

GIMA

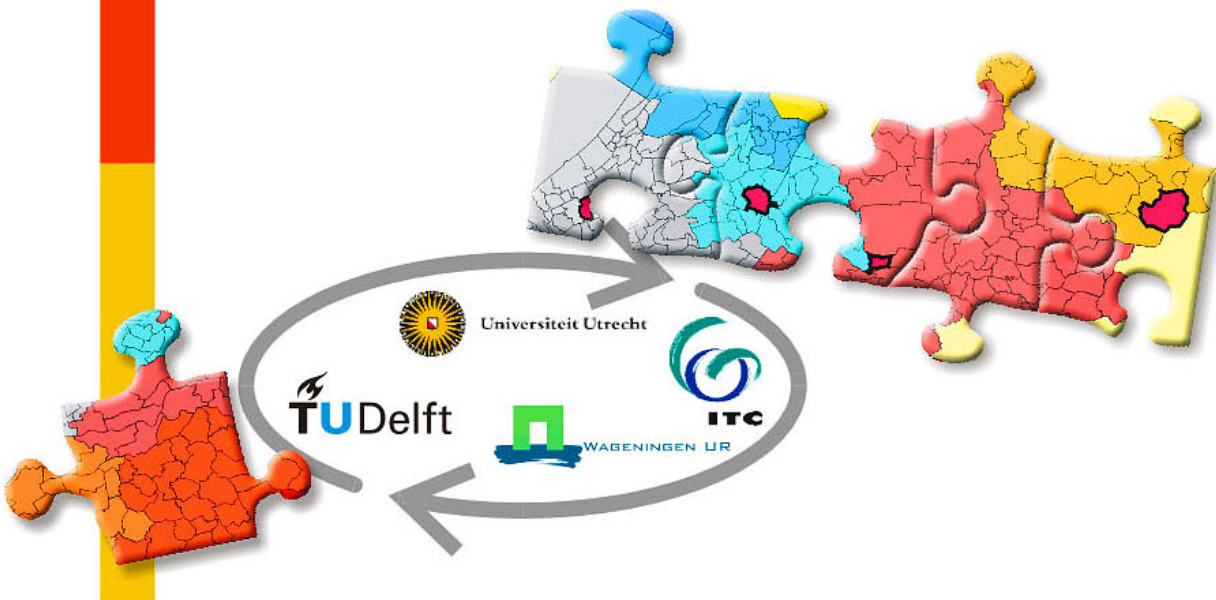
Geographical Information Management and Applications

**EXCHANGE OF GEO-INFORMATION IN
LAND CONSOLIDATION PROJECTS VIA A
WEB SERVICE
—
A FEASIBILITY STUDY FROM A USER'S
PERSPECTIVE**



Master of Science Thesis

M. Louwsma



**EXCHANGE OF GEO-INFORMATION IN LAND
CONSOLIDATION PROJECTS VIA A WEB SERVICE**

—

A FEASIBILITY STUDY FROM A USER'S PERSPECTIVE



Master of Science Thesis Geographical Information Management and Applications (GIMA)
Ir. M. Louwsma
Wageningen, August 2010

Professor:
Prof. Dr. J.A. (Jaap) Zevenbergen, ITC

Supervisor:
Dr. C.P.J.M. (Corné) van Elzakker, ITC

Reviewer:
Ir. J. (John) Stuiver, WUR

Acknowledgements

This thesis is part of the MSc Geographical Information Management and Applications (GIMA). During the course of the programme I was luckily working in an attractive geo-environment at the Dutch Kadaster, making the learning outcome of the modules often immediately applicable. In this environment I also gradually gained some ideas about possible topics for my thesis. Ultimately I chose to focus on a feasibility study about the development of a web service in land consolidation projects to enable two-way communication of geo-information between title holders and the land consolidation committee. These services are often developed from a providers perspective. Therefore in this study I wanted to focus more on the users perspective in terms of usability and utility. If the user needs are not met, they are less likely to adopt it.

First of all, I sincerely want to thank Corné van Elzaker and Jaap Zevenbergen, respectively supervisor and responsible professor, for the constructive discussions during the research. At critical moments they were able to guide me through the process always stressing the academic skills.

Secondly, I am very grateful that the Kadaster gave me the opportunity and, equally important, time to work on this thesis. Hopefully, the results of this research contribute positively to the ongoing product innovations.

Colleagues were of course also important for me during the research process. Special thanks go to Ursula who facilitated the publication of the online questionnaire on the website and kept me going in this phase of research with her enthusiasm. Also, I have to thank Laris, whom I could always contact for information about the existing web application and the pilots held with this web application during the period of public inspection in two land consolidation projects. Also she informed me on request about the current state of the art of related projects. Furthermore, I want to mention the experts who collaborated in the focus group to discuss the user characteristics and their tasks. Their ideas greatly contributed to a solid discussion about these topics. And last but not least, I am grateful for the co-operation of the involved project leaders who gave permission to conduct the user survey among a sample of title holders within their project or provided me with information needed for the evaluation of the existing prototype.

Besides colleagues at the Kadaster, I also would like to thank both land consolidation committees (Land van Maas en Waal and Saasveld-Gammelke) who gave permission to conduct the user survey among title holders, the primary user group. Furthermore, I sincerely want to thank all the interviewed people who were willing to spend some of their precious time. Their contributions gave me further insight in relevant developments in the field of web-based applications with geo-information whether or not in relation to land consolidation. And, finally, I am grateful to the people that were willing to review the web service. Their participation proved to be very useful in terms of getting better insight in the usability of the web service.

Samenvatting

Geo-informatie is de afgelopen jaren steeds belangrijker geworden. Een groeiend aantal webapplicaties gericht op geo-informatie is voor een groot publiek beschikbaar op internet. Omdat in landinrichtingsprojecten met grond wordt geruild, speelt geo-informatie een belangrijke rol. In 2009 is een webapplicatie geïntroduceerd om relevante (geo-)informatie van de landinrichtingscommissie (namens de provincie) aan betrokken rechthebbenden beter toegankelijk te maken. Het doel van dit onderzoek is te onderzoeken of het mogelijk is om een webservice in landinrichtingsprojecten te gebruiken die het mogelijk maakt dat rechthebbenden (geo-)informatie aanleveren aan de landinrichtingscommissie. E-overheid voorzieningen hebben zowel voordelen voor de overheid, in dit geval de provincie, als burgers, in dit geval rechthebbenden in een landinrichtingsproject. Voor de overheid vergroot het de effectiviteit en efficiency van het gebruik van (geo-)informatie in landinrichtingsprojecten. Een voordeel voor rechthebbenden is dat ze te allen tijde en waar ze maar willen de informatie kunnen inzien, zo lang er maar een internetverbinding beschikbaar is.

Kortom, dit onderzoek richt zich op de vraag of het haalbaar is om e-overheid in te zetten in landinrichtingsprojecten om de uitwisseling van (geo-)informatie tussen overheid (provincie) en burgers (rechthebbenden) te verbeteren zodat de beschikbare (geo-)informatie effectiever en efficiënter wordt gebruikt. Een gebruikers georiënteerd ontwerp proces is als theoretische benadering gebruikt om de haalbaarheid te onderzoeken. Een inventarisatie van de behoeften van de gebruikers is nodig om een maximaal gebruik van de webservice te bewerkstelligen en het conceptueel ontwerp toe te kunnen spitsen op de gebruikersbehoeften om zo de gebruiksvriendelijkheid te vergroten. Het gebruikers georiënteerde ontwerp proces bestaat uit drie verschillende componenten, namelijk (1) een analyse van de randvoorwaarden en wensen vanuit de overheid, het gebruik en de gebruikers van de webservice en de context waarin de webservice wordt gebruikt, (2) ontwerp oplossingen en (3) een evaluatie van het voorgestelde ontwerp. Het valt buiten de scope van dit onderzoek om een prototype van de voorgestelde webservice te ontwikkelen. Daarom is het niet mogelijk om een evaluatie van het conceptueel ontwerp uit te voeren. In plaats daarvan zal de bestaande webapplicatie, waar (geo-)informatie wordt ontsloten voor rechthebbenden, worden geëvalueerd om informatie te verzamelen voor het conceptueel ontwerp. Daarnaast wordt een korte technische haalbaarheidsanalyse uitgevoerd om beveiligingsaspecten en de interoperabiliteit met bestaande software die gebruikt wordt in landinrichtingsprojecten, bijvoorbeeld Transfer, te onderzoeken.

Het onderzoek naar voorwaarden of wensen vanuit de betrokken overheid heeft aangetoond dat provincies een belangrijke rol spelen. Provincies zijn de belangrijkste verantwoordelijke organisatie voor landinrichtingsprojecten en de financiering hiervan. De semi-gestructureerde interviews met een aantal provincies lieten zien dat provincies over het algemeen positief staan tegenover de introductie van een webservice als communicatiemiddel om (geo-)informatie in landinrichtingsprojecten uit te wisselen tussen overheid en burger. Voorwaarde is wel dat het een aanvulling is op de bestaande methoden voor informatievoorziening om alle betrokken burgers gelijke kansen te geven. Ook wetgeving bepaalt voor een groot gedeelte de speelruimte van provincies met betrekking tot de voorgestelde webservice. Belangrijke in deze context is de wetgeving met betrekking tot de landinrichting, de openbaarheid van overheidsbesluiten en het recht op privacy. Gelet op het recht op privacy en de openbaarheid van overheidsbesluiten wordt geadviseerd om de manier waarop de informatie wordt gepresenteerd en hoeveel moeite gebruikers moeten doen om de informatie te raadplegen, te variëren al naar gelang het belang van openbaarheid of privacy van individuele personen. (Geo-)informatie met een openbaar karakter kan standaard aan alle rechthebbenden worden getoond, terwijl meer privacy gevoelige (geo-) informatie alleen wordt getoond aan diegene die het betreft. Hetzelfde geldt voor het aanleveren van (geo-)informatie door rechthebbenden in een landinrichtingsproject. Een ingediende zienswijze

bijvoorbeeld, bevat vaak privé-informatie die niet openbaar hoeft te worden gemaakt. Het is echter wel van belang om informatie over een mogelijk vervuild perceel openbaar te maken als dit door één van de rechthebbenden (anoniem) wordt aangegeven via de webservice.

Het gebruik en de gebruikersbehoeften zijn onderzocht door middel van een enquête onder rechthebbenden en een focus groep discussie. De focus groep discussie richtte zich op kenmerken van verschillende gebruikersprofielen en mogelijke taken die uitgevoerd zouden kunnen worden via de webservice. De enquête was vooral geconcentreerd op de voorkeuren van de potentiële gebruikers van de webservice. Gebaseerd op de resultaten van de enquête kunnen onder potentiële gebruikers twee groepen worden onderscheiden. De ene groep staat positief tegenover de introductie van een webservice om (geo-)informatie uit te wisselen, terwijl de andere groep liever de voorkeur geeft aan andere manieren van data uitwisseling, bijvoorbeeld via persoonlijk contact. De meeste respondenten vinden veilige data overdracht, opslag en gebruik belangrijk en hechten ook waarde aan een ontvangstbevestiging.

