVENTUS coordination type are the relative low score in the 'cognitive filter to the environment' aspect and the relative high score in the 'operations orientation' aspect. The EVENTUS coordination, aiming to streamline similarity of end products conditions, thus coincides with personal judgments of operational staff members on production choices.

The MODUS and CAUSUS coordination type do not generate any distinctive score in one discretion aspect specifically. The results in discretion aspects are quite simillar to each other, albeit quite different from both LOCUS and EVENTUS. In both MODUS and CAUSUS the discretions are mainly reached by alignment staff members, and are mainly reached to simplify personal tasks. This finding gives a reason to think that either the coordination requirements are too vague (the lack of specification may require staff to defer from the requirements and create their own set of instruments and results), or the context in which the coordination requirements need to be applied is too complex (requiring the staff to simplify their own task).

7.4 Comparison of indicators on changes in stability elements

The four stability elements of geoG2Gs are power, economic rules, conformity and collectivity. Each of these elements can remain stable or can change. Eight aspects reflect the variation in stability elements and the changes in stability: long-term mutual expectations, control over resources, transaction cost

limitations, transaction cost expansion, dominance of network agency over personal interests, dominance of alternative networks, collective sanctions and incentives and credibility. The following sections provide further evidence of the variation in stability elements.

Power stability and change
The aspects of 'long-term mutual expectations' and 'control over resources' reflect the power stability and changes in power stability respectively. Table 7.12 provides a summary of the findings from the previous chapter.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Power stability	Long term mutual expectations and staff allocations	High, but decreasing	High, but decreasing	High.	High
Power change	Control of resources	Low, but Increasing	High, but decreasing	Low, but increasing	Low

Table 7.12: Comparison of power stability and power change aspects

In all cases the long term mutual expectations and staff allocations are high, but the biggest change occurs in the in the Cadastral case as a result of BAG enforcement. The BAG prescribes how Kadaster and municipalities should interact, and thus fixes their mutual relations and associated budget commitments. At the same time, the changes of power stability in both the Kadaster and the Dataland case relate to the increasing number of responsibilities for municipalities. The gradual integration of technologies provides more power for individual municipalities to engage in principle-agent relations with private ICT consulting companies. Implementing Egov policies at municipal levels also increases the requirements for municipalities. The multitude of tasks for municipalities makes their long term expectations with specific partners, such as the Kadaster, or the central office of Dataland in relation to practical ICT matters more loose. If on the other hand municipalities already have a major say in subcontracting ICT matters, such as within the Sabimos case, then their expectations towards other partners did not change or did not increase the authority.

So, the relation of power stability in the geoG2Gs with the ability to enforce new geoICT legislation confirms the expection of both resource dependency and social exchange theory. Power is the resultant of a dependency or an exchange relation, and not of a change witin an individual actor. The BAG effectively changes the exchange and dependency relation between Kadaster

and municipalities, and the multitude of tasks resulting from Egov requirements changes the exchange relation between municipalities and the Dataland central office. Municipalities become less dependent on a single partner, and increase their own authority to decide for themselves with with private geoICT companies they want to engage. The increase of these exchange relation decrease the long term commitment to one single partner.

Economic rules stability and change
The kind and extent of transaction costs is an indicator for economic rules stability. Economic rules are stable if transaction costs are low, or if the transaction costs are kept low through several instruments or rules. If transaction costs increase and the kinds of transaction costs expand, there is instability in economic rules. Table 7.13 provides a summary of the findings from the previous chapter.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Economic rules stability	Transaction cost limitations	High, but decreasing	High	High	High
Economic rules change	Transaction cost expansion	Low, but increasing	Low	Low	Low

Table 7.13: Comparison of economic rules stability and economic rules change aspects

Similar as for the power element, the biggest changes occurred in the Cadastral case. The internal and external budget re-allocations are the reason for this change. The change concerns a revision of geoICT responsibilities, and a re-organisation financial resources as a direct result of the BAG legislation. Such a comparable change linked to changed legislation is absent in all other cases. Especially the immediate effect of the BAG budget re-allocation by the VROM Ministry nessecitated the Kadaster the maintain a Kadaster agency budget based on real estate registration and information service fees (needed for cost recovery), alongside with a national-wide budget related to the BAG. The role of the municipalities also changed in this relation. As a result of BAG they were no longer just a recipient of the information, but now also became an active contributor of the production of geo-information. Therefore they also had to allocate additional human resources to cater for the BAG related requirements.

Part of the human resource re-allocation within the Kadaster and part of the budget revision was contributed by some staff members to having to meet the European INSPIRE requirements. This supranational coordination instrument require a set of national agencies to appoint specific staff to foster and ensure

preparation and implementation of INSPIRE guidelines. The cadastral dataset is one of the specific datasets in INSPIRE. Allocating staff to prepare and implement INSPIRE guidelines changes the internal resource allocation.

The changes is economic rules reflect the changes in asset specificity (Carter and Hodgson, 2006; David and Han, 2004). Whereas earlier most of the specific assets to produce geo-information were in the hands of national organisations such the Kadaster and RWS, the national budget allocations were related to this. The BAG regulations changed these budget allocations and therefore implicitly changed the allocations for specific assets (the large volume geo databases). In these cases the transaction costs increased, because the specific database asset was distributed over more than one partner. Access to the database now required an agreement with an increased number of partners. In the other cases the developments in ICT throughout the municipalities facilitated the integration of geoICT with other forms of ICT at one location, and therefore decreased the asset specificity. In these cases the transaction cost decreased.

Conformity stability and change
The aspect of 'dominance of network agency over personal interests' reflects the degree to which geoG2G staff members refer to an ideal situation for all staff members which is more valuable than individual interests. The degree to which ideas from alternative networks outside the geoG2G starts to play a role inside the geoG2G is an indication of conformity change. Table 7.14 provides a summary of the findings from the previous chapter.

The results show that for all cases there has been little change in the conformity stability. Conformity is apparently a strong stability element which is relatively unaffected by any geoICT coordination strategy or by any changes in human resources within the partners. All cases show that conformity is rooted in long term working traditions and conventions given the fact within all cases practitioners tend to refer a common narrative as a reasons for their partnerhsip. This common narrative is shared by the geoICT practitioners.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Conformity stability	Dominance of network over personal interests	High	High.	High	High
Conformity change	Dominance of alternative networks	Low	Low	Low	Low

Table 7.14: Comparison of conformity stability and conformity change aspects

The stability in conformity may also be explained by the common feeling that

EU INSPIRE Directive was important. Most of the geoICT actors at national level were familiar with the directive and were often aware of what this Directive would implicate for their own organisation. Organisations such as the Kadaster are even actively involved in the preparation of the guidelines, and their invovement may therefore be one of the causes for the network agency.

Isomorphism theory explains the high degree of conformity in two ways. In the Cadastral case the strong coercing rules of BAG prescribe a similar behavior for all partners. In all other cases the similar behavior is the result of a strong professional network where frequent professional interaction takes place. Within that network there are a set of central narratives, namely that of large scale mapping (In AHN case), the VNG (Dataland) and transportation info (Sabimos). These central narratives dominate the choices in executing geoICT related activities. As a result, the professionals mimick the traditions of their historical professional relations more than that of an alternative domain (that of geoICT specifically).

Collectivity stability and change
The degree to which partners maintained common interests through incentives and sanctions, a measure for the collectivity stability. A change of collectivity stability is visible through the aspect of 'loss of credibility', the degree to which geoG2G staff loses faith in the necessity of the current common product and jointly agreed ways of production means of the geoG2G. The following Table 7.15 provides a summary of the findings from the previous chapter.

Characteristics	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Collectivity stability	Combination of collective interest with collective sanctions and incentives	Low, but increasing	High	High.	High.
Collectivity change	Loss of credibility	High, but decreasing	Low	Low	Low

Table 7.15: Comparison of collectivity stability and collectivity change aspects

The change aspect only scores high in the Cadastral case. In all other cases the change in collectivity is low, hence collectivity is stable. What made the Cadastral case different from the other cases is that the Kadaster in particular had to follow up on the international INSPIRE requirements alongside with the BAG requirements. There are multilevel agreements at different administrative scales which strongly influence the implementation of BAG. Although these requirements were not necessarily contradictive, the dual requirements affected the Kadaster staff members' perception of being a exclusive collective with

municipalities. The idea of a common product, exclusively shared by Kadaster and municipalities, decreased as a result of this.

Summary of findings on stability and changes in stability
Although the empirical evaluation does not provide an absoluate measure of stability and change, the qualitative scores of 'high' and'low' in each of the stability aspects provide a reasonable basis for the comparison. Comparing all individual aspects for all cases shows that the most significant changes occur in the power stability. The changes in power stability are most apparent in the Cadastral case, where the coordination was able to apply a legislative instrument. The power stability change was therefore the resultant of a change in a structrual dependency or an exchange relation. It cannot be contributed to a change of relations between individual actors, or a set of discretions.

In comparison to the changes in power stability, the perceived changes in the other stability elements were less apparent, but were still perceived. The changes is economic rules primarily relate to new budget rules, but also partly relate to having to adhere to INSPIRE. The changes reflect the changes in asset specificity and resulting in additional transaction costs.

The change in conformity is very limited for all cases. This can be explained by isomorphism theory. The professionals mimick the traditions of their historical professional relations more than that of an alternative domain (that of geoICT specifically).

The change of collectivity stability is only high in the Cadastral case. What made the Cadastral case different from the other cases is that the Kadaster in particular had to follow up on the international INSPIRE requirements alongside (and in alignment with) with the BAG requirements.

When comparing cases for all elements in stability, the cadastral case, LOCUS geoICT coordination type, showed instability in all stability elements. There is a gradual increase in conformity and collectivity stability. For AHN, EVENTUS geoICT coordination type, most stability elements were increasingly stable by 2010. For Dataland, MODUS geoICT coordination type, 3 stability elements have become increasingly unstable. For Sabimos, CAUSUS geoICT coordination type, all stability element reflect stability in the whole period. Remarkable is that the case with the most persuasive geoICT coordination type (Cadastral case) also showed the highest degree of instability in all stability elements, whereas the case with the most flexible coordination type (Sabimos) showed the highest degree of stability. Given that the Dataland case also showed increasing instabilities, and that the AHN and Sabimos case involved much less partners than the Cadastral and Dataland case, the instability may have to do with the scale at which the geoICT coordination is aiming, and the

size (ie.the number of partners and number of immediately affected staff members) of the geoG2G partnership.

All cases – except for Sabimos - show a variation in at least one of the stability element in the period 2007-2010. This suggests that stability may increase and/or decrease, and that one stability element is not directly changing with any other stability element. It seems further that as long as there are indications of perpetuation instability in any geoG2G stability element, than all stability elements are still in a process of change, or will change. A continued stability in all elements of Sabimos, compared to the variation in stability elements in all other cases suggests that overall new stability of a geoG2G only occurs if all stability elements have returned to new stability. As a result, actors will only perceive a geoG2G partnership as stable if all artefacts of stability are re-enforcing each other.

Given the different time spans needed for each stability element to return to stability, there is not a fixed time or a fixed tool to return to stability. This confirms the theoretical expectation provided in table 4.6 that periods during which stability in each element changes is fundamentally different. Each stability element is likely to change in its own pace, some with sudden changes, others with punctuated changes.

7.5 Relations between patterns

The above findings contribute to answering the main research question ***Which variations in geoICT coordination and discretions influence which changes in stability elements when comparing all cases?*** This question has three components:

1) The influence of variations in geoICT coordination on variations in discretions;
2) The influence of variations in geoICT coordination on changes in stability elements; and,
3) The influence of variations of in discretions on changes in stability element.

These questions are answered by using the answers to these same questions in all of the separate cases, and by using on the findings on patterns and explanation for each of the individual aspects.

1. The influence of variations in geoICT coordination on variations in discretions

Table 7.5.1 gives a grouped summary of the high and low scores in the geoICT coordination and discretion aspects for all cases. The results in Table 7.5.1 show that the Cadastral case is very similar as the Dataland case in 4 of the 6 coordination aspects are concerned, but dissimilar as far as all the discretion

aspects are concerned. More, concretely, the coordination instruments of the BAG standards in the Cadastral case clearly resemble the E-government reference models and Chapeau price criteria in the Dataland case. However, the emergence of strategic discretions in the Cadastral case to seek possible alliances at national level is of a different order than the occurrence of alignment discretions in smaller municipalities originating from the uncertainty about the perceived (financial or strategic) benefits of Dataland membership.

Furthermore, the AHN case is different in 4 of the 5 geoICT coordination aspects compared to the Cadastral case, but is similar to the Cadastral case in 3 of the 4 discretions aspects. Concretely, the role of the water boards staff in the AHN coordination makes the coordination much more open and flexible than the role of the municipal staff in the BAG coordination. In contrast, the type of discretions are similar. In both cases the discretions orignate in the wish to seek further alliance.

Finally, Sabimos has rather unique scores for the geoICT coordination aspects, but is very similar to Dataland for the discretions aspects.

Overall, the combined results in these tables suggest a connection between high degrees of standards, national focus and client orientation on the one hand and high degrees of cognitive filter and ability to envision alternative courses of action on the other hand. Similarly, the combined low scores suggest a relation between low degrees of voluntary action and operations orientation on the one hand and low degrees of personal access to resources and adherence to client interests on the other hand. Both of these relations are plausible with the following explanation:

First of all, the comparison of geoICT coordination aspects led to the conclusion that all geoICT coordination types have the tendency to scale up their aims, visible in a high degree of standardisation and national focus. This originates from a strong national interest and is the result of operating in a relatively small sector. This tendency makes the decision freedom for strategic staff members more restrictive. More specifically, the high scores in the national focus aspect, visible in three cases, but absent in the Sabimos case, correspond to high scores for discretions from strategic staff members in the same cases and not in the Sabimos case. In the Sabimos case the strategic staff members do not defer from the agreed coordination strategy, as they are close enough to the formulation of this. As a result, there is no reasons to reach to dsicretions. This suggest that the correspondence between the scaling up and strategic discretions lies in the distance that strategic staff members have to the geoICT coordinators. If they are not closely involved in the coordination they are more likely to reach to discretions, making the geoICT coordination activities less influential.

A second observation is that in three cases, all except for the Cadastral case, the increasing scores on openness coincide with the high scores in ability to envision courses of action for alignment staff. This differentiation can be explained by the fact that most alignment staff in any of the cases do often not directly interact with staff members of ministries or law makers at national level, but with peers across organisations. These staff members frequently interact with their peers, which makes them aware of alternative solutions. For alignment discretions the peer network thus seems to outweigh the national coercive structures. The discretions of alignment staff are primarily occurring in the geoG2G cases AHN and Dataland. This would suggest that the lower degrees of uniformity, standardisation or national focus would explain a possible presence of alignment discretions. In these cases the geoICT activities are more the result of interaction of system developers. If such alignment staff are not involved in the formulation of objectives of the geoICT coordination they are more likely to defer from the national geoICT coordination objectives. This makes the geoICT coordination less influential.

A third specific relation emerges when observing that the client/customer orientation in the Cadastral case coincides with discretion types which adhere to client interests in the Cadastral case, whereas in the Dataland and Sabimos case it coincides with discretions types favoring personal task simplification. This suggest a relation between the type of orientation in the coordination and the justification that actors use to reach to discretions. This relation may be linked to the role that users or other external actors play in the degree that they can and want to contribute to the coordination objectives. The description of users in sections 6.3.1 and 6.4.1 reveal that they do not have a prime geoICT interest. In the Dataland case the main users are real estate agents, banks and insurance companies, utility companies, project developers, housing corporations, spatial planning bureaus. In Sabimos these constitute beneficiaries of transport, including passengers. In both these cases these external users do not have a primary interest in the geodata and geoICT in particular, and are thus by implicit choice much more disconnected from the geoICT coordination activities. They have not been able to formulate or foster their specific geo-data or geoICT system requirements, and as a result they are much more likely to justify task simplification as a reason to defer from geoICT requirements. The influence of geoICT coordination is then limited.

A final point is that the involvement of municipalities is crucial in the degree of influence that geoICT coordination has on staff member discretions. Given the relatively low scores of cognitive filter of the environment in the AHN case, geoICT coordination influences the emergence of discretions differently if the geoG2G does not involve municipalities or if the geoG2G involves partners of a single sector only. If geoICT coordination is applied to actors from a single sector (such as water management) it is unlikely that discretions occur on the

basis of alternative geoICT requirements. Hence, the influence of geoICT coordination on the emergence of discretions in cases where there is no common connection, such as the municipalities, is low. A possible explanation is that the municipalities enable a form of weaker ties. One of the potential consequences of such weaker ties is that it may bring together previously non-connected groups with different value systems through a common connection. While this may lead to an (unexpected) increase of interdisciplinary work and potential innovation, it may also lead to a change in either individual or joined value systems, hence discretions.

	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
GeoICT coordination aspects	Standards	High	High, but decreasing	High	Low
	National focus	High	High	High	Low
	Openness	Low	Low, but increasing	Low, but increasing	High
	Voluntary actions	Low	Low	Low	High
	Client/customer orientation	High	Low	High	High
	Operations orientation	Low	High	Low	Low
Discretion aspects	Cognitive filter to environment	High (for strategic staff)	Low, but increasing (for strategic staff); Low (alignment & operational staff	High	High
	Personal access to alternative resources	Low	Low	Low	Low
	Ability to envision courses of action	High (for strategic staff); Low (alignment & operational)	High (for alignment staff)	High (for alignment staff)	High
	Degree of personal task simplification	Low	Low	High	High
	Degree of adherence to client interests	High	Low	Low	Low

Table 7.5.1: Summary of scores in both geoICT coordination and discretion aspects in all four cases

2. *The influence of variations in geoICT coordination on variations in (changes in) stability elements*

Table 7.5.2.a and 7.5.2b give a grouped summary of the high and low scores in the geoICT coordination and stability element aspects for all cases. With

regards to the scores in stability elements the Cadastral case is most dissimilar from the Sabimos case. Only in 2 aspects the scores are similar. Contrastingly, the Sabimos case has 5 similar scores in stability aspects with the Dataland and AHN cases. AHN and Dataland are similar in 4 aspect scores. The most consistent scores are the scores for the aspects of conformity and collectivity, where all for cases score high.

The inconsistency in stability element scores indicates that there is no one-to-one relation between the combination of high scores in standards, national focus, client orientation and increasing openness with any combined high scores of the stability elements. Similarly the low scores in voluntary actions and operations orientation do not always coincide with low scores in any of the stability elements. So, the results in the cases do not suggest the existence of a universal rule which connects one geoICT coordination aspect to one change in stability element. Still, the results suggest a number of connections – hence a certain degree of influence from geoICT coordination to stability elements. .

First of all, the aspect of standards and the power change aspect of control of resources are only high in the Cadastral case and Dataland case – in AHN and Sabimos they are decreasing or low. What seperates the Cadastral case and Dataland from AHN and Sabimos is a relation between a central organisation (Kadaster and Dataland head office) with a large set of municipalities. This one to many relation is also present in AHN but does not involve municipalities (but water boards). In Sabimos there is just a one to few (municipalities) relation. In the municipal context the geoICT standards are one out of many newly introduced ICT related standards. Introducing a new standard thus introduces a new set of power dependencies which affect the partnership relation between a central agency and individual municipalities much more than if municipalities are not invovled, or if only few municipalities are involved. Apparently introducing a standard in a bulky set of principle-agent relations creates more instances of changes in power stability than introducing and fostering such a standard in constricted sets of principle-agent relationships. The explanation for this difference lies in the long duration of contingency effects. Social exchange theory formulates that actions are contingent on rewards from others (Blau, 1964: 91), but also indicates that actions on the basis of relationships can only evolve over time (Cropanzano and Mitchell, 2005). The standards are thus not immediately agreed upon as new fixed rules of exchange but are only gradually adopted.

	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
GeoICT coordination aspects	Standards	High	High ,but decreasing	High	Low
	National focus	High	High	High	Low
	Openness	Low	Low, but increasing	Low, but increasing	High
	Voluntary actions	Low	Low	Low	High
	Client/customer orientation	High	Low	High	High
	Operations orientation	Low	High	Low	Low
Power	Long term mutual expectations and staff allocations	High , but decreasing	High, but decreasing	High.	High
	Control of resources	Low, but increasing	High, but decreasing	Low, but increasing	Low
Econo mic rules	Transaction cost limitations	High, but decreasing	High	High	High
	Transaction cost expansion	Low, but increasing	None	Low	Low
Conformit y	Dominance of network over personal interests	High	High.	High,	High.
	Dominance of alternative networks	Low	Low	Low	Low
Collectivity	Combination of collective interest with collective sactions and incentives	Low, but increasing	High	High	High.
	Loss of credibility	High, but decreasing	Low	Low	Low

Table 7.5.2: Summary of scores in both geoICT coordination and stability element aspects in all four cases

A second relation exists between the high scores of openness and high scores of transaction costs limitations. Only in the Cadastral case the transaction cost expansion is high, while the aspect for openness is low. The finding above was that direct and personal operational contact and communication influences the degree of perceived openness, while asset specificity and budget re-allocations influenced transaction cost. These combined results suggest a relation between the presence of direct and personal contacts in the implementation paths and the asset specificity. The explanation is that once all actors have the perception that they can contribute to an open debate on future geoICT decisions then they are more likely to share their resources and assets with each other. Fostering an open environment seems thus to foster an increase in sharing of resources.

A third observation is that both conformity and collectivity stability are consistently high for all cases. This would either imply that conformity and collectivity are not influenced by variation in geoICT aspects, and/or would suggest a relation between conformity and collectivity. For the Cadastral case, AHN and Dataland the latter may be partly due to the influence of INSPIRE, as a overarching supranational agreement which causes of this relation. As noted in the Cadastral case description the subsequent Kadaster annual reports of 2007-2010 often make the link to the international developments on uniform european cadastral data models within INSPIRE. Similarly, the AHN newsletters of September and December 2007 and September 2009 refer to AHN members contributing to INSPIRE-related European height models. INSPIRE furthermore forces governments to make their data available at the lowest cost possible, which is one of the dilemma's for municipalities, including the association of municipalities and Dataland.

On the one hand the supranational participation in developing the INSPIRE content (in a multitude of conferences, workshops, working groups etc.) strongly increases the extent of interactions within a single professional field (hence increases the dominance of the values within a single professional network), and on the other hand the rules of INSPIRE itself and commitment of European member states to adhere to these rules implicitly provide a set of collective sanctions for partners at the national level. The sanctions increase the likelihood of collective action of government agencies having to adhere to INSPIRE. In other words, the supranational geoICT coordination strategy has an impact on the national coordination strategies of BAG, AHN and the E-government related strategies for Dataland.

For Sabimos the high degree of conformity and collectivity does not relate to INSPIRE or any other european strategy. What makes Sabimos different in from the other cases is the score in the 'voluntary action' aspect. It is plausible that part of this voluntary action is rooted in collective interests and network agency of the transport and mobility domain.

3. The influence of variations of in discretions on changes in stability element
Table 7.5.3 gives a grouped summary of the high and low scores in discretion and stability element aspects for all cases. As mentioned in the previous two sections, the scores of both the discretion aspects and the stability element aspects are not consistent for all cases. The combinations of discretion and stability aspect scores across cases suggest four types of relations:

First of all, the simultaneous high scores of cognitive filter to the environment (for strategic staff members) on the one hand, and dominance of network over personal interest and collective interests on the other hand suggest a relation between these aspects. The previous section comparing the results of cognitive

filter indicated that a likely explanation for the variation in this aspect is the involvement of multiple sectors (in the case of a single sector - water in AHN – the score for this aspect is relatively low). If however multiple sectors are involved (in the execution of geoICT production and other work arrangements), whereby each sector has their own requirements, than staff discretions may emerge to deal with the possible risks of not being able to comply to all requirements. Essentially this leads to strategic discretions which favor a needs of one particular partner in the geoG2G. The Cadastral case showed such discretions of Cadastral staff members, the Dataland case of ICT subcontracting municipal staff members, the Sabimos case of system management staff members. In these discretions they would clearly favor solutions which they know. This would explain the relative high scores for network dominance and collective interests.

A more theoretical explanation for this relation comes from the theory of collective action. The discretions favor a situation which maintains the collective interest of partners. In maintaining the colelctvie interest they make the group size (of potential partners) larger). Whereas in the absence of collective incentives, the incentive for group action diminishes as group size increases, in the presence of collective interests, the incentive for group action increases as the group size increases. A (high score in) cognitive filter to the environment is thus a stimulus to support the collective interest.

Secondly, the high scores in ability to envision courses of action (for alignment staff members) and the high perceived degree of transaction cost limitations coincide. Whereas the high scores for the ability of alternative courses of action originate in the active contact that alignment staff members maintain with the technical experts in private IT companies or universities, the perceived transaction costs are low if there is a single geoICT database to which all partners have equal and transparent access, and if the degree of asset specifiy is low. The interaction on geoICT technical matters and the discretions favoring solutions presented by technical experts thus seem to stimulate a partnership whereby geoG2G partners perceive low transaction costs and stable economic rules.

Theoretically one can explain this in two theoretical perspectives: The discretions, and the ability to envision alternative courses for action are in fact closely tied to certain historically accepted work practices within a professional network. This leads to re-enforcing these practices (as alternative for the coordination requirements), hence to a isomorphic behavior. The individual staff members are more likely to enact the values of their professional networks than to enact the values of new, alternative coordination strategies. Investing in these alternative values can then be regarded as additional transaction cost which staff members are trying to avoid. So, both the discretions and the re-

enforcement of stability can be explained from both transaction cost theory and from isomorphism theory.

On the basis of the scores a third relation exists between the (high) degree of personal task simplification and (high) degree of long term mutual expectations. The personal task simplification relates in the two cases Dataland and Sabimos to the choice of alignment staff members to avoid actions to create (geo)ICT interoperability with other operating ICT systems. In the two other cases this interoperability was considered crucially important, and was therefore not a reason to simplify tasks. By simplifying tasks the alignment staff members decrease technical uncertainty, but this apparently also strengthens the trust between in long-term cooperation and mutual expectations of partners. This does not seem evident at first. It suggests that geoICT interoperability with other ICT systems operated by individual partners is not a crucial condition for maintaining long term partnerships. This can only be explained if the dependency on geoICT is not crucial enough for the individual partners. There are other ICT related dependencies in these geoG2G cases, which outweigh the need to maintain geoICT interoperability.

A theoretical explanation for the relation between the alignment discretions, rooted in task simplification by avoiding data integration, and the stability in all elements can be given by resource dependency theory. The discretions are not fundamentally altering an resource dependencies. In both the Sabimos and the Dataland case none of the partners are affected by a different choice in technical systems or a particular format in geoICT generated data. As a result, there is little change in the dependency relation and no change in power stability occurs.

The scores suggest a fourth relation between the degree of adherence to client interest and transaction cost expansion. In the Cadastral case strategic staff decided themselves to scan the environment for alternative cooperative arrangements by being actively involved in the PDOK discussions. The PDOK discussions essentially re-evaluate the current cooperation agreements, including those with the municipalities. There was also the increase in transaction cost because of the new budgeting rules relating to the BAG. The strategic staff members of the Kadaster also indicated that this budget allocation change caused uncertainty among the strategic staff members on how to explain this to their customers. The underlying reason to reach to discretionary decisions is therefore likely to come from this need to adhere to client interests. Hence, there is a relation to client interest driven discretions and economic stability changes.

Theoretically, the PDOK discussions of the strategic staff in the Cadastral case reflects the activation of weaker ties in the social network theory. The theory would predict that strategic staff members would do this in view of creating and

fostering more stability in conformity, i.e. more support for the values in their peer network. However, maintaining these new ties increases the transactions costs.

	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Discretion aspects	Cognitive filter to environment	High (for strategic staff)	Low, but increasing (for strategic staff) Low (alignment & operational staff	High	High
	Personal access to alternative resources	Low	Low	Low	Low
	Ability to envision courses of action	High (for strategic staff); Low (alignment & operational)	High (for alignment staff)	High (for alignment staff)	High
	Degree of personal task simplification	Low	Low	High	High
	Degree of adherence to client interests	High	Low	Low	Low
Power	Long term mutual expectations and staff allocations	High ,but decreasing	High, but decreasing	High.	High
	Control of resources	Low, but increasing	High, but decreasing	Low, but increasing	Low
Economic rules	Transaction cost limitations	High, but decreasing	High	High	High
	Transaction cost expansion	Low, but Increasing	Low	Low	Low
Conformity	Dominance of network over personal interests	High	High.	High,	High.
	Dominance of alternative networks	Low	Low	Low	Low
Collectivity	Combination of collective interest with collective sanctions and incentives	Low, but increasing	High,	High..	High.
	Loss of credibility	High, but decreasing	Low	Low	Low

Table 7.5.3: Summary of scores in both discretion and stability element aspects in all four cases

7.6 Conclusion

The above findings contribute to answering the main research question ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?*** There are three main components in this question: the 2 types of variation (in geoICT coordination and in discretions), the changes in stability elements, the issue of influence (i.e. the plausability that a specific kind of variation corresponds to a specific change).

The first component is the variation. The comparison of geoICT coordination aspects across all cases in Section 7.2. shows that the different geoICT coordination types vary in all aspects. The most distinguishing coordination types are LOCUS and CAUSUS which are almost diametrically different in approach. The LOCUS type in the Cadastral case scores high on use and enforcement of standards and has a clear national orientation, whereas the CAUSUS type is much more flexibile in their approach by utilizes voluntary contributions of staff members and remaining much more open in the formulation of requirements. The EVENTUS coordination in the AHN differs from the other types in the way it apprpaches external users. The context of production and use are disconnected in the EVENTUS case, whereas in all other types there is a much closer connection. Finally, the MODUS type is a mix of all other types in the sense that all aspect it resembles one other geoICT coordination type, but as a package it is different.