Behalve de voorwaarden en wensen is ook de bestaande webapplicatie geëvalueerd. Een klein aantal test personen heeft de bestaande applicatie getest op gebruiksvriendelijkheid. De resultaten zijn gebruikt in het conceptueel ontwerp voor de voorgestelde webservice die ook het aanleveren van (geo-)informatie omvat. Tijdens de test werden geen kritische problemen ondervonden door de test personen. Verder bleek dat de test personen informatie op verschillende manieren opzocht. Daarmee kan worden geconcludeerd dat de huidige webapplicatie als basis kan worden gebruikt voor het conceptueel ontwerp. De resultaten van de evaluatie komen deels overeen met de bevindingen uit de literatuur.

De korte technische haalbaarheidsanalyse toonde aan dat aanpassingen aan Transfer kunnen worden beperkt als rechthebbenden wordt gevraagd om drie verschillende toedelingsalternatieven aan te geven gebaseerd op de wensen die men heeft. Ook hier is veiligheid een belangrijk onderwerp en kunnen verschillende beveiligingsniveaus worden onderscheiden. Het is aan te bevelen om de beveiligingsmaatregelen altijd duidelijk aan te geven aan de gebruiker. Dit bevordert het vertrouwen van de gebruiker in de applicatie en zal de intentie om de applicatie te gebruiken positief beïnvloeden.

Het conceptueel ontwerp is gebaseerd op de onderzoeksresultaten van het gebruikers georiënteerde onderzoek, de technische haalbaarheidsstudie en literatuur. Het conceptueel ontwerp is voor twee fasen in het landinrichtingsproject in detail uitgewerkt, namelijk het opstellen van het ruilplan en de tervisielegging van dit plan. Beide fasen worden gekenmerkt door de uitwisseling van (geo-)informatie tussen beide betrokken partijen.

De eindconclusie is dat het haalbaar lijkt om een webservice te ontwikkelen die de uitwisseling van (geo-) informatie tussen provincie of de landinrichtingscommissie en rechthebbenden verbetert. Voorwaarde is wel dat deze service een aanvulling is op de bestaande manieren van communicatie. Omdat het buiten de scope van het onderzoek viel om een prototype te ontwikkelen, was het niet mogelijk om het conceptueel ontwerp te evalueren. De belangrijkste aanbeveling is om een prototype gebaseerd op het ontwerp te evalueren om te testen of de webservice voldoet aan de wensen van de gebruikers en de webservice gebruiksvriendelijk is. Verder kan de evaluatie dienen om de onderzoeksresultaten van de focus groep discussie, de enquête en de evaluatie van de bestaande webapplicatie te valideren.

Summary

The importance of geo-information has increased enormously last years. Many web-based applications are nowadays widely available for a general public. Geo-information plays an important role in land consolidation projects where re-allotment of land takes place. In 2009, a web application was launched to disseminate (geo-)information from the land consolidation committee, on behalf of the province, to the involved citizens (title holders) in the land consolidation project. The aim of this research is to investigate the feasibility of a web service in land consolidation projects that also allows title holders to submit geo-information to the land consolidation committee. E-government services are considered to have advantages for both parties involved. It increases an efficient and effective use of (geo-)information in land consolidation projects. For the involved title holders the web service has advantages as well. It allows them to access the information whenever and wherever they want, as long as an internet connection is available.

This research discusses whether it is feasible to use e-governance in land consolidation projects to exchange (geo-)information between concerned government (province) and citizens (title holders) in order to increase an effective and efficient use of (geo-)information. A user-centred design process is adopted as theoretical approach to investigate the feasibility. Investigating the user needs is necessary to maximise the use of the proposed web service and to be able to tailor the design to the user needs, consequently optimising usability. The user-centred design process consists of three components, namely (1) requirements analyses of the government requirements, use and user requirements and the context, (2) design solutions for the web service and (3) evaluation of the design solution. It is out of scope of this research to actually build a prototype. Instead the existing web application was evaluated to collect data for the conceptual design of the proposed web service. In addition, a short technical feasibility study was carried out to investigate security issues and the operability with existing software used in land consolidation projects, e.g. Transfer.

The government requirements analysis showed that provinces play an important role, both as sponsor of land consolidation projects and as principal responsible organisation. The semi-structured interviews revealed that, in general, provinces are willing to consider the use of a web service as a means of communication in land consolidation projects, although this would be complementary to existing communication means in order to give all involved citizens equal chances. Legislation also determines the discretionary space of the province. Relevant legislation for this research relates to land consolidation and the right for freedom of information in relation to the right to privacy. Based on the right to privacy and freedom of information, it is recommended to vary the way how information will be presented or submitted and how much effort users have to put into accessing the data. Geo-information with a public character can be supplied standard to all title holders, while (geo-) information with a more private character can only be shown to the person it concerns. The same accounts for (geo-)information submitted by users. For example, a submitted objection to the draft re-allotment plan does not have to be accessible to all, since it often contains private information. On the other hand, the location of possibly polluted parcels concerns a much wider audience. This information could be public and accessible on the web service for all title holders.

The use and user requirements have been investigated by means of a focus group session with experts in the field of land consolidation and a user survey (questionnaire). The focus group session centred on the tasks and characteristics of the title holders, whereas the questionnaire focused on the preferences of the title holders. The user survey showed that two different user groups may be distinguished based on their preferences. One group is positive about the introduction of a web service to exchange geo-information, while the other group hesitates and appreciates personal contact. Most respondents attach high value to secure data transfer, storage and handling as well as a confirmation of the submitted data.

Besides the requirements, the existing web application has been studied. The study encompassed a review of the existing web application by a small number of test persons in order to collect data for the development of the conceptual design. It proved that the existing web application provides a solid base for the extension to submit geo-information. No test persons encountered critical problems. Furthermore, it appeared that the test persons looked up information differently. Some people preferred to look up information via the provided interactive maps, whereas other people navigated to the overview of administrative data. The review results have been used for the conceptual design, including improvements of the existing part of the web application. Findings from the review coincided mainly with findings from literature about the design of web applications.

The short technical feasibility study demonstrated that adaptations to the existing software Transfer can be limited to a minimum if title holders are asked to deliver three alternative wishes for the new allotment through the proposed web service. By analogy with privacy, different levels of security standards can be distinguished. To view the information on the web application title holders are required to login. The security level for submitting data varies from no login to point out possibly polluted parcels to login by e.g. DigiD to submit wishes or objections to the land consolidation committee. The taken security measures should always be clearly communicated to the user. This will enhance the user's trust in the application and, in turn, will enhance a positive intention to use the web service for consulting and submitting data.

The results of the requirements analyses, the technical feasibility study and the review of the existing web application have been the basis for the initial conceptual design of the proposed web service. Besides that, relevant findings from literature were used. The design has been worked out in detail for two important phases in a land consolidation project, namely the preparation phase of the re-allotment plan and the public inspection of the plan. Both phases are characterised by the exchange of (geo-)information between land consolidation committee and title holders.

The overall conclusion is that it seems to be feasible to develop a web service that enables the exchange of geo-information between title holders and province or land consolidation committee, if tasks are delegated by the province. However, it should be complementary to the existing manners to exchange geo-information between involved parties, as indicated by the interviewed provinces and the group of respondents of the user survey that prefers other ways of contact than through a web application.

Since it was out of scope to actually build a prototype of the proposed web application, the most important recommendation would be to build a prototype based on the conceptual design and to evaluate whether it meets the user needs as appeared from the findings of this research. The evaluation may, as well, act as a validation of the research results obtained through the focus group, the user survey and the review of the existing web application.

Contents

Acknowledgements.....	i
Samenvatting	ii
Summary	iv
1 Introduction	3
1.1 Problem statement and context.....	3
1.2 Research objectives	7
1.3 Research questions.....	7
1.4 Scope	7
1.5 Thesis structure	8
2 Methodology.....	9
2.1 Introduction	9
2.2 Theoretical approach.....	9
2.3 Research methodology	10
2.3.1 Research structure	10
2.3.2 Stakeholder analysis.....	12
2.3.3 Organisation analysis.....	12
2.3.4 Legislation analysis	13
2.3.5 Context	13
2.3.6 Use and user requirements (tasks, preferences, characteristics)	14
2.3.7 Review of existing web application of Peize	15
2.3.8 Analysis of technical feasibility.....	17
2.3.9 Conceptual design	17
2.4 Conclusions and discussion	17
3 Theoretical context	19
3.1 Introduction	19
3.2 E-governance	19
3.3 User needs	22
3.4 The role of maps in web-based services.....	25
3.5 Web-based GIS in public participation	27
3.6 Case studies	28
3.6.1 Agricultural census web service of Dutch Regulation Service.....	29
3.6.2 Partial parcels web service at Kadaster.....	31
3.7 Conclusions and discussion	31
4 Government requirements	33
4.1 Introduction	33
4.2 Organisation of land consolidation projects.....	33
4.3 Stakeholders and the role of provinces.....	34
4.4 Freedom of information	37
4.5 Right to privacy.....	37
4.6 Legislation related to land consolidation	40
4.7 Conclusions and discussion	41
5 Use and user requirements	42
5.1 Introduction	42
5.2 User characteristics	42

5.3	User tasks	45
5.4	User preferences	46
5.4.1	Questionnaire	46
5.4.2	Results	47
5.4.3	Discussion	52
5.5	Conclusions and discussion	53
6	Usability review of web application Peize	54
6.1	Introduction	54
6.2	Review of web application.....	54
6.3	Results	58
6.4	Design principles.....	60
6.5	Conclusions and discussion	61
7	Technical feasibility.....	63
7.1	Introduction	63
7.2	Submission of geo-information	63
7.3	Requirements of Transfer software.....	64
7.4	Security	66
7.5	Conclusions and discussion	67
8	Conceptual design of the new web service	69
8.1	Introduction.....	69
8.2	Information architecture and navigation aspects	69
8.3	Conceptual design	71
8.3.1	Preparation re-allotment plan.....	71
8.3.2	Public inspection re-allotment plan	76
8.4	Limitations	79
8.5	Conclusions and discussion	80
9	Conclusions and recommendations.....	81
9.1	Conclusions.....	81
9.1.1	Main conclusion	81
9.1.2	Other conclusions.....	81
9.2	Recommendations.....	85
	Literature.....	87
	List of figures	92
	List of tables	92
	Appendix I - Compendium.....	93
	Appendix II – Interviews case studies	94
	Appendix III – User survey.....	101
	A - Questionnaire.....	101
	B - Results	105
	Appendix IV – Interviews provinces	121
	Appendix V – Review of website	130
	A – Test session	130
	B - Questions after test session.....	131

1 Introduction

1.1 Problem statement and context

In the past few years in society the importance of geo-information has increased enormously. As a consequence, or maybe due to this importance, more and more geo-information is distributed through the internet and through mobile devices. Many different applications are nowadays available such as real-time traffic information displayed on maps, spatial plans, cadastral data, aerial photos or topographic maps. Also governmental organisations acknowledge the importance of electronic government (e-government) and have been developing more and more e-services related to their public task. E-government can be broadly defined as a government's use of ICT, particularly web-based internet applications, to enhance the access to and delivery of government information and service to citizens, business partners, employees, and other agencies and entities (Wang and Liao, 2008). Resulting benefits are an efficient and transparent government (Prattipati, 2003).

Three general types of e-government systems and services can be distinguished based on user groups, namely government to government (G2G), government to citizen (G2C) and government to business (G2B). According to Jaeger (2003) citizens actually receive the widest array of benefits from e-government.

E-government also encompasses web services including spatial data. A well-known example in the Netherlands is the website "RO-online" (URL 1) which provides geodata about e.g. municipal spatial plans. The provided data includes the spatial plans of municipalities and provinces, which consist of maps, rules and a description of land use categories, national government rules and decisions that are related to spatial planning. In this research a broad definition of geographical data is used. Geographical data, or geo-data, represents phenomena from the real world in terms of (a) their position with respect to a known coordinate system, (b) their attributes that are unrelated to position and (c) their spatial interrelations with each other which describe how they are linked together (Burrough and McDonnell, 1998). Although there may be a slight difference in interpretation of the terms geo-data and geo-information, in this research the terms are reciprocally exchanged.

The Dutch government has specified their aims for public electronic services regarding geo-information in GIDEON (VROM, 2008). GIDEON describes the vision and implementation strategy of the national spatial data infrastructure in order to facilitate the use of geodata.

As mentioned already, e-government services are expected to benefit, among others, citizens. So, it is important to know whether these electronic applications are successful or, in other words, whether these meet the user needs. If not, the developed services will not be adopted by citizens. Wang and Liao (2007) define, after DeLone and McLean (2003), six success factors for usability that are information quality, system quality, service quality, use, user satisfaction, and perceived net benefit. In recent years a more user-oriented approach towards the development of e-government services has been proposed in literature (Bertot and Jaeger, 2008; Verdegem and Verleye, 2009; Jokela et.al, 2003; Jokela, 2004; Williams and Lafrenière, 2005). They stress the need to investigate the user needs. What is it that the users want from e-government and how should the service be designed in order to maximise usability?

The providers of e-government services operate in a legal and social environment. It is unnecessary to say that legal, social and technical issues also determine the framework in which applications are developed.

The Netherlands' Cadastre, Land Registry and Mapping Agency (Kadaster) is an important data provider in the Netherlands. The organisation registers land properties and rights. Also, the organisation is involved in land consolidation projects in order to guarantee the rights and properties in land consolidation projects as described in the Land Use Act and the Rural Areas Development Act (in Dutch: Wet Inrichting Landelijk Gebied, see also compendium in Appendix I). During the execution of a land consolidation project they

work in close co-operation with the Government Service for Land and Water Management (in Dutch: Dienst Landelijk Gebied or in short DLG). The work of the Government Service for Land and Water Management includes among others the general project management, the development of the land use plan and the execution of civil engineering works. The tasks and responsibilities of the department of spatial planning and consultancy of the Kadaster in land consolidation projects are mainly related to geodata management, safeguard of legal certainty and cadastral expertise.

The province is responsible for the approval of land consolidation projects and is also the main sponsor. Other stakeholders are among others title holders, water boards, municipalities, and interest groups. Title holders are owners and holders of other rights in land. In land consolidation projects title holders can be private persons or non-private persons. Non-private persons for example, are enterprises, governmental or non-governmental organisations or foundations. Farming enterprises are an important title holder in land consolidation projects. These enterprises can have a formal character, but may also be managed based on informal family relationships.

Geo-information plays an important role throughout the whole process, since land consolidation is about re-allotment of parcels. As Figure 1-1 shows, first a land use plan is developed and published. The second phase consists of the development of a re-allotment plan. It is in this phase that the dissemination of reliable geo-information about parcellation and rights is vital for the whole process. After the re-allotment of parcels has taken place, a list of financial settlements is drawn up to divide (part of) the costs among all stakeholders.

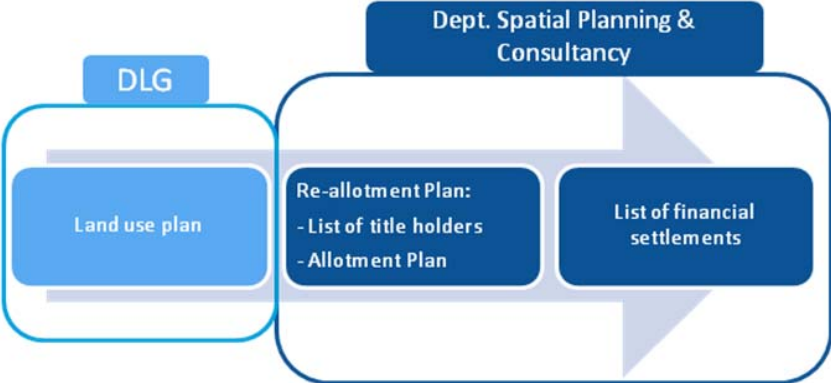


Figure 1-1 Basic elements of a land consolidation project

Maps are an important means to disseminate information to the public since land consolidation has a strong geographical component. An example of a map of the land use plan of the project “Peize” is displayed in Figure 1-2, while Figure 1-3 shows the type of maps that are used to inform people about their new allotment which can be compared with the existing situation.

The exchange of geo-information takes place between different stakeholders. The primary stakeholder group in this process are the title holders within the land consolidation area. At certain moments throughout the project, title holders receive information regarding their real estate properties and corresponding rights, e.g. about the current situation, the proposed situation after re-allotment, the final situation and the financial settlements. Also, title holders provide the project team with information about relevant land lease contracts and their wishes regarding the new allotment. An overview of the most important moments of geo-data exchange between title holders and the spatial planning and consultancy department of the Kadaster is given in Figure 1-4.

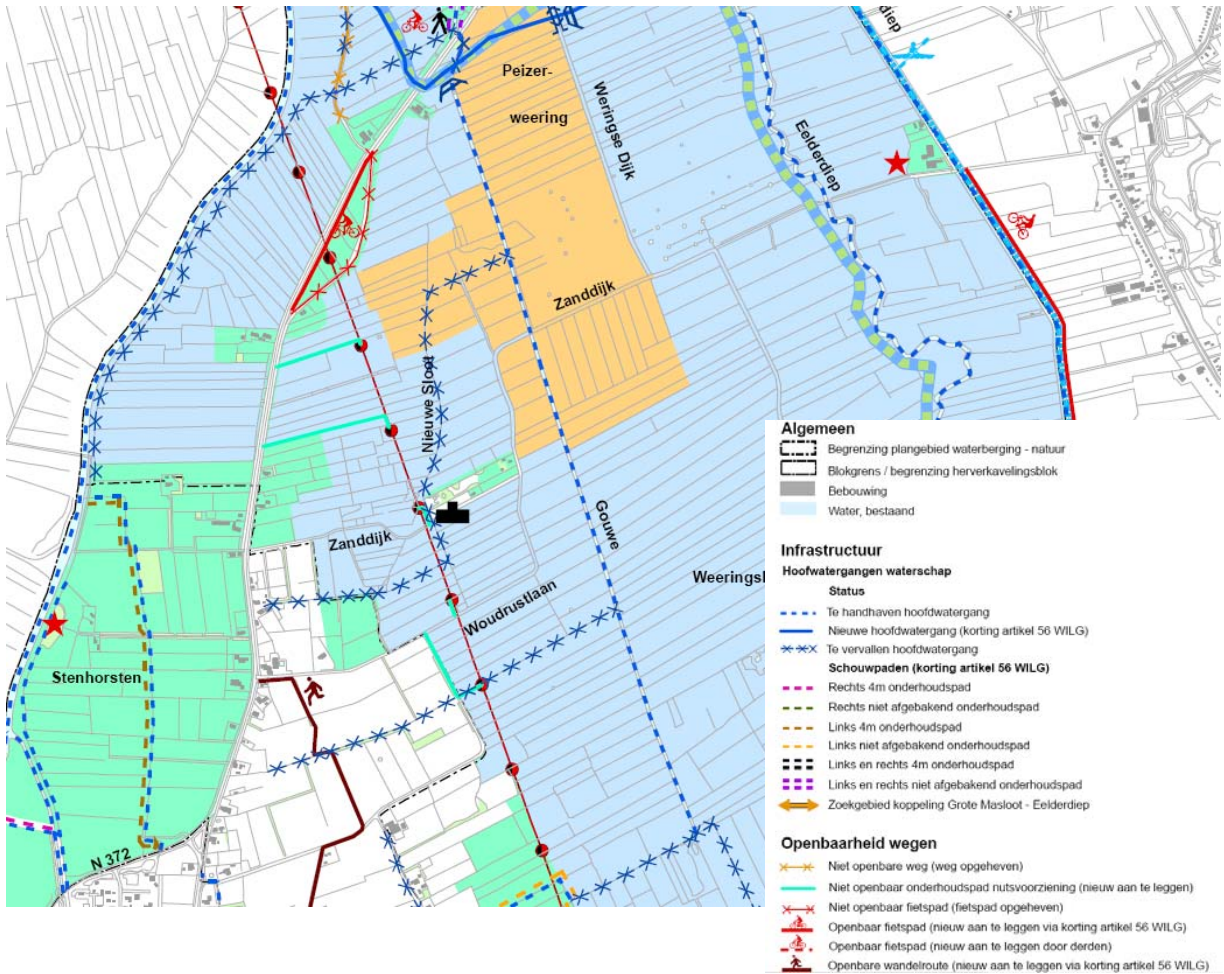
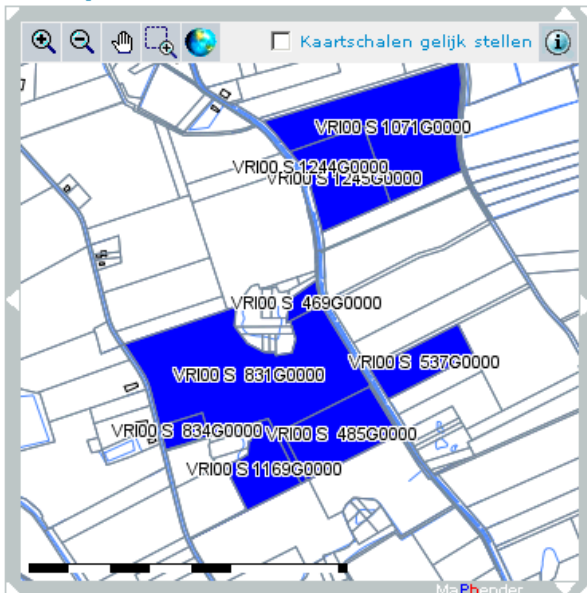


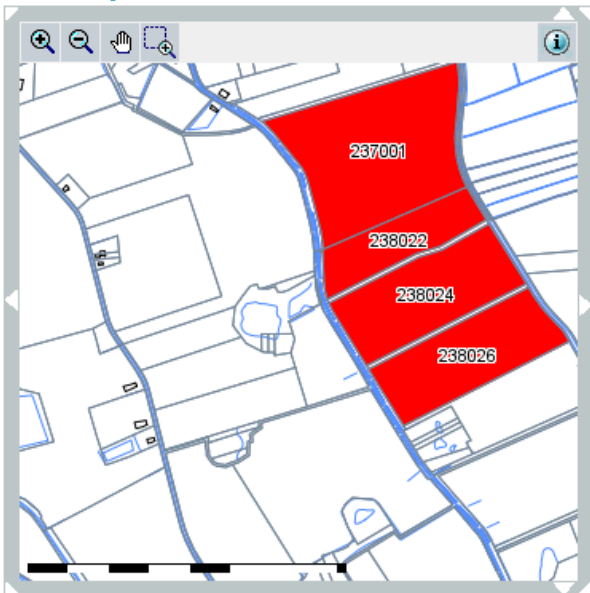
Figure 1-2 Map (detail) of land use plan Peize (URL 2)