The other kind of variation occurs in the discretions. The findings in section 7.3. reveal that context in which discretions are reached (the orign of the dsicretions) vary only slightly when comparing the cases. In fact most cases show rather similar scores in the aspects of 'cognitive filter to the environment', 'personal access to resources' and 'ability to envision courses of action. There are however differences in staff types reaching to discretions. In the Cadastral case the astrategic staff members ar emore likely to reach to discretions, wherreas in the other cases this occurs more with alignment staff members. The most significant variation is visible in the purpose of discretions, expressed through the aspects of 'personal task simplification' and 'adherence to client interests'. Here there is a clear split between cases: the staff members of the Dataland and Sabimos case would be more inclided to reach discretions with the task simplification justification than the staff members in the Cadastral and AHN case. The Cadastral case staff members would be more inclined to use adherence to client interests as a justification to reach to discretions.

The second component concerns the changes in stability. The comparison of all stability element in all cases shows the most significant change occurring in the power stability. The changes in power stability are most apparent in the Cadastral case, where the coordination was able to apply a legislative

instrument, resulting in a fundamental change of dependency and exchange relation. In comparison to the changes in power stability, the perceived changes in the other stability elements were less apparent, but were still perceived. The changes is economic rules primarily relate to new budget rules, but also partly relate to having to set aside resources to adhere to INSPIRE.The change in conformity is very limited for all cases. This can be explained by isomorphism theory. The change of collectivity stability is only high in the Cadastral case. What makes the Cadastral case different from the other cases is that the Kadaster in particular had to follow up on the international INSPIRE requirements alongside (and in alignment with) with the BAG requirements.

The third component concerns the issue of actual influence. First of all, there is influence of geoICT coordination on discretions. The results in the Cadastral case have shown that an all encompassing standards coordination strategy has a higher potential for strategic discretions than geoICT coordination strategies which are more flexible. In the former the origin of these discretion would lie in their ability to envision alternative courses of strategic action. Such alternative courses consist of seeking more or larger partnerships, and the wish to adhere to client interests. For cases which exhibit more open and flexible coordination strategies there is also a potential for discretions, but these are mostly discretions of alignment staff. The discretions in these cases are rooted in the ability to envision alternative courses of action.

In addition, the choice for a national focus and scaling up approach, visible in three of the four cases, seems typical for the geoICT coordination preferences in the Netherlands. This has however also an influence on the discretions. The result of this scaling up is that many professionals mimick solutions from one place to another without much contest. Only once the solutions are contested, especially when integration with other ICT systems is necessary, then discretions emerge which favor simplification of tasks. This simplification is often in the form of avoiding the ICT-geoICT integration, and maintaining a separate geoICT-based system.

The empirical findings confirm the theoretical expectations that certain discretionary decisions emerge in a bureacratic system where there is a significant gap between the managers at a strategic, often national, level and alignment and operational staff, which usually operate in a more local environment. As the reasons for staff members to reach to discretions are different at each of these levels, it seems plausible to derive that the discretions at the respective levels are not causally related, i.e. a discretion at strategic level does not seem lead to a specific discretion at alignment or operational level, or vice versa. At the same time, it can not be derived if the discretions at any level are the result of an organisational culture where discretions are commonly

accepted or common practice. The cases do not exhibit such a culture, but also do not exclude the possibility for such a culture. Therefore, this would require further theoretical grounding in the relations between discretions at different levels.

The second type of influence is that from geoICT coordination on stability. The influence of emphasizing to use standards is most significant. It is visible in the change of control on resources. If geoICT standards are introduced and enforced in a municipal context they introduce alongside with them a set of new power dependencies, which decreases the power stability in the partnership. Especially if the geoG2G partnership is large, such as within the Cadastral case and the Dataland case, the power stability has a tendency to decrease initially, and only increase gradually afterwards. This effect seems in line with resource dependency theory expectations. It also highlights that geoICT related data and processes act as a resource along which inter-organisational relations (and dependencies) change.

In contrast, when geoICT coordination fosters openness there is a decrease in transaction costs. Once staff members of any of the geoG2G partners perceive that they can contribute to the geoICT decisions, they exhibit more sharing of their resources and assets. Openness thus increases economic rules stability. This seems in line with transaction cost theory. Transactions involving geoICT related data and processes can be more efficient if the (meta-) information on these data and transactions and the way in which this (meta-) information is developed has been shared. In light of the theory this reflects a situation of increased information symmetry decreased. However from the angle of asset specificity one could also argue that openness only applies for a specific group of staff members, namely those who have specialised skills and sufficient knowledge to appreciate the geoICT related technology and work processes. As the distribution of this knowledge asset among the partners changed in the cases which involved municipalities (where the knowledge base on geoICT increased over time) one would expect a change of the distribution of transaction cost (e.g. less on the side of municipalities, more on the side of central agencies). This aspect is however not evident from the empirical results, or may even need further theoretical study.

The third type of influence is from variations in discretions on stability. The effect of variations in discretions on stability are fourfold. The first effect concerns the effect of predominantly strategic discretions. This originates from strategic uncertainty about the role of one of the partners in a geoG2G. The discretions tend to favor a solution which is carried by a larger network of professionals. The Kadaster strategic staff members seek for example alliances in a network of what they consider peers. A potential effect of such discretions is an enlargement of the partnership or a descrease of long term mutual

expectations within the partnership.In the Cadastral case this implies the introduction of a new partnership parallel to the Kadaster-municipalities partnership. Such a development changes the expectations of external parties.

The second effect occurs when alignment discretions emerge, originating in the active contacts that alignment staff members have with the private geoICT sector and the academic community in geoICT. This stimulates a partnership with low asset specificity. In other words, the choice for specific databases and information systems becomes less specific or less determined by a single coordination requirement. This has a specific effect on the economic rules stability. It becomes more easily possible to maintain the geoICT interactions, because one can rely on multiple technical solutions. The partnership becomes more stable, as the enforcement costs of the overall transaction cost are decreasing with these discretions. The effect on other stability elements is less visible.

The third effect takes place when discretions which arise out of the need for task simplification. This has the effect that the discretions strengthen the trust, and the long-term mutual expectations between the geoG2G partners. This is counter-intuitive because one would expect that actions of individual staff members which deviate from a coordination strategy would decrease trust. However, the explanation for this counter-intuitive finding is that task simplification is only tolerated if geoICT does not play a crucial strategic role for both partners. In the Sabimos case the core interest was the generation of mobility (time-based) indicators rather than the exact and authentic (=based on BAG and BGT data for example) location of buses and passengers. The trust is then ot rooted in the geo-information resource relation (municipality versus national agency for key registers) but in the mobility-information resource relation (municipality versus regional agency responsible for transportation). Resource dependency theory would give two contradictory explanations in this case, depending on the type of resource. Similarly, transaction cost theory would also fail to capture this fully, because the transaction of using already existing data would seem more effecient than creating new data. Therefore the transaction costs need to be associated in this case to boundaries between disciplines rather then boundaries in efficiency.

The fourth effect is when discretions arise out of the need to adhere to client interests. The discretions in this case have the effect that they increase the transaction costs in managing the partnership. The deviation from a central coordination strategy towards a potential or actual client implicitly brings in a new partner in the partnership. This increases the degree of necessary interactions to maintain the internal alignment within partnership, and therefore increases transaction costs. In the Cadastral case this is visible in the initiatives towards PDOK. Reversely, in the AHN case the reduction of partners reduced

the transaction costs.

Having identified these 4 effects and the types of actual influence of geoICT coordination and discretions on stability, provides an answer to the research question ***Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?*** Addressing this question followed from comparing the aspects in each case presented in the chapter 6 and interpreting the crosscomparison. With the answers to this question it is possible to derive a set of overall conclusions and recommendations in chapter 8.

Chapter 8

Conclusions and recommendations

This chapter addresses the last research question of this research **Which theoretical and practical conclusions can be drawn from this research?** Addressing this question follows from the conclusions drawn in each chapter, which each contribute to parts of the overall research question of this research: **How and why do different geoICT coordination types change the geoG2Gs in the Netherlands, and what is the influence of staff discretions in this process?**

The main research question originated from a case in 2005 where three public agencies in the Netherlands failed to agree on how to cooperate with geoICT, a specific subset of ICT. The case showed that it proved difficult for public sector managers in the Netherlands, who were responsible in their respective agencies to work and cooperate with geoICT, to get a grip on geoICT related decisions. It also showed that certain geoICT related agreements were not followed by certain partners, which resulted in the particular case that one of the partners ended the cooperation. The case revealed furthermore that many of the geoICT activities and coordination were largely handled by a specific professional geoICT community. This raised the question whether working with geoICT systematically changes the way in which public sector agencies cooperate, and whether there was any influence of a set of –less controllable – professional decisions in these changes. This is a relevant question in the larger scheme of public sector management because the observations in the case would suggest that a specific technology, and its related set of professional geoICT practitioners handling this technology, could influence public sector views and decisions on public sector cooperation and integration. For geo-information science this is a relevant question because the influence of the socio-organisational context on geoICT decisions is not well understood. Moreover the question addresses the need to substantiate, understand and explain the coordination of geo-information in the real world of practice. For the field of public administration a further insight in the actual practice of ICT coordination in the public sector is relevant because the role of discretions of 'system-level' bureaucrats, who are key actors in the design and implementation of information systems, has been rarely evaluated in the studies on the ICT developments and the rapid intrusion of ICT in public sector activities.

This chapter consists of a conclusions section 8.1 and a recommendations section 8.2. The conclusions section synthesizes the respective sub-conclusions and the theoretical contributions. After that, section 8.2 addresses the

recommendations for further research and the recommendations for practitioners in the field of public sector geoICT coordination.

8.1 Conclusions

With the potential relation between geoICT coordination and public sector cooperation assumed in the main research question in mind, the research focused on three main components of this potential relation: the geoICT coordination, the public sector cooperation and the geoICT practitioners' views and decisions. The geoICT coordination concerns all activities and all decisions to make the geoICT operational. The public sector cooperation was viewed from the stability angle. The assumption hereby was that geoICT related decisions could influence the stability between partners which agreed to work with geoICT changed. And, finally, the role of the practitioners was conceptualised by the concept of discretions, i.e. personal, professional judgments, guided primarily by individual professional views and experience rather then guided by jointly agreed strategic arrangements or coordination objectives. The subsequent 3 first research questions aimed to describe each of the three components, and identify which types of coordination, stability and discretions were possible. This was followed by 2 more empirical research questions, to evaluate empirically if there were any relations between those components, and if the relations could be explained. The 5 subsequent research questions were addressed as consecutive components of the overarching research question.

In an explorative model the relations between the main components were summarised as displayed in Figure 8.1. The components of the overall research question model include respectively the different geoICT coordination types, the staff discretions, and the types of cooperation with geoICT. While a public sector cooperative agreement with geoICT was called a 'geoG2G', the characteristics of such geoG2Gs were described by 'stability elements. Four stability elements were identified in the exploratory phase: power stability, economic rules stability, conformity stability and collectivity stability.

The power stability relates to what each partner in the geoG2G agrees to in terms of responsibility and authority. Cooperating with geoICT introduces a power question on the one hand (given the agreement over resources) and a dependency relation on the other (given the distribution of resources). The economic rules stability includes the agreement on who gains what benefit from the geoICT production process. The cooperation contract not only formalises the operational details of which contract party is to handle the geoICT in which way, and which contract party is to distribute geospatial data and how to third parties, but also specifies the rules regarding how any contributing organisation gains authority over a particular resource (technology, funds, human resources),

and which resource (internal funds, staff allocations) each contract party is obliged to bring to the cooperation. The conformity stability refers to how partners agree to internal behaviour in relation to the specific geoICT. The operational procedures within geoG2Gs are a balancing act between what is institutionally allowed and what is operationally possible. In reality this may mean that internal organisational structures can be both formal (following legally formulated regulations and guidelines) and informal (following non-legally-documented guidelines). Finally, the collectivity stability refers to the agreed behaviour and standpoints towards the external world. All partners to the agreement are expected to adhere to the internally agreed social 'partnership' or 'membership' model, and all internal partners agree to be consistent in displaying their joint geoG2G profile to the external world. Those who adhere to this collective behaviour can be members, while those who don't, or are unwilling to, cannot be members.

Any change in each of these stability elements was considered a change in the stability of the geoG2G. The explorative model 8.1 is therefore a simplified version of the possible relations between the different types of geoICT coordination, the different types of personal judgments (discretions) and the different types of stability elements which geoG2G exhibit. It was hypothesised that any changes in the stability elements of geoG2Gs could be traced back to either choices made in the geoICT coordination and/or choices made through professional judgments / discretions. These traces are depicted as arrows in figure 8.1. The research questions 1, 2 and 3 deal with the content and possible variation of each of the boxes in Figure 8.1., while the research questions 4 and 5 deal with how to evaluate the relation (the arrows) between the boxes and how to derive any explanation for these relations.

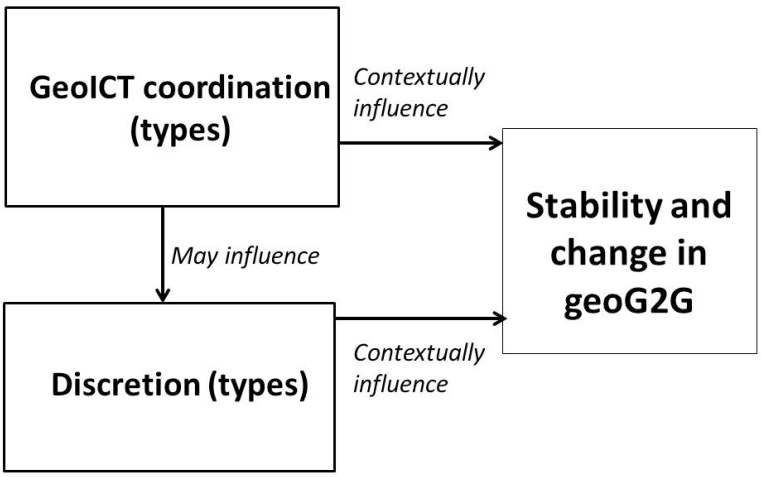


Figure 8.1: Conceptual relations between overall research components

1. *What is' geoICT coordination', and what are geoICT coordination actions about*?

The first box of figure 8.1 concerns the geoICT coordination. GeoICT coordination can be considered a specific type of coordination in the public sector. Broadly defined, geoICT coordination is a comprehensive goal-setting and goal-implementation action which aims at aligning geoICT activities and choices in at least two organisations, and which usually results in a change intervention in how public sector agencies cooperate with geoICT. The actions and the aims to intervene are not uniform. It is possible to distinguish geoICT coordination types based on which actors the coordination aims to target and on which kind of data and processes the coordination aims to streamline. These two dimensions derive 4 geoICT coordination types, which this research has labelled as: LOCUS, EVENTUS, MODUS and CAUSUS coordination.

Each of these types employ different tools and instruments to obtain alignment results. LOCUS geoICT coordination is a type which emphasises the need to align geoICT activities and objectives at all public administrative levels. This implies that for example municipalities, provinces and national agencies should work in such a way that geoICT is easily exchangeable and following standard requirements. The LOCUS type relies on a broad range of predominantly coercive and regulatory tools and instruments to achieve the LOCUS goals. Contrastingly the CAUSUS coordination type aims for aligning geoICT objectives to the organisational and operational environment in which it plays a role. CAUSUS coordination employs a much more modest range of tools, such

as providing licences or technical alignment, such that the geoICT employed within one organisational system easily matches the other ICT within that same system. It thus emphasises the alignment of geoICT with certain contextual conditions or requirements, such as sector interests. EVENTUS coordination aims to align geoICT production steps to ideal-type geoICT results. This relies on the careful formulation and evaluation of end results, and the construction of layers of cooperation agreements. MODUS geoICT coordination aims for the alignment in chains of geoICT production activities, through business redesign and re-engineering, and standardisation models.

From the differentiation in geoICT coordination types it becomes obvious that geoICT coordination does not just concern the technical dimension of geoICT, i.e. the software, hardware and information product requirements, but can also concern the socio-economic conditions through which, or for which, the geoICT is employed. GeoICT coordination can help to specify public sector products and services, which are either constructed with geoICT technology (mainly through MODUS coordination), or disclosed under the condition a certain type geoICT technology is applied consistently (LOCUS or EVENTUS coordination). In certain cases the coordination activities aim to align the geoICT technical requirements to policy requirements (CAUSUS coordination).

Given the differences in geoICT coordination types, it is obvious that each type also generates different type of effects. The first type of effect is in uncertainty. The uncertainty arises because the geoICT coordination activities may change individual authority over geoICT matters, rules of day-to-day work, work norms and standards and collaborative arrangements. Each geoiCT coordination type makes different choices on each of these issues. As a result, uncertainties constrain staff members in their cooperative activities with geoICT. They thus seek practical answers to reduce the uncertainties, partly in the form of creating their own decisions.

A second type of effect is therefore the rise to professional discretions. For LOCUS and CAUSUS coordination types the uncertainties are more likely to emerge among actors active at the intersection of a geoG2G with its environment, such as staff members working at public counters, or staff members responsible for external relations. For the MODUS and EVENTUS coordination types the uncertainties are more likely to emerge among actors active within the geoG2Gs, such as staff members responsible for the ICT in the organisation. With the assumption that the discretions depend on and correspond with uncertainties, discretion types thus also relate to the variations in geoICT coordination types. The emergence and location of uncertainties (within geoG2Gs or at the intersection with the geoG2G environment) is relevant for the second component of the exploratory model, namely the type and the location of discretions of geoG2G actors. How this works is explored in

the second research question.

2. *Whose discretions are affected by geoICT coordination in the Netherlands, and how are these affected?*

The second box of figure 8.1 concerns the discretions. Discretions can be defined as *actions by individual staff members, which rely on a personal appraisal of what is appropriate, given the socio-organisational circumstances and preferences of that particular staff member.* Discretions occur at all levels within an organisation: strategic, alignment and operational. strategic discretions consist of the opportunity set of decisions that strategic managers have to enforce inter- or intra-organisational changes, start-up or end inter-organisational coalitions, reallocate internal and external resources, in response to a changing environment. The alignment discretions consist of the range of decisions which internal staff (may) create or appropriate to change workflows, re-design internal activities, revise budget and revenue allocations, or change information and communication channels, in response to either the organisational strategy changes, operational activities changes, or the combination of both strategy and operations changes. The operational discretions consist of the set of decision opportunities and degrees of freedom which operational staff may create or appropriate in the delivery of products and services to external customers or citizens.

Each of these type of discretions may emerge as a reaction to any type of geoICT coordination and/or alongside geoICT coordination requirements. They relate furthermore to uncertainties of staff members at the level at which staff members operate. The theoretical underpinning of why discretions occur (explained in section 3.3) is first simplification of personal tasks and/or to handle ambiguous tasks ('autonomous' discretions). These arise even in a situation with multiple rules and instructions, because the extent to which all these rules are applied depends on the ability to enforce those rules. In practice the enforces cannot check every aspect of every staff's decision and every action actions. As a result, staff always has a certain degree of freedom.

Secondly, staff members could seek discretionary space when acting as engaged advocates for their deserving clients. Certain staff members may have frequent interactions with customers and clients. This interaction may lead to more personal acquaintance and may even be based on personal sympathies. This may result in personal judgments which cater for needs of clients and/or other actors external to their organisation ('joint' discretions).

When combining the three levels of staff members with the two rationales for discretions there are from a theoretical point of view six types of discretions, which may emerge as a result of the four geoICT coordination types: autonomous or joint strategic discretions, autonomous or joint alignment

discretions and autonomous or joint operational discretions.

The variation in discretions extends the exploratory model of Figure 8.1. Figure 8.2 provides this extended explorative model. Certain types of discretions emerge as a result of or succeeding certain types of geoICT coordination. The variation in certain discretions is more likely to co-occur with the variation in geoICT coordination.

LOCUS coordination emphasises aligning geoICT agreements at higher administrative levels with those at lower administrative levels. In this process, the scope for lower level discretions is reduced to a minimum. At the same time however, local levels have to deal with a multiplicity of hierarchical relations, resulting in uncertainty about what to report and how to account for the local implementation towards higher levels. Given this uncertainty, autonomous strategic discretions may emerge.

EVENTUS coordination emphasises aligning production steps by formulating and evaluating through end results. This emphasis implies that there is little scope for autonomous operational discretions on alternative end results. Yet at the same time it opens up the possibility that alignment staff decides on relatively greater freedom on how to achieve these end results. Both autonomous and joint alignment discretions may thus increase.

MODUS coordination accentuates alignment of chains of geoICT-related activities. Such chains often end by delivering to customers and clients. If the chains need to be harmonious, then client-oriented (joint) operational discretions – suiting individual client needs – are targeted to decrease. However, aligning business processes may result in uncertainties on aligning portions of the chains which could rely on different standards. Such a situation would require flexibility in internal resource allocation and work process alignments. In other words, it would require space in autonomous alignment discretions.

CAUSUS coordination types emphasise adaptation to local contextual needs. This coordination type stimulates the possibility for strategic level staff to exercise strategic discretions. Yet at the same time the multiplicity of environmental demands may result in operational difficulties. To simplify their tasks operational staff may therefore formulate operational discretions.

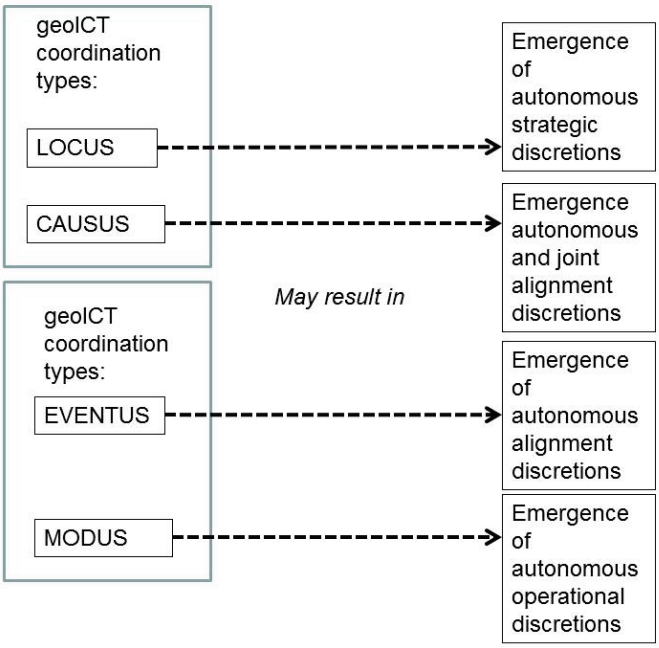


Figure 8.2: Relation of geoICT coordination types with discretion types.

Having identified how the variation in both geoICT coordination may lead to any variation in discretions, the assumption is that both geoICT coordination and discretions correspond with changes in the stability elements of geoG2Gs (power, economic rules, conformity and collectivity). This requires however first a more thorough description of how to identify the stability and change in geoG2Gs.

3. *How to describe and evaluate changes in each of the geoG2G stability elements?*

The third box of Figure 8.1. concerns the stability within geoG2Gs. It is possible to describe geoG2G stability and change in through the elements of power, economic rules, conformity and collectivity. This is done in the following ways:

- Stability in power can be described by looking into the inter-organisational dependencies between the geoG2G partners. The stability in this case depends on the degree to which partners maintain long-term mutual expectations towards each other and make long-term staff allocations to sustain the relationship.
- Stability in economic rules governing the geoG2G can be described by the degree to which the partners anticipate on efficiency gains. This degree is best explained by the logic of transaction cost theory and the theory of

administrative behavior. As long as transaction costs remain low, one can assume stable economic rules.

- Stability in conformity is best explained through the degree to which geoG2G partners can make their own geoICT decisions independently from any agency of external social networks and the degree to which each of the partners in the geoG2G act in a similar – isomorphic - way.
- Stability in the collectivity of the geoG2G can be described by the degree in which the partners maintain collective interests and pursue collective action. As long as collective interests and actions are sustained with collective sanctions and incentives the geoG2G collectivity is stable.

Evaluating the change in stability of these elements is possible through establishing for every stability element what concerns a fundamental discontinuation of stability, and how such fundamental discontinuations are visible at a given moment or over a longer period of time. Using the above descriptions of stability Table 8.1. provides a summary of how to detect changes in stability in geoG2Gs. The artefacts of change and the duration of change for each type of stability can be derived on the basis of theoretical grounds.

A change in power relates to a change in mutual dependencies. When geoG2G partners agree they do not negotiate their relation. Conversely, the presence of negotiations reflects a period of instability in power, and thus reflects a possible change in power relations. Given that changes depend on negotiations, the period during which changes in power stability occur is likely to be relatively long, or period during which the required behaviour of other individuals alters to accommodate this new control. A change in power can thus occur frequently and rapidly if negotiations are settled. However, power instability is always at the surface, as negotiations are more likely to be present than absent. As a result, the shift from power stability to instability occurs frequently.

Instability in economic rules occurs when partners stop adhering to the formalised economic rules. The occurrence of instability in economic rules is visible through the increase in activities related to the construction of work protocols, the redefinition of performance indicators and the perception of enforcement failures. Transaction cost theory would reason that change incurs transaction costs, whereas the theory of administrative behaviour would predict that this would coincide with more autonomous decisions and work processes by ‘administrative men.’

Changes in conformity can be derived from both the social network theory and the isomorphism theory. Conformity stability is strongly related to how active geoG2G staff m embers have affinity with and are committed to their social and professional networks. It is especially those networks which generate

'standards' and 'best practices' that are likely to provide isomorphism and stability in conformity. Consequently, instability emerges when there are multiple influential external networks acting on individual actors at the same time, or when there is a decline in the dominance of one specific network in favour of another. This usually results in a gradual change.

Changes in collectivity stability follow the logic of collective action. A change occurs at the moment that staff members start to question the credibility, or appropriateness, of the product which they contribute to. So when they lose faith in the jointly produced product or jointly agreed production means, they may become less willing to support the geoG2G as a whole. This willingness to support the sustenance of the geoG2G reflects the stability element collectivity. A change in collectivity has the tendency to be abrupt, and have a 'tipping point'.

	geoG2G stability elements			
Four Change Characteristics	**Power**	**Economic rules**	**Conformity**	**Collectivity**
Artefact of the change concerns	New control & dependency agreements	Different transaction costs	New external rules	Alternative collective interest
Duration of changes	Relatively long (almost continuous) with unpredictable results	Relatively short – mostly sequentially	Gradual – often with somewhat predictable results	Incongruent within short interval (tipping point)

Table. 8.1: Summary of change characteristics of stability elements

These aggregated characteristics of 'stability' and 'change in stability' enable an encompassing evaluation of the stability of geoG2Gs – a more detailed picture of figure 8.1, as displayed as the conceptual relation in Figure 8.2. On the left the boxes show the characteristics of geoICT coordination and discretion types, while on the right the box summarises the characteristics of stability and change in geoG2Gs. The arrows represent the potential relations between any of these characteristics.

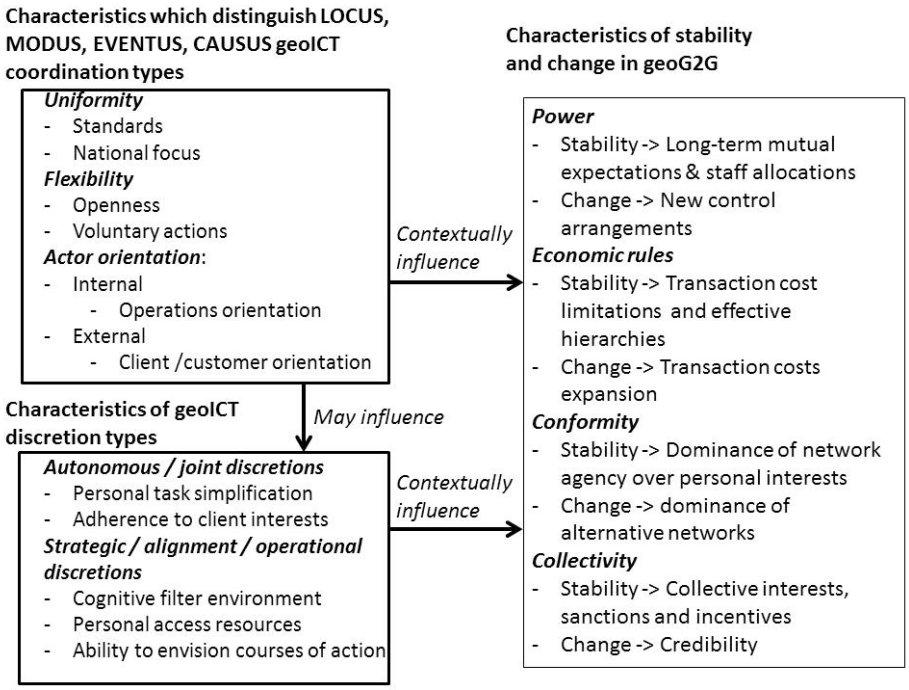


Figure 8.2: Conceptual model relating characteristics of geoICT coordination, discretions and geoG2G stability and change

Having identified how to describe and evaluate stability and change in geoG2Gs, the next step is to find out how to observe the causes and triggers for change in an actual case. Such empirical data should show if the changes in stability correspond to the types of discretions which emerged or the type of geoICT coordination which was employed. The objective of the operationalisation strategy should thus be where, when and how to find and observe artefacts for each of these conceptual elements. The result of this strategy leads to an empirical description of the contextual influences displayed by the arrows in Figures 8.1 and 8.2. This introduces the next question.