Inbreng



Old situation

Toedeling



New situation

Figure 1-3 Example map of re-allotment plan

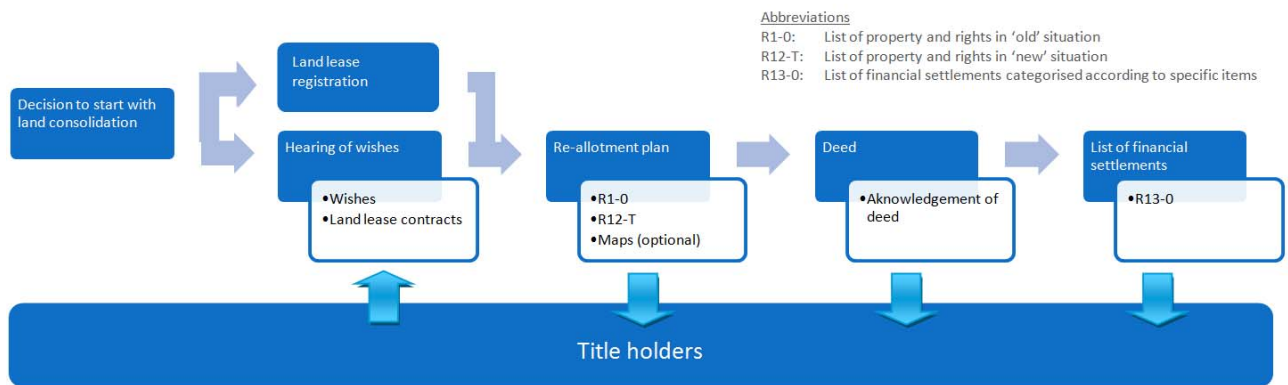


Figure 1-4 Data flow between title holders and the spatial planning and consultancy department

In 2009, a website has been developed by the department of spatial planning and consultancy of the Kadaster as commissioned by the land consolidation committee of 'Land van Maas en Waal' and after that 'Peize'. The website was online during the six week period of public inspection. The digital publication of relevant geo-information via internet was based on a basic prototype, whereby the current parcellation as well as the new allotment could be consulted on the internet by title holders. Additional administrative data could be viewed as well. Title holders had to log in with their registry number and (one of their) subject number(s) to enter the website. Part of the administrative data was only available for them and could not be viewed by others.

As it was the first pilot with a web service, the service and its performance have been evaluated by users through a short questionnaire on the website. Unfortunately, the response was low. Some title holders made a remark about the usability and the content. Other remarks were more related to the content of the re-allotment plan instead of the web service as such.

So far, this web service only disseminated geo-information to title holders. The next step would be to extend the web service so that title holders can also deliver geo-information. It is expected that this possibility has certain advantages, such as prevention of mistakes and errors in submitted data by stakeholders and an increase of efficiency regarding internal work processes of the land consolidation committee, whether carried out by Kadaster or Government Service for Land and Water Management. Land lease contracts, for example, are currently delivered mostly analogue. The interpretation of the documents is done by employees of the Kadaster on behalf of the land consolidation committee and might lead to errors due to indistinct information. Also a title holder may profit of a web service that enables the exchange of (geo-)information between committee and title holders, because they can access and deliver (geo-) information to the committee outside office hours or without leaving home. This will increase accessibility to information and possibly increase active participation. Additionally, it could give title holders the possibility to point out their wishes in more detail compared to the current, mostly analogue procedure, especially if a specific location is of importance.

Given the expected advantages it is desirable to investigate the feasibility to develop a web service that enables title holders to submit (geo-)information to the land consolidation committee (for example their wishes regarding the new allotment and any land lease contracts). The submitted geographical information could be excellent input for further (automated) processing of e.g. a draft re-allotment plan. It may improve substantially the integration of (geo-)information in the chain of a land consolidation project.

1.2 Research objectives

As appears from the problem definition in the previous paragraph the main objective of this research is:

To investigate the feasibility of a web service in land consolidation projects to exchange geo-information to and from stakeholders (government to citizen and citizen to government).

Besides this main objective, this research aims to:

- describe the user needs of stakeholders regarding e-governance
- describe the legislative framework regarding e-governance in relation to geo-information such as publicity, security and privacy issues
- find a suitable and user friendly manner to improve access for stakeholders to relevant (geo-) information
- provide the possibility for title holders to deliver geo-information (response) e.g. wishes or land lease contracts
- improve the efficiency of work processes of the Kadaster making use of digital geo-data provided by title holders
- be able to decide on appropriate techniques and applications given the user needs and the technical, legislative and organisational framework

1.3 Research questions

In order to achieve the aim of this research, the following general research question is formulated:

Is it feasible to use e-governance in land consolidation projects to exchange geo-information between concerned government and title holders (government to citizen and citizen to government) in order to increase an effective and efficient use of (geo-) information?

Specific research questions in these are:

1. How does the development of a web service for land consolidation projects fit into the e-governance policy of the sponsor (provinces)?
2. What is the usability of the web service for the title holders in terms of user requirements?
3. What is the legislative framework (privacy, publicity, security) within which the web service has to operate?
4. What are the technical requirements for the implementation of the new web service related to the currently used software "Transfer"?
5. Is it possible to use the geo-data provided by title holders (wishes) through the web service as automated input for Transfer?

1.4 Scope

The research will focus on land consolidation projects as mentioned in the Rural Areas Development Act. Thus, it concerns project-based dissemination of geo-information by means of a web service. Furthermore, the research does encompass government to citizen and citizen to government dissemination of geo-information. The web service can be useful in several phases of a land consolidation project. In this research the focus lies on the phase that title holders may acknowledge their wishes regarding their new land position. It is expected that the user needs (functionality, preferences, usability) also apply to other, similar, phases in the land consolidation projects, such as the registration of land lease contracts. Since the latter is only applicable to a limited number of title holders, in this research the focus is on the dissemination of wishes.

Out of scope is the technical design and implementation of a web service. The research encompasses a feasibility study about the introduction of a web service with two-way exchange of geo-information

between title holders and project board (government to citizen and citizen to government), extending the pilot of the existing web application with only one-way communication, namely government to title holders.

1.5 Thesis structure

This chapter briefly introduced the context of the research as well as the reason why this feasibility study about a web service to exchange geo-information in land consolidation projects will be conducted (problem definition). Also it described the general and specific research objectives and the accompanying research questions.

Chapter 2 explains the theoretical approach of the research, namely the user-centred design process which is the basis for the research structure. Additionally it describes the adopted research methodology in order to answer the research questions.

Chapter 3 discusses the theoretical context about e-governance in general, the user needs, the role of maps, web-based GIS and case studies of comparable initiatives.

In line with the adopted theory, namely the user-centred design approach, chapter 4 and 5 discuss respectively the government requirements and the use and user requirements. The government requirements focus on organisational aspects and relevant legislation in relation to, for example, publicity and privacy. The use and user requirements focus on use and user characteristics, use and user tasks and their preferences.

In Chapter 6 the evaluation of the existing web application, that was used to disseminate (geo-) information from the land consolidation committee to title holders during the period of public inspection, will be discussed. Suggestions of potential users about the usability of this prototype might be of importance for the development of a web service that enables also the submission of geo-information by title holders, even though the evaluated prototype only aims to disseminate information to the public (one way communication).

Chapter 7 deals with the technical feasibility and focuses mainly on security issues and the software Transfer, which is used to draw up a re-allotment plan. Delivered geo-information by title holders may be used as automated input for Transfer, but it should be technically feasible.

The results of chapters 3 to 7 will be input for the conceptual design of the web service, which is discussed in chapter 8. At last conclusions and recommendations are presented in chapter 9. In this chapter, the research questions are answered and recommendations for further research are presented.

Because many specific terms are related to the context of this research, a compendium is included in Appendix I. The compendium includes Dutch – English translations of words or phrases that are used in this thesis. They refer among others to the land consolidation jargon, specific organisations or legislation.

2 Methodology

2.1 Introduction

The research topic has been illustrated in the previous chapter. In this chapter, the chosen research methodology will be highlighted. The chosen methodology is tailored to the research questions in order to meet the research objectives. The chapter starts with a theoretical approach that forms the basis for the overall research structure (paragraph 2.2). This paragraph is followed by a description of the adopted research methodology and structure (paragraph 2.3). The chosen methodology is related to the theoretical approach as well as to the research questions which have been described in the previous chapter. The methodology is described in more detail per research component in paragraph 2.3. Also the chosen combination of research methodologies is discussed in this paragraph. The chapter ends with conclusions and a discussion (paragraph 2.4).

2.2 Theoretical approach

In line with literature (Bertot and Jaeger, 2008; Verdegem and Verleye, 2009; Jokela et.al, 2003; Jokela, 2004; Williams and Lafrenière, 2005) a user-centred approach is chosen for this research. This means that the users play a central role. A user-centred design process model, which is tailored to geo-information applications, will be used as a basis to analyse the user needs with regard to the proposed web service. The user-centred approach encompasses questions such as, who are the users, what do they really use the web service for, how do they use it and how satisfied are they (Kramers, 2007)?

The existing model about the user-centred design process as known from literature (Van Elzakker and Wealands, 2007) is slightly adapted to put it in the e-governance context in order to meet the needs of this research (Figure 2-1). A new element for example is legislation. Legislation is included as part of the government requirements, because governments are more likely to be responsible for a set of key registries and should treat these with care in any e-government service given the publicity and privacy legislation among others. Also the position of the context has been shifted slightly in the model as is explained later on. The research will be mainly structured by analogy of the user-centred design model.

First, a requirements analysis will be conducted to address the government and use(r) requirements. The government requirements include organisational aspects, legislation and involved stakeholders. It should be noted that in the given context only one stakeholder group is determined, namely the end user of the web service being title holders within a land consolidation project. However, the stakeholder group consist of several user groups with different profiles, e.g. farmers, small land owners, or institutions. The study on organisational requirements focuses on the organisational context of a land consolidation project whereby the provinces play an important role as sponsor. Internal organisational aspects within the Kadaster are out of scope of this research.

The use and user requirements study encompasses the tasks, characteristics and needs, or preferences, of the distinguished user groups. The context, as is displayed in Figure 2-1, is defined by both the governmental requirements and the use(r) requirements because the web service will enable interactive two-way communication. This implies that the government as well as the user determine the context in which the web service will operate. In this research the government requirements are determined by organisational aspects of a land consolidation project, legislation regarding land consolidation and geo-information and the involved stakeholders. The use context also refers to the situation in which stakeholders communicate through the internet. Legislation is introduced to the model, since it is an important aspect with respect to the dissemination of geo-information on the web. Privacy and publicity of geo-information are two important aspects to consider for example. These aspects all influence the context of the web service from a governmental perspective. On the other hand, the use requirements

also define the context by means of the tasks the users perform, their preferences and their characteristics or profile.