4. *What are appropriate indicators to verify the extend of relations between geoICT coordination types, discretions and stability changes, and with which techniques is it possible to determine the values of those indicators?*

The conceptual model of Figure 8.2 can be operationalised through the detailed breakdown of each of the concepts derived above. For each of these concepts it is possible to formulate a set of aspects and indicators for the types of coordination, discretions and stability elements. A description and assessment of the aspects 'standards', 'national focus', 'openness', 'voluntary actions', 'operations orientation' and 'client/customer orientation' provide an indication of how the geoICT coordination aims and activities in a particular case are

executed. The degree to which the aspects 'personal task simplification', 'adherence to client interests', 'cognitive filter to the environment', 'personal access' and 'ability to envision alternative courses of action' are or have been present provide an indication of the presence and significance of discretions. An assessment of the aspects of 'long term mutual expectations and staff allocations' and 'control over resources give an indication of a change in the power stability of a geoG2G, the aspects of 'transaction cost limitations' and 'transaction cost give an indication of a change in the economic stability of a geoG2G, the aspects 'dominance of network agency' and 'dominance of alternative networks' give an indication of a change in conformity stability, and the aspects of 'combination of collective interests with collective sanctions' and 'loss of credibility' give an indication of a change in collectivity stability.

Finding a value of these indicators empirically is possible through a qualitative approach of data collection, combining responses during semi-structured interviews, document analysis and systematic coding and interpretation of textual data. Such a process derives a comparative assessment of the indicators in each case. Where respondents and documents systematically and/or regularly refer to elements of each indicator it is assumed that the significance and the intensity of the aspect is considered *high (or increasing)*. If they do not, then the aspect can be considered *low (or decreasing)*. Linking the high values of aspects and the low values of aspects gives an insight in possible sequential or corresponding relations between each of these aspects. This process of connecting high and low 'scores' thus establishes the contextual relations of Figure 8.2 empirically.

With the basic classifications of geoICT coordination types, discretions types, and characteristics of stability and change, and with the operationalisation strategy to evaluate stability and change through 8 operational aspects it is possible to investigate the overarching research question for a set of cases. This culminates in the empirical results in a set of cases.

5. *Which variations in geoICT coordination and discretions actually influence which changes in stability elements in geoG2Gs?*

This question has been addressed through executing the operationalisation strategy in four cases, whereby each case represented one type of geoICT coordination. The four cases included:

- Cadastral case, whereby the construction and maintenance of parcel-geodata at the National Kadaster together with all municipalities in the Netherlands are coordinated through a national (LOCUS) geoICT coordination strategy of key registers;
- AHN case, whereby the emphasis of managing the collection and distribution of water geo-data by both the water boards and the public water

department was put on streamlining the inter-agency technical processes towards an agreed geoICT product (EVENTUS coordination).
- Dataland case, whereby the real estate geo-data of the majority of Netherlands municipalities were aligned through a centrally directed process (MODUS coordination).
- Sabimos case, whereby the transport and mobility geo-data of regionally clustered municipalities in Twente were aligned with regional mobility requirements (CAUSUS coordination).

The aspect values for all cases were collected in a 4 year period. Although this research period of 4 years was relatively limited, the empirical data collection derived values for each aspect in all the cases. The complete set of findings on each aspect in each case is summarised in Table 8.2

	Aspects	**LOCUS (Cadastral)**	**EVENTUS (AHN)**	**MODUS (Dataland)**	**CAUSUS (Sabimos)**
GeoICT coordination aspects	Standards	High	High, but decreasing	High	Low
	National focus	High	High	High	Low
	Openness	Low	Low, but increasing	Low, but increasing	High
	Voluntary actions	Low	Low	Low	High
	Client/customer orientation	High	Low	High	High
	Operations orientation	Low	High	Low	Low
Discretion aspects	Cognitive filter to environment	High (for strategic staff)	Low, but increasing (strategic staff); Low (alignment & operational staff	High	High
	Personal access to alternative resources	Low	Low	Low	Low
	Ability to envision courses of action	High (for strategic staff); Low (alignment & operational)	High (for alignment staff)	High (for alignment staff)	High
	Degree of personal task simplification	Low	Low	High	High
	Degree of adherence to client interests	High	Low	Low	Low

	Aspects	LOCUS (Cadastral)	EVENTUS (AHN)	MODUS (Dataland)	CAUSUS (Sabimos)
Stability elements & aspects					
Power	Long term mutual expectations and staff allocations	High ,but decreasing	High, but decreasing	High.	High
	Control of resources	Low, but increasing	High, but decreasing	Low, but increasing	Low
Economic rules	Transaction cost limitations	High, but decreasing	High	High	High
	Transaction cost expansion	Low, but Increasing	Low	Low	Low
Conformity	Dominance of network over personal interests	High	High	High,	High.
	Dominance of alternative networks	Low	Low	Low	Low
Collectivity	Combination of collective interest with collective sanctions and incentives	Low, but increasing	High	High	High
	Loss of credibility	High, but decreasing	Low	Low	Low

Table 8.2: Results of all aspects in all cases

The analysis of findings in Table 8.2. leads in two steps towards the answer of the main research question. The first step is to compare and explain the findings in each aspect. The second step is to compare and relate the high and low values in different aspects and to synthesize these relations from both other contextual findings in each case and the theoretical models with which the stability elements were conceptualised.

In relation to the first step of the analysis the findings of the geoICT coordination aspects show that three of the cases have high values in the aspects 'standards' and 'national focus'. An explanation for the high values in standards can be found in the historical contingencies of each of the respective coordination strategies. In the cadastral case the relations between the Kadaster and the municipality date back to the 19th century. Similarly, in the Dataland case, the association of municipalities (VNG), which plays a crucial role in the coordination, also already exists for more than 100 years. These long paths of experience may have generated a choice for standards and a national orientation. In contrast, the partners within the AHN case have witnessed many institutional changes and reforms in the past two decades. As a result, many of

the historically grown processes and process objectives have been seriously re-considered through several iterations. The knowledge base has thus changed in this case, and have thus favored more adaptations to the general standards. Finally, the Sabimos case is only in existence since some 10 years, so there is little to no knowledge base to fall back on. This may explain why the coordinators opted for a more gradual and flexible coordination strategy, thus providing higher values in the openness and voluntary actions aspects than in the Cadastral case, for example.

An explanation for the high values in national focus and the simultaneously increasing standardisation and scaling up tendency across all cases is the mere fact that any national focus in objectives together with the involvement of actors from a variety of administrative levels is likely to require standardisation in order to achieve any type of result. Furthermore, the fact that the same actors have to implement a supranational LOCUS type of geoICT coordination strategy, namely INSPIRE, contributes to the thinking in scales and linking geoICT at different scales. Finally, the scaling up tendency is rooted in the fact that the majority of experts represent a small technical field, which is seldom challenged with competition. This makes isomorphic choices, i.e. technical and managerial solutions to geoICT problems which strongly resemble each other even though they are proposed for different organisations and different geoG2Gs, less contested.

A second observation as part of the first step of the analysis concerns the differences in the discretions aspects. As shown in Table 8.1 the discretion values on the basis of a cognitive filter to the environment and on the basis of ability to envision alternative courses of action tend to be high, whereas the values on the basis of personal access to resources or on the basis of adherence to client interests tend to be low. Apparently, the professional discretions are more often sought in seeking alternative technical procedures and alternative partners to execute the processes, rather than seeking alternative funding or alternative clients. An explanation for this could be that the geoICT staff are primarily mitigating technical risks and technical dependencies rather than mitigating financial risks of budget dependencies. The geoICT staff feels apparently that they have too little influence to change any (inter-)organisational budgets.

A third general observation as part of the first step of the analysis is that the power stability aspects in Dataland and Sabimos are high, whereas in the Cadastral case and the AHN case these are low. The economic rules stability is only low in the Cadastral case. The conformity and collectivity stability remain high for all cases. Part of this variation may be due to the intrinsic characteristics of the partnerships. The Cadastral geoG2G and the AHN are existing already much longer than the Dataland and Sabimos and have therefore

gone through many more phases of stability and change. Furthermore, the size of the partnership is of influence. A geoG2G with many partners, such as the Cadastral geoG2G and in the Dataland, will certainly have much more difficulties to maintain any stability than a geoG2G with fewer partners, such as the AHN and Sabimos. Still, more crucial for the variation in stability elements probably however the influence of the coordination types. This will be discussed hereafter.

The second step of the analysis concerns comparing and relating the high and low values of every aspect to each other and seek an explanation for a correspondence of high or low values in different aspects. This involves first relating high and low values of geoICT coordination aspects to high and low values of discretion aspects, then relating high and low values of geoICT coordination aspects to high and low values of stability aspects, and finally relating high and low values of discretion aspects to high and low values of stability aspects.

The first kind of relation concerns the high values in the standards and national focus aspects and the high values of strategic discretions on the basis their cognitive filter of the environment. At first this seems a surprising relation because the coordination strategies employ different types of standards for different reasons. The LOCUS coordination type – employed by BAG in the Cadastral case - reasons from the need to employ and align standards in geoICT in all agencies using similar data, whereas the CAUSUS type of coordination - employed in the Sabimos case - reasons from a completely opposite starting point, namely from disregarding national geoICT standards, but constructing workable geoICT solutions which enable local contextual technical solutions. The explanation for the relation between national standards and strategic discretions is therefore probably rooted in the strategic risk mitigation. The risk mitigation discretions of strategic staff reflect the activation of weaker ties in the social network theory, i.e. an activation of personal acquaintances rooted in similar educational backgrounds or previous work relations. The reaction to the external change, with potential external values, is to seek alliances with professional peers of the staff members with similar values and ideas about geoICT alignment. In the LOCUS type the strategic ties with similar technical ideas are found in strategic partners, in the CAUSUS type the technical ties are found in sector specific alignment and operational partners.

Although the values for strategic discretions were prominent in the LOCUS case, the Table 8.2. also shows that in the other cases alignment and operational discretions emerged as well, even though the degree to which these were present differed per case and differed in time. The other types emerge in particular in cases where standardisation is less coercive. Whereas the strategic

discretions of the Cadastral case were mainly rooted in the practice to prioritize external client relations, the alignment and operational discretions (as far as the latter exist) of the Sabimos case for example tend to be more rooted in task simplification. Discretions on the basis of simplifying tasks may thus be much closer linked to avoiding geoICT interoperability with other forms of ICT. When organisations have partnered in a one-to-many partnership (such as in the Cadastral case) there are more strategic discretions. This can be explained by the argumentation that the largest partner (in terms of staff members under a single roof and budget under a single authority) has a bigger strategic interest. This would make this partner have a bigger stake in the mutually shared resources, creating a power difference between partners. In other forms of partnerships alignment discretions occur. Alignment staff members are the only ones who are in direct contact with technical geoICT experts and developments. This provides them more freedom to adapt coordination requirements to their own judgements to prefer one or the other technical provider, or technical solution.

With regards to the relation between geoICT coordination aspects and stability aspects, Table 8.2. suggests a correspondence between the coercing of standards at a national level and a change the power stability and economic rules stability. The persuasive standardisation actions can only be effective if the standards are sustained. This implies that resources have to be adapted accordingly (i.e. more resource need to be available) to sustain the standards. The implication is that power stability and economic rules stability change to sustain the standards. In the absence of a full-fletched system to enforce such a uniform standard solution, the power and economic rules do not need to change, as can be witnessed in through the lower values in power change and economic rules change in the Sabimos case, for example.

Another relation between geoICT coordination aspects and stability aspects concerns the high values of standards with the high values of conformity stability. As the standards foster strategic discretions in view of mitigating strategic risks, social exchange theory further predicts that strategic staff members act like this in view of creating and fostering more stability in conformity, i.e. more support for the values in their peer network. The empirical data of the cadastral staff members seeking new partners with similar technical values confirm this theory. Such a strategic reaction of risk mitigation is completely absent in the CAUSUS case (where no standard solution is promoted) and in the EVENTUS case of AHN (where production standards are gradually outsourced). Coercing and/or fostering geoICT standards at a national level is therefore likely to trigger a rise of strategic discretions based on the weaker ties in their professional networks. The empirical data on the aspects of conformity show furthermore that the values of BAG are only gradually accepted and regarded as unavoidable, and that the return to conformity stability

strongly relates to the acceptance of BAG rules. The gradual adoption of 'foreign standards' as valuable alternatives was found to be in line with social exchange theory, which posits that interactions on the basis of new relationships can only evolve over time. At the same time, the coercive nature of having to implement a BAG standard as opposed to possibly wanting to adhere to a national transportation information standard (in the Sabimos case) creates a gradual change in control of resources and transaction costs. This would suggest that is the main –longer term and more fundamental - impact of the LOCUS coordination is not so much a change in conformity (resulting from strategic discretions), but a change in power and economic rules stability.

The second zoom is on the relation between discretions and geoG2G stability aspects. Table 8.2 shows that for the LOCUS type of geoICT coordination (exemplified by the Cadastral case) the discretion aspects are in particular high for strategic staff members, and that this corresponds to simultaneously occurring yet diverging effects in stability: decreasing stability in power and economic rules and increasing stability in conformity and collectivity. The discretions are in particular high for strategic staff members who seek new alliances and new partners with similar geoICT interests. A theoretical explanation is that the origin of discretions lies in the risk mitigation of strategic staff members. The risk mitigation is in the form of spreading the risk within a broader network. This explains why the need for a collective image becomes larger. Sharing the risk in a broader network automatically also means sharing the power in a broader network, thus reducing the power stability, and increasing the transaction cost to maintain the network relations.

Table 8.2. shows a different relation in the EVENTUS case. The discretion aspects are high for alignment staff, while for the stability there is a decrease in transaction cost and a maintenance of conformity and collectivity stability aspects. It would seem that the discretions in AHN concern primarily decisions on technical choices and technical partners in the operational processes. Such discretions are a way to re-enforce certain historically accepted work practices within technical professional networks. This leads to a re-conformation of the conformity and collectivity stability. It is likely that the technical professional networks contain members with a similar professional background, which causes isomorphic behavior. The individual staff members are more likely to enact the values of their professional networks than to enact the values of new, alternative coordination strategies. Investing in these alternative values can also be regarded as additional transaction cost which staff members are trying to avoid. So, both the discretions and the re-enforcement of stability can be explained from both transaction cost theory and from isomorphism theory.

In the MODUS type (exemplified by Dataland) the high values of discretions correspond to high values in conformity and collectivity aspects. The

discretions in this case are primarily related to the municipal decisions on whether to join the central Dataland agency (and its geoICT alignment objective) not. Theoretically one could explain the emergence of type of discretions and the effect on stability in conformity and collectivity with the theory of isomorphism. Essentially the conformity is rooted and stimulated by mimicking, i.e. copying practices and seeking similar organisational forms. Mimicking is a survival strategy on the one hand, and provides stability on the other. The result of mimicking is that the municipalities are leaving their judgment to adhere to Dataland to their trust in other similar municipalities. As a result, they are gradually becoming similar in geoICT activities, and many staff members exhibit similar professional behaviour. Organisations and staff behaviour within the organisations become 'isomorphic' with regards to parcel and building information. Following Meyer and Rowan (1977) the compliance to the Dataland requirements and placing value to the Chapeau price is a form of seeking legitimacy for their judgment to join Dataland or not.

Table 8.2. shows that there are high values of discretion aspects in the CAUSUS type yet little variation in stability aspects. The explanation for the relation between the alignment discretions, rooted in task simplification by avoiding data integration, and the stability in all elements can be given by resource dependency theory. The discretions are not fundamentally altering an resource dependencies. None of the partners are affected by a different choice in technical systems or a particular format in geoICT generated data. As a result, there is little change in the dependency relation and no change in power stability occurs. Furthermore, the discretions favor solutions in support of the transport and mobility requirements and not necessarily the geoICT based solutions (they do not make use of the authentic geo datasets for example). One could see this as a behavior whereby the values of the professional values of the transportation domain are more dominant than the values and solutions of the geoICT professional domain. The discretions are thus not rooted in the interests of clients with a geoICT background or geoICT need, but in the interests of the transportation sector. These interests form the social network ties upon which this geoG2G is based. These stronger network ties explain the high conformity and collectivity.

Having found and explained the empirical results from the four cases provides room to elaborate on the overall research question.

6. *Which theoretical and practical conclusions and recommendations can be drawn from this research?*

In summarizing the conclusions to the main question **How and why do different geoICT coordination types change the geoG2Gs in the Netherlands, and what is the influence of staff discretions in this process?, t**he following conclusions can be drawn:

GeoICT coordination indeed influences geoG2G stability. So, within the larger scheme of public sector management one can state that coordination of a particular technology (in this case geoICT technology) can have an effect on why and how public agencies cooperate. This research found three main types of influence originating from choices in geoICT coordination :

1) When opting for LOCUS or MODUS geoICT coordination strategies there is more significant connection between emphasizing standards and a change in power than in the EVENTUS and CAUSUS cases. In the former the power change is visible through the aspect of control of resources. The reason is that introducing a new standard which would apply to many layers of administration (as in LOCUS coordination) or alongside many other existing work practices (as in MODUS) introduces a new set of power dependencies. The empirical results have shown that introducing a standard in a bulky set of principle-agent relations in which many municipalities are involved creates more instances of changes in power stability than introducing and fostering such a standard in constricted sets of principle-agent relationships. In the municipal context the geoICT standards are one out of many newly introduced ICT related standards. According to social exchange theory introducing and fostering 'battles' with the contingency effects of previous standards. The standards are thus not immediately agreed upon as new fixed rules of exchange but are only gradually adopted.

2) The empirical results suggest a relation between valuing openness in geoICT coordination and an increase in sharing of geoICT resources (visible in limited transaction costs in the geoG2G). Only in the LOCUS case the transaction cost seemed to increase, while the aspect for openness is low. The results suggest a relation between the presence of direct and personal contacts in the implementation paths and the asset specificity. Once all actors have the perception that they can contribute to an open debate on future geoICT decisions then they are more likely to share their resources and assets with each other. Fostering an open environment seems thus to foster a decrease in transaction costs and therefore more stability in economic rules in geoG2Gs.

3) Stability in conformity and collectivity are not influenced by any choices in geoICT coordination. This may be partly due to the influence of INSPIRE, as a overarching supranational agreement. On the one hand the supranational participation in developing the INSPIRE content strongly increases the extent of interactions within a single professional field (hence increases the dominance of the values within a single professional network), and on the other hand the rules of INSPIRE itself and commitment of European member states to adhere to these rules implicitly provide a set of collective sanctions for partners at the national level. The sanctions increase

the likelihood of collective action of government agencies having to adhere to INSPIRE. In other words, the supranational geoICT coordination strategy has an impact on the national geoICT coordination strategies. If on the other hand, the geoICT coordination is dominated by local interests (such as in CAUSUS) any degree of conformity and collectivity does not relate to INSPIRE or any other European strategy. However in these type of cases there is likely to be a high degree of 'voluntary action'. It is plausible that part of this voluntary action is rooted in collective interests and network agency of the specific domain.

Furthermore, it can be concluded that discretions of individual staff members indeed play a role in how stability of geoG2Gs changes. This implies that there is indeed an influence of professional judgments on how and why public agencies cooperate. Specifically there are four ways in which professional discretions influence the stability of cooperations:

1) Strategic discretions which are rooted in the professional insight in the organisational environment (measured through the aspect 'cognitive filter to the environment') correspond to a stability in conformity (visible in the aspects 'high dominance of network interests over personal interest and collective interests'). The potential of strategic discretions seems to depend on whether multiple sectors are involved in the geoG2G. The empirical cases showed that in the case of a single sector – 'water' in AHN – the strategic discretion aspects are relatively limited. If however multiple sectors are involved (in the execution of geoICT production and other work arrangements), whereby each sector has their own requirements, than staff discretions may emerge to deal with the possible risks of not being able to comply to all requirements. This leads to strategic discretions which favor a needs of one particular partner in the geoG2G. The Cadastral case showed such discretions of Cadastral staff members, the Dataland case of ICT subcontracting municipal staff members, the Sabimos case of system management staff members. In these discretions they would clearly favor solutions which they know. The theory of collective action explains this relation. The discretions favor a situation which maintains the collective interest of partners. In maintaining the collective interest staff members exhibit discretions to make the group size (of potential partners) larger. Whereas in the absence of collective incentives, the incentive for group action diminishes as group size increases, in the presence of collective interests, the incentive for group action increases as the group size increases. A (high score in) cognitive filter to the environment is thus a stimulus to support the collective interest.

2) Alignment discretions correspond to higher stability in economic rules. Theoretically one can explain this as follows. The discretions, rooted in the

ability to envision alternative courses for action, emerge from having close affinity with certain historically accepted work practices within a professional network. This leads to re-enforcing these practices (as alternative for the coordination requirements), hence to a isomorphic behavior. The individual staff members are more likely to enact the values of their professional networks than to enact the values of new, alternative coordination strategies. The staff members thus consider investing in new coordination values the new coordination requirements as additional transaction cost which staff members are trying to avoid. So, both the discretions and the re-enforcement of stability can be explained from both transaction cost theory and from isomorphism theory.

3) A third relation exists between discretions based on the need for personal task simplification and the power stability (visible through a (high) degree of long term mutual expectations). The choice for personal task simplification was visible in the two cases Dataland and Sabimos, where alignment staff members opted to avoid actions to create (geo)ICT interoperability with other operating ICT systems. In the two other cases this interoperability was considered crucially important, and was therefore not a reason to simplify tasks. By simplifying tasks the alignment staff members decrease technical uncertainty, but this apparently also strengthens the trust between in long-term cooperation and mutual expectations of partners. This does not seem evident at first. It suggests that geoICT interoperability with other ICT systems operated by individual partners is not a crucial condition for maintaining long term partnerships. This can only be explained if the dependency on geoICT is not crucial enough for the individual partners. There are other ICT related dependencies in these geoG2G cases, which outweigh the need to maintain geoICT interoperability. A theoretical explanation for the relation between the alignment discretions, rooted in task simplification by avoiding data integration, and the stability in all elements can be given by resource dependency theory. The discretions are not fundamentally altering an resource dependencies. In both the Sabimos and the Dataland case none of the partners are affected by a different choice in technical systems or a particular format in geoICT generated data. As a result, there is little change in the dependency relation and no change in power stability occurs.

4) A fourth relation exists between discretions rooted in the choice to adhere to client interests and the instability in economic rules (visible as an increase in transaction costs). In the Cadastral case strategic staff decided themselves to scan the environment for alternative cooperative arrangements by being actively involved in the PDOK discussions. The PDOK discussions essentially re-evaluate the current cooperation agreements, including those with the municipalities. There was also the increase in transaction cost

because of the new budgeting rules relating to the BAG. The strategic staff members of the Kadaster also indicated that this budget allocation change caused uncertainty among the strategic staff members on how to explain this to their customers. The underlying reason to reach to discretionary decisions is therefore likely to come from this need to adhere to client interests. Hence, there is a relation to client interest driven discretions and economic stability changes. Theoretically, the PDOK discussions of the strategic staff in the Cadastral case reflects the activation of weaker ties in the social network theory. The theory would predict that strategic staff members would do this in view of creating and fostering more stability in conformity, i.e. more support for the values in their peer network. However, maintaining these new ties increases the transactions costs.

From these general observations and conclusions of this research it is possible to derive recommendations. This is done in section 8.2.

8.2 Recommendations

The approach of this research was pragmatist in the formulation of the concepts of geoICT coordination and discretions, based on a certain set of theories in the theoretical part on stability and change, and qualitative in the analysis. Furthermore the cases were only from the Netherlands, thus restricting the empirical field. Each of these choices obviously influence how the research findings were derived. This section addressed two types of recommendations:

1) the recommendations for further research, which implicitly addresses the pros and cons of the above made choices , and
2) the recommendations for practitioners working in the field of public sector geoICT coordination.

8.2.1 Recommendations for further research

The pragmatist choice in the formulation of concepts has the advantage that the derivation of concepts has an immediate connection to practice and practitioners. There is no uniform theory on every type of coordination which practitioners utilize, hence their practices provide a good ground to derive the typology of geoICT coordination types. The disadvantage of such an approach is twofold: practically, it is a lengthy and uncertain process to do so, because it depends on a large set of grey literature, of which the quality and accuracy may be at stake. Moreover, grey literature is often not available in standardized (i.e. journal article, thesis, book) form, but appears in many types and shapes (on CD/DVD's, in working papers, blogs, etc.). Secondly, one has to work at the end with a conceptual framework which is not entirely rooted in tested theories, but in the combination of theories and practice. An alternative approach would therefore be to rely on tested theories only.

The choice of theories for both the derivation of concepts in chapters 2, 3 and 4 and the explanation of findings in chapters 6 and 7 was useful and helpful on the one hand, but on the other hand also led to reductionism which is partially contradictive with the more inductive grounded theory approach. Some of the limitations and critiques on the theories were also apparent in the empirical findings. In relation to the concept of geoICT coordination, the critique from critical geographers (raised in chapter 2) that the social agency and fixed epistemologies underlying geoICT coordination are insufficiently taken into account became apparent in the consistency with which spatial objects are included and conceptualised by geoICT software. In all the empirical cases the geoICT related to either points (AHN used points of height), lines (Sabimos is based on transportation lines), or polygons (Cadastral cases relies on parcels, which are boundaries forming an areas or polygons; Dataland cases relies on buildings, represented by boundaries or areas). To address the concerns of critical geographers on the epistemologies of geospatial objects and phenomena, it would be interesting to see if these have an impact on the choices that professionals make in geoICT coordination. If for example the geoICT does not conceptualize space with the properties of conventional geospatial objects (in the form of points, lines, polygons or pixels) but with the properties of how individuals perceive certain phenomena in space (e.g. such as in the studies on the geography of emotions, fear (Kwan, 2008; England & Simon, 2010)) then geoICT coordination may also be conceptually different. This is therefore subject for further studies.

In relation to the theoretical conceptualisation of discretions, and the conceptual relations between different gradations of discretions, the theoretical criticism concerned the lack of fundamental "grand" theory which would explain the origin, type, occurrence and variations of discretions in one model. The findings of this research have confirmed indeed that it remains difficult as a result to evaluate and differentiate discretions empirically. Therefore, in line with the recent work of Evans (2011), which focused on the management of discretions, the findings of this research could be compared in future studies to other professional fields, with the aim to see if these findings are consistent. Alternatively, discretions could be conceptualised as "operant subjectivity", i.e. people enacting their beliefs, which could be studied with Q methodology techniques (Brown, 1980; van Exel & de Graaf, 2005; Watts & Stenner, 2012).

In relation to the employed theories to evaluate change in each of the stability elements, it must be re-iterated that the nature of stability in geoG2Gs proved to be dynamic and multi-layered. Furthermore it appeared possible that stability and change of one element may also influence the other element. Yet, the employed theories tend to focus on singular stability elements only, and thereby leave out the interrelation between the elements, or the reasons why and under which circumstances certain stability element changes influence other stability

element changes. Therefore, it is recommended to continue further research into these interrelations and to seek a connection between for example resource dependency theory and transaction costs theory to explain and predict the relation between power changes and economic rules changes. In addition, a theoretical relation between isomorphism theory and collective action theory could possibly help to explain and predict a relation between stability in conformity and collectivity. In the empirical results very little, change seemed to take place in the period of research, and as a result either this change is not visible or the timeframe of this change is much longer than the research period. Perhaps information infrastructure notions of "contingency", "installed base" and "drift" (Ciborra & Hanseth, 1998; Hanseth & Lyytinen, 2004) can provide more insights in the slow changes or hidden change processes which affect these kinds of stability.

The analysis in the case studies entirely focused on cases in the Netherlands. Further research could extent this research with more cases inside and outside the Netherlands, apply a more longitudinal time scope, and extend to cases with other types of ICT. As many of the geoICT activities involve one of more municipalities in the Netherlands, a crucial question is whether this localisation of geoICT activities is similar in other countries with other administrative structures. It is for example likely that countries with more hierarchical public administrative structures and cultures exhibit much more uniformistic types of geoICT coordination strategies. This would potentially imply that narrowing down the geoICT coordination types with different shades of uniformity is essential. When extending in particular to developing countries, there may be completely different patterns. GeoICT may still be underused, and public agencies, their coordination processes and their cooperation structures are quite different than in the Netherlands. This would also address the concerns of neglect of non-western scientific epistemologies of Sheppard (2005). It is likely to find different results in coordination effects, discretions and stabilities. Comparing these cases to those found in this research could help to understand the role of historically developed political and institutional structures on cooperating with geoICT.

The choice of cases and a comparative casestudy analysis had the advantage that certain similarities, difference and patterns could be revealed. Table 8.2 provides these similarities and differences. One of the potential drawbacks of this methodology is the choice of cases and the type of case study comparison. Although all 4 cases are clearly representative for one particular type of geoICT coordination, drawing the boundaries between the cases itself is not always evident. In addition, it must be acknowledged that the case selection process limits the research to comparing dissimilar cases in terms of geoICT coordination. Adding similar cases of geoICT coordination could provide more insight in the role of the socio-organisational context in the formation of

discretions and the changes in stability elements when staff members are confronted with similar coordination strategies.