Second, based on the results of the requirements analysis a conceptual design will be developed. It is beyond the scope of this research to build a prototype and evaluate this prototype by means of testing with a group of representative users. Instead it is aimed to evaluate the existing web application that provides geo-information to title holders (one-way government to citizen communication). Although it does not cover the interactive aspects in terms of delivering geo-information to the government, it is possible to study other aspects of usability such as interactive mapping. The findings from the requirements analysis provide input for the evaluation criteria. The evaluation also provides input for the conceptual design. Based on the results of the evaluation it can be necessary to adapt the conceptual design. These steps could be repeated several times until the design meets the user needs.

The user centred approach will be supplemented in this research with a study of the software aspects. It is necessary to specify the software requirements of Transfer in order to find out if it is possible to use the wishes delivered through the web service as automated input for Transfer.

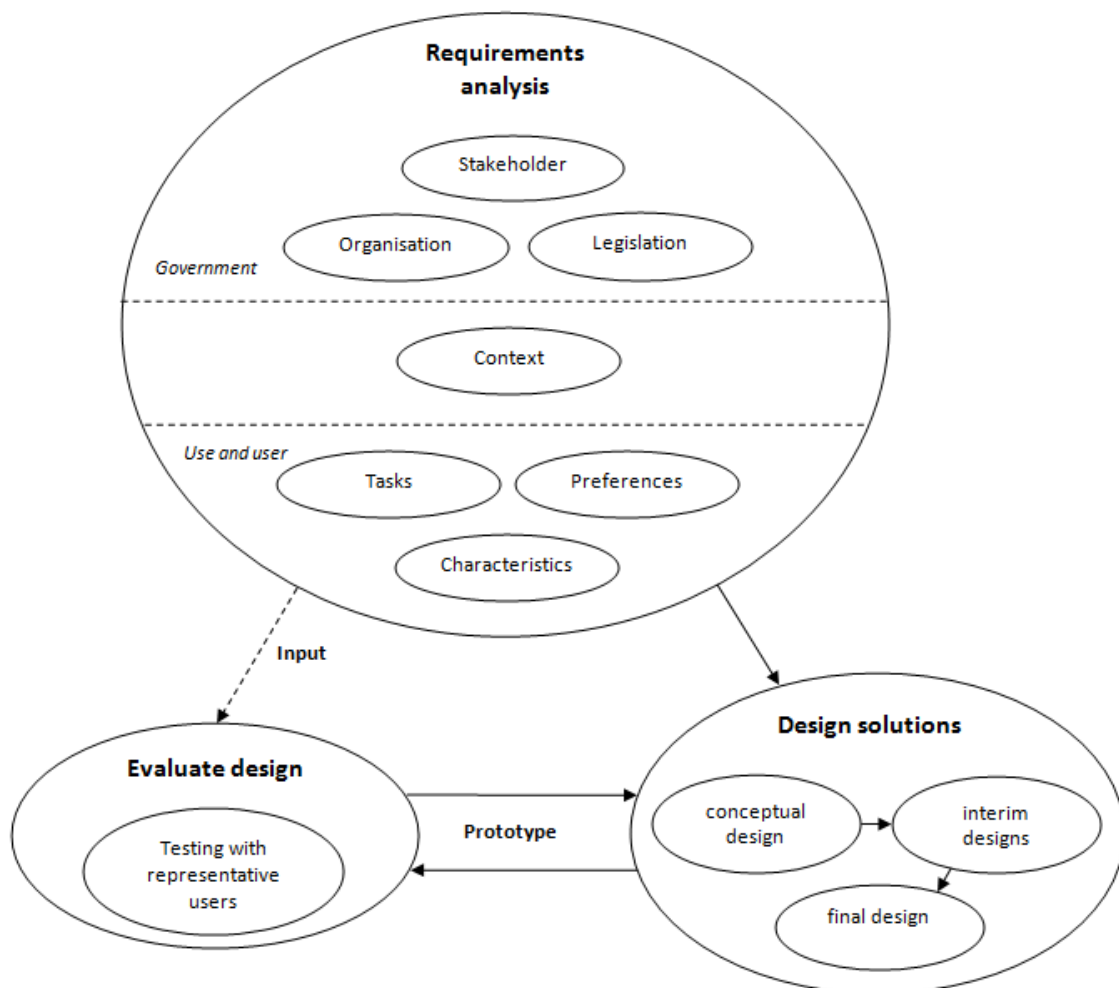


Figure 2-1 User-centred design process (based on Van Elzakker and Wealands, 2007)

2.3 Research methodology

2.3.1 Research structure

The chosen methodology is closely related to the adopted theoretical approach. The user-centred design theory implies that the users of the web service are strongly involved. This can be done in a qualitative

(e.g. in-depth interviews, observing users) or quantitative way (e.g. questionnaires, analysis of click stream data). As follows from the adopted user-centred design process the government requirements, the use and use requirements and the use context are subject of research. The government requirements study consists of a stakeholder analysis, legislative framework and organisational framework. Similar the use and user requirements can be further detailed into an analysis of tasks, preferences and characteristics. The user-centred design process is completed with a review of the existing prototype web service to disseminate geo-information. In addition to the user-centred design approach a short technical feasibility study will be carried out. All results from these studies are finally put together in the conceptual design.

A wide array of research techniques can be used. Some aspects of the requirements analyses are studied by means of literature, empirical research (qualitative or quantitative) or a combination of both. A more detailed explanation of each part is described in the next paragraphs. An overview of the research structure and the applied methods is given in Figure 2-2.

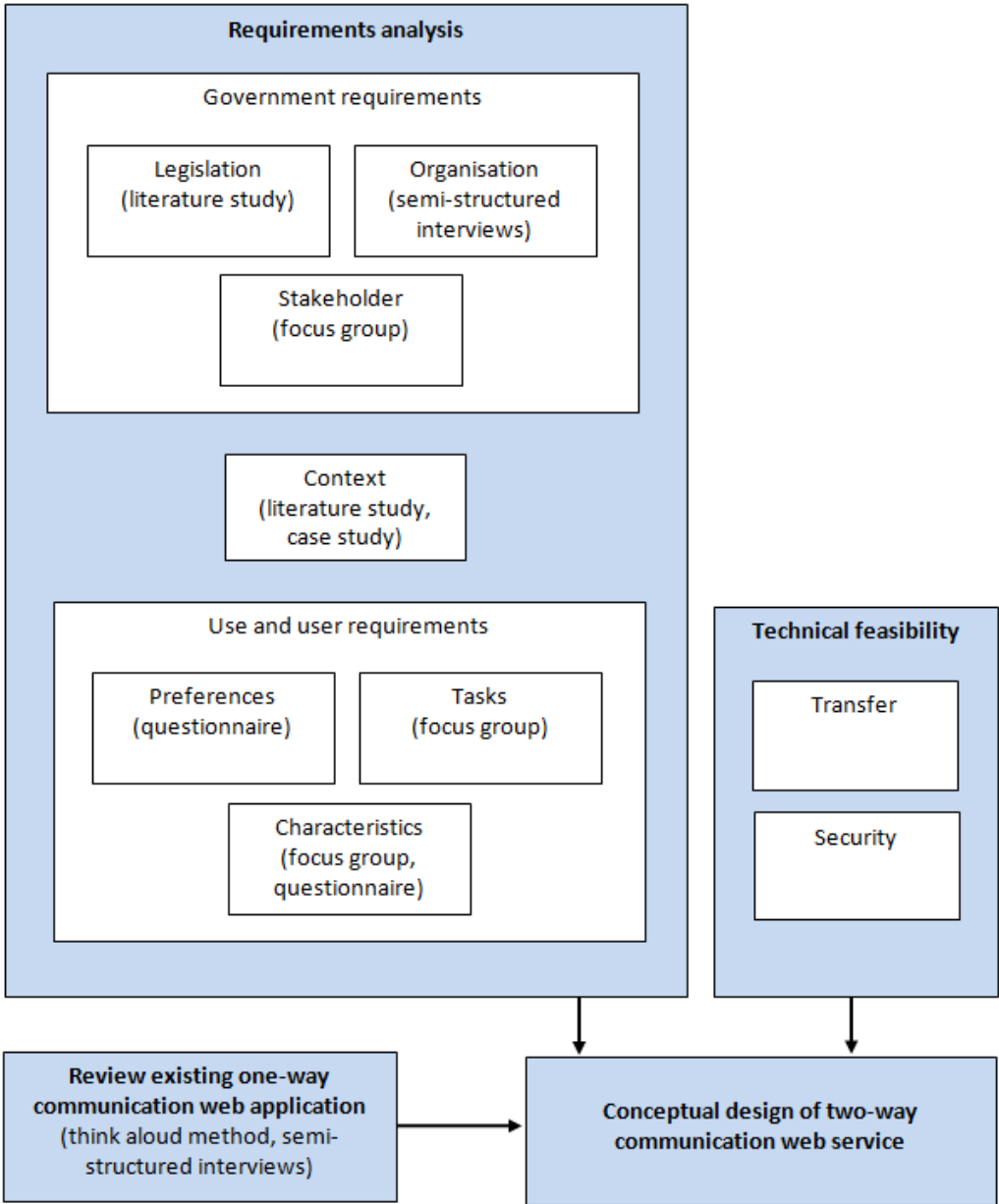


Figure 2-2 Methodology and structure of research

2.3.2 Stakeholder analysis

The stakeholder analysis provides more insight in the potential users of the web service. A stakeholder analysis will be conducted in a strict way. That means only users of the web service will be considered as stakeholders. It can be argued that also other stakeholders should be taken into account, such as provinces or municipalities. The role of these organisations and other stakeholders in a land consolidation project is discussed in the organisation analysis. As far as the web service is concerned only the end-users, which are title holders in land consolidation projects, are part of the analysis. That said, municipalities and other organisations often are a title holder because they own land or have other rights that are registered in the cadastral registries. In this role they are involved as a stakeholder, namely as a potential end-user of the web service.

The stakeholder analysis will be carried out by means of a focus group. A focus group is a small group discussion focused on a particular topic and facilitated by a researcher (Tonkiss, 2004). It is an informal technique that can be used to assess user needs and feelings both before the interface has been designed and after it has been used for a while (Yovcheva, 2010). Normally a focus group consists of six to ten users (Nielsen, 1993). Morgan (1996) defines a focus group discussion as a research technique that collects data through group interaction on a topic determined by the researcher. This definition has three essential components: (1) it focuses on data collection, (2) the interaction in a group discussion is the source of the data and (3) it acknowledges the researcher's active role in creating the group discussion for data collection purposes.

The focus group methodology belongs to the group of qualitative research methodologies. The 'focus' of the group discussion can take different forms and be more or less structured. The following forms can be distinguished (Tonkiss, 2004):

- a fixed schedule of questions
- a topic guide of themes for discussion
- a group exercise
- visual cues (such as video clips, advertisements, press reports or photographs)

In this research themes for discussion have been chosen as form for the focus group session. Chosen themes of discussion are describing user profiles among title holders, and the expected characteristics and tasks per user profile. The focus group session is thus used as part of the government requirements analysis and for the use and user requirements analysis as it aims to describe the characteristics of the use of the web service and the user (see also paragraph 2.3.6).

2.3.3 Organisation analysis

An overview is given of the organisational context of land consolidation projects. It focuses on the organisation of land consolidation projects and the role of involved parties. Special attention goes to the role of provinces. This part of the analysis aims to investigate how the development of a web service fits in the e-governance strategy of provinces. It is necessary to know if they are willing to invest in such a web service and whether it is complementary to, and complies with, existing initiatives. Empirical research will be conducted to collect information about this subject.

The most obvious method to use is interviews. Interviews are most importantly a form of communication, a means of extracting information from individuals or groups. The interactive nature means that interviewing is a highly flexible, but also somewhat unpredictable form of social research (Byrne, 2004). It is a somewhat unpredictable form of research, because many different variables affect the outcome. These include among others who is doing the interviewing, who is being interviewed, the location in which the interview takes place and the form of questioning (Byrne, 2004). The type of interview may range from a formal questionnaire to a totally open-ended interview. Within this spectrum a qualitative

interview might be somewhere in between those two extremes. Burgess (cited in Byrne, 2004, p. 181) refers to semi-structured interviews as 'conversations with a purpose' and classifies these as qualitative interviews.

Semi-structured interviews will be conducted to investigate how the development of a web service to exchange (geo-)information in land consolidation will fit in the e-governance and land consolidation policies of provinces. It is aimed to gain insight in the arguments of provincial policy and the reasoning behind it as well.

Also, it is possible with this method to tailor the interview to the provincial policy regarding land consolidation. Different approaches between provinces occur. In one province for example the provincial executive has decided not to use land consolidation at all, while other provinces opt to use voluntary re-allotment first instead of formal land consolidation projects. If land consolidation projects are not part of the provincial policy implementation strategy, there will be no use in interviewing employees of this province since the scope of this research is the development of a web service for land consolidation projects.

The semi-structured interviews with provincial representatives concern among others (Appendix IV):

- the adopted e-governance strategy of province related to geo-information
- does this strategy correspond and comply with the initiative of this research
- relation with similar projects (are there any?)
- ownership issue
- funding

The potential interviewees will be contacted by means of e-mail and phone. It is aimed to have the interview with two representatives together in one session, because it is not expected that one employee has knowledge about both fields of interest (e-governance strategy and Rural Areas Development Act). The interview will be recorded (audio).

It is expected that, for several reasons, not all provinces will co-operate, but it should be possible to interview responsible employees of 5 to 6 provinces in order to get an idea of above described points of attention.

2.3.4 Legislation analysis

Legislation will be studied by means of a literature study. It will cover relevant issues regarding publicity and privacy in the context of the new medium of a web service and in the context of two-way exchange of geo-information.

The new medium will enable stakeholders to retrieve information in another way, e.g. more detailed or by means of querying the data. Publicity and privacy are closely related to the use of geo-information on the internet, because large scale geo-information often has a relation to an individual due to the location component (Loenen et.al., 2008). Aim is to investigate if legislation set limitations to the way information is presented on a web service. Besides that, the legislation research aims to find out what the juridical prerequisites are with respect to two-way communication. When title holders for example submit their wishes through the web service it should be possible to validate the identity of the title holder.

Given the time frame, only principal legislation will be studied. It is beyond the scope of this research to study also relevant case law, unless there is an urgent need to study this based on the outcome of the studied principal legislation.

2.3.5 Context

Based on literature the current state of the art regarding e-government, with the focus on web services with geo-information, is described. The user-centred design approach will be adhered to. Also relevant literature is known from mobile device application design and participatory or interactive mapping.

Participatory or interactive mapping enables title holders to use maps as a graphic base to notify their wishes regarding their new situation. The provided input can be used for further processing, especially for drawing the re-allotment plan. In the context of this research participatory planning should not be seen as a political tool as it is often used in development countries (Bauer, 2009).

Also two or three case studies will be conducted to get information about comparable projects, more specifically about points of attention with respect to the development of a web service with two-way communication of geo-information and the user needs.

It is difficult to give a definition of the term case study, because it is used in many research disciplines. The case study research methodology is common in social science and is based on an in-depth investigation of a single instance or event: a case (URL 3). Besides that, it offers the opportunity to explore or describe a phenomenon in its context (Baxter and Jack, 2008). Case study research can contribute to the knowledge of the researcher and, consequently, be of use for comparable research subjects. It enables the researcher to answer 'how' and 'why' questions, while taking into consideration how a phenomenon is influenced by the context within which it is situated (Baxter and Jack, 2008). Furthermore it can be used to gain insight into a case. As Eysenck described it; "sometimes we simply have to keep our eyes open and look carefully at individual cases – not in the hope of proving anything, but rather in the hope of learning something" (Flyvbjerg, 2006, p. 224). In this research it is not aimed to use the case studies for generalisation, but to use the cases to gain knowledge about comparable initiatives that include the submission of geo-information through a web-based application. The use of case studies, as is common in social sciences, can also be useful for the field of geo-information science. Like all human artefacts, applications of information technology are open to interpretation by their developers, users and other actors. As a consequence, this affects the technology's actual design, deployment and use (Robey and Sahay, 1996).

So far, two interesting projects are selected for the case study namely (1) the agricultural census web service of the Dutch Regulation Service and (2) the partial parcels web service at Kadaster. The case studies focus on (1) the context within which the web-based application operates, (2) the needs of the user regarding the application and (3) the role of the users in the development or evaluation of the web application. The case studies will be studied mainly based on literature and, additionally, through a semi-structured interview.

2.3.6 Use and user requirements (tasks, preferences, characteristics)

The use and user requirements are studied by means of a questionnaire and a focus group discussion. The use of a focus group as qualitative method for exploring social meanings (see paragraph 2.3.2) works well in tandem with quantitative research (Tonkiss, 2004). Focus groups may play a useful role in survey design, clarifying and defining the key research concepts, ensuring that the language used in the survey is likely to be understood by respondents (Tonkiss, 2004). The focus group discussion can point out for example different user profiles. The described user profiles in turn can be used in the questionnaire to determine the characteristics of the respondents.

A questionnaire is a very suitable method to collect data about attitudes, opinions, knowledge, emotions, behavioural intentions, and circumstances (Baarda et.al., 2007). Questionnaires or focus group discussions are not good methods to collect detailed data about the usability of for example a web service, because these methods generally provide generic information (Cotton and Gresty, 2007). However, at this stage of research it is not the aim to collect information about the usability of a certain web-based application. The main aim of the questionnaire is to find out whether title holders intend to use a web service to enable interactive communication and dissemination of (geo-) information. The analysis also aims to reveal whether people are likely to use the internet for 'citizen to government' communication, e.g. to provide the project with relevant (geo-) information, and if so, what preferences

they have. An a-select number of title holders will be asked to fill in the questionnaire to get more insight in the use and user requirements. It is aimed to get a response of 100 questionnaires, so that requires approximately 500 questionnaires to be sent to title holders based on a response rate of 20%.

Unfortunately not everyone will take time to fill in the questionnaire. Research has shown that reasons for no response are (Jansen et.al., 2004):

- no interest in the subject
- no time to fill in the questionnaire
- the questionnaire is too difficult
- the questionnaire is too long
- the answer categories are too limited

Furthermore, respondents might not answer all questions. This especially accounts for analogue questionnaires. Nowadays, software for online questionnaires can prevent this problem. Online questionnaires can be set up so that it is impossible to proceed to the next question without answering the previous question. This will avoid missing values, although people might decide to quit halfway which in turn increases the drop out rate.

The user survey focuses on the preferences of the potential users, whereas the focus group describes the characteristics of several user types and the tasks they most likely will perform. The focus group consists of experts within the field of land consolidation. The result of both analyses should be a description of the user preferences, tasks (functionality) and characteristics of the title holders in a land consolidation project.

2.3.7 Review of existing web application of Peize

It is beyond the scope of this research to actually build a prototype web service that enables two-way exchange of geo-information. However, it is aimed to get more insight in the usability of such a web service. Usability can be described as the extent to which a computer system enables users, in a given context of use, to achieve specified goals effectively and efficiently and with satisfaction (Ivory and Hearst, 2001).

A wide range of usability evaluation methods (UEM's) does exist. Ivory and Hearst (2001) and Hartson et.al. (2001) give an overview of several UEM's in use. For the review of the existing web application the think-aloud method is used. This method involves observing and video-taping test persons while they use the application, noting their navigational decisions and listening to their thoughts and feelings (Cotton and Gresty, 2007). The think-aloud approach enables access to the thought processes or decision-making of someone performing a specific task (Cotton and Gresty, 2006). Concerns about the method are related to the level of guidance given to participants, observer influence, and the complexity of data analysis. However, Cotton and Gresty (2006) conclude based on their experience that the richness of collected data outweighs these constraints.

The think aloud test will be followed up by a short interview that allows gaining a deeper understanding of user likes and dislikes towards the design and experienced difficulties.

It is possible to perform screen logging during the think aloud session in order to analyse the user interactions with the interface. Results are better if screen logging is synchronised with the video and think aloud recording (Abrams et. al., 2004). Although it is acknowledged that screen logging would add to a better understanding of the usability, it is not possible to apply for this research due to practical reasons regarding the test location.

Yet, in two land consolidation projects an existing web application has been used that provided geo-information to title holders (one-way communication). It is aimed to review the usability of this web application as part of the requirements analysis. The results are input for the conceptual design of a web service that enables exchange of geo-information between title holders and the land consolidation

committee. It should be noticed that the results do not cover usability of submitting geo-information to the committee. Nevertheless it is expected that the results are useful in capturing general guidelines about usability, which are also relevant for the exchange of geo-information. To compensate for this, participants are asked to answer some questions about their preferences related to the online submission of geo-information.

A small sample of the test persons will be asked to review the interface so as to learn whether the website was appropriate and what could be improved. Were they able to use the web service? Could they find the information (both maps and related attribute information) that was provided and was it easy to interpret? Did they miss some functionality? These are issues that should be addressed in the review. It includes both utility aspects (functionality) as usability aspects (effectiveness, efficiency, satisfaction).

The review consists of two parts. The first part focuses on tasks that will be performed by a small sample of volunteers out of the user group. Participants are asked to think aloud. The sessions will be observed by the researcher and will be videotaped to provide screenshots of the performance of tasks by the participants. The video camera is pointed towards the computer screen. Secondly, participants are interrogated after the tasks to gain further insight in the users' opinion about the interface and preferences for online submission of (geo-)data.

The combination of methods is chosen, because the think aloud method does not cover all issues (why and how) and it only encompasses the existing web application which only allows for one-way communication. A short in-depth interview will compensate for this. For example, participants may think aloud about how they are going to do the task, but this might not provide insight in why they chose to do it that way. This might be very useful in case of deciding on e.g. design or navigation issues. Information should be provided at a logic place on the website and the needed functionality (e.g. buttons) should be easy to recognise, to interpret and to locate. Any key issues of concern or motivation of the choices made during the tasks may be subject of the short interview afterwards.