Finally, in a research time span there is only a limited amount time and opportunity of direct interaction with staff members within geoG2Gs. Although interviews were in-depth, and were carefully validated, the findings still present an outsiders' view. A more longitudinal and more interactive approach could potentially lead to more data about the behavior of staff members and their reasoning towards this behavior. This could in particular provide more insights about reasons for discretions. In this research it was not possible to find evidence for joint discretions due to pressure from the commercial companies executing the data collection and quality control. Such discretions are however possible, because of the increasing outsourcing of operational activities, and outsourcing of quality checks. Therefore, further empirical investigation could possibly substantiate this hypothesis. At the same time, it is obvious that technological and societal developments are rapid. At the end of the research period there were already new developments, such as PDOK, which could have been incoprated in this research and thereby altering some of the findings. This is an immediate effect of narrowing down research in time.

8.2.2 Recommendations for practitioners.

The summary of geoICT coordination aspects shows that a crucial insight relevant for geoICT coordination practitioners is that there does not exist a unique tool or instrument to 'coordinate' geoICT objectives in a particular direction. With any choice of geoICT coordination type there will be effects in the form of individual discretions and stability element changes (apparent in the findings on discretions and stability elements in the case studies. This implies that working with geoICT is likely to be rooted in a socio-technical environment which limits on the one hand what geoICT coordinators can achieve, or what they can utilize as coordination instrument. Often the geoICT coordinators have a strong relation with this environment as well, making them partially or completely entangled with this environment. As a result any coordinator needs to be aware of the potential for subjectivity, flexibility and discretions of him-/herself and others.

The case study results on the geoICT coordination aspect of 'national focus' show that geoICT coordinators tend to scale up their objectives geographically and organisationally. The scaling up tendency of geoICT coordination has a number of side effects on stability that geoICT coordinator should be aware of. Coordination is increasingly complex with every new partner, and every new business rationality added to the partnership. Discretions become increasingly difficult to manage, and as a result coordinator may turn to use standards. However, although standards are increasingly needed, these standards may

become increasingly non-uniform and may become even non-practical to some partners in the geoG2G partnership. In other words, with scaling up of coordination objectives, and scaling up of the number of partners, there is an increased need to maintain stability with stronger rules, and stronger coercion of rules. This may increase instability of power and economic rules stability. The potential for overall instability thus increases, even in cases where the relations had been historically stable. The results of the cadastral case show this fluctuation in stability despite the fact that the partners had an historically stable relation. The case of Dataland is showing this same fluctuation in 2010. The case of Sabimos is therefore likely to show fluctuation in the future, if they change their priority from local interests to national interests. The case of AHN may become less stable if they start to actively engage more parties (e.g. all municipalities) in their new agreements for AHN.3.

A pragmatic solution for practitioners to avoid such fluctuation in stability (as a result of scaling up) is perhaps not to scale up too fast, and not to enforce uniform regulations for all parties (such as municipalities) if these municipalities have not been involved actively. The results in the Cadastral case have shown that quick and forceful standardization at all public administrative levels can also lead to high degree of discretions (see the high scores in discretions and stability changes aspects. Instead, a more gradual and phase-to-phase approach may be preferred similar to AHN and Sabimos, whereby the inter-organisational relationships are either made or kept more stable. The degree of discretions is rather low in these cases.

The comparison of the high and low scores in geoICT coordination aspects and stability changes aspects show that that fostering an open environment seems to foster an increase in sharing of resources and decrease the transaction cost. So, the argument of lowering the transaction costs may be a confusing and contradicting argument in the case of geoICT coordination. For practitioners this insight implies that lowering transaction costs may be both the results of adhering to a standard but also the results of fostering openness and participation. In these cases practitioners need to be aware of the possible consequences which they aim for.

Annexes

Annex 1a – List of key interviews

14 KEY INTERVIEWS USED FOR CHAPTERS 2, 3 AND 4

	#	Date	Name	Position	Organisation
National level	1	20-1-2010	Hanneke Ester	Chief financial officer (CFO)	Kadaster
	2	17-11-2008	Floris de Bree	Adviseur afdeling Strategie & Beleid	Kadaster
	3	11-1-2008	Leen Murre	Director-Seccretary GBKN	Kadaster/ GBKN , Aperdoorn
	4	1-4-2008	Ruud van der Kroode	Senior policy advisor information management	VNG (Dutch association of municipalities)
	5	25-1-2007	Mark Bruinsma	Productmanager AHN	Rijkswaterstaat / Adviesdienst Geo-Informatie en ICT
	6	26-4-2007	Martin Peersmann	manager afdeling Data en Informatiebeheer Nederlandse Ondergrond (DINO).	DINO/TNO
	7	10-4-2007	Wim Hendrikse	Programma manager	ICTU
Regional level	8	7-3-2007	Bert Ludikhuize	Afdelingsmanager Informatica & Geografie	Waterschap Velt en Vecht
	9	6-3-2008	Marjan Bevelander	Teamleider Datamanagement Eenheid Integrale Informatie Voorziening	Provincie Noord-Brabant; IOG-Geo
	10	26-4-2007	Patrick Zoontjes	Beleidsadviseur Mobiliteit	Regio Twente
Local level	11	8-12-2008	Mirjam Wiebinga	Adviseur I&A	Gemeente Culemborg
	12	21-11-2008	Leen Blok	Projectleider digitale Gemeentelijke Ruimtelijke Plannen; Implementatieteam WKPB onroerende zaken; Contentbeheer internet en intranet; Ondersteuner AO risicovolle werkprocessen; EGEM-I	Gemeente Katwijk

	#	Date	Name	Position	Organisation
	13	11-12-2008	Anouk Nieuwenhuis	Beleidsadviseur ICT	Gemeente Boxmeer
	14	4-6-2007	Henk Achterkamp	Hoofd afd. Vastgoedinformatie	Gemeente Enschede

Annex 1b – List of interviewees and email correspondents – used in chapter 6

Case	#	Date	Name	Position	Organisation
Case Cadastre-Municipalities	1	27-03-2007	Floris de Bree	Adviseur strategie en beleid	Kadaster
	2	04-06-2007	Henk Achterkamp	Hoofd afdeling vastgoedinformatie	Gemeente Enschede
	3	30-01-2008	Henk Veen	Concernstaff materiebeleid Geo / kaartvernieuwing	Kadaster
	4	19-02-2008	Nicole de Keijzer	Beleidsmedewerker informatiebeleid	VNG
	5	01-04-2008	Ruud ten Kroode	Senior Beleidsmedewerker	VNG
	6	14-08-2008	Jan Stufken	Senior advisor, Strategie en beleid	Kadaster
	7	11-12-08	Anouk Nieuwenhuis	Beleidsadviseur ICT	Gemeente Boxmeer
	8	21-11-2008	Leen Blok	Projectleider Digitale gemeentelijke plannen	Gemeente Katwijk
	9	08-12-2008	Mirjam Wiebinga	Adviseur I&A	Gemeente Culemborg
	10	20-01-2010	Hanneke Ester	Chief financial officer	Kadaster
	11	08-03-2010	Martin Salzmann	Senior adviseur strategie & beleid	Kadaster
	12	27-01-2010	Lars Fehse	Information manager	Gemeente Enschede
	13	03-11-2010	Anouk Nieuwenhuis	Beleidsadviseur ICT	Gemeente Boxmeer
	14	03-11-2010	Henk Achterkamp	Hoofd afdeling vastgoedinformatie	Gemeente Enschede
Case AHN	1	25-01-2007	Mark Bruinsma	Produkt manager AHN	RWS-AGI
	2	07-03-2007	Bert Ludikhuize	Afedlingsmanager Informatica & Geografie	Waterschap Velt en Vecht
	3	20-03-2007	Marcel de Ruiter	Lid stuurgroep AHN – namens UWV	UWV
	4	10-04-2007	Hugo v/d Baan	Lid stuurgroep AHN – namens provincies	IPO
	5	14-09-2007	Ingrid Alkema	Adviseur service management geo-informatie	RWS-AGI
	6	06-03-2008	Marjan Bevelander	Teamleider datamanagement	IOV-Geo / Provincie Brabant

	7	26-02-2008	Stefan Flos	Secretaris stuurgroep AHN	RWS
	8	21-5-2010	Rene van der Velden	Programma manager AHN	Waterschapshuis
		03-10-07	AHN bijeenkomst,		
		06-10-10	AHN congres, Utrecht		
Case Dataland	1	11-12-08	Anouk Nieuwenhuis	Beleidsadviseur ICT	Gemeente Boxmeer
	2	21-11-2008	Leen Blok	Projectleider Digitale gemeentelijke plannen	Gemeente Katwijk
	3	28-11-2008	Michiel Jellema	Directeur	Dataland
	4	08-12-2008	Mirjam Wiebinga	Adviseur I&A	Gemeente Culemborg
	5	29-01-2010	Rene van Erkelens		Dimpact – Enschede
	6	29-10-2010	Carla Pleging		Dimpact - Enschede
	7	16-11-2010	Michiel Jellema	Directeur	Dataland
Case Sabimos	1	31-08-2006	Rob Hulleman	Transport & GIS medewerker	Gemeente Almelo
	2	22-03-2007	Leo de Jong	Directeur	Keypoint
	3	22-03-2007	Patrick Duwel	Projectleider Sabimos	Keypoint
	4	22-03-2007	Korné Pot	Project medewerker Sabimos	Keypoint
	5	04-06-2007	Patrick Zoontjes	Beleidsadviseur mobiliteit	Regio Twente
	6	04-06-2007	Korné Pot	Project medewerker Sabimos	Keypoint
	7	04-01-2008	Leo de Jong	Directeur	Keypoint
	8	04-01-2008	Patrick Duwel	Projectleider Sabimos	Keypoint
	9	12-11-2010	Mark ten Brummelhuis	Projectleider Sabimos	Keypoint

Annex 1c – Interview protocol and interview questionnaire used

Protocol

1) Elk interview is in principe open, maar volgt wel een vast patroon.
2) Elk interview vindt plaats op de werkplaats van de geïnterviewde. Dit biedt de gelegenheid de werkplaats en de geoICT producten te observeren.
3) Elk interview start met de vraag (en de daarbij behorende uitleg waarom) of het interview opgenomen mag worden (met een voice recorder). Daarna volgt een persoonlijke introductie, een korte uitleg over het onderzoek en vanuit welke instituten dat plaatsvindt, de methode van onderzoek, en een korte inleiding over de belangrijkste vragen. Hier wordt ook aangegeven dat het gesprek ongeveer 1 uur tot anderhalf uur kan duren.
4) Het interview start met algemene vragen over de geïnterviewde zelf, met name over de rol binnen de organisatie, de functie, de professionele achtergrond, de historische band en kennis van de organisatie.
5) Dan volgen een aantal vragen per thema. Elk van deze thema's raakt aan de onderzoeks aspecten. Laat hierbij de geïnterviewde zoveel mogelijk aan het woord. Intervenieer als de antwoorden te ver van de vragen af komen te liggen.
6) Aan het eind van het gesprek wordt aangeven dat van het gehele interview een transcriptie wordt gemaakt. Deze zal samen met een samenvatting naar de geïnterviewde worden toegestuurd, om te bevestigen of dit een correcte weergave van het gesprek was.

CHECKLIST VAN VRAGEN:

Algemene vragen

Wat is uw rol/positie/functie binnen uw organisatie?
Wat is uw professionele/academisch achtergrond?
Heeft u beslissingsbevoegdheid binnen uw organisatie?
Zo, kunt u contracten of convenanten ondertekenen?
Zo nee, watvoor invloed kunt u uitoefenen op een formeel contract tussen uw organisatie en een externe organisatie?
Ziet u uw organisatie als één organisatie of als een vertegenwoordiging van een aantal organisaties? Evt. hoeveel organisaties vertegenwoordigt u?
Hoe lang bent u al (direct of indirect) betrokken bij deze samenwerking?

Geo(ICT) en Geoinformatie

Wat beschouwt u als het kernproduct of dienst van de samwenwerking?
Welke geoinformatie producten of diensten had u al in huis voordat u de samenwerking begon?
Welke (informatie productie) processen vinden er plaats binnen uw organisatie?

Hoe worden de data momenteel voornamelijk door uw organisatie gebruikt?
Wordt er op dit moment anders gebruik gemaakt van de data dan vroeger? En, verwacht u dat er in de toekomst anders gebruik gemaakt gaat worden van de data?
Welke rol hebben geo-informatie en geoICT binnen uw organisatie?

Over het samenwerkingsverband

Hoe is de samenwerking tot stand gekomen, en hoe is deze gewijzigd in de loop der jaren (en waarom hebben die wijzigingen plaatsgevonden)?
Kende u de partners in de samenwerking persoonlijk voordat de samenwerking begon?
Als u die niet kende, hoe heeft u toen informatie ingewonnen over de partners?
Op basis waarvan had u voldoende vertrouwen in een mogelijk succes of voortzetting van de samenwerking?
Hoe gedetailleerd was het contract / de regels voor uw gevoel aan het begin / tijdens de samenwerking?
Heeft u eenzelfde onderwijsachtergrond als uw partners? Kent u de onderwijsachtergrond van uw partners?
Heeft u tijdens de samenwerking uw partners op een andere manier leren kennen dan u vantevoren wist?
Op welke manier hebben de verschillende manieren waarop elk van de partners wordt gefinancierd een rol gespeeld binnen de samenwerking?
Ziet u het samenwerkingsverband als een blijvend of tijdelijk samenwerkingsverband?

Over de coordinatie

Tot op welke hoogte bent u de samenwerking aangegaan om (meer) toegang te krijgen tot de data?
Op welke manier vindt momenteel de uitwisseling van data plaats? Is dat altijd zo geweest, en denkt u dat dze manier van uitwisselen in de toekomst gaat veranderen?
Hebben alle organisaties binnen de samenwerking momenteel dezelfde toegang tot alle data? Zo ja, hoe vindt dat plaats? Zo nee, hoe is dit verschillend?
Hoe heeft de samenwerking zich vanuit uw organisatie ontwikkeld?
Heeft u het gevoel dat de samenwerking uiteindelijk een toevallige constellatie van partners was, of een logisch gevolg van geplande eerdere activiteiten?
Heeft u het gevoel dat de gegevens / de data structuur / het formaat van de uitwisseling is opgelegd middels een specifiek kader? Zo ja, welk kader wordt gebruikt? Is dat kader van een van de partners in de relatie? Zo nee, door wie is dat ontwikkeld?
Wie heeft autoriteit over het informatiesysteem, en over de individuele data? Zijn hier afspraken over gemaakt?

Over eigen beslissingen

Heeft u het gevoel dat de samenwerking van bovenaf is opgelegd, of dat u ook zelf ruimte ziet om initiatieven te ondernemen?
Hoe zijn beslissingen binnen de samenwerkingsrelatie genomen wat betreft data modellen, het beheer, gebruik en het eingedom van de data?
Vindt u deze samenwerkingsrelatie succesvol? Waarom (niet?)
Ziet u zichzelf meer als een publieke belangorganisatie of als een vertegenwoordiger van andere publieke organisaties?
Op welke manier hebben de verschillende manieren waarop elke organisatie wordt gemanaged een rol gespeeld bij uw eigen rol in deze samenwerking?
Hoe wordt omgegaan met mogelijke conflicterende belangen?
Bent u bekend met theorieen of methoden van samenwerken? Speelt dit een rol?
Werkt u ook in andere samenwemkringsverbanden? Zo ja, speelt dit een rol?

Annex 2 - Table providing examples of geog2g cases in the netherlands

GeoG2G Examples	Partners	geoICT objectives of partnership	Tangible cooperation rules	geoICT rules embedded in policies / laws / strategies	Interpretation in terms of geoICT coordination types
Cadastre-municipalities www.kadaster.nl	1 National Cadastre, 443 municipalities	Exchange of basic objects, including parcels, addresses, building	Individual contracts – backed by national laws (Cadastral law, base registrations)	Basic registrations cadastre	LOCUS (because a the national, uniform land administration at all levels emphasizes the who and where)
Dataland www.dataland.nl	360 municipalities (July 2009)	Making real estate data of municipalities uniformly accessible to government, citizens and private parties	Cooperative of municipalities with Dataland foundation and Dataland Limited	WOZ – law on real estate	MODUS (Because the central coordination towards municipalities is on uniformity of processes when dealing with real estate products
ISZF www.iszf.nl	ICT cooperation agreement Zuidwest Fryslân – comprising municipali-ties Bolsward, Gaasterlân-Sleat, Harlingen, Lemsterland, Littenseradiel, Bolsward & Wûnseradiel.	Joint acquisition of systems to cope with Basisregistraties Adressen en Gebouwen (BAG) (and Wet kenbaarheid publiekrechterlijke beperkingen (Wkpb).)	Joint contracts to publish and coordinate joint tenders	Basic registrations addresses and buildings	LOCUS (because guided by idea to enforce a national, uniform real estate administration at all levels)
RO online www.ruimtelijkeplannen.nl	Ministry of spatial planning,, provinces and municipalities (VROM, provinces,	Collection and digital publication / distribution of spatial plans	Through public administrative law (WRO- Wet ruimtelijke	Law WRO provides the standardisation rules spatial plans (Regeling	EVENTUS (because the guidelines centre the output specification

GeoG2G Examples	Partners	geoICT objectives of partnership	Tangible cooperation rules	geoICT rules embedded in policies / laws / strategies	Interpretation in terms of geoICT coordination types
	municipalities)		ordening) - As of 1 january 2010 all levels of government will be required to deliver spatial plans through this website	standaarden ruimtelijke ordering 2008)	
Addwijzer	Province Zuid-Holland with municipalities; private companies	Provision of legal spatial information (land use plans, spatial regulations, restrictions)	Contract funded under eContent programme funded by (EU) Public sector information initiative	Law WKPB – law on spatial restrictions	EVENTUS (Because the activities of uniform municipal information service to external parties emphasize the 'what' – spatial restriction information
TNO/DINO www.dinoloket.nl/	1 TNO/DINO office ; many data providers	Collection and distribution of sub-surface geodata	Individual contracts between TNO/DINO and data suppliers and data consumers/clients	Natural resources management	LOCUS (emphasis on uniformity and distribution of who and where)
SUN	State forest management (Staatsbosbeheer), Union of provincial waterboards (Unie van Provinciale Waterschappen) and NGO Nature	Collection of ground water data	Cooperation contract	National directive ground water monitoring	MODUS (the directive specifies 'how' to monitor and how to collect which data)

GeoG2G Examples	Partners	geoICT objectives of partnership	Tangible cooperation rules	geoICT rules embedded in policies / laws / strategies	Interpretation in terms of geoICT coordination types
	reserves (Natuurmonumenten)				
Risicokaart Nederland http://www.risicokaart.nl/	Ministry of interior, provinces, municipalities	Maps to prepare for potential calamities and disasters	Through public administrative law – relation municipality with provinces and national government - Various laws on public safety (Wet rampen en zware ongevallen (Wrzo) en de Wet kwaliteitsbevordering rampenbestrijding (Wkr))	Public safety, crime reduction and emergency management	CAUSUS (because the emphasis on use and users context why)
Sabimos - dynamic public transport information system http://www.sabimos.nl/	Regional government Twente, municipalities	Provision of and dynamic public transport information	Contract between regional and local governments and private company	Law / regulations on Transportation planning and management	CAUSUS (emphasis on why)
AHN (National Height System of the Netherlands) www.ahn.nl	National Water Agency and, local Water boards (and provinces)	Provision of nationwide height information	Contract / covenant	Water and coastal management	EVENTUS (emphasis on what – namely height information)
WaterAtlas Twente http://www2.wateratlas.waterschapshuis.asp	Water board Regge en Dinkel ; municipalities region Twente	Regional water system analysis	A consecutive series of project contracts	Water management	EVENTUS (emphasis on what – namely water information)

GeoG2G Examples	Partners	geoICT objectives of partnership	Tangible cooperation rules	geoICT rules embedded in policies / laws / strategies	Interpretation in terms of geoICT coordination types
4all.nl/					
GBKN http://www.gbkn.nl/	Cadastre, water management agency, utility companies, water boards, union of municipalities	Provision of basic topographic information and uniform topographic data management	Public-private partnership	Public-private exchange on basic topography	EVENTUS (emphasizing the end product – the 'what')
DIMPACT (http://www.dimpact.nl/)	Municipalities: Hellendoorn, Enschede, Zwolle, Borne, Oldenzaal, Emmen, Helmond, Coevorden, Oost Gelre, Noordoostpolder, Hardenberg, Borger-odoorn, Gemert-Bakel, Assen.	Joint development of front/mid/back office at municipalities	Association with members;		MODUS (emphasizing how)
ANDEZ-I ANDEZ-II ANDEZ-III http://www.egem-iteams.nl/andez	ANDEZ-II partners Municipalities: Barendrecht, Barneveld, Maastricht, Utrecht, Veghel, Venlo	Development of mid-office suite; Joint tender to purchase mid-office systems coordinated by EGEM-i	Consecutive contracts organized by EGEM. Joint contract, partners organized by EGEM		MODUS (emphasizing how)
/ GovUnited 1 http://www.govunited.nl/	75 municipalities	Development of digital municipal services	Association with members;		MODUS (emphasizing how)
NOFA www.nofa.nl	Municipalities Achtkarspelen, Dantumadeel, Dongeradeel en Kollumerland	Development of joint front office	Cooperation contract		MODUS (emphasizing how)
VELDA http://www.veldagemeenten.nl/	De vijf gemeenten Vlaardingen, Ede,	Implementation of front-mid office ; Cooperation	Joint contract		MODUS (emphasizing how)

GeoG2G Examples	Partners	geoICT objectives of partnership	Tangible cooperation rules	geoICT rules embedded in policies / laws / strategies	Interpretation in terms of geoICT coordination types
	Leidschendam-Voorburg, Delft en Alphen aan den Rijn (VELDA)	towards private mid office-providers like Circle, Emaxx en Seneca			

Annex 3 – Data sources for all 4 cases (chapter 6)

Description of data sources Cadastral case

The data sources include interview transcripts and email correspondence with 14 staff members, held in three different periods (2007, 2008 and 2010). In addition, a number of key documents contribute to the data collection, including:

- Laws: Cadastre Law ('Kadaster wet') of 4 May 1989; Law on Key registers of buildings and addresses ('Wet basisregistraties adressen en gebouwen') – BAG law - of 24 January 2008.
- Annual reports Kadaster 2007, 2008, 2009 – available through the website of www.kadaster.nl
- Several geo-data and geo-information process management publications by Kadaster staff
- Terz@ke – digital newsletters from Kadaster ; period 2005-2010; 66 issues; http://www.basisregistratieschepen.biz/index_frames.html?inhoud=/zakelijk/service/terzake.html&navig=/zakelijk/nav_serverside.html%3Fscript%3D1
- Several publications by the Netherlands Ministry of Housing, Spatial planning and the Environment (VROM) – such as: (Ellenkamp and Rietdijk, 2010), (VROM, 2008).
- Newsletters Association of Netherlands municipalities ('Nieuwsbrieven VNG – dossier Basisregistraties' - http://www.vng.nl/smartsite.dws?id=76697) ; period 2007-2010 ;
- Articles in the digital magazine BB – Binnenlands bestuur – http://www.binnenlandsbestuur.nl/ ; period 2006 – 2010 ; 46 digital articles on BAG
- Several publications in magazines: VI Matrix, Geodesia, GIN Magazine - (Blankema, 2009; Capelleveen, 2008; Coumans, 2009; Ovaa, 2007; van Tiggelen, 2008)
- Dissertation of (van der Meer, 2007), and several (edited) books.

Description of data sources case AHN

The data sources include interview transcripts and email correspondence with 8 staff members, held in three different periods (2007, 2008 and 2010). In addition, a number of key documents contribute to the data collection, including:

- Hard copies and digital copies of the newsletters AHN – period 2007-2010 (12 newsletters)
- Articles in VI Matrix and Geonews on AHN progress, (Coumans, 2007b), (Alkemade, 2006)
- Presentations during AHN user congresses, period 2007-2010

- (Twynstra Gudde, 2003) - Haalbaarheidsstudie status Authentieke Registratie voor het Actueel Hoogtebestand Nederland
- (KplusV, 2005) – Consultancy report 'Quick scan consultants report about factors determining quality of AHN'
- Document VVG/AGI 1995 distribution requirements for AHN data
- Dissertations - (Toet, 2007), (van den Brink, 2009)
- Laws: Water law ('Waterwet') of 29 January 2009, article 5.2

Description of data sources case Dataland

The data sources include interview transcripts and email correspondence with staff members in Dataland head office, staff members in municipalities and staff members working with Dataland data (Dimpact). Interviews were held in three different periods (2007, 2008 and 2010). In addition, a number of key documents contribute to the data collection, including:

- Annual reports Dataland 2002-2009
- Dataland newsletters; period 2007-2010 (issues 24-42)
- Dataland presentations during Dataland congresses
- Dataland online news message 2007-2010 (35 messages)
- Report 'NUP', (in Dutch: Nationaal uitvoeringsprogramma dienstverlening en e-overheid – in English: National implementation program service and e-government) – and Statement of the minister of interior and kingdom relations, , December 2008
- Reports: (Duijm and Kanne, 2010) on municipal cooperation agreements to conduct e-government activities;
- VNG reports and letters: (VNG, 2010) on the implementation of municipal public services; (VNG, 2007) on '(Municipalities as) the 'first government'; VNG letter of 15 November 2007 titled 'Betere dienstverlening begint bij betere informatievoorziening' (Better –municipal- service starts with better information provision)

Description of data sources Case Sabimos

The empirical data consist of interview transcripts and email correspondence with 7 staff members related Sabimos, held in three different periods (2007, 2008 and 2010). In addition, several documents and presentations ((Hulleman, 2004) , the orignal Sabimos design documents (Keypoint Consultancy, 2005), the Newsletters of Keypoint – period 2009-2010, The Regio Twente document on'Regional mobility policy 2007-2010' (Regio Twente, 2007) provide historical and descriptive information.

Annex 4 – Original quotes and interview excerpts in Dutch

Chapter 2

2.1
Onze visie is dat je op overheidsniveau..nationaal niveau..moet er meer regie zijn in de hele sector

2.2
Wij willen met de AHN ook toe naar een basisregistratie. Wij zijn klaar voor de basisregistratie

2.3
We gaan het zodanig omvormen dat we ons centraal systeem 'lighter' maken, en dat we dan beter gaan aansluiten bij het landelijk plaatje. Idealiter zou het mooiste zijn als je met alle partijen in heel Nederland afspreekt.

2.4
Dus als je het hebt over de voorziening van geo data…dat is al besloten op landelijk niveau

2.5
..er wordt naar samenwerking geduwd door het ministerie....bijvoorbeeld op het gebied van basisregistraties

2.6
zorg nou dat je voor wat betreft ICT en data en zo, dat je daar niet op gaat concurreren met andere partijen en mede-overheden maar zorg dat je aan de voorkant jouw hulpverlening en jouw burgers, of jouw dienstverlening aan jouw burgers zo optimaal mogelijk organiseert, en daar heb je dit als instrumenten voor

2.7
In het begin spreek je af hoe de data eruit zien, en hoe ze moeten worden aangeleverd.

2.8
Het is zo dat we een informatie taak hebben voor 4 ministeries. Dat geld is geoormerkt voor de uitvoering van het databeheer. We worden door de hoogste raad aangestuurd voor dat databeheer.

2.9
V: Wat coördineer je dan, voor je idee? Coördineer je mensen, of activiteiten, of processen, of onzekerheden?
A: Eigenlijk alles. Ja, eigenlijk alles. Ja, eigenlijk alles, want je bent met alles bezig. Je beschrijft werkprocessen; je implementeert die; je zorgt dat je mensen meekrijgt; dat ze de spullen gaan gebruiken; je zorgt dat ze goed data aanleveren; dus dat het allemaal opgeschoond is, en dat het allemaal gecontroleerd is. Dus je coördineert heel veel verschillende zaken.

Chapter 3

3.1
V:En wanneer zoek je dan meer invloed, of meer beslissingsruimte, of zeg je van..dat laten we gewoon op ons afkomen?
A:Nee, wat je daar, denk ik, moet gaan doen is ..dat je er heel bewust van moet zijn dat de buitenwereld eerder op het revolutiepad zit, dan op het evolutiepad van de overheid. Maar dat je daar wel tijdig ook de componenten uithaalt, die je wel nodig hebt om ook je publieke taken te doen. Maar je moet niet meer de illusie hebben dat je ook ..of het nou zeg maar de googles..of wie dan ook zijn…daar heb je niet meer zo'n maatgevende invloed meer op.
V:Wat betekent dat voor jezelf? Zoek je dan meer speelruimte, of zoek je eigenlijk toch een kleinere taak, waar je dan volledige controle op hebt?
A: Kijk, dat wisselt. Een kleinere taak ..in de kern zou je het beste een kleine taak hebben waar je volledig controle op hebt…maar dan wordt je een vrij kleine organisatie. Waar je uiteindelijk wel heen wil is dat je onderscheidt van die andere werelden.(…) Alleen..vroeger maakte je al je middelen zelf..en al je kanalen had je zelf in beheer ..en je deed het met je eigen techniek..daar moet je veel opener voor staan. Zowel binnen de publieke sector, als daarbuiten van..dat je veel sneller mee-evolueert met al die revoluties die in de buitenwereld gebeuren. Je moet veel adaptiever worden als organisatie. Want je wettelijke taak houd je natuurlijk, en die kan je ook niet verzaken.

3.2
V:Wat is draagvlak? Wat het is in de praktijk, bedoel ik?
A: Nou precies. Ik heb zoiets van ..kijk..als je ergens enthousiast over bent, en je zegt als bestuurs zijnde bijvoorbeeld van ja..dat willen we..daar gaan we voor..dan toon je draagvlak door dan ook te zeggen van..OK..daar zet ik dan zoveel middelen tegenover, en zoveel uren kun je daar en daar vandaan halen. Dat vind ik draagvlak. Het wordt gedragen door het bestuur van ..dat willen we…daar gaan we voor, en daar zetten we ook tegenover wat er voor nodig is. Dan heb je draagvlak. Hetzelfde geldt eigenlijk voor de mensen in de organisatie. Daar begint al vaak..daar stokt het draagvlak al op het moment dat het gaat over 'willen'. Die willen het gewoon helemaal niet.
V: En dat zie je dan doordat mensen bepaalde dingen niet doen, of wel doen, of snel zijn…?
A: Ja, niet doen, of niet luisteren, of gewoon per definitie een negatieve houding tonen..niet gemotiveerd zijn, of proberen taken af te schuiven, dat soort zaken. Dat is geen draagvlak.
V: Maar dat is dus herkennen van een bepaald gedrag, of een bepaald onderdeel, waarmee je ziet van..wacht even..hier is..?
A: Ja, want als je draagvlak hebt, dan zeggen mensen van een afdeling van ..OK..wij zien dat wij indirect een belang hebben daarbij, dus dat gaan we gewoon doen. Zeg maar hoe we het moeten doen. Of, wij willen graag een stem hebben in hoe we dat dan gaan doen. (…).Daarom vind ik het ook zo belangrijk dat je bij de opbouw, of bij de implementatie van een bepaald project , dat je daarvoor ook zorgt dat je daarbij zo veel mogelijk mensen bij betrekt, die straks in de beheerfase dat moeten doen, zeg maar.

Chapter 4

4.1
En van onze kant uit , kan je vanuit de ervaring van afgelopen jaren zeggen dat ..je kan wel heel veel willen..je kan wel prachtige technische inzichten hebben..weten hoe het allemaal moet..maar als je management..bestuur..niet op de een of andere manier weet te mobiliseren..dan kom je niet zover in de praktijk. Zeker niet als het om interprovinciale samenwerking gaat. De enige interprovinciale samenwerking die er in praktische zin is gekomen is altijd afgewongen vanuit bestuur en management. Bijvoorbeeld risicokaarten. Toen die rampen zich in Volendam en Enschede voordeden..toen zeiden de commissarissen van..en nu willen wij dat er hier die data op de risico kaart staat..in landelijke samenwerking. En dan gebeurt er wat. Als je dat soort krachten niet weet te mobiliseren..dan kun je het nog zo mooi zien, maar dan komt er..kom je ..zeker als het om samenwerking gaat..nergens uit.

4.2
Bij sommige gemeenten zie je gebrek aan draagvlak. Dat kan je oplossen door in termen van (directe of indirecte) belangen te gaan spreken met de verschillende actoren in de organisatie; daarnaast ook druk uitoefenen op degenen die de werkprocessen aansturen. Op het politieke vlak kan druk worden gegeven uitgeoefend door te wijzen op verplichtingen naar hogere bestuurslagen ("laat VROM maar langs komen") maar ook door te wijzen op de belangen voor burgers en bedrijven.

4.3
Want die stichting die toen opgericht is in '92, op basis van zo'n landelijke samenwerkingsovereenkomst..die kreeg vanuit VROM ook geld mee..10 miljoen gulden hebben ze toen gekregen..en dat geld was bedoeld om de regionale samenwerking te stimuleren. Om eventueel als er een karteerproject op poten werd gezet, en er ontbrak dan nog een partij van die honderd procent..dat er dan bijvoorbeeld een gemeente niet meedeed, of een nutsbedrijf niet meedeed..dan kon vanuit die 10 miljoen gulden tijdelijk een soort lening gegeven worden uit die samenwerking, om die voor financiering te regelen.

4.4
Omdat gemeenten toch..dat willen ze zich niet aan laten leunen dat ze dat niet kunnen..dan gaan ze met nabuur gemeenten..dan gaan ze zich groeperen om het dan gezamenlijk aan te pakken. Maar het blijft suboptimalisatie, want in feite moet elke gemeenten gewoon zijn eigen taak kunnen uitvoeren, en ook daar voldoende financiële middelen voor moeten hebben. Want ook capaciteit is natuurlijk gewoon een kwestie van financiële middelen.

4.5
Als je kijkt..bijvoorbeeld bij de geoICT....dat krijgt straks met alle gemeentes te maken… bij de basisregistraties..grootschalige topografie … Maar op een gegeven moment moeten wij met VNG, of KING, en ook Dataland gewoon ook een afspraak maken van …hoe ga je dat nou doen? Als je kijkt bij de basisregistratie topografie ..daar heb je natuurlijk een paar grote gemeentes die het zelf doen. En daar maken we dan wel individuele deals mee, want dat is overzichtelijk..daar heb je misschien 10 in Nederland

die hun eigen middelschalige topografie bijhouden..kijk..en dan maak je nog wel individueel..dan probeer je natuurlijk wel 10 keer ongeveer hetzelfde af te spreken. En dan is het wel doenbaar.

4.6
Gemeenten en Kadaster..dat is altijd..tenminste op ons vakgebied dan..he? dat is altijd een beetje…daar is altijd een spanningsveld... En het was echt vanuit het verleden ..als je nou over vakbroeders praat…van..het Kadaster beslist, en gemeentes hebben maar te doen en te volgen. Nou..en daar zie je de laatste tijd wel iets van een verandering....hoor. Het is wel zo dat ze wel iets meer communiceren, maar dat was in het verleden echt niet zo. En daar heb je wel een spanningsveld.

4.7
in het begin toen het echt..je deed dingen die stomweg..je hoorde nergens bij..er was geen beleid over..dus het gebeurde niet..het ging allemaal via achterdeuren. En nu zie je dat de afdelingen integreren. Bij ons..en bij andere zie je dat..dat geo en ICT bij elkaar komt, en één informatie-ding worden. En bij ons bijvoorbeeld binnen teams geïntegreerd.

4.8
Want de nutsbedrijven, die vonden het gewoon veel te duur worden om te karteren. En je ziet dus voortdurend dat die op economische gronden zitten te sturen. Dus op economische drijfveren..doelstellingen. Voor een dubbeltje op de eerste rij willen zitten. Want ja...op zich moeten ze dat doen..maar dat was toen niet eens wettelijk verplicht om een registratie te hebben. Dat is straks met de nieuwe wet op de informatie over onze netwerken ..is er ook een wettelijke verplichting dat netbeheerders een registratie hebben, waarin je de kabels en leidingen kan terug vinden..die ze in beheer hebben, of in eigendom hebben.
Uiteindelijk hebben de nutsbedrijven wel hun verantwoordelijkheid genomen, en hebben wel een goede registratie opgezet. Want ze hadden best een belang erbij om te weten wat ze in huis hadden…wat ze bezaten.

Chapter 5
-
Chapter 6

Document excerpt 6.1
Op het moment dat bijhoudingsprocessen in verschillende gemeenten namelijk tot verschillende resultaten in de registratie zouden leiden, kan niet meer worden gesproken van een landelijk uniforme registratie.

Document excerpt 6.2
Met ingang van 1 juli 2009 zijn de gemeenten in Nederland op grond van de Wet basisregistraties adressen en gebouwen verplicht een basisregistratie adressen en een basisregistratie gebouwen te hebben opgezet en te beheren.

Interview excerpt 6.3a
het is allemaal hartstikke leuk wat ze bedenken, maar …ik zie het bij de BAG ook..de stukken die bij VROM vandaan komen ..je moet er echt constant bovenop zitten, want anders wordt het alleen maar geschreven voor de grote gemeenten. Het is absoluut onbruikbaar spul voor de kleine en middel grote gemeenten.

Interview excerpt 6.3b
ik zal je zeggen.de meeste gemeentes van deze omvang.en de meesten zijn dus ook nog veel kleiner..zijn alleen maar heel hard aan het worstelen om te kunnen voldoen aan de BAG, en met hangen en wurgen. En dat kost al heel veel inspanning. Dus laat staan dat men zich druk maakt om het op iets hoger peil brengen van de geo-informatie.

Interview excerpt 6.3c
Het was geen medestander, maar echte tegenwerking. Dat is overigens niet alleen aan die afdeling te wijten, maar ook aan onze organisatie na de fusie. …we hebben slechte ervaringen met externen. Bijvoorbeeld voor de BAG en zulk soort zaken..toen die externe persoon wegging..toen kwamen er ineens uit allerlei lades dingen die wij moesten regelen met Kadaster..met weet ik veel wat allemaal..dat was gewoon allemaal maar blijven liggen.

Interview excerpt 6.4a
Dus, ik weet dat wij aan onze kant dingen zo'n beetje geregeld hebben. We gaan nu, ik dacht deze week of zo, de eerste gemeente aansluiten. En dan gaan we kijken waar we tegenaan lopen. Dus…dat is dus iets dat door VROM ATOS is gebouwd, wat aan ons is overgedragen, waar we ook wel last van hebben gehad, omdat het dus eenmaal gebouwd is zonder dat we daar bij betrokken waren en nu moeten wij het wel in beheer gaan nemen… dat is niet iets wat we nog graag een keer zouden willen hebben. Daar wil je eigenlijk toch vanaf het begin bij betrokken zijn. Dan weet je wat er gebouwd wordt en dan pas het ook beter bij wat je altijd gewend bent, technieken te gebruiken, enzovoort enzovoort. Dat maakt het beheren ook wel makkelijker. En dat was bij BAG natuurlijk niet zo. Dus daar draait nu intern ook een groot programma om het allemaal netjes voor elkaar te krijgen.

Interview excerpt 6.4b
Wat je nu ziet bij grote dossiers als de basisregistratie grootschalige topografie..dat gaat ook verhoudingen veranderen in het veld, van wie wat doet, en hoe die informatiestromen allemaal lopen….zeg maar…uiteindelijk gaat dat ook de organisatie raken. Tot nu toe was dat niet zo aan de orde, maar dat gaat gewoon een keer veranderen.

Interview excerpt 6.5
De gemeenten hebben een eigen administratieve organisatie..die is in elke gemeente anders. Maar als je zorgt dat je in elke gemeente één persoon hebt die volgens de maatstaven en volgens de wettelijke richtlijnen die registratie bijhoudt…is het goed dat je weet wie het is. We hebben VROM dat ook voorgesteld om een beheerder aan te wijzen. Die is er dus niet, en daarmee wordt het een probleem van iedereen. En als het fout gaat, is het niemands probleem. VROM is niet bereid om na te denken wat gemeenten willen.

Interview excerpt 6.6
Als je nou zegt..waar zitten nou de hoofdpijnen bij zoiets als PDOK..dan zeg ik die zitten in het feit van ..PDOK gaat heel snel een aantal keuzes afdwingen van hoe je je ICT organiseert, hoe je je shared service centre inricht, maar ook welke dienst je daar bovenop zet. Er zit de vraag in van..hoe ga je die boel nou financieren?. En wat je ziet is dat soort projecten in het klein in een snel tempo af gaan dwingen ..die vragen om antwoorden die heel bepalend gaan worden van hoe je het als bedrijf in de breedte doet. Dus PDOK is een soort…..hoewel het geen klein project is..is toch een soort..alle vragen die bij het Kadaster komen..die je daar tegenkomt..die krijgen we bij PDOK ook voor onze kiezen...en de wissels die je nu zet worden vrij bepalend voor hoe we het verder doen.

Document excerpt 6.7
Waar het Kadaster leeft van de tarieven die het voor zijn diensten rekent, had Burmanje 'bijna slapeloze nachten' gehad van het overheidsgebruik van de basisregistraties: verplicht en daarom kosteloos. Maar het Kadaster doet nu toch mee, zij het dat het VROM, zijn moederministerie, als 'inkoopbureau voor de overheid' wil zien.

Interview excerpt 6.8
En we gaan bijvoorbeeld software kopen. We denken aan een software voor de omgevingsvergunning straks. We hebben daar modules voor gezien bij een andere leverancier dan we nu hebben. Dat zijn de dilemma's waar straks elke gemeente voor staat. En als je daar dus verkeerde keuzes in maakt, dan kun je de burger op termijn minder goed bedienen dan als je daar de goede keuze in maakt.

Document excerpt 6.9
'Het is erg aanbodgedreven, een onderonsje van basisregistraties die hun afnemers afzonderlijk in kaart brengen, maar niet als klant van het stelsel. De invloed van de klant moet groter."

Interview excerpt 6.10a
Onze gemeente heeft sinds 2008 op organisatorisch niveau grote veranderingen doorgemaakt (en maakt ze nog steeds door). Ik wil er niet al te veel over zeggen, maar deze veranderingen maken i.i.g. dat er steeds minder ruimte is voor eigen initiatief. Dus ja, ik denk dat we nu meer in een keurslijf gedrukt worden. De wetgeving draagt daar ook aan bij, maar daar zie ik ook wel weer voordeel, omdat het op een standaard wijze moet en er dus geen sprake is van veel maatwerk

Interview excerpt 6.10b
Er is zeker niet meer vrijheid. Juist de basisregistraties zorgen ervoor, dat er steeds meer standaardisering komt. Ook de verplichte aansluiting hierop beperkt je in je vrijheden. Maar dat is juist wel een goede ontwikkeling

Interview excerpt 6.11
Uiteindelijk wat je wil…als ik even naar klanten kijk, en klantbewegingen…is dat je..ik dat uiteindelijk wat wij het liefst hebben is dat je gewoon met een partij kan samenwerken die namens de gemeentes spreekt, en waarmee je dingen mee kan regelen. En de meeste klanten willen gewoon ook een soort produkt waar ze van op aan kunnen

over gemeentes heen. Dat je heel concreet..als je landelijke voorziening bent..dat je even los met elke gemeente te dealen hebt

Interview excerpt 6.12
Dus daar zit je heel erg op het grensvlak van markt en overheid. Dus daar proberen we heel erg de samenwerking te zoeken. In de zin van..wat kunnen we samen doen? En ook wel de afbakening, van ..om zo voorspelbaar mogelijk te zijn. We noemen dat in onze nieuwe strategie notitie: strategisch dialoog. Zodat we heel voorspelbaar worden, van welk onderdeel van die hele grote taartpunt aan geo-werkzaamheden doen wij, en wat dus niet. De vraag is..waar ligt onze positie, en wat is onze rol? Zo voorspelbaar mogelijk te maken voor ozne omgeving. Daarmee proberen we eigenlijk de onzekerheid voor onze stakeholders zo klein mogelijk te maken.

Interview excerpt 6.13
En wat er bij gemeenten ook heel erg speelt. Die moeten nu de BAG registratie optuigen. Dus, verplicht in 2009, één adressenregistratie in gemeenten, en geen 30 andere meer. Terwijl nu iedere afdeling zijn eigen addressen registratie heeft..omdat zij denken , vanuit hun toepasing, dat zij toch wel de beste hebben. Maar dat is een hele vertrouwens..een hele cultuur omslag. Vertrouwen is nodig.

Interview excerpt 6.14
Minder kosten zal ik nooit uitdragen. Echt niet. Het kost gewoon geld, en …De samenwerking heeft wel minder geld gekost, doordat we gezamenlijk bijvoorbeeld een applicatie hebben aangeschaft. Dat kun je natuurlijk wel duidelijk maken. Maar an sich, de invoering van die wet, die kost alleen maar geld.

Document excerpt 6.15
De pilot gaat niet alleen over techniek. Hij moet ook opleveren wat een goede toekomstige organisatievorm voor het AHN zal zijn. Daarom loopt het Zeeuwse traject onder rechtstreekse verantwoordelijkheid van de stuurgroep. We zijn benieuwd of de taakverdeling binnen projecten blijft zoals het is, met AGI als uitvoerende partij. Wellicht krijgen de waterschappen een duidelijker rol. Ze zijn ook immers de klantengroep waarvoor de AHN het meest belangrijke is.

Document excerpt 6.16
We moeten laten zien dat we het ook in het groot kunnen

Document excerpt 6.17
‘Dat de website is aangepakt vind ik heel belangrijk. De site oogt frisser, meer een ‘gezicht 2010’, dat past bij AHN-2. AHN-2 is immers een heel ander product dan AHN-1.Niet alleen heeft dat effect op de content, maar ook op de gewenste uitstraling. Het logo is ook aangepast; iets dat we voor de huisstijl van de nieuwsbrief in Vi matrix begin volgend jaar zullen doorvoeren. Prettig is dat er nu een content management systeem achter zit, waardoor het geheel veel beter is te beheren. De site www.ahn.nl moet geen techneutensite zijn. Mensen moeten gewoon even een kijkje kunnen nemen zonder GIS expert te hoeven zijn. Daarom ook de Googleachtige feel-and-look en de aanwezigheid van laagdrempeliger informatie naast de meer technische.”

Interviews excerpt 6.18
Wij specificeren ook niet meer op de dichtheden en de kansverdeling. Wij vragen een AHN.2 produkt wat in gebruikerswensen is geformuleerd..in eindtermen noemen we dat. Dat betekent namelijk..het bestand moet geschikt zijn om bepaalde objecten met bepaalde nauwkeurigheden te kunnen karteren, en moet een bepaalde hoogte nauwkeurigheid hebben. En dat betekent dus dat de inwinnende partijen..de markt..vrij is om zelf een combinatie te zoeken van puntdichtheden bij de punt verdeling en planimetrische precisie.

Document excerpt 6.19a
De resultaten van AHN-2 zijn zodanig, dat de betrokkenen erg enthousiast zijn en vele innovatieve toepassingen zien. Daarom stond de gebruikersdag 2008 in het teken van nieuwe mogelijkheden met de tweede versie van het landsdekkend hoogtebestand.

Document excerpt 6.19b
We zijn er in geslaagd om het AHN landsdekkend op te pakken. We hebben kunnen voorkomen dat het een lappendeken is geworden met verschillende standaarden en onduidelijke kwaliteit.

Document excerpt 6. 20
We rekenen, anders dan in het verleden, nu op eindtermen af en schrijven geen werkwijze voor.

Interview excerpt 6.21a
Alleen in het begin was het echt nieuwe technologie. Dus…er zaten gewoon …wat beginnersfouten in. Maar..hoe heet het…enkele uitzonderingen daargelaten..toch een behoorlijk breed draagvlak voor het AHN.

Interview excerpts 6.21b
De waterschappen …met elkaar hebben ze..ze hebben.. zeg maar.. dat waterschapshuis. Ze werken met elkaar heel goed samen. Ze hebben ook één terrein. Dat is ook wat makkelijker. Het gaat om water. Dat is hun grote voordeel. En ze hebben heel veel belang bij dat produkt AHN. De provincies gebruiken heel graag het AHN, maar hebben minder gauw specifieke eisen aan het AHN. Waterschappen ..die heeft dat bij uitstek specifieke eisen. De visie heeft zich daar ook aan onttrokken. Wij hebben daar niet specifieke eisen zoals het waterschap.

Document excerpt 6.22
Na een kwaliteitscontrole door Fugro-Inpark werd die nog eens grondig overgedaan door DID Rijkswaterstaat, ITC en Geodelta. Ook de werkgroep grootschalige laseraltimetrie van de STOWA heeft het proefbestand beoordeeld. Het resultaat is een kwalitatief hoogwaardig bestand dat ruimschoots voldoet aan de eisen. Door het waterschap werd de conclusie getrokken dat de kwaliteit van het bestand nu geschikt is voor vele toepassingsmogelijkheden, ook ver buiten het terrein van de waterschappen: in de ruimtelijke ordening, voor archeologie, cultuurhistorie, onderwijs, het beheer van ondergrondse leidingen, de bijhouding van GBKN en BAG en zelfs flightsimulatie.

Document excerpt 6.23
Je kunt je afvragen of de top wel wat waard is zonder een goed proces. Het is maar net hoeveel waarde je hecht aan de top. En aan het pad ernaartoe. In de loop van de jaren is het proces – de klimtocht zelf, de teamgeest en de voorbereiding – voor mij steeds belangrijker geworden. Je staat maar heel even op die top, maar je bent weken bezig met klimmen en zelfs maanden met de voorbereiding. Niet bepaald onbelangrijk dus, de 'weg'"

Interview excerpt 6.24
Alle toepassingen die ontstaan uit het gebruik van AHN.2 kun je niet verzinnen. Die belemmer je ook op het moment dat je het niet vrijgeeft. Dus, men wil het vrijgeven, maar de discussie die nu ontstaat, is ..willen we dat zomaar vrijgeven, of willen we nog verbreding zoeken naar andere overheidspartijen? Dus dit is wel een moment waarop we daar een hele strategische keuze moeten maken. Van..gaan we naar verbreding zoeken naar andere overheidspartijen, die we dus vragen mee te betalen aan het AHN? Als we dat bereikt hebben, dan heb je ..dat heeft meer effect..als je andere partijen mee laat betalen …zodat je ook daar commitment en betrokkenheid krijgt rondom dit thema..dat is heel erg mooi meegenomen. En dat is heel goed voor AHN.3 natuurlijk.

Document excerpt 6.25
Het inwinwerk gaat naar twee aannemers, geen drie zoals nu. Het controlewerk blijft in twee percelen verdeeld. De AHN-projectleider heeft ervaren: "Vijf contracten was te veel; het vraagt ook vijf maal management- en communicatie-aandacht, terwijl we eigenlijk vooral de regie willen voeren. Je spreidt de risico's op te hoge prijs of niet tijdige inwinning als met meer partijen wordt gewerkt, maar je krijgt er ook meer, andere risico's voor terug. Daar gaan we verandering in aanbrengen."

Document excerpt 6.26a
Dit leidde bij sommige afnemers tot een laag vertrouwen in de kwaliteit van het AHN. (Alkemade, 2006)

Interview excerpt 6.26b
Samenwerking is ook vertrouwen in elkaar. Dat is een heel belangrijke factor.

Document excerpt 6.26c
We moeten laten zien dat we het ook 'in het groot' kunnen! Maar ik heb er alle vertrouwen in; de nieuwe manier van werken heeft zich wel bewezen.

Document excerpt 6.26d
Stel het vrijgeven van het AHN draagt bij aan 1% meer kwaliteit in waterveiligheid, ruimtelijke ordening, archeologische waarden, geomorphologische basiskaarten, serious gaming, vertrouwen in de overheid, et cetera. Druk dat dan maar eens in geld uit! Wellicht wordt het jaar 2008 later als een omslagpunt in het denken en doen bestempeld.

Document excerpt 6.26e
Als het resultaat van de projecten een kwalitatief goed AHN bestand is, waarbij er een goede en constructieve samenwerking is geweest tussen de AHN organisatie, het bedrijf

dat de inwinning van de data verzorgt en het bedrijf dat de controles uitvoert." In zo'n klantgerichte medewerker kunnen we alleen maar veel vertrouwen hebben.

Interview excerpt 6.26f
Dat was ook een belangrijk gegeven om toch weer in zee te gaan met de stuurgroep AHN op dat moment. Dus toen kreeg de stuurgroep toch wel weer het vertrouwen van dat ene waterschap om het te gaan doen.

Interview excerpt 6.27a
Het ligt bij waterschappen natuurlijk heel anders. Waterschappen hebben dat bestand gewoon dagelijks nodig. Dus, die roepen veel harder, dus daar is de Unie ook wel van doordrongen. En, het heeft natuurlijk ook te maken met personen, uiteindelijk. Bij de waterschappen hebben er hier een aantal mensen aan getrokken in dit traject…en we hebben ook heel veel energie daarin gestoken om ook anderen te mobiliseren en ook te zeggen het is belangrijk..dit moeten we gaan doen…Bij de provincie heb ik dat veel minder gezien. Het is niet om mijzelf, of mijn collega's bij de waterschappen op de borst te slaan. Ik heb wel een beetje die drive bij de provincies gemist. Dat er iemand was of een paar mensen waren die er gewoon voor wilden gaan. Dat soort mensen heb je nodig, anders komen dit soort dingen niet van de grond.

Interview excerpt 6.27b
We hebben daar heel algemeen over gesproken. Verbreding..dat je niet alleen vanuit water ..belangrijk..maar ook breder geo-informatie..je moet bij de geo-informatie breder zien...je moet het AHN.. breder te positioneren.

Document excerpt 6.28
Maar neem de discussies over de kostenverdeling, de projectopzet of het versneld inrichten van een landsdekkend bestand met veel hogere specificaties: wie is de stuurgroep eigenlijk, dat die dat mag beslissen? Het heeft de voorkeur van de stuurgroep om afwegingen, ervaringen, voorstellen voor acties naar de Regiegroep te brengen die daar vervolgens besluiten over neemt. De Regieraad is nu met een voorlopige bezetting ingesteld. Zo gauw er een nieuw convenant is, wordt deze definitief.

Interview excerpt 6.29
Het kostte elk jaar veel trammelant, maar dat is hoogstwaarschijnlijk voorbij. In de nieuwe constructie heeft het Waterschapshuis immers een centrale rol. Alle waterschappen participeren daar al in en het geld voor het AHN zal dus gewoon in de jaarlijkse dotatie aan het Waterschapshuis worden opgenomen. Dan ben je van dat gezeur van kredietvergaring af en betaalt iedereen gespreid. Dat maakt intern waterschapsoverleg overbodig, want het staat als vaste post op de begroting. Medio 2008 moet dat rond zijn, zodanig, dat alle partijen dat voor de begroting 2009 mee kunnen nemen.

Document excerpt 6.30a
Het AHN is nagenoeg landsdekkend beschikbaar. In het voorjaar van 2003 zal het laatste gedeelte (Zuid-Holland) worden opgeleverd.

Document excerpt 6.30b

Het AHN is een maaiveldbestand waar alle niet-maaiveld punten uit zijn gefilterd. Het AHN is uniform en landsdekkend.

Document excerpt 6.30c
Overal ging de mare rond dat Fugro voor eigen rekening en risico een landsdekkend hoogtebestand met veel betere specificaties in de markt wilde zetten. (…) Op de vraag of het ingenieursbureau hiermee de wind uit de zeilen wordt genomen, antwoordt Bert Ludikhuize luchtig: "Als Fugro naast het AHN een markt ziet voor een alternatief landsdekkend bestand, moet ze doen wat ze wil doen. Maar ik denk, dat de kans dat het gebeurt kleiner is geworden nu wij met dezelfde specificaties opleveren. Fugro ziet bovendien dat er een stevig samenwerkingsverband is. Ik heb hen er niet meer over gehoord."

Document excerpt 6.30d
De resultaten van AHN-2 zijn zodanig, dat de betrokkenen erg enthousiast zijn en vele innovatieve toepassingen zien. Daarom stond de gebruikersdag 2008 in het teken van nieuwe mogelijkheden met de tweede versie van het landsdekkend hoogtebestand.

Document excerpt 6.30e
We zijn er in geslaagd om het AHN landsdekkend op te pakken. We hebben kunnen voorkomen dat het een lappendeken is geworden met verschillende standaarden en onduidelijke kwaliteit.

Document excerpt 6.30f
Het inwinnen van de data voor het AHN is al gestart in 2008. In de loop van 2013 is het bestand landsdekkend.

Document excerpt 6.31
In het NUP wordt een keuze gemaakt voor een randvoorwaardelijke, verplicht te gebruiken basisinfrastructuur voor de e-overheid door de basisvoorzieningen te benoemen die daar onderdeel van uitmaken. De aangewezen basisvoorzieningen zijn voorzieningen waarvan het gebruik voor alle bestuursorganen voor eind 2010 moeten worden gerealiseerd of het zijn voorzieningen die als essentiële bouwstenen kunnen worden aangemerkt door andere basisvoorzieningen of projecten die voor eind 2010 als focus zijn aangemerkt. De basisvoorzieningen die als prioriteit worden aangemerkt zijn onder te verdelen in: e-toegang tot de overheid, e-authenticatie, nummers, basisregistraties en informatie-uitwisseling.

Document excerpt 6.32
Kleinere gemeentes moeten we stimuleren tot samenwerking. En wij van VROM moeten beter de dialoog openhouden, processen integreren en het overzicht delen. Ik wil door alle elementen waar VROM voor aan de lat staat, een rijgdraad halen en samen met BZK, VNG, IPO en de Unie van Waterschappen zoeken naar verbindingen. Van de meeste regelingen is de invoeringsdatum onlangs opgeschort. En het belangrijkste: we nemen er – als het aan mij ligt -geen nieuwigheden bij op korte termijn. De ombouw van GBKN naar BGT zit al in de pijplijn, maar tegen uitbreiding van de NUP (nationaal uitvoeringsplan, FC) met geo-informatie heb ik 'neen' gezegd."

Interview excerpt 6.33
En als die gegevens ergens anders vandaan komen, dan moet je al weer veel meer handelingen doen om dat op de juiste manier aangeleverd te krijgen aan Dataland. Ja, en buiten dat denk ik..het levert gewoon niks op. Want..we hebben er helemaal niks aan. Het lijkt een heel mooi iets, maar dan denk ik van …het zit ook gewoon niet op de goede plek. Maar dat is ook een beetje voortschrijdend inzicht, hoor. Je stapt ergens in, en dan op een gegevens moment dan denk je..het was geen goede keuze. Dat hadden we niet moeten doen. We hadden gewoon moeten blijven bij onze stellingname ..gemeente is knooppunt voor vastgoedinformatie. En niet welke andere organisatie dan ook.

Interview excerpt 6.34
Onze gemeente is helemaal van Dataland afgestapt. Ik blijf op dit moment nog steeds bij mijn standpunt zoals ik dat had ten tijde van het interview. Mogelijk dat er in de toekomst nog dusdanige veranderingen bij Dataland plaatsvinden, waardoor deelname aan Dataland toch nog weer interessant wordt. Ik zeg nooit, nooit. Maar voor dit moment kunnen we prima zonder Dataland.