The existing web application was only available during the period of inspection and is currently not accessible for title holders. The prototype of the project 'Peize' is still available on a demo site of the Kadaster by means of log in. Ideally, the test persons should review the website on a location close to the project area in order to increase participation. However, this requires a location with internet connection and this is not available in the temporary land consolidation offices. A simulation of the website on a laptop or computer without access to internet is not a realistic option given the time frame of this research. The second best option is to evaluate the website in a Kadaster office. Arnhem is relatively close to Land van Maas en Waal. Test persons will be recruited from the group of title holders that indicated, when visiting the website during the period of public inspection, that they would not mind to be contacted for further research. Title holders of Land van Maas en Waal do not know the area of 'Peize', which is both an advantage and disadvantage. It is an advantage because they will not recognize data from their neighbours. Contrary, it might be a disadvantage because it is less easy to navigate through the maps due to a lack of identification points.

The review follows a qualitative approach with a limited number of test persons. Research (Virzi, 1992; Nielsen, 2000) shows that 80% to 85% of the usability problems are detected with four of five test persons, whereby the most severe usability problems are likely to be detected by the first few test persons. Additional test persons are less likely to reveal new information. There is one exemption, namely if distinct groups of users will use the web service. In that case more than five test persons are needed. It is expected that the user group is quite homogenous, that is, a regular sample of Dutch society. Therefore it is aimed to select four to six persons to review the prototype of the existing one-way communication website of Peize.

2.3.8 Analysis of technical feasibility

The analysis of the technical feasibility consists of two parts. On the one hand it is studied whether the input of title holders via the web service, especially their submitted wishes regarding the new allotment, can be used for automated processing in Transfer. Transfer is a software programme that supports the making of a draft re-allotment plan. Interoperability issues are of special interest in this context. It is less important to study the technical feasibility of other submitted (geo-)information, because that is, in general, not used for further automated processing. Therefore, the benefits are limited compared to the possibility of an automated processing of submitted wishes. The study will be carried out by means of examining the software Transfer, and, more specifically, the requirements for input of data and data manipulation to draw up the sketch of the re-allotment plan.

On the other hand, the required security levels for the proposed web service are studied. Special attention goes to the submission of geo-information by title holders, because provided (geo-) information by title holders has a private character and this requires a careful approach towards the transfer, storage and management of (geo-)data. By means of a literature study these topics related to security are investigated.

2.3.9 Conceptual design

The outcome of the government and use and user requirements analyses, the review of the prototype web service and the technical feasibility study will be interpreted. The results provide information about the provincial strategy regarding the introduction of web-based applications to get information exchanged in land consolidation projects. Furthermore, it provides information about the user characteristics, their preferences and tasks that are expected to be carried out by means of the web application. Also, the use and user requirements study should have answered the question whether title holders are willing to submit information to the land consolidation committee or not. The review of the existing web application that only disseminates (geo-)information to title holders will give more information about the usability of the web application.

All these results are the basis for the development of a conceptual design for the proposed web service. Additionally, some literature may be studied to verify the results of some analyses. It is expected that this will apply mostly for the results of the review of the existing web application that enables the dissemination of geo-information during the period of public inspection.

2.4 Conclusions and discussion

This chapter discussed the overall research strategy as well as the chosen methodology to study the different components of the research structure. The focus lies on the user-centred design process, which is adopted as theoretical approach. This approach forms the backbone of the research structure, which is extended with a short technical feasibility study to investigate the interoperability with existing software used in land consolidation projects. This component is added, because an efficient exchange between submitted data by title holders through the proposed web service and the existing software to process the land consolidation data is needed to benefit best from the advantages of the web service to optimise the project process. An optimal process has advantages for both the title holders and province.

The adopted user-centred design process implies that in general the research centres on the user needs and less on technical issues. Users play an important role in different components of the research. Users' interests are among others involved in the user survey and focus group discussion to study the use and user needs (characteristics, tasks and preferences) and the review of the existing web application to collect data about the usability of the application and the proposed web service.

A combination of qualitative and quantitative methodologies is used to investigate the feasibility. The mixing of methodologies is a form of triangulation (Olsen, 2004; Bryman, 2004). Triangulation is often

applied in social sciences and has developed through a thriving interaction of quantitative and qualitative analysis. It enables the researcher to use different techniques to get access to different facets of the same phenomenon (Olsen, 2004). Bryman (2004) suggests that for practical reasons one type of technique will usually be primary, but all research is enriched by the addition of other, very different, techniques. A risk of triangulated research is taking on too many unfocused questions at all once, unless it has sequencing and a sense of which technique is primary (Olsen, 2004). In this research the survey methodology is used after examining relevant literature, a case study and having had the focus group session. The semi-structured interviews with provinces are set apart from the user survey since these interviews focus on another facet of the feasibility.

The following chapters each focus on different components of the research structure. First, in the next chapter, the theoretical background will be discussed.

3 Theoretical context

3.1 Introduction

This chapter will provide a theoretical context to this research. The context is based on literature as well as case studies. The literature study focuses on relevant theories and findings from other research (paragraphs 3.2 to 3.5), while the case studies stress more the implementation and practical experience of similar initiatives whereby geo-information is submitted via a web service (paragraph 3.6).

Paragraph 3.2 focuses on e-government in general. Paragraph 3.3 describes what is needed by the user and what is needed to change the behaviour of users. Paragraph 3.4 focuses on the role of maps in relation to web-based services, whereas paragraph 3.5 is tailored to web-based GIS in public participation. Both topics are of importance for the proposed web service in land consolidation projects. Maps play an important role to get information via the proposed web service across from the land consolidation committee and title holder and vice versa. Therefore, it is useful to study published articles and other literature about this topic. Web-based GIS in public participation can provide information about interactive participation of citizens. How were such initiatives organised and has it proved to be useful? These aspects can be interesting for this research, for example. The chapter ends with conclusions and discussion of the results.

3.2 E-governance

A wide array of e-government services is possible. It ranges roughly from posting information on a website (information level) or request transactions (transaction level), to interactive two-way communication web services (interactive level). Websites at the information level post for example information on public policies. The most well-known example related to geo-information is the website “www.ruimtelijkeplannen.nl” (URL 1) on which governments publish their digital spatial plans, including the accompanying regulations. Other non-governmental initiatives are for example “www.hisgis.nl” (URL 4) (information level) that provides access to historical geo-information, www.mijnakker.nl (URL 5) (transaction / interactive level) that enables farmers to buy information about the crop growth on their parcels, or “www.wikimapia.org” (URL 6) (interactive level) that is a collaborative mapping website where any user can add a place mark to any location and provide information.

Research has shown that local governments heavily focus on information dissemination and provision of web services and not so much on services that directly engage citizens in discussion, debate or decision making (Musso et al., 2000; Qureshi, 2005). Most initiatives of e-government in the Netherlands were initially aimed at providing governmental information through internet. Lately, more and more services at transaction level are developed. The invention of the DigiD (electronic signature) in the Netherlands, which enhances the possibility of transactions in a secure way, played an important role in this development (Thaens and Zouridia, 2004). Fully interactive web services are not yet widely adopted by governments. Although in literature this term is used, it is not clearly defined. On the one hand it encompasses two-way communication, which means exchange of information to and from governments. In fact this is similar to the transaction level, where citizens (or organisations) can send information to governments by means of a transaction. Web services at this level in general also provide information, thus from this point of view two-way communication takes place. A new element to the interactive level is the possibility to interact with each other. It is presumed that this interaction takes place in a direct way, thus providing the opportunity to have for example a (public) discussion on the internet by posting messages. On the other hand, a logic application could be a web service that provides the possibility to communicate with governments during a project. Action and reaction are not ‘direct’ in terms of quick reply or response, but the service is more regarded as a means of communication throughout the project

whereby both parties (government and stakeholders) can provide each other with information, whether or not by means of transactions. The main difference with the transaction level is the character of a transaction, which is a once-only act whether or not in a regular interval (e.g. yearly tax return application). Interactive websites that engage citizens in discussion or decision making hardly exist in the Netherlands. In other countries web-based initiatives exist, such as, for example, in the field of public participation in spatial planning (see paragraph 3.5). The left side of Figure 3-1 shows how web services at the three distinguished levels are related to each other.

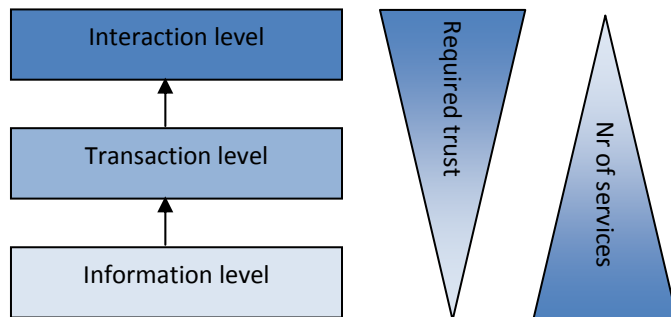


Figure 3-1 Type of web service

E-governance is considered to have some advantages. On the one hand it provides citizens with better and more accessible services. This provides the opportunity to involve citizens in government issues (Gauld et.al., 2009). On the other hand it is considered to benefit governments by means of cost reduction and time savings. Other benefits include a positive effect of use of e-government services on the performance of firms and on new business generated from e-government use (Badri and Alshare, 2008). Successful e-government can also influence the image of governments. Welch et.al. (2005) link citizen satisfaction with e-government to citizen trust in government. E-governmental services are considered by citizens to reflect government performance, and governmental performance in turn is associated with trust. Their research showed that individuals who are more satisfied with e-government and government websites also trust the government more and those individuals who trust government more are also more likely to be satisfied with e-government.

Additionally, the type of e-governance service is also related to trust. Citizens do run more risk at the transaction and interaction level than at the information level, due to the fact that (private) information is sent electronically to the government and this information is stored electronically (Horst et.al., 2007). Perceived risks are related to the possibility that third parties can intercept, read or modify the information. Also, coupling of digital data is easier than traditionally stored information. That said, most governments work already completely digital whereby analogue delivered information by clients is stored digitally. Thus, compared to traditional ways of delivering information to governments, the risks of digital delivery of information are mainly related to the digital transmittance of data. Nevertheless, citizens have to decide on the use of the web service considering the risks against the benefits, such as 24h access, quick service etc.

Bélanger and Carter (2008) have developed a model that relates trust and risk to e-government adoption by citizens (Figure 3-2). The model identifies four aspects related to trust (disposition to trust, trust of the internet, trust of the government, perceived risk) that have impact on the intention to use e-government services. Trust of the internet, also called institution-based trust, is defined as an individual's perception of the institutional environment, including the structures and regulations that make an environment feel safe. Trust of government refers to the perception of users regarding the integrity and ability of the agency providing the service. Disposition to trust is defined as one's general propensity to trust others (faith in humanity and trusting attitude). Disposition to trust is beyond the immediate control of any

government agency, as it is part of someone’s personality. Perceived risk is the citizen’s subjective expectation of risks. Conducted research of Bélanger and Carter (2008) to validate the model showed that trust of the internet and trust of the government are very important elements of e-government adoption by citizens. Citizens must believe that the service is secure and private data transmission is guaranteed. Both types of trust are influenced by one’s disposition to trust. Although governments cannot influence one’s disposition to trust, they should be aware of a group of citizens that shows a natural disposition to distrust governmental e-services.