Interview excerpt 6.35
Deregulering en standaardisatie is absoluut een keuze. De gegevens uitwisseling..dat gaat met berichten verkeer uiteindelijk. Dat zijn landelijke standaarden, die we gebruiken, en je ziet dat gemeenten daar op individueel niveau heel moeilijk meters maken. Maar door de samenwerking die we doen, zie je dat we in staat zijn om met marktpartijen in gesprekken aan te tonen wat er voor nodig is om dat soort berichten wel mogelijk te maken. Dat zijn langdurige trajecten, maar daarmee dwing je wel met elkaar standaardisatie in de markt af.

Interviews excerpt 6.36
Wij willen veel meer verantwoordelijkheid. We hebben met 4 gemeentes één projectleider aangetrokken om alle processen en standaarden in kaart te brengen. En op basis daarvan kan je een keuze maken voor de applicatie die dat gaat ondersteunen.

Interview excerpt 6.37a
Gebrek aan vertrouwen? Mogelijk. Is er ergens toch een soort defensief denken. Als je echt wilt samenwerken, dan heb je de doelstellingen en de belangrijkste uitgangspunten..heb je met elkaar gewisseld. Als je wil samenwerken omdat je nog een tweede agenda hebt..ja..dan zit je heel anders in die samenwerking. En in essentie zijn Dataland en Kadaster..de mid-office en de front-office van het Kadaster , en de mid-office en front-office van Dataland doen twee keer hetzelfde. Het enige verschil is..de data is verschillend. Ja, dan moet je dat toch logisch bundelen?
Interview excerpt 6.37b
Ja, je hebt dus EGEM. De EGEM-e-teams gaan naar primaire gemeentes. Maar wij krijgen weer van gemeentes te horen van ..goh..onze egem-e-adviseur is langs geweest..hoe moeten wij onze geo-informatievoorziening daarin positioneren? Dus wij zijn op dat moment als het ware een soort kenniscentrum voor die gemeenten. En wij hebben zelf weer met de EGEM contact over de RSGB..het rijksmodel stroomlijning gemeentelijke basisgegevens. Dat is natuurlijk voor de gemeentelijke gegevensbijhouding heel erg belangrijk. En wij gaan hu actief, samen met EGEM, dat RSGB weer uitdragen naar de gemeentes toe.

Document excerpt. 6.38
"Wij hebben vanuit verschillende ministeries heel veel wensen en programma's. Het baart me zorgen hoe een lagere overheid al die elementen zo zorgvuldig mogelijk kán regelen. Wabo, nWro, BAG, NUP en straks de BGT zijn voorbeelden van programma's die op hen afkomen. Dat alles wordt vaak op het bord van dezelfde paar mensen gelegd", realiseert Borgers zich. "Ik zie hoeveel frustratie en weerstand het geeft om te zien wat ze allemaal moeten doen, en dat bovendien veelal in de wetenschap dat ze niet op tijd klaar zullen zijn. De kleine en middelgrote gemeenten worden door inhuur dus ook nog eens afhankelijk van derden. De spankracht houdt een keer op."

Interview excerpt 6.39
Kijk je naar de korte termijn..we willen landsdekkend worden. We willen dat alle gemeentes deelnemer zijn. Dat is de echt korte termijn. Wat ik merk in de samenwerking binnen de totale overheids geo-informatie voorziening is het grote communicatie gat tussen de rijksoverheid en de lokale overheid. Kijk naar Gideon, kijk naar dergelijke projecten, kijk ook naar Geonovum projecten. Je ziet heel vaak dat de rijksoverheid geo-informatie projecten initieert, en op voorhand wordt daar niet, zeg maar, de lokale overheid, gebundeld in Dataland, in meegenomen.

Interview excerpt 6.40
We zitten nu met een project voorbereiding voor de ombouw naar Sabimos.3, zoals we dat noemen. En dat betekent dat we enerzijds overgaan naar de landelijke standaarden die bij ons grotendeels ontwikkeld zijn, of ontwikkeld worden. Om de informatie uit te wisselen tussen de vervoerder en het Sabimos systeem. En ook tussen het Sabimos systeem en de displays. Alleen denken we daar niet dat we dat gaan overnemen, want dat draait gewoon. Dat is toch een regionaal draaiend systeem. De displays aansturen..landelijk zullen we dat gaan doen. Maar wel de voorkant.

Interview excerpt 6.41
Dit project is een complex spel – balancerend op verschillende inzichten en belangen

Document excerpt 6.42
Sinds 11 december 2005 is de nieuwe ov-concessie "Twents" gestart. Het ov product heeft een flinke kwaliteitsimpuls gekregen door o.a.:

- Hogere frequenties
- Meer reizigersinformatie
- Nieuwe busvloot
- 1 produktmerk (Twents)
- Twents Tarief

Zowel qua aanbod (frequenties), als betrouwbaarheid (HOV-assen, Sabimos), informatievoorziening (Infoxx, Sabimos) en een eenduidig makkelijk tarief. Het Twents Tarief is vooral gemakkelijk door de afgeronde bedragen en verkrijgbaarheid in de bus. Het is zeker niet goedkoper dan de reguliere strippenkaart. Desondanks kent het een stijgend gebruik.

Interview excerpt 6.43
Dus dat is de intelligentie die daar in zit. Maar dat is alleen een aansturingsysteem van karretjes. Dus dat is geen reisinformatie voor mensen waar ze wat mee kunnen doen.

Die krijgen alleen een karretje, en die moeten er dan op vertrouwen dat die via de computer de slimste route gaat rijden. Dus dat is een andere soort intelligentie…

Interview excerpt. 6.44
Want hier doen we toch nog een aantal dingen gewoon dubbel, die we niet hoeven te doen. Dus we gaan het zodanig omvormen dat we ons centraal systeem 'lighter' maken. En daardoor, ook naar verwachting aan beheerderskant, nog een aanzienlijke besparing kunnen bewerkstelligen. En daarbij is het dan ook zo dat we dan beter gaan aansluiten bij het landelijk plaatje,

Document excerpt 6.45
Sabimos, ooit het eerste regionaal werkend Dynamisch Reisinformatie Systeem (DRIS) in Nederland, draait inmiddels ruim 6 jaar stabiel, maar dient omgebouwd te worden. Regio Twente heeft Keypoint Consultancy gevraagd deze soft- en hardware matige ombouw te begeleiden. Na ombouw zal Sabimos de meest recente BISON DRIS koppelvlakken, meerdere vervoerders en multi-modale reisinformatie ondersteunen. Daarnaast zullen er ook beheertechnische verbeteringen en verbeteringen met betrekking tot het genereren van management rapportages doorgevoerd worden. Deze laatste 2 verbeteringen zijn gebaseerd op de ervaring en het voortschrijdende inzicht dat Keypoint in de loop der jaren bij het beheren van Sabimos en het opstellen van de managementrapportage heeft opgedaan.

Interview excerpt 6.46
Het zijn natuurlijk wel vertrouwelijke documenten..want er staan ook uitval gegevens..stiptheidgegevens..en daar wordt ook met Connexxion over gesproken over..zeg maar het contract tussen de regio Twente en Connexxion…over de prestatie..ja daar wordt nog in getuned, en daar wordt nog niet aan de grote klok gehangen..dat wordt ook bewust niet aan de grote klok gehangen. ..de gegevens die daar uitkomen…
Maar..het feit dat de regio Twente heel duidelijk bezig is om een concessie te bewaken..en dat is toch een rol van de overheid..waar je praat over legitimiteit en efficiency..zelfs dat communiceren we niet. Dus ..het is enerzijds de uitkomsten. Nou daar kan je dan nog zeggen van..dat is deels vertrouwelijk. En daar moet je Connexxion al dan niet een bonus of een malus voor geven. Maar het feit dat er gemonitord wordt ..ook dat wordt niet uitgedragen.

Chapter 7

Chapter 8

Annex 5 - List of concepts and definitions

Concept	Definition
abduction	method of inference, aiming at finding causes, given rules and effects
Actor	a person or organisation who behaves / acts
alignment discretions	the personal actions of staff members who based on personal judgments create or change work flows, re-design internal activities, revise budget and revenue allocations and change information and communication channels
alignment staff	staff members who can create or change work flows, re-design internal activities, revise budget and revenue allocations and change information and communication channels
alignment uncertainty	the perception of alignment staff members that the information of the internal environment is incomplete, inappropriate and/or inconsistent
authority	the ability of a person or organisation to influence the behavior of another person and/or organisation
autonomous discretions	discretions of individual staff members aimed at simplifying one's own tasks and/or handling the ambiguities in the task descriptions
autonomous interest	the potential benefit for a single individual in a geoG2G
CAUSUS geoICT coordination	a geoICT coordination type which emphasises the alignment of activities to specific contextual outcomes
Change	a fundamental discontinuation of something old and a transition to something new
collective action	the joint behavior of at least two actors to achieve a common goal or set of common goals together
collectivity stability	stability resulting when the collective interests combined with sanctions and incentives outweigh the individual benefits and decisions of individual staff members to opt for non-collective actions
conformity stability	stability resulting from the dominance of network agency on individuals over personal interests and endeavors of individual staff members
Deduction	method of inference, aiming at finding effects, given causes and rules
Discretion	personal actions of individual staff members, based on a personal judgment on what is considered appropriate, given the socio-organisational circumstances and preferences of that particular staff member
discretionary space	the degree of freedom for actors to have discretions
economic rule stability	stability resulting from adherence to formalised production and transaction agreements

Concept	Definition
EVENTUS geoICT coordination	a geoICT coordination type which aim for specific outputs through output specifications
external environment	the people, organisations, institutions and rules which are not part of a geoG2G
external interest	the potential benefit for a set of actors in the external environment of geoG2Gs
geoG2G	an inter-organisational public sector arrangement constructed to work cooperatively with at least one type of geoICT
geoG2G change	a fundamental discontinuation of stability in geoG2Gs and a transition to instability in geoG2Gs
geoICT	the collection of information and communication technologies (ICT-) based systems that allows the study of natural and man-made phenomena with an explicit bearing in space
geoICT coordination	geoICT coordination is a comprehensive goal-setting and goal-implementation action which aims at aligning geoICT activities and choices in at least two organisations, and which usually results in a change intervention in how public sector agencies cooperate with geoICT
geo-information	information on natural and man-made phenomena with an explicit bearing in space
grounded theory	a theory and/or a system of concepts which is inductively derived from the study of the phenomena they represent
induction	method of inference, aiming at finding rules, given causes and effects
Instability	a state or situation of change, unbalance and/or rejection
institutional arrangements	a set of socially agreed rules on how to behave
internal environment	the people, organisations, institutions and rules which are part of a geoG2G
Isomorphism	the practice whereby actors mimic the behavior and organisation of other actors
joint alignment discretions	discretions of individual staff members aimed at facilitating, complying and/or adhering to the interests of actors in the external environment
LOCUS geoICT coordination	a geoICT coordination type which aims at localisation of a national plan to a local action
MODUS geoICT coordination	a geoICT coordination type which emphasises particular standard instruments and tools
operational discretions	the personal actions of staff members who based on personal judgments create or change the production and/or the delivery of products and services
operational staff	staff members who can create or change the production and/or the delivery of products and services

Concept	Definition
operational uncertainty	the perception of operational staff members that the information on the production and product delivery processes and is incomplete, inappropriate and/or inconsistent
Partner	a person or organisation who shares a common interest or participates in a common goal
power stability	stability resulting from inter-relational dependencies
Practice	the aggregate of actual decisions, behavior and experience of people
Practitioners	people working in geoG2Gs
Pragmatism	philosophical stream which reasons that actions of actors are determined by the value that people attach to the results of these actions, and that concepts of reality are embedded in the practical, cognitive and linguistic use of actors
pragmatist interpretation	the process of deriving concepts, models and meaning by combining concepts, models and meaning available in both theory and practice
pragmatist approach	an interpretative research process which explains reality by linking theory with practice
public sector organisation	an organisation which has a public administrative function and/or which relies on public (tax-based) funds
punctuated change	a highly discontinuous and discrete change
Resource	a means with which one can produce products and services
resource dependency	a structural need for a resource to produce a particular product or service, which is only available outside the organisation or outside the geoG2G
social network	a relationship between at least two persons based on a common issue and/or a common interest
Stability	a state of accepted balance and steadiness
stability element	a characteristic of a geoG2G, which remains present for a relatively long time
Stable	the label given to geoG2G stability elements, when they reflect stability
stable geoG2G	a geoG2G operating under the same conditions for a relatively long time span
standardisation	the process where individuals and organisations start and continue to adhere to standards
Standards	particular types of rules applying to resources and processes of both individuals and organisations
strategic discretions	the personal actions of staff members who can decide based on personal judgments on enforcing organisational changes, starting up or ending inter-organisational coalitions, and reallocation of internal resources

Concept	Definition
strategic staff	staff members who can decide on enforcing organisational changes, starting up or ending inter-organisational coalitions, and reallocation of internal resources
strategic uncertainty	the perception of strategic staff members that the information of the external environment is incomplete, inappropriate and/or inconsistent
Theory	a comprehensive interrelated set of concepts describing a particular phenomenon
Transaction	economic interaction between actors, whereby economically valuable goods or services are exchanged for financial resources
transaction cost	the costs arising out of inefficient transactions between actors
Uncertainty	the perception of individual staff members that information on a particular issue is incomplete, inappropriate and/or inconsistent
Unstable	the label given to geoG2G stability elements, when they reflect instability
unstable geoG2G	a geoG2G operating under varying conditions for a given time span
variation	a slight, yet not fundamental, transition in the stability or instability

References

Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly, 45*(3), 425-455.

Alexander, E. R. (1993). Interorganizational Coordination: Theory and Practice. *Journal of Planning Literature, 7*(4), 328-343. doi: 10.1177/088541229300700403

Alexander, M., McDermott, T., & Goodrich, G. (2004). *Collaborative Capital Investment Planning*. Paper presented at the Twenty-Fourth Annual ESRI User Conference, San Diego, CA. http://proceedings.esri.com/library/userconf/proc04/docs/pap1233.pdf

Alicia, I. (2006). *Reporting On-Campus Crime Online: User Intention to Use*.

Alkemade, I. (2006). AGI betrekt klanten bij de controle van Actueel Hoogtebestand. *AGI-Geonieuws*(3), 28-29.

Andersen, K. V., & Henriksen, H. Z. (2006). *Reorganizing Government: Bhutan Visa Online.* Paper presented at the System Sciences, 2006. HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on.

Andersson, M., Lindgren, R., & Henfridsson, O. (2008). Architectural knowledge in inter-organizational IT innovation. *The Journal of Strategic Information Systems, 17*(1), 19-38.

Baarda, W., de Groot, D., & Harkink, F. (1956). *Handleiding voor de technische werkzaamheden van het kadaster: vastgesteld bij de beschikking van de Staatssecretaris van Financien van 28 Mei 1956, nr. 41 : naar het ontwerp door W. Baarda, D. de Groot en F. Harkink, in overleg met de Directie Kadaster en Hypotheken*: Ministerie van Financien, 's-Gravenhage.

Baker, J., Jones, D. (2008). A Theoretical Framework for Sustained Strategic Alignment and an Agenda for Research. *Proceedings of JAIS Theory Development Workshop. Sprouts: Working Papers on Information Systems, 8*(16), 32.

Barnes, B. (1995). *The elements of social theory*: Princeton University Press, New Yersey.

Barwinski, K. J. (2002). *Spatial data play-offs in political decisions.* Paper presented at the FIG XXII congress 2002 Washington, D.C., USA. http://www.fig.net/pub/fig_2002/PL1/PL1_barwinski.pdf (last date of access 28-1-2013)

Baskerville, R., & Myers, M. D. (2004). Special issue on action research in information systems: making IS research relevant to practice. *MIS Quarterly, 28*(3), 329-335.

Beaumont, P., Longley, P. A., & Maguire, D. J. (2005). Geographic information portals--a UK perspective. *Computers, environment and urban systems, 29*(1), 49-69.

Bellegarda, J. R. (2000). Exploiting latent semantic information in statistical language modelling. *Proceedings of the IEEE, 88*(8), 1279-1296.

Benbya, H., & McKelvey, B. (2006). Using coevolutionary and complexity theories to improve IS alignment: a multi-level approach. *Journal of information technology 21*, 284-298.

Benslimane, D., Leclercq, E., Savonnet, M., Terrasse, M. N., & Yétongnon, K. (2000). On the definition of generic multi-layered ontologies for urban applications. *Computers, environment and urban systems, 24*(3), 191-214.

Bernard, L., Einspanier, U., Lutz, M., & Portele, C. (2003). *Interoperability in GI service chains - the way forward* Paper presented at the 6th AGILE conference,

Lyon, France.
Biermann, S., & Smit, L. (2003, 10-16 August 2003). *Idea 2002: National housing sptial investment potential Atlas.* Paper presented at the 21st International Cartographic Conference, 2003, Durban, South Africa.
Bimber, B., Flanagin, A. J., & Stohl, C. (2005). Reconceptualizing Collective Action in the Contemporary Media Environment. *Communication Theory, 15*(4), 365-388. doi: 10.1111/j.1468-2885.2005.tb00340.x
Blankema, F. (2009). Samen de BAG te lijf. *Geo - Info : tijdschrift voor geo - informatie Nederland (GIN)*(11), 10-12.
Bourdieu, P. (1986). The forms of capital. . In J. R. (Ed.) (Ed.), *Handbook of Theory and Research for the Sociology of Education.* (pp. 241-258): New York, Greenwood.
Bovens, M., & Zouridis, S. (2002). From Street-Level to System-Level Bureaucracies: How Information and Communication Technology Is Transforming Administrative Discretion and Constitutional Control. *Public Administration Review, 62*(2), 174-184.
Brehm, J., Gates, S., & Gomez, B. (2003). Donut shops, speeds traps, and paper work: Supervision and the allocation of time to bureaucratic tasks. In G. A. Krause & K. J. Meier (Eds.), *Politics, policy, and organizations. Frontiers in the scientific study of bureaucracy* (pp. 133-159): University of Michangan Press.
van den Brink, M. (2009). *Rijkswaterstaat on the horns of a dilemma. Dissertation Department of spatial planning, Radbouw University, Nijmegen, NL.* : Eburon.
Brown, K., Ryan, N., & Parker, R. (2000). New modes of service delivery in the public sector: Commercialising government services. *International journal of public sector management, 13*(2), 206-221.
Brown, S. R. (1980). *Political subjectivity: applications of Q methodology in political science*: Yale University Press
Brunschwig, C. (2002). Legal Design and e-Government: Visualisations of Cost & Efficiency Accounting in the wif ! e-Learning Environment of the Canton of Zurich (Switzerland) In R. Traunmüller & K. Lenk (Eds.), *Electronic Government* (Vol. 2456, pp. 215-218): Springer Berlin / Heidelberg.
Burkhardt, M. E., & Brass, D. J. (1990). Changing Patterns or Patterns of Change: The Effects of a Change in Technology on Social Network Structure and Power. *Administrative science quarterly, 35*(1), 104-127.
van Capelleveen, P. (2008). BAG belandt in Zwolle IT- én gebruikstechnisch in een gespreid bedje. *VI Matrix*(april-mei 2008), 26-28.
Carter, R., & Hodgson, G. M. (2006). The impact of empirical tests of transaction cost economics on the debate on the nature of the firm. *Strategic management journal, 27*, 461-476.
Cetina, K. K., Schatzki, T. R., & von Savigny, E. (Eds.). (2001). *The practice turn in contemporary theory*: Routledge.
Chen, L., Sheng, O., Goreham, D., & Watanabe, J. (2005). *A real option analysis approach to evaluating digital government investment*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Chisholm, D. (1989). *Coordination without hierarchy. Informal structures in multiorganizational systems.*: University of California Press.
Chrisman, N. (2005). Full circle: More than just social implications of GIS.

Cartographica, 40(4), 23-35.
Ciborra, C. U. (1983). Markets, bureaucracies and groups in the information society : An institutional appraisal of the impacts of information technology. *Information economics and policy, 1*(2), 145-160. doi: Doi: 10.1016/0167-6245(83)90024-0
Ciborra, C. U., & Hanseth, O. (1998). *Toward a continguency view of infrastructure and knowledge: an exploratory study.* Paper presented at the International conference of information systems, Helsinki.
Clemons, E. K., Reddi, S. P., & Row, M. C. (1993). The impact of information technology on the organization of economic activity: the "Move to the middle" hypothesis. *Journal of Management Information Systems, 10*(2), 9-35.
Coase, R. H. (1937). The nature of the firm. *Economica, 4*, 386-405.
Coglianese, C., & Kennedy, J. F. (2004). *Digital government and e-rulemaking: new directions for technology and regulation*. Paper presented at the Proceedings of the 2004 annual national conference on Digital government research, Seattle, WA.
Coleman, J. S. (1988). Social Capital in the Creation of Human Capital. *The American journal of sociology, 94*(ArticleType: research-article / Issue Title: Supplement: Organizations and Institutions: Sociological and Economic Approaches to the Analysis of Social Structure / Full publication date: 1988 / Copyright © 1988 The University of Chicago Press), S95-S120.
Coleman, J. S. (1994). A rational choice perspective on economic sociology. In N. Smelser & R. Swedberg (Eds.), *The Handbook of Economic Sociology* (pp. 166-180): Princeton University Press.
Cook, K. S. (1977). Exchange and Power in Networks of Interorganizational Relations. *Sociological Quarterly, 18*(1), 62-82. doi: 10.1111/j.1533-8525.1977.tb02162.x
Cook, K. S., & Emerson, R. M. (1978). Power, Equity and Commitment in Exchange Networks. *American Sociological Review, 43*(5), 721-739.
Coumans, F. (2007a). Actueel Hoogtebestand Nederland wordt veel gedetailleerder. *VI Matrix*(November 2007), 24-27.
Coumans, F. (2007b). Gemeenten vullen (noodgedwongen) het stelsel van basisregistraties aan. *VI Matrix, 11*(November 2007).
Coumans, F. (2009). Minister Cramer wil duidelijkheid over wettelijke taken Kadaster. *VI Matrix*(September 2009), 28-29.
Coursey, D. H., Welch, E. W., & Pandey, S. K. (2005). *Organizational Determinants of Internally Perceived Website Effectiveness in State Health and Human Service Agencies.* Paper presented at the Hawaii International Conference on System Sciences (HICSS), Hawaii.
Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*: Thousand Oaks, CA: Sage.
Crompvoets, J., & Bregt, A. (2003). World status of national spatial data clearinghouses. *URISA Journal, 15*(1), 43-50.
Cropanzano, R., & Mitchell, M. S. (2005). Social Exchange Theory: An Interdisciplinary Review. *Journal of Management, 31*(6), 874-900. doi: 10.1177/0149206305279602
Cushing, Judith Bayard, Tyrone Wilson, Alan Borning, Lois Delcambre, Geoff Bowker, Mike Frame, John Schnase, William Sonntag, Janos Fulop, Carol Hert, Eduard

Hovy, Julia Jones, Eric Landis, Charles Schweik, Lawrence Brandt, Valerie Gregg, and Sylvia Spengler. (2005). *Eco-informatics and natural resource management*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
David, R. J., & Han, S.-K. (2004). A systematic assessment of the empirical support for transaction cost economics. *Strategic management journal, 25*, 39-58.
David, T. G., & John, M. P. (2005). *Social Software and Cyber Networks: Ties That Bind or Weak Associations within the Political Organization?* Paper presented at the Hawaii International Conference on System Sciences (HICSS05).
Davis, K. C. (1969). *Discretionary justice - a preliminary inquiry*: Louisiana State University Press.
Davis, K. C. (1976). Discretionary Justice in Europe and America. *The ANNALS of the American Academy of Political and Social Science, 428*(1), 134-a-. doi: 10.1177/000271627642800113
de By, R. A. (Ed.). (2004). *Principles of geographic information systems* (third edition ed.). Enschede: ITC.
de Kruif, J. (2008). Kadaster en gemeenten bundelen krachten. *Geo - Info : tijdschrift voor geo - informatie Nederland (GIN)*(11), 434-435.
Denhardt, R. B., & Perkins, J. (1976). The Coming of Death of Administrative Man. *Public Administration Review, 36*(4), 379-384.
Di Cesare, R., Luzi, D., & Ruggieri, R. (2008). The impact of Grey Literature in the web environment: A citation analysis using Google Scholar. *The grey journal (TGJ), 4*(2), 83-96.
DiMaggio, P. J. (1995). Comments on "What Theory is Not". *Administrative science quarterly, 40*(3), 391-397.
DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review, 48*(2), 147-160.
van de Donk, W. B. H. J. (1997). *De arena in schema : een verkenning van de betekenis voor de verdeling van middelen onder verzorgingshuizen*. Lelystad: Koninklijke Vermande.
Duijm, S., & Kanne, P. (2010). Analyse gemeentelijke coalitieakkoorden. De plaats van de dienstverlening in gemeentelijke coalitieakkoorden (pp. 26): TNS NIPO.
Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review, 14(4),*, 532-550.
Ellenkamp, Y., & Rietdijk, M. (2010). Kwaliteit van de basisregistraties adressen en gebouwen. Verdiepingsinformatie kwaliteit en de meting daarvan tijdens de toelatingsaudit. Versie 2010 (pp. 61): Ministerie van Volkshuisvesting, ruimtelijke ordening and milieubeheer (VROM).
Emel, J. (1991). Ecological crisis and provocative pragmatism. *Environment and Planning D: Society and Space, 9*(4), 384-390.
Emerson, R. M. (1962). Power-Dependence Relations. *American Sociological Review, 27*(1), 31-41.
England, M. R., & Simon, S. (2010). Scary cities: urban geographies of fear, difference and belonging. *Social & Cultural Geography, 11*(3), 201-207. doi: 10.1080/14649361003650722
Esterling, K. M., Lazer, D. M. J., & Neblo, M. (2004). *Home (page) style: house members on the web*. Paper presented at the Proceedings of the 2004 annual

national conference on Digital government research, Seattle, WA.
Evans, T. (2011). Professionals, Managers and Discretion: Critiquing Street-Level Bureaucracy. *British Journal of Social Work, 41*(2), 368-386. doi: 10.1093/bjsw/bcq074
Evans, T., & Harris, J. (2004). Street-Level Bureaucracy, Social Work and the (Exaggerated) Death of Discretion. *Br J Soc Work, 34*(6), 871-895. doi: 10.1093/bjsw/bch106
van Exel, J., & de Graaf, G. (2005). Q methodology: A sneak preview. Retrieved from www.jobvanexel.nl (last date of access 28-1-2013)
Fenger, M., & Noordegraaf, M. (2001). Beleidsvrijheid van publieke managers. De werking en versterking van de beleidsvrijheidsketen, *Management in Overheidsorganisaties, nov. 2001, B2240, .* (pp. pp. 1-23).
Finkelstein, S., & Hambrick, D. C. (1990). Top-Management-Team Tenure and Organizational Outcomes: The Moderating Role of Managerial Discretion. *Administrative science quarterly, 35*(3), 484-503.
Flak, L. S. (2007). *Addressing theoretical and practical aspects of contradictory stakeholder interests in e-Government integration efforts.* (PhD dissertation), Aalborg University, Aalborg.
Flak, L. S., Nordheim, S., & Munkvold, B. E. (2008). Analyzing Stakeholder Diversity in G2G Efforts: Combining Descriptive Stakeholder Theory and Dialectic Process Theory. *e-Service Journal, 6*(2), 3-23. doi: doi:10.2979/ESJ.2008.6.2.33
Flanagin, A., & Metzger, M. (2008). The credibility of volunteered geographic information. *GeoJournal, 72*(3), 137-148. doi: 10.1007/s10708-008-9188-y
Fortes, J. A. B. (2005). *Transnational digital government research project highlights*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Gächter, S., & Fehr, E. (1999). Collective action as a social exchange. *Journal of Economic Behavior & Organization, 39*(4), 341-369.
Georgiadou, P. Y. (2008). *Using geo - information : from a market to a polis perspetive : inaugural address by Yola Georgiadou, Professor in Geo - information for governance, Wednesday, 17 December 2008, ITC Enschede, The Netherlands*. Enschede: ITC.
Gersick, C. J. (1991). Revolutionary Change Theories: A Multi-Level Exploration of the Punctuated Equilibrium Paradigm. *Academy of Management Journal, 16*(1), 10-36.
Gherardi, S. (2000). Practice-Based Theorizing on Learning and Knowing in Organizations. *Organization 7*(2), 211-223.
Gilsing, V. A., & Duysters, G. M. (2008). Understanding novelty creation in exploration networks--Structural and relational embeddedness jointly considered. *Technovation, 28*(10), 693-708. doi: DOI: 10.1016/j.technovation.2008.03.004
Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: strategies for qualitative research.* . Chicago: : Aldine
Granovetter, M. (1983). The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory*, 201-233.
Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness. *The American Journal of Sociology, 91*(3), 481-510.

Granovetter, M. S. (1973). The strength of weak ties. *American journal of sociology, 78*(6), 1360-1380.
Grönlund, A. (2005). *What's In a Field - Exploring the eGoverment Domain.* Paper presented at the System Sciences, 2005. HICSS '05. Proceedings of the 38th Annual Hawaii International Conference on.
Grönlund, Å. (2002). Private Sanctity - e-Practices Overriding Democratic Rigor in e-Voting. In R. Traunmüller & K. Lenk (Eds.), *Electronic Government* (Vol. 2456, pp. 245-259): Springer Berlin / Heidelberg.
Gummesson, E. (2000). *Qualitative methods in management research* (second edition ed.): Sage Publications, Inc.
Gundars, K. (2005). *Legal and Ethical Implications of Employee Location Monitoring.* Paper presented at the Hawaii International Conference on System Sciences (HICSS05).
Hailu, T., & Belsham, J. (2003). *Integrating ArcGIS technology with transportation infrastructure management applications.* Paper presented at the 2003 ESRI International user conference, San Diego, CA.
Hanseth, O., & Lyytinen, K. (2004). Theorizing about the design of information infrastructures: design kernel theories and principles. *Sprouts: Working papers on information systems and organizations, 4*(4 - Article 12), 207-241.
Harrison, T., Gil-Garcia, J. R., Pardo, T. A., & Thompson, F. (2006). *Learning about interoperability for emergency response: Geographic information technologies and the World Trade Center Crisis.* Paper presented at the 39th Hawaii International Conference on System Sciences (HICCS'06), Hawaii.
Harvey, F. (2001). Constructing GIS: Actor Networks of Collaboration. *URISA Journal, 13*(1), 29 - 37.
Harvey, F. (2003). *How Do Local Governments Share and Coordinate Geographic Information?* Paper presented at the 21st International Cartographic Conference,, Durban, South Africa.
Harvey, F., & Tulloch, D. (2006). Local-government data sharing: Evaluating the foundations of spatial data infrastructures. *International Journal of Geographic Information Science, 20*(7), 743 - 768.
Hay, C., & Wincott, D. (1998). Structure, agency and historical institutionalism. *Political studies, XLVI (46)*, 951-957.
Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *Management Information Systems Quarterly (MISQ), 28*(1).
Higgs, G. (1999). Devolution and rational planning--some threats and opportunities for the break-up of GIS. *Computers, environment and urban systems, 23*(2), 71-73.
Hjort-Madsen, K. (2006). *Enterprise Architecture Implementation and Management: A Case Study on Interoperability.* Paper presented at the Hawaii International Conference on System Sciences (HICSS).
Homans, G. C. (1958). Social Behavior as Exchange. *The American journal of sociology, 63*(6), 597-606.
Homburg, V. M. F. (1999). *The political economy of information management. A theoretical and empirical analysis of decision making regarding interorganizational information systems.* PhD dissertation, University of Groningen.
Hood, C. (1995). The "new public management" in the 90s: variations on a theme. *Accounting organizations and society, 20*(2/3), 93-109.

van den Hooff, B. (2004). Electronic coordination and collective action: use and effects of electronic calendaring and scheduling. *Information & Management, 42*(1), 103-114.
Hu, Q., Hart, P., & Cooke, D. (2007). The role of external and internal influences on information systems security - a neo-institutional perspective. *The Journal of Strategic Information Systems, 16*(2), 153-172.
Hudson, B. (1989). Michael Lipsky and street-level bureaucracy: a neglected perspective. In L. Barton (Ed.), *Disability and dependency* (pp. 160): Routledge.
Hulleman, R. (2004). *Public transport. The comprehensive and cooperative approach of Almelo. The Netherlands.* . Paper presented at the 8th International Conference on Competition and Ownership in Land Passenger Transport (Thredbo 8), , September 2003, Rio De Janeiro, Brazil.
Hupe, P., & Hill, M. (2007). Street-level bureaucracy and public accountability *Public administration, 85*(2), 279-299.
Hutjes, J. M., & Buuren, J. A. v. (1992). *De gevalsstudie, Strategie van kwalitatief onderzoek.*: Boom.
IPO. (2004). Interprovinciaal milieuprogramma 2004 (pp. 118).
Irani, Z., Al-Sebie, M., & Elliman, T. (2006, 04-07 Jan. 2006). *Transaction Stage of e-Government Systems: Identification of Its Location and Importance.* Paper presented at the HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on System Sciences, 2006.
Irani, Z., Ezingeard, J.-N., Grieve, R. J., & Race, P. (1999). A case study strategy as part of an information systems research methodology: a critique. *International Journal of Computer Applications in Technology, 12*, 190-198. doi: 10.1504/ijcat.1999.000203
Islamoglu, M., & Liebenau, J. (2007). Information technology, transaction costs and governance structures: integrating an institutional approach. *Journal of Information Technology, 22*(3), 275-283.
Jackson, S. (2006). *Water models and water politics: design, deliberation, and virtual accountability*. Paper presented at the Proceedings of the 2006 international conference on Digital government research, San Diego, California.
Jankowski, P., & Nyerges, T. (2001). GIS-Supported Collaborative Decision Making: Results of an Experiment. *Annals of the Association of American Geographers, 91*(1), 48-70.
Janssen, M., & Cresswell, A. (2005). *Enterprise Architecture Integration in E-Government.* Paper presented at the Hawaii International Conference on System Sciences (HICSS).
Janssen, M., & Kuk, G. (2006). *A Complex Adaptive System Perspective of Enterprise Architecture in Electronic Government.* Paper presented at the Hawaii International Conference on System Sciences (HICSS06).
Johnson, T. (2002). *Organization, structure, and goals of the North Carolina, USA Approach.* Paper presented at the ACSM/ASPRS Annual Conference, Washington, D.C. .
Joia, L. A. (2004). Developing Government-to-Government enterprises in Brazil: a heuristic model drawn from multiple case studies. *International Journal of Information Management, 24*(2), 147-166.
Jonker, J., & Pennink, B. J. W. (2000). *De kern van methodologie*: Van Gorkum.

Jorna, F., & Wagenaar, P. (2007). The 'Iron Cage' Strengthened? Discretion and digital discipline *Public administration, 85*(1), 189-214.
Jorna, F. B. A. (2009). *De autobureaucratie. Informatisering en leren van uitvoering.* (Doctor dissertation), Leiden.
Kafeza, I., Kafeza, E., & Chiu, D. K. W. (2005, 03-06 Jan. 2005). *Legal Issues in Agents for Electronic Contracting.* Paper presented at the System Sciences, 2005. HICSS '05. Proceedings of the 38th Annual Hawaii International Conference on.
Kannan, C., Greenlee, D., Goretti, A., & Nagy, Z. (2004). *Spatial data infrastructure: North Carolina case study - panle discussion on NC OneMap and the National Map*. Paper presented at the ESRI User conference, San Diego, CA. http://training.esri.com/campus/library/bibliography/RecordDetail.cfm?ID=33386
ten Kate, L. (2007). Encyclopedie van de filosofie. In R. Bremmer, L. t. Kate & E. Warrink (Eds.), (pp. 583). Amsterdam: Boom.
Keast, R., & Brown, K. (2002). The Government Service Delivery Project: A Case Study of the Push and Pull of Central Government Coordination. *Public management review, 4*(4), 439-459. doi: 10.1080/14616670210163015
Keith, S., Suzann, B., & Marcie, E. (2005). *Strategic Information Technology Management: Managing Organizational, Political, and Technological Forces.* Paper presented at the Hawaii International Conference on System Sciences (HICSS), Hawaii.
Kern, T., & Willcocks, L. (2000). Exploring information technology outsourcing relationships: theory and practice. *The Journal of Strategic Information Systems, 9*(4), 321-350. doi: Doi: 10.1016/s0963-8687(00)00048-2
King, J. L., & Lyytinen, K. (2006). *Information systems. the state of the field*: John Wiley & Sons Ltd.
Kingdon, J. (1995). *Agendas, Alternatives, and Public Policies*.
Klein, M. R. (2004). Government Support for Energy Saving Projects. In R. Traunmüller (Ed.), *Electronic Government* (Vol. 3183, pp. 97-101): Springer Berlin / Heidelberg.
Kockelkoren, J. H. M., Marchesini, L. G. N., Rikken, A. J. A., & Schreuder, P. (Eds.). (1991). *Kadaster in perspectief : bundel opstellen aangeboden aan Prof. Mr. Ir. J.L.G. Henssen ter gelegenheid van zijn 65e verjaardag*. Apeldoorn: Dienst van het Kadaster en de Openbare Registers.
Kocman, V., Stöger-Frank, A., & Ulreich, S. (2002). Elektronische Steuer Erlass Dokumentation a Documentation on Official Tax Guide Lines. In R. Traunmüller & K. Lenk (Eds.), *Electronic Government* (Vol. 2456, pp. 230-233): Springer Berlin / Heidelberg.
Koerten, H. (2007). Een ingenieur is geen landmeter: een culturele vergelijking van Kadaster en Rijkswaterstaat als spiegel voor de NGII. *Geo-Info, 4*(1), 10-15.
Koerten, H. (2011). *Taming technology. The narrative anchor reconciling time, territory and technology in geoinformation infrastructures*: IOS Press.
Koopmans-van Berlo, M., & de Bruijn, H. (2004). When e-Government is opposed by unwilling clients : case studies on e-Enforcement. *In: Electronic journal of e-Government, 2(2004)1, pp. 65074*.
Koshkarev, A. V., Antipov, A. N., Batuyev, A. R., Yermoshin, V. V., & Karakin, V. P. (2008). Geo-portals as part of spatial data infrastructures: Russian Academy-

supported resources and geoservices. *Geography and Natural Resources, 29*(1), 18-27.
KplusV. (2005). Quick scan Actueel Hoogtebestand Nederland. De factoren die de kwaliteit van het AHN bepalen. Eindrapport. (pp. 24): KplsV.
Kramer, R. M., Brewer, M. B., & Hanna, B. A. (1996). Collective trust and collective action: The decision to trust as a social decision. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations. Frontiers of theory and research* (pp. 357-389): Thousand Oaks, CA: Sage.
Kumar, K., & van Dissel, H. G. (1996). Sustainable collaboration : managing conflict and cooperation in interorganizational systems. *In: MIS Quarterly, 20(1996)3, pp. 279-300*.
Kumar, R. (1996). *Research methodology: a step by step guide for beginners*: SAGE Publications Ltd.
Kwan, M.-P. (2008). From oral histories to visual narratives: re-presenting the post-September 11 experiences of the Muslim women in the USA. *Social & Cultural Geography, 9*(6), 653-669. doi: 10.1080/14649360802292462
Lamb, R., & Kling, R. (2003). Reconceptualizing Users as Social Actors in Information Systems Research. *MIS Quarterly, 27*(2), 197-236.
Lance, K. T., Georgiadou, P. Y., & Bregt, A. K. (2009). Cross - agency coordination in the shadow of hierarchy : joining up government geospatial information systems. *International journal of geographical information science (IJGIS), 23*(2).
Landauer, T. K., Foltz, P. W., & Laham, D. (1998). An introduction to latent semantic analysis. *Discourse processes, 25*, 259-284.
Langley, A. (1999). Strategies for theorizing from process data. *The academy of management review, 24*(4), 691-710.
Lash, S., & Urry, J. (1984). `The New Marxism of Collective Action: A Critical Analysis'. *Sociology, 18*(1), 33-50. doi: 10.1177/0038038584018001004
Lau, G. T., Kerrigan, S., Wang, H., Law, K. H., & Wiederhold, G. (2004). *A software infrastructure for government regulation analysis and compliance assistance*. Paper presented at the Proceedings of the 2004 annual national conference on Digital government research, Seattle, WA.
Lazer, D., Esterling, K., & Neblo, M. (2005). *Style conscious: how members of congress learn new ways to communicate*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Lee, J.-N., & Kim, Y.-G. (1999). Effect of partnership quality on IS outsourcing success: conceptual framework and empirical validation. *Journal of Managent Information Systems, 15*(4), 29-61.
Lee, T. W. (1999). *Using qualitative methods in organizational research*: Thousand Oaks, CA: Sage.
Leiblein, M. J. (2003). The choice of organizational governance form and performance: Predictions from Transaction cost, resource-based, and real options theories. *Journal of management, 29*(6), 937-961.
Lens, V. (2006). Examining the Administration of Work Sanctions on the Frontlines of the Welfare System. *Social Science Quarterly, 87*(3), 573-590.
Letsche, A. T. A., & Berry, A. M. W. (1997). Large-scale information retrieval with latent semantic indexing. *J Inf. Sci., 100*(N 1-4), 105-137.

Levy, B., & Spiller, P. T. (1994). The institutional foundations of regulatory commitment - A comparative analysis of telecommunications regulations. [Article]. *Journal of Law Economics & Organization, 10*(2), 201-246.
Lewandowski, J., & Streich, G. (2007). Democratizing Social Capital: In Pursuit of Liberal Egalitarianism. *Journal of Social Philosophy, 38*(4), 588-604. doi: 10.1111/j.1467-9833.2007.00400.x
Lewins, A., & Silver, C. (2007). *Using Software in Qualitative Research : A Step-by-Step Guide*: Sage publications, London.
Lewis, R. B. (2004). NVivo2.0 and ATLAS.ti 5.0: A comparative review of two popular qualitative data-analysis programs. *Field methods, 16*(4), 439-469.
Li, Ron, Keith Bedford, C. K. Shum, Xutong Niu, Feng Zhou, Vasilia Velissariou, J. Raul Ramirez, and Aidong Zhang. (2006). *Digitalization of coastal management and decision making supported by multi-dimensional geospatial information and analysis*. Paper presented at the Proceedings of the 2006 international conference on Digital government research, San Diego, California.
Lichtenstein, B. M. B. (2000). Emergence as a process of self-organizing - New assumptions and insights from the study of non-linear dynamic systems. *Journal of Organizational Change Management, 13*(6), 526 - 544.
Lim, S., Saldanha, T., Malladi, S., & Melville, N. P. (2009). *Theories Used in Information Systems Research: Identifying Theory Networks in Leading IS Journals" (2009).* Paper presented at the ICIS 2009 Proceedings.
Lipsky, M. (1980). *Street-level bureaucracy : dilemmas of the individual in public services* (Paperback ed. ed.): New York : Russell Sage Foundation.
Lipsky, M. (1983). *Street-level bureaucracy : dilemmas of the individual in public services* (Paperback ed. ed.): New York : Russell Sage Foundation.
Lourenco, R. P., & Costa, J. P. (2006). *Discursive e-Democracy Support.* Paper presented at the HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on System Sciences, 2006.
MacEachren, A. M., Carr, D., & Scott, D. (2004). *Collaborative research: quality graphics for federal statistical summaries - results*. Paper presented at the Proceedings of the 2004 annual national conference on Digital government research, Seattle, WA.
MacEachren, A. M., Fuhrmann, S., McNeese, M., Cai, G., & Sharma, R. (2005). *Project highlight: GeoCollaborative crisis management*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Magnusson, J., & Nilsson, A. (2006). *Infusing an Architectural Framework with Neo-Institutional Theory: Reports from Recent Change Management Initiatives within the Swedish Public Administration.* Paper presented at the HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on System Sciences, 2006.
Mansourian, A., Rajabifard, A., Valadan Zoej, M. J., & Williamson, I. (2006). Using SDI and web-based system to facilitate disaster management. *Computers & Geosciences, 32*(3), 303-315.
Mariahazy, L. (2002). *Urban information and the private sector: GIS as a business tool in commerce*. Paper presented at the URISA 2002 Annual conferecne, Chicago, Illinois. Available from:

http://www.plangraphics.com/publications/urisa2002papers/MariahazyURISA.PDF (last date of access 28-1-2012)
Markus, L., Steinfield, C. W., Wigand, R. T., & Minton, G. (2006). Industry-wide information systems standardization as collective action: The case of the US residential mortgage industry. *MIS Quarterly, 30*(special issue), 439-465.
Martin, W., & Kiles, J. (2004). *Hazards Mitigation: using localized data in HAZUS MH*. Paper presented at the 24th Annual ESRI user conference, San Diego, CA, USA. http://training.esri.com/campus/library/bibliography/RecordDetail.cfm?ID=33285 (last date of access 28-1-2013)
Masser, I., Rajabifard, A., & Williamson, I. (2007). Spatially enabled government through SDI implementation. *International journal of geographic information science, 2007*(1), 1-16.
Mathiasen, D. G. (1999). The New public management and its critics. *International public management journal, 2*(1), 90-111.
Maynard-Moody, S., & Musheno, M. (2000). State Agent or Citizen Agent: Two Narratives of Discretion. *J Public Adm Res Theory, 10*(2), 329-358.
McBride, N. (2005). Chaos theory as a model for interpreting information systems in organizations. *Information Systems Journal, 15*(3), 233-254. doi: 10.1111/j.1365-2575.2005.00192.x
McGlamery, P. (2000). Lifting the fog: maps and spatial information emerging as grey literature. *International Journal on Grey Literature, 1*, 5-11. doi: 10.1108/14666180010292392
McLafferty, S. (2005). Women and GIS: Geospatial Technologies and Feminist Geographies. *Cartographica: The International Journal for Geographic Information and Geovisualization, 40*(4), 37-45. doi: 10.3138/1341-21jt-4p83-1651
van der Meer, A. (2007). *Gemeentegrenzen in Nederland: een juridisch, technisch en kadastraal onderzoek. Dissertation TU Delft.* : Delft University Press.
Mercadante, V., & Salvemini, M. (2008). *Geoportals evaluation. Italian regions: A case study*. Paper presented at the 11th AGILE International conference on geographic information science 2008, University of Girona, Spain. <http://plone.itc.nl/agile_old/Conference/2008-Girona/PDF/88_DOC.pdf>. (last date of access 28-1-2013)
Messick, S. (2003). *Ordering chaos: Information management in humanitarian crises*. Paper presented at the URISA, Atlanta, Georgia. http://training.esri.com/campus/library/bibliography/RecordDetail.cfm?ID=36019 (last date of access 28-1-2013)
Meyer, G. W. (1994). Social Information Processing and Social Networks: A Test of Social Influence Mechanisms. *Human relations, 47*(9), 1013-1047.
Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: formal structure as myth and ceremony. *The American journal of sociology, 83*(2), 340-363.
Migué, J.-L., Bélanger, G., & Niskanen, W. (1974). Toward a general theory of managerial discretion. *Public Choice, 17*(1), 27-47. doi: 10.1007/bf01718995
Mills, A. P., Baggie, A., Lettsome, B., & Potter, L. (2003). *Small Islands, Big Ideas*. Paper presented at the 23rd Annual ESRI user conference, San Diego, CA. http://proceedings.esri.com/library/userconf/proc03/p0465.pdf
Mitton, C., Adair, C. E., McKenzie, E., Patten, S. B., & Perry, B. W. (2007).

Knowledge Transfer and Exchange: Review and Synthesis of the Literature. *Milbank Quarterly, 85*(4), 729-768. doi: 10.1111/j.1468-0009.2007.00506.x
Moe, T. M. (1984). The New Economics of Organization. *American Journal of Political Science, 28*(4), 739-777.
Molm, L. D., Peterson, G., & Takahashi, N. (1999). Power in Negotiated and Reciprocal Exchange. *American Sociological Review, 64*(6), 876-890.
Moon, M. J., Welch, E. W., & Wong, W. (2005). *What Drives Global E-Governance? An Exploratory Study at a Macro Level.* Paper presented at the Hawaii International Conference on System Sciences (HICSS05).
Morris, T. (2007). Internal and external sources of organizational change: Corporate Form and the Banking Industry. *Sociological Quarterly, 48*(1), 119-140. doi: 10.1111/j.1533-8525.2007.00073.x
Moutinho, J. L., & Heitor, M. (2007). Building human-centered systems in the network society. *Technological Forecasting and Social Change, 74*(1), 100-109.
Muhlberger, P. (2006). *Should e-government design for citizen participation?: stealth democracy and deliberation*. Paper presented at the Proceedings of the 2006 international conference on Digital government research, San Diego, California.
Mulford, C. L., & Rogers, D. L. (1982). Definitions and models. In D. L. Rogers & D. A. Whetten (Eds.), *Interorganizational coordination: Theory, research and implementation* (pp. 9-31): Iowa State University Press.
Murgia, J., Amemiya, N., & Turkstra, J. (2002). *Local Spatial Data Infrastructure, Trujillo - Peru.* Paper presented at the Governance and the Use of GIS in Developing Countries, Enschede, Netherlands.
Natasha, D. (2005). *Business Compliance to Changing Privacy Protections.* Paper presented at the Hawaii International Conference on System Sciences (HICSS05).
Nebert, D. D. (2004). Developing spatial data infrastructures: The SDI Cookbook. Version 2.0. In T. w. g. GSDI (Ed.), (pp. 171): GSDI.
Nedovic-Budic, Z. (2000). Geographic Information Science Implications for Urban and Regional Planning. *URISA Journal, 12*(2), 81-93.
Nedovic-Budic, Z., Feeney, M.-E. F., Rajabifard, A., & Williamson, I. (2004). Are SDIs serving the needs of local planning? Case study of Victoria, Australia and Illinois, USA. *Computers, environment and urban systems, 28*(4), 329-351.
Nedovic-Budic, Z., & Pinto, J. K. (2000). Information sharing in an interorganizational GIS environment. *Environment and Planning B: Planning and Design, 27*, 455-474.
Nedovic-Budic, Z., & Pinto, J. K. (2004). GIS database development and exchange:interaction mechanisms and motivations,. *URISA Journal,*Vol. 16, issue 1, pp. 15-30, http://www.urisa.org/files/vol16no1.pdf (last date of access 28-1-2013)
Ni, A. Y., & Bretschneider, S. (2005). *Why Does State Government Contract Out Their E-Government Services?* Paper presented at the Hawaii International Conference on System Sciences (HICSS05).
Niles, S., & Hanson, S. (2003). A new era of accessibility? *URISA Journal, 15*(Special issue - Access and participatory approaches), 35-42.
Nitzan, S., & Romano, R. E. (1990). Private provision of a discrete public good with uncertain cost. *Journal of Public Economics, 42*(3), 357-370.

North, D. C. (1990). *Institutions, institutional change and economic behaviour*: Cambridge University press.
Oliveira, A., Fradinho, E., & Caires, R. (2006). *From a Successful Regional Information Society Strategy to an Advanced Living Lab in Mobile Technologies and Services.* Paper presented at the HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on System Sciences, 2006.
Oliver, C. (1990). Determinants of interorganizational relationships: integration and future directions. *Academy of Management Reviews, 15*, 241-265.
Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review, 16*(1), 145-179.
Olsen, M. (1965). *The logic of collective action: public goods and the theory of groups.*: Harvard University Press.
Omran, E. E., & van Etten, J. (2007). Spatial-Data Sharing: Applying social-network analysis to study individual and collective behaviour. [Article]. *International Journal of Geographical Information Science, 21*(6), 699-714. doi: 10.1080/13658810601135726
van Ooijen, C. (2007). *How states use spatial information strategically: learning from the history of maps.* Paper presented at the EGPA - european group of public administration conference, Madrid, Spain.
Van Oosterom, P., Maessen, B., & Quak, W. (2002). Generic query tool for spatio-temporal data. *International Journal of Geographical Information Science, 16*, 713-748.
Orlikowski, W. J., & Barley, S. R. (2001). Technology and institutions: What can research on information technology and research on organizations learn from each other? *MIS Quarterly, 25*(2), 145-165.
Orlikowski, W. J., & Iacono, C. S. (2001). Research commentary: Desperately seeking the 'IT' in IT research - A call to theorizing the IT artifact. *Information systems research, 12*(2), 121-134.
Otjacques, B., Hitzelberger, P., & Feltz, F. (2006). *Identity Management and Data Sharing in the European Union*.
Ovaa, W. (2007). Roosendaal bouwt BAG 'onder architectuur'. *VI Matrix*(Maart/April 2007), part 1: pp 24-25 (maart 2007); part 2002: pp. 2038-2041 (April 2007).
Paez, D., Bishop, I. D., & Williamson, I. P. (2004). *DISCUSS: an alternative for taking decisions with an incomplete SDI.* Paper presented at the 2004 ESRI user conference, San Diego, CA, USA. http://proceedings.esri.com/library/userconf/proc04/docs/pap2137.pdf (last date of access 28-1-2013)
Painter, M. (1981). Central agencies and the coordination principle. *Australian Journal of Public Administration, 40*(4), 265-280. doi: 10.1111/j.1467-8500.1981.tb00519.x
Pantel, P., Philpot, A., & Hovy, E. (2005). *Aligning database columns using mutual information*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Park, H. M. (2005). *A Cost-Benefit Analysis of the Seoul OPEN System: Policy Lessons for Electronic Government Projects*.
Parrish, R. (2002). *Spatially enabled e-government*. Paper presented at the URISA, Chicago. Illinois. http://downloads2.esri.com/campus/uploads/library/pdfs/23881.pdf (last date

of access 28-1-2013)
Perkins, R. M., & Xiang, W.-N. (2006). Building a geographic info-structure for sustainable development planning on a small island developing state. *Landscape and Urban Planning, 78*(4), 353-361.
Peters, B. G. (1998). Managing horizontal government: The politics of co-ordination. *Public Administration, 76*(2), 295-311. doi: 10.1111/1467-9299.00102
Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: a resource dependency perspective*. New York: Harper and Row.
Pfeffer, J., & Salancik, G. R. (2003a). *External control of organizations : a resource dependence perspective*. Stanford: Stanford Business Classics.
Pfeffer, J., & Salancik, G. R. (2003b). *The External Control of Organizations: A Resource Dependence Perspective*: Stanford University Press.
Pickles, J. e. (1995). *Ground truth : social implications of Geographic Information Systems*. New York etc.: Guilford Press.
Pollitt, C. (2003). Joined-up Government: a Survey. *Political Studies Review, 1*(1), 34-49. doi: 10.1111/1478-9299.00004
Pollitt, C., Thiel, S. v., & Homburg, V. (2007). *New public management. Adaptation and alternatives.*: Palgrave, Macmillan.
Polman, J., & Salzmann, M. A. (1996). *Handleiding voor de technische werkzaamheden van het kadaster*: Kadaster, Apeldoorn.
Price, H. (2004). Models and modals. In D. Gillies (Ed.), *Laws and models in science*. London: King's College Publications.
Pulusani, P. (2002). *An Open Political and Business Agreement to Underscore the Importance of Global Co-operation.* Paper presented at the FIG Congress 2002, Washington, D.C.
Putnam, Hilary. *Pragmatisme: Een open vraag*. Translated by Laterza & Figli Spa Translated from Italian by Rein Gerritsen; Vert. van: Il pragmatismo: una questione aperta. - Roma-Bari : Gius, cop. 1992. Amsterdam: Boom, 2001..
Putnam, H. (2005). Pragmatisme: een open vraag. In W. van Gils, A. Hermesdorf, L. ten Kate & E. Warrink (Eds.), *De nieuwste folisofie: Derrida, Sloterdijk, Nussbaum* (pp. 146-184): Company of books.
Quane, J. M., Su, J. H., & Joshi, P. (2009). "It's Not Business As Usual Any More": Workers' Reflections on Discretion, Trust and Power Dynamics at the Frontlines of Welfare Reform. *working paper 09-04*. Retrieved from https://orchid.hosts.jhmi.edu/wfp/files/WP%2009-04%20It's%20Not%20Business%20As%20Usual%20Any%20More.pdf (last date of access 28-1-2013)
Rajabifard, A., Feeney, M., & Williamson, I. P. (2002). The Cultural Aspects of Sharing and Dynamic Partnerships within an SDI Hierarchy. *Cartography Journal, 31*(1), 15.
Rajabifard, A., & Williamson, I. P. (2001). *Spatial data infrastructures: concept, SDI hierarchy and future directions* Paper presented at the GEOMATICS'80 Conference, 29 April-2 May 2001 Tehran,Iran.
Rajabifard, A., Williamson, I. P., Holland, P., & Johnstone, G. (2000). *From local to global SDI initiatives: a pyramid of building blocks.* Paper presented at the 4th Global Spatial Data Infrastructure Conference 13-15 March 2000, Cape Town, South Africa,.
Rajão, R. G. L. (2011). *Objects, boundaries and joint work.* (Doctor of Philosophy),

Lancaster University, Lancaster, UK.
Regner, P., Wiesinger, T., Küng, J., & Wagner, R. (2004). Software Acquisition Based on Business Models. In R. Traunmüller (Ed.), *Electronic Government* (Vol. 3183, pp. 108-111): Springer Berlin / Heidelberg.
Richards, L. (2005). *Handling qualitative data : a practical guide*. London etc.: Sage.
Robey, D., & Boudreau, M.-C. (1999). Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications. *Information systems research, 10*(2), 167-185. doi: 10.1287/isre.10.2.167
Rocheleau, B. A. (2007). *Case studies on digital government*. Hershey, PA: Idea Group Pub.
Rorty, R. M. (1979). *Philosophy and the Mirror of Nature*. NJ: Princeton University press.
Rose-Redwood, R., Alderman, D., & Azaryahu, M. (2008). Collective memory and the politics of urban space: an introduction. *GeoJournal, 73*(3), 161-164. doi: 10.1007/s10708-008-9200-6
Rowley, T., Behrens, D., & Krackhardt, D. (2000). Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strategic Management Journal, 21*(3), 369-386.
Sabherwal, R., Hirschheim, R., & Goles, T. (2001). The Dynamics of Alignment: Insights from a Punctuated Equilibrium Model. *Organization science, 12*(2), 179-197.
Sabherwal, R., & Robey, D. (1995). Reconciling Variance and Process Strategies for Studying Information System Development. *Information systems research, 6*(4), 303-327. doi: 10.1287/isre.6.4.303
Sastry, M. A. (1997). Problems and Paradoxes in a Model of Punctuated Organizational Change. *Administrative science quarterly, 42*(2), 237-275.
Schildt, K., Beaumaster, S., & Edwards, M. (2005). *Strategic information technology management: Managing Organizational, political, and technological forces.* Paper presented at the 38th Hawaii International Conference on System Sciences, Hawaii.
Schindler, U., & Diepenbroek, M. (2008). Generic XML-based framework for metadata portals. *Computers & Geosciences, 34*(12), 1947-1955.
Schneberger, S., Pollard, C., & Watson, H. (2009). Theories: For Academics and Practitioners. *Information Systems Management, 26*(1), 52-60. doi: 10.1080/10580530802384738
Schneberger, S. L., Watson, H. J., & Pollard, C. E. (2007). *The efficacy of "Little t" theories.* Paper presented at the 40th Annual Hawaii International Conference on System Sciences (HICSS 2007).
Scholl, H. J. (2005). *Interoperability in E-Government: More than Just Smart Middleware*. Paper presented at the Proceedings of the Proceedings of the 38th Annual Hawaii International Conference on System Sciences (HICSS'05) - Track 5 - Volume 05.
Scholl, H. J. (2005). *Organizational transformation through e-Government: Myth or reality.* Paper presented at the EGOV05, Copenhagen.
Searle, J. (1990). Collective Intentions and Actions. In P. Cohen, J. Morgan & M. Pollack (Eds.), *Intentions in Communication* (pp. 401-415). Cambrige, MA: : The MIT Press,.

Shah, R. C., & Kesan, J. P. (2005). *Governance characteristics of information technology*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Sheppard, E. (2005). Knowledge Production through Critical GIS: Genealogy and Prospects. *Cartographica: The International Journal for Geographic Information and Geovisualization, 40*(4), 5-21. doi: 10.3138/gh27-1847-qp71-7tp7
Shneiderman, B. (2005). *Human-computer interaction themes in digital government: web site comprehension and statistics visualization*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Sieber, R. E. (2004). Rewiring GIS/2. *Cartographica: The international journal for geographic information and geovisualization, 39*(1), 25-39.
Silva, L. (2007). Epistemological and theoretical challenges for studying power and politics in information systems. *Information Systems Journal, 17*(2), 165-183. doi: 10.1111/j.1365-2575.2007.00232.x
Simon, H. A. (1955). A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics, 69*(1), 99-118.
Simon, H. A. (1976). *Administrative behavior : a study of decision-making processes in administrative organization* (3rd edition ed.): New York : The Free Press.
Sin, C. H. (2007). Using Software to Open up the 'Black Box' of Qualitative Data Analysis in Evaluations. *Evaluation, 13*(1), 110-120.
Soper, D. S., Demirkan, H., Goul, M., & St. Louis, R. (2006, 04-07 Jan. 2006). *The Impact of ICT Expenditures on Institutionalized Democracy and Foreign Direct Investment in Developing Countries.* Paper presented at the System Sciences, 2006. HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on Systems Sciences (HICSS).
Stevenson, H., & Harmeling, S. (1990). Entrepreneurial management's need for a more "chaotic" theory. *Journal of Business Venturing, 5*(1), 1-14. doi: Doi: 10.1016/0883-9026(90)90022-l
Stokes, G. (2002). *Data management as we move forward sustainable resource development.* Paper presented at the URISA annual conference proceedings, Chicago, Illinois.
Stoltzfus, K. (2005). *Motivations for implementing e-government: an investigation of the global phenomenon*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.
Stone, A., Levy, B., Paredes, R. (1996). Public institutions and private transactions: a comparative analysis of the legal and regulatory environment for business transactions in Brazil and Chile. In L. J. Alston, Eggertsson, T., North, D.C. (Ed.), *Empirical studies in institutional change*: Cambridge University Press.
Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques. (1st edition)*.
Strauss, A., & Corbin, J. (1998). *Basics of qualitative research. Techniques and procedures for developing grounded theory* (second ed.): Sage.
Styhre, A. (2002). Non-linear change in organizations: organization change management informed by complexity theory. *Leadership and Organization Development Journal, 23*, 343-351.
Talman, J. A. (2009). Management control in joint ventures: an analysis based on

transaction cost economics and game theory (pp. 180-202).
Tams, S. (2010). *On the appropriateness of theory borrowing in is: an interdisciplinary evaluation.* Paper presented at the Southern Association for Information Systems Conference, March 26th-27th, 2010, Atlanta, GA, USA.
Tan, C.-W., Pan, S.-L., & Lim, E. T. K. (2005). *Towards the Restoration of Public Trust in Electronic Governments: A Case Study of the E-Filing System in Singapore.* Paper presented at the Hawaii International Conference on System Sciences (HICSS), Hawaii.
Tarafdar, M., & Gordon, S. R. (2007). Understanding the influence of information systems competencies on process innovation: A resource-based view. *The Journal of Strategic Information Systems, 16*(4), 353-392.
Thellufsen, C., Rajabifard, A., Enemark, S., & Williamson, I. (2009). Awareness as a foundation for developing effective spatial data infrastructures. *Land use policy, 26*(2), 254-261.
van Thiel, S. (2007). *Bestuurskundig onderzoek. Een methodologische inleiding*: Coutinho.
van Thiel, S. R. (2004). *Governance van uitvoeringsorganisaties : nieuwwe vraagstukken voor sturing in het publieke domein*. Apeldoorn: Kadaster.
van Tiggelen, G. (2008). Gemeente Helmond heeft BAG-bestand gereed. *VI Matrix*(Oktober 2008), 8-11.
Tillquist, J., King, J. L., & Carson, W. (2002). A Representational Scheme for Analyzing Information Technology and Organizational Dependency. *MIS Quarterly, 26*(2), 91-118.
Tingling, P., & Parent, M. (2002). Mimetic isomorphism and technology evaluation: does imitation transcend judgment? *Journal of the association for information systems (JAIS), 3*, 113-143.
Toet, R. (2007). *Een referentiearchitectuur voor de waterschappen : de realisatie en de invloed van een integraal model. PhD Dissertation*: Faculty of Economics and Business. University of Amsterdam.
Travers, J., & Milgram, S. (1969). An Experimental Study of the Small World Problem. *Sociometry, 32*(4), 425-443.
True, J. L., Jones, B. D., & Baumgartner, F. (2007). Punctuated-equilibrium theory. Explaining stability and change in public policy making. In P. A. Sabatier (Ed.), *Theories of the policy process* (pp. 155-187): Westview press.
Tucker, M., & Corriveau, A. (2002). *Leveraging legacy mainatenance data and GIS to optimize infrastructure replacement and rehabilitation.* Paper presented at the 2002 ESRI international user conference, San Diego, CA. http://proceedings.esri.com/library/userconf/proc02/pap0196/p0196.htm (last date of access 28-1-2013)
Tullberg, J. (2006). Group egoism; investigating collective action and individual rationality. *Journal of Socio-Economics, 35*(6), 1014-1031.
Twynstra Gudde. (2003). Haalbaarheidsstudie status Authentieke Registratie voor het Actueel Hoogtebestand Nederland (pp. 26).
Ulrich, D., & Barney, J. B. (1984). Perspectives in Organizations: Resource Dependence, Efficiency, and Population. *The Academy of Management Review, 9*(3), 471-481.
Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological*

Review, 61(4), 674-698.
Vatn, A. (2009). Cooperative behavior and institutions. *Journal of Socio-Economics, 38*(1), 188-196.
VNG. (2007). De eerste overheid. In VNG (Ed.), (pp. 46).
VNG. (2010). *Dienstverlening draait om mensen. De basis op orde, werken aan de toekomst.*
VRO. (1982). *Op goede gronden : het kadaster en de openbare registers in Nederland : een bundel opstellen ter gelegenheid van het 150 - jarig bestaan van de dienst van het kadaster en de openbare registers*. 's-Gravenhage: Staatsuitgeverij.
VROM. (2008). GIDEON - Basisvoroziening geo-informatie Nederland (English version : GIDEON: Key geo-information facility for the Netherlands) (pp. 52): VROM - The Netherlands Ministry of Housing, Spatial Planning and the environment.
Wade, M., Biehl, M., & Kim, H. (2006). If the tree of IS knowledge falls in a forest, will anyone hear? : A commentary on Grover et al. *Journal of the association for information systems (JAIS), 7*(5), 326-335.
Walker, K., Corcoran, P. B., & Wals, A. E. J. (2004). Case studies, make-your-case studies, and case stories: a critique of case study methodology in sustainability in higher education. *Environmental Education Research, 10*(1), 7-21.
Wareham, J. D. (2003). Information Assets in Interorganizational Governance: Exploring the Property Rights Perspective. *IEEE Transactions on engineering management, 50*(3), 337-351.
Wasko, M. M., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly, 29*(1), 35-57.
Wastell, D. G. (2006). Information systems and evidence-based policy in multi-agency networks: The micro-politics of situated innovation. *The Journal of Strategic Information Systems, 15*(3), 197-217.
Watts, D. J. (2002). A simple model of global cascades on random networks. *Proceedings of the National Academy of Sciences of the United States of America, 99*(9), 5766-5771.
Watts, S., & Stenner, P. (2012). *Doing Q Methodological Research : Theory, Method and Interpretation*. London: Sage publications.
Weaver, M., Delcambre, L., Tolle, T., Behlings, D., Toccalino, P., Baldwin, L., & Nielsen, M. L. (2004). *Metadata++: a digital library for natural resource managers*. Paper presented at the Proceedings of the 2004 annual national conference on Digital government research, Seattle, WA.
Webb, A. (1991). Coordination: A problem in public sector management. *Policy & Politics, 19*(4), 229-242. doi: 10.1332/030557391782454188
Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly, 26*(2), xiii-xxiii.
Weerakkody, V., Dwivedi, Y. K., & Irani, Z. (2009). The diffusion and use of institutional theory: a cross-disciplinary longitudinal literature survey. [Article]. *Journal of information technology, 24*(4), 354-368. doi: 10.1057/jit.2009.16
Wehn de Montalvo, U. (2003). In search of rigourous models for policy-oriented research: A behavioral approach to spatial data sharing. *URISA Journal, 15*(1), 19-28.

White, L. (2002). Connection matters: exploring the implications of social capital and social networks for social policy. *Systems Research and Behavioral Science, 19*(3), 255-269. doi: 10.1002/sres.464

Wicks, A. C., & Freeman, R. E. (1998). Organization Studies and the New Pragmatism: Positivism, Anti-Positivism, and the Search for Ethics. *Organization science, 9*(2), 123-140.

Williamson, I., Rajabifard, A., & Binns, A. (2006). Challenges and issues for SDI development. *International journal of spatial data infrastructures research, 1*, 24-35.

Williamson, O. E. (1983). *Markets and hierarchies: Analysis and antitrust implications: a study in the economics of internal organizations. [original publication: 1975]* (1st Free Press paperback ed ; 1983 ed.): New York: Free Press.

Williamson, O. E. (1996). *The mechanisms of governance*. New York, NY: Oxford University press.

Williamson, O. E. (1998). Transaction cost economics: How it works, where it is headed. *De Economist - Quarterly Review of The Royal Netherlands Economic Association, 146*(1), 23-58.

Wolber, D. (2006). *Political e-identity: campaign funding data and beyond*. Paper presented at the Proceedings of the 2006 international conference on Digital government research, San Diego, California.

Wollin, A. (1999). Punctuated equilibrium: reconciling theory of revolutionary and incremental change. *Systems Research and Behavioral Science, 16*(4), 359-367. doi: 10.1002/(sici)1099-1743(199907/08)16:4<359::aid-sres253>3.0.co;2-v

Woods, M., & Wickam, M. (2006). *Methodological implications of software use: an empirical investigation of the impact of software programs on literature analysis using n6 and nvivo7.* Paper presented at the Quality and impact of qualitative research. 3rd annual QualIT conference, Brisbane.

Woolcock, M. (1998). Social capital and economic development: Toward a theoretical synthesis and policy framework. *Theory and Society, 27*(2), 151-208. doi: 10.1023/a:1006884930135

Xenakis, A., & Macintosh, A. (2005). *Procedural Security and Social Acceptance in E-Voting.* Paper presented at the Hawaii International Conference on System Sciences (HICSS05).

Yanow, D. (2006). Talking about Practices: On Julian Orr's Talking About Machines. *Organization Studies, 27*(12), 1743-1756. doi: 10.1177/0170840606071935

Yin, C.-C. (1998). Equilibria of collective action in different distributions of protest thresholds. *Public Choice, 97*(4), 535-567. doi: 10.1023/a:1004921725560

Yin, R. K. (2003). *Case study research : design and methods* (Edition: 3rd [upd. and exp.] ed ed.): Thousand Oaks, CA [etc.] : Sage.

Yuan, Y., Gay, G., & Hembrooke, H. (2006). Focused Activities and the Development of Social Capital in a Distributed Learning Community. *The Information Society, 22*, 25-39. doi: 10.1080/01972240500388347

Zenger, T. R., Lazzarini, S. G., & Poppo, L. (2002). Informal and formal organization in new institutional economics *New Institutionalism in Strategic Management* (Vol. 19, pp. 277-305). Amsterdam: Jai-Elsevier Sci Bv.

Zouridis, S., & Thaens, M. (2005). Reflections on the Anatomy of E-Government. In , edited by Amsterdam:. In V. H. V. Bekkers (Ed.), *The Information Ecology of*

E-Government. E-Government as Institutional and Technological Innovation in Public Administration: IOS Press.

Zuurmond, A. (1994). *De infocratie. Een theoretische en empirische heroriëntatie op Weber's ideaaltype in het informatietijdperk. (The infocracy. A theoretical and emprirical reorientation on Weber's idealtype of the rational legal bureaucracy in the information age.* : Uitgeverij Phaedrus.

Zwahr, T., Finger, M., & Mueller, P. (2005). *More than Digitisation - The Transformative Potential of E-Governance: An Exploratory Case Study.* Paper presented at the Hawaii International Conference on System Sciences (HICSS05).

Zwahr, T., Rossel, P., & Finger, M. (2005). *Towards electronic governance: a case study of ICT in local government governance*. Paper presented at the Proceedings of the 2005 national conference on Digital government research, Atlanta, Georgia.

Summary

This dissertation addresses the overall research question of this research **How do different geoICT coordination types transform geoG2Gs in the Netherlands.** This research question derives from an empirical entry point, namely a dilemma which occurred in 2005 on how to coordinate the management of National Height Data (AHN) in the Netherlands. The question is addressed through 5 research questions and presented in 8 chapters. The analysis relies on a pragmatist approach, which systematically combines theoretical insights with experiences of practitioners and practical observations. This approach leads to a first exploratory model relating geoICT coordination to discretions and stability elements.

Chapter 2 defines 'geoICT coordination'as a comprehensive goal-setting and goal-implementation action to align geoICT choices in work processes across different organisation and categorises 4 geoICT coordination types based on the aims. LOCUS geoICT coordination aims at uniformity and aligning geoICT across multiple administrative levels, EVENTUS coordinates based on output requirements, MODUS on the use of particular instruments and tools and CAUSUS based on specific contextual outcomes (CAUSUS).

Chapter 3 conceptualises 'discretions' as personal judgments by individual staff members, based on a personal appraisal of what is appropriate, given the socio-organisational circumstances and preferences of that particular staff member. Discretions result in a change of organisational behaviour and/or structure, and may thus change the stability of geoG2Gs. This research identifies two types of discretions for three types of staff within geoG2Gs: discretions to simplify one's own tasks and/or to handle ambiguous tasks ('autonomous' discretions), and discretions which modify prescribed tasks to cater for needs of clients and/or other actors external to their organisation ('joint' discretions). Both types may occur at strategic, alignment and operational staff levels (hence 'strategic', 'alignment' and 'operational' discretions). The combination of these two categories leads to six types of discretions, which may emerge as a result of the four geoICT coordination types.

Chapter 4 provides the justification and explanation of 4 theoretical frameworks to analyse stability and change in geoG2Gs. The stability elements power, economic rules, conformity and collectivity are explained by respectively inter-organisational dependencies, anticipated effects on transaction costs, agency of external network relations and collective interests and collective action. Stability depends on respecitvely their long-term mutual expectations and associated staff allocations, low transaction cost and effective hierarchies, dominance of network agency over personal interests and a combination of collective interest with collective sanctions and incentives. Furthermore, there

are four characteristics of change: ‘change’ concerns a fundamental discontinuation of previously given process and/or organisational structures; ‘change’ has clear artefacts; ‘change’ occurs in a punctuated period; and, one can identify a moment at which ‘fundamental change’ occurs. On the basis of these characteristics of change, it is possible to identify how change in each stability element is visible.

Chapter 5 describes the methodology to test, analyse and adapt the exploratory model. It identifies with which indicators to find the relations between geoICT coordination types, discretions and stability changes, it justifies with which cases to do so. Combining the case selection and the empirical indicators provides a pragmatic method for conducting practice-based data collection in 4 geoG2G cases in the Netherlands: the Cadastral case, AHN, Dataland and Sabimos. Twenty representative aspects were acquired in each case.

Chapter 6 provides the results of the empirical investigation in the 4 cases. The individual case analysis show that each case has one dominant geoICT coordination type, which has different effects on both discretions and stability. The BAG coordination of the Cadastral case increases the strategic and decreases the alignment and operational discretions. These discretions arise to spread the risk of possible negative outcomes, and result in a reduction of power and economic rules stability. In the AHN case the geoICT coordination coincides with the presence of both strategic and alignment discretions, which re-enforce certain historically accepted work practices. This leads to a re-conformation of the conformity and collectivity stability. In the Dataland case the emphasis on geoICT ‘standards’ and ‘national focus’ cause high scores in most of the stability aspects. The Dataland case exhibits discretions which re-enforce stability in conformity and collectivity. In Sabimos, the flexibility in geoICT coordination coincides with alignment discretions, rooted in task simplification by avoiding data integration. There is stability in all elements. There is a high degree of sector interests, which explains the high conformity and collectivity.

Chapter 7 compares all aspects across and analyses the influence of geoICT coordination on discretions and stability elements, and of discretions on stability elements. GeoICT coordination activities which utilize standards and employ a scaling up approach have a high potential for strategic discretions. These discretions aim to seek more or larger partnerships, and the wish to adhere to client interests. The effect of this is that power stability has a tendency to decrease initially, and only increase gradually afterwards.

The choice for a national focus and scaling up approach seems typical for the geoICT coordination preferences in the Netherlands. This can be contributed to the implementation of INSPIRE, and the fact that both a national ministry

(VROM) and a national association (VNG) have been actively and historically involved in the formulation of geoICT coordination objectives. In addition, it appears that the majority of experts represent a small technical field, which is seldom challenged with competition. This makes it easier to mimick solutions from one place to another without much contest.

For cases which exhibit more open and flexible coordination strategies there is also a potential for discretions, but these are mostly discretions of alignment staff. An additional effect is the decrease in transaction costs. Once staff members of any of the geoG2G partners perceive that they can contribute to the geoICT decisions, they exhibit more sharing of their resources and assets. Openness thus increases economic rules stability.

The effect of variations in discretions on stability are fourfold. 1) Strategic discretions tend to favor a solution which is carried by a larger network of professionals, and may enlarge the geoG2G. 2) Alignment discretions stimulates a partnership with low asset specificity, which makes the economic rules stability more stable, as the transaction cost are decreasing. The effect on other stability elements is less visible. 3) Discretions which arise out of the need for task simplification has the effect that it strengthens the trust, and the long-term mutual expectations between the geoG2G partners. 4) Discretions which arise out of the need to adhere to client interests has the effect that it increases the transaction costs. This enlarges the scope for additional partners and thus increases the degree of necessary interactions to maintain the partnership.

Chapter 8 finds that geoG2G transformation, expressed by the aggregate of all changes in stability, depends on the scale at which the geoICT coordination is aiming, and the size (ie.the number of partners and number of immediately affected staff members) of the geoG2G partnership.The case with the most persuasive geoICT coordination type exhibits the largest transformation and the highest degree of discretions. The least transformation is visible in the case with the most flexible coordination type.

Further research could complement the findings with more cases inside and outside the Netherlands, apply a more longitudinal time scope, and extend to cases with other types of ICT. A practical advise for practitioners from this research is not to scale up geoICT coordination objectives too fast, and not to enforce uniform regulations for all parties (such as municipalities) if these municipalities have not been involved actively. Instead, apply a more gradual and phase-to-phase approach whereby the inter-organisational relationships and mutual expectations are kept more stable.

Samenvatting (Summary in Dutch)

Deze dissertatie heeft de volgende onderzoeksvraag **Hoe transformeren verschillende typen van geoICT coordinatie de publieke samenwerking met geoICT in Nederland.** Dit onderzoek begint met een empirisch startpunt uit 2005, namelijk een dilemma over de coordinatie van het Actueel Hoogtebestand Nederland (AHN) voort te zetten. Het onderzoek bestaat uit 5 onderzoeksvragen die in 8 hoofdstukken behandeld worden. Het onderzoek gaat uit van een pragmatistische aanpak, waarbij systematisch theorie, ervaring en praktijk worden gecombineerd. Deze aanpak begint met een exploratief model waarin geoICT coördinatie, discreties en stabiliteits elementen in samenwerkingsverbanden met geoICT (geoG2Gs) met elkaar worden verbonden.

Hoofdstuk 2 definieert 'geoICT coördinatie' als een actie die aanpassing van geoICT gerelateerde activiteiten en keuzes in verschillende organisaties nastreeft en die daardoor een verandering in zowel de structuur, de afhankelijkheden als het gedrag binnen geoICT gerelateerde samenwerkingsverbanden kan veroorzaken. Er bestaan 4 typen van geoICT coördinatie: het LOCUS type gaat uit van de de noodzaak van uniformiteit van geoICT in meerdere administratieve lagen, het EVENTUS type stuurt op criteria in uitkomsten, het MODUS type op het gebruik van instrumenten en productie processen, en het CAUSUS type op inbedding van geoICT in contextuele omstandigheden.

Hoofdstuk 3 conceptualiseert 'discreties' als individuele handelingen van stafleden op basis van eigen beoordelingen over wat onder gegeven sociale en organisatorische omstandheden juist is. Discreties resulteren in een verandering van organisatorisch gedrag en/of structuur, en kunnen zorgen voor een verandering in de stabiliteit van geoG2Gs. Dit onderzoek onderscheidt 2 typen discreties voor drie typen stafleden in geoG2Gs: discreties om zijn eigen taken te vereenvoudigen en/of meerdere overlappende taken makkelijker uit te voeren ('autonome discreties), en discreties die zorgen voor een aanpassing van een taak om tegemoet te komen aan wensen van externe klanten (gezamenlijke discreties).Beide typen komen voor onder verschillende typen stafleden: op strategisch (beleids) niveau, op informatie management niveau en op operationeel niveau. De combinatie van deze 2 categorieën leidt tot 6 typen discreties, die zich kunnen voordoen als gevolg van de 4 typen geoICT coördinatie.

Hoofdstuk 4 legt uit hoe met 4 theoretische raamwerken stabiliteit en verandering binnen geoG2Gs te analyseren. De stabiliteitselementen macht, economische regels, conformiteit en collectiviteit kunnen worden uitgelegd door respectievelijk inter-organisatorische afhankelijkheden, gevolgen in

transactiekosten, invloed van externe netwerkrelaties en de combinatie van collectieve belangen en collectieve maatregelen. Stabiliteit hangt dan af van wederzijdse verwachtingen op langere termijn, lage transactiekosten en effectieve hierachische relaties, de dominantie van netwerk relaties ten opzichte van persoonlijke belangen, en een combinatie van collectieve beperkingen en stimuleringen. De verandering in stabiliteit onstaat als er een fundamentele stopzetting van een bepaald proces of bepaalde structuur binnen een organisatie plaatsvindt. Deze is zichtbaar als deze binnen een afzienbare periode gebeurt, en als men een moment kan aanwijzen waarop de verandeing tot stand is gekomen.

Hoofdstuk 5 beschrijft de methodologie om het exploratieve model te testen, analyseren en aan te passen. De beschrijving gaat in op de indicatoren om de relaties te vinden tussen geoICT coordinatie typen, discreties en stabiliteitsveranderingen. De geselecteerde casussen voor het onderzoek zijn: de Kadastrale informatie, het AHN, Dataland en Sabimos.

Hoofdstuk 6 geeft de empirische resultaten in de 4 casussen. Elke casus heeft een dominant geoICT type, die verschilledne gevolgen heeft voor discreties en stabiliteit. De BAG coordinatie zorgt voor meer strategische discreties en een minder informatie management en operationele discreties. Deze ontstaan om het risico van mogelijke negatieve effecten te beperken, en zorgen voor een verlaging van stabilitet in macht en economische regels. In het AHN komen zowel strategische als informatie management discreties voor, die beide de historisch gegroeide werkpraktijken versterken. Dit leidt tot een vergroting van de stabiliteit in conformiteit en collectiviteit. In Dataland zorgt de nadruk op standaarden en de nationale aanpak voor hogere scores in stabiliteitsaspecten. Toch zijn ook hier discreties, die met name de collectiviteit en conformiteit nastreven. In Sabimos gaat de meer flexibele coordinatie gepaard met informatie management discreties. Deze zijn met name gericht op vereenvoudiging van taken. Er is stabiliteit in alle elementen. De invloed van de sector is hierbij groot.

Hoofdstuk 7 vergelijkt alle aspecten en analyseert welke invloed geoICT coordinatie heeft op discreties en stabiliteitsveranderingen, en welke invloed discreties hebben op stabiliteitsveranderingen. Er blijkt dat geoICT coordinatie activiteiten die voornamelijk bestaan uit het stimuleren van standaarden en het opschalen hiervan de mogelijkheid van het ontstaan strategische discreties vergroten. Deze discreties zijn gericht op het zoeken naar nieuwe partners en het bevorderen van belangen van klanten. Het gevolg is dat machtsstabiliteit aanvankelijk afneemt, en daarna pas langzamenhand weer toeneemt.

De keuze voor een landsdekkendheid lijkt typsich voor de geoICT coordinatie in Nederland. Dit kan deels worden verklaard door INSPIRE en het feit dat zowel een ministerie (VROM) en een landelijke organisatie (VNG) actief heeft

bijgedragen aan de coordiantie doelstellingen. Daarnaast blijkt dat de meerderheid van de experts uit een relatief klein werkveld komen, die nauwelijks onderhevig is aan competitie. Dit maakt het makkelijker om elkaars coordinatie oplossingen over te nemen.

Bij de gevallen met meer flexibele coordinatie strategieën komen ook discreties voor, voornamelijk op informatie management niveau. Deze zorgen voor een vermindering van transactiekosten, doordat meer faciliteiten worden gedeeld. De openheid zorgt dus voor meer stabiliteit in economische regels.

Er zijn 4 gevolgen van discreties op de stabiliteit. 1) Strategische discreties zoeken vaak de steun binnen een brder netwerk van professionals, en kunnen zorgen voor grotere samenwerkingsverbanden. 2) Discreties op informatie management niveau zijn vaak ten faveure van partners waarmee makkelijker assets en gegevens kunnen worden uitgewisseld, waardoor transactiekosten kunnen worden verminderd. De effecten op andere stabiliteits elementen is vaak minder zichtbaar. 3) Discreties die taken vereenvoudigen zorgen voor meer vertrouwensbanden en langere termijn verwachtingen tussen partners. 4) Discreties die zich meer richten op de belangen van externe klanten kunnen transactiekosten verhogen, omdat het meer tijd en menskracht kost om de samenwerking op te volgen en in te vullen.

Hoofdstuk 8 komt tot de conclusie dat geoG2G transformatie, uitgedrukt in de aggregatie van veranderingen in stabiliteit, afhangt van de schaal waarop de geoICT coördinatie en de grootte van de geoG2G samenwerkingsverbanden zich richt. Het meest veelomvattende geoICT coordinatie type, LOCUS, zorgt voor de meeste kans op discreties. De minste transformatie komt voor daar waar de geoICT coordinatie flexibel is.

Verder onderzoek zou kunnen worden gedaan via andere casussen in en buiten Nederland. Verder zou een meer longitudinaal onderzoek worden gedaan met andere gevallen van ICT coördinatie. Een praktisch advies vanuit dit onderzoek is de doelstellingen van geoICT coördinatie niet te snel te willen opschalen, en niet uniforme standaarden te reguleren voor alle samenwerkingsverbanden als deze niet zijn betrokken bij de voorbereiding van die standaarden. Een meer geleidelijke aanpak waarbij inter-organisatorische samenwerkingsverbanden meer intact blijven zou de wederzijdse verwachtingen stabieler houden.

CURRICULUM VITAE - WALTER TIMO DE VRIES

Walter Timo de Vries is married and has two children. He is a lecturer/ researcher at the faculty of geo-information science and earth observation (ITC) of the University Twente in Enschede in institutional, organizational and economic aspects of geo-information, in governance of spatial data infrastructures and in land administration. Holding an MSc degree in geodetic engineering from the Technical University of Delft, he has worked since 1988 in a number of international projects in Asia, Africa and South America. These projects have dealt with land reform, geospatial data infrastructures and professional training and education. After working for the Netherlands Ministry of Development cooperation (DGIS) in Lampung/ Indonesia and the UN Institute for training and research (UNITAR) in Geneva / Switzerland, he joined ITC in 1995. At ITC he has been programme director for the Geoinformation management programme, course coordinator of different local courses on geospatial data infrastructures and land administration and long-term on site teamleader in capacity building and institutional development projects in Namibia and Rwanda amongst others. He has been involved in a Netherlands research programme GeoGov, with a specific interest for the interaction between geo-information and inter-organizational cooperation in the public sector together with Erasmus University. His dissertation on geoICT coordination developed out of this project, and most of his publications touch upon those issues.

ISBN 978-90-6164-349-4
ITC dissertation no. 225