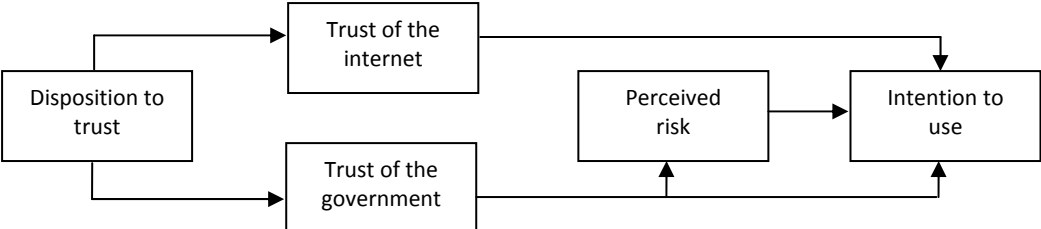


Figure 3-2 Trust and risk in e-government adoption (Bélanger and Carter, 2008)

Horst et.al. (2007) also acknowledge institutional trust (trust of the internet) and trust of the government as important indicators for the intention to use governmental e-services. So, how can governments enhance the adoption of e-services by means of increasing trust, and minimising risks, as mentioned above? Nelson (1997) has identified five issues that are of importance, namely security and reliability, identity and authentication, confidentiality, verification, and jurisdiction. These technical issues are considered to increase citizen’s trust of the internet. Governments should incorporate these aspects into their e-services. Additionally, they have to inform citizens about these measures. This could be done for example by posting security and privacy stamps on their e-services. In addition to these technical oriented issues, aspects such as equity (of access and use), accountability and interactive e-governance are related to trust (Welch et.al., 2005). So, do citizens have equal access to internet in the Netherlands? About 76% of the homes in the Netherlands had access to internet in 2006 as research showed, of which the majority (84%) was a broadband internet connection (Van Dijk et.al., 2008). Data of ‘Statistics Netherlands’ shows that about 90% of the households in the Netherlands has access to internet (Figure 3-3). The majority of households has a fast broadband connection (Figure 3-4).

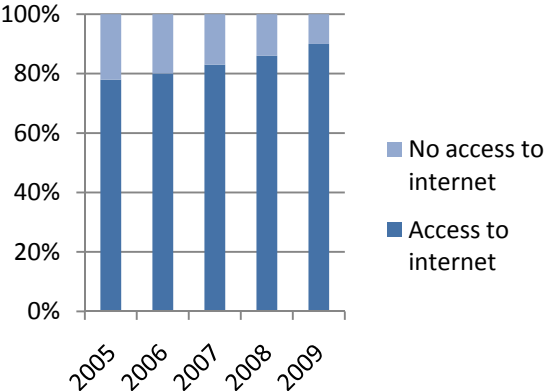


Figure 3-3 Internet access of households (CBS, 2010)

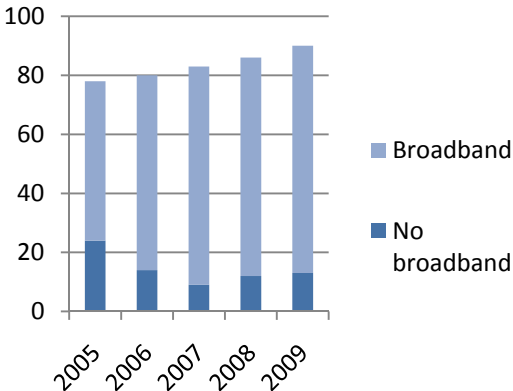


Figure 3-4 Type of internet access (CBS, 2010)

For those who do not have internet access at home, internet access in most towns is available in public libraries. However, it cannot be expected that all people have access to internet or, also important, do know how to use internet. About 20% of the Dutch population is a so-called “digital illiterate”. In other

words, they do not have a computer or any internet experience (Van Dijk et.al., 2008). The divide between people with access and people without access to internet is called the digital divide. In Singapore, for example, the government provided community self service terminals with internet access and launched education programmes to enhance computer literacy and e-government awareness among all citizens in order to bridge the digital divide (Ke and Wei, 2004).

The success of e-governance systems depends on several aspects. The model in Figure 3-5 is based on the updated model of DeLone and McLean (2003) that distinguishes several success variables for information systems. The quality of information on the government e-service, the system quality and service quality determine the use of the service as well as the user satisfaction. The actual use and satisfaction in turn affect the perceived benefit. The perceived net benefits include among others individual, organisational, consumer and societal impacts.

The model has been validated and it showed that the citizen use of e-governance systems is the strongest success factor in relation to perceived net benefit. This implies that it is important to promote the existence and usage of governmental e-services among citizens. Furthermore, information quality, user satisfaction and perceived net benefits are substantially more important variables for success than system quality and service quality. So, quality of the provided information on e-services is another aspect on the supply-part that is of importance for governments.

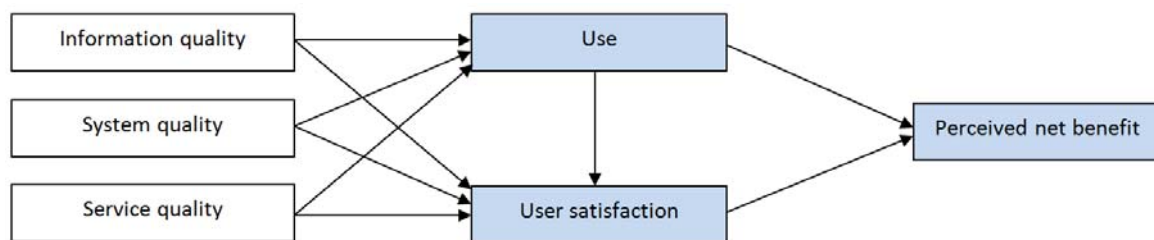


Figure 3-5 Success of e-governance systems based on model of DeLone and McLean (Wang and Liao, 2007)

The last few years more and more research has been conducted about e-governance, and more specifically about the user needs. Unfortunately, hardly any research is tailored to e-governance initiatives related to geo-data except for research in the field of spatial planning in relation to public participation. It is assumed that most of the findings also apply for e-governance facilities with geo-information, although some specific issues tailored to the use of geo-information are yet unknown.

3.3 User needs

Far too often, governments transfer traditional services into digital, without taking into account the user needs. This supply-side oriented approach is often seen in the Netherlands (Van Dijk et.al., 2008). However, a different medium to offer services has an impact on users. For example, face to face communication is direct and two-way, allowing for direct interaction. Internet as a medium offers a wide array of interactive websites and web applications. However, it is not necessarily interactive if people are involved to answer. It depends on the discipline of the person that is responsible for answering the question. This may range from an instant reply to no reply at all. For example, the response time of Dutch governments to a general or specific question by e-mail has been subject of research. Depending on the type of question it showed that in 2007 only 25% to 33% of the provinces sent an automatically generated confirmation of the received e-mail. Answering the specific question took 58% of the provinces one to ten days, whereas 25% did not even answer within six weeks (Flos et.al., 2008).

The differences related to a different medium should be taken into account during the development of a web service. Therefore, it is very important to consider the user needs, as it will enhance an effective and

efficient use of web services on the internet. In order to use the potential of the internet optimally, the involvement of citizens is required in the development of web services. In literature this demand-oriented approach is called citizen-centred e-government (Verdegem and Verleye, 2009; Bertot and Jaeger, 2008). Aspects that should be considered in relation to user needs are (Bertot and Jaeger, 2008):

- *information and service needs assessment*;
- *technology needs assessment*; Governments need to understand what technologies are preferred by citizens, depending on familiarity, service and need.
- *information and technology literacy*; Familiarity of users with computing and internet-based technologies.
- *government literacy*; Interaction of users depends on their knowledge of the structure of government. Arranging content by agency or departments is based on the assumption that users know which topics are covered by which agency or department.
- *usability and functionality of e-government initiatives*;
- *accessibility*; Includes accessibility of the internet (not all people have access to the internet) and interoperability (web services need to be accessible through different software systems).
- *meeting user expectations*; Encompasses consistency between sites and services and provided materials. These need to be presented in a coherent manner in design, organisation and content.
- *understanding how citizens actually use e-government services*.

All in all it is argued that thorough research should be conducted in order to develop a web service that will meet the user needs. In relation to this aspect Bertot and Jaeger (2008) even state that the development of e-government services does not necessarily cost less, because the initial costs involved in researching the user needs outweigh the savings gained by the service. However, e-services may have additional benefits that are difficult to express in money, such as improvement of the organisations' image, better service for citizens, ease of use etc.

People are known to show habitual behaviour. The introduction of a new web service requires a change in the behaviour of people, at least if we want them to use the web service. Why should people want to change their behaviour? Generally said, the change in behaviour should be of advantage to them. For example if they are convinced that the web service has advantages over other alternatives (visiting the office at determined opening hours) or that it solves a problem they have (e.g. no means to visit the office during the period of hearing). From communication research it is known that several aspects influence changes in behaviour (Figure 3-6).

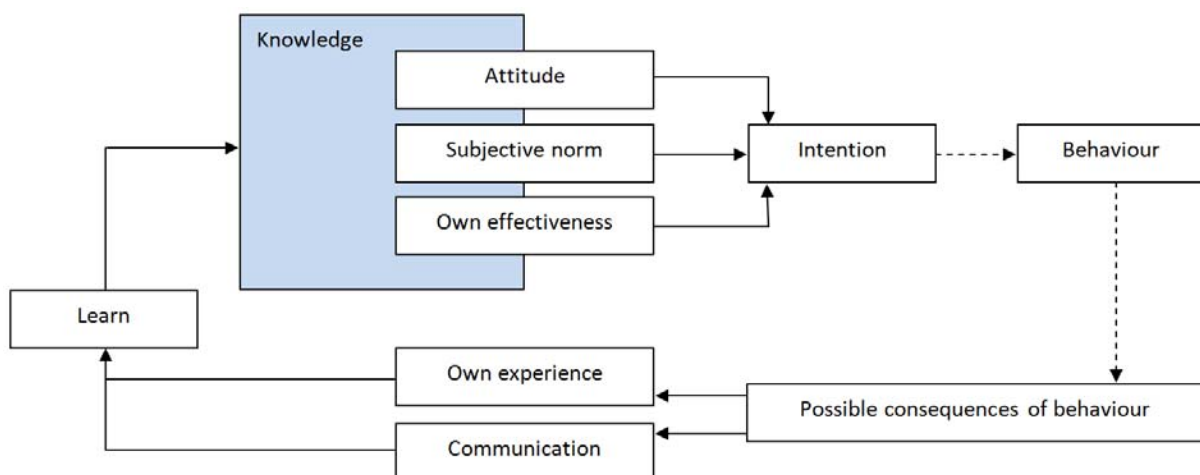


Figure 3-6 Communication and change of behaviour (Aarts and Van Woerkum, 2008)

Five determinants of behaviour are of importance given the context of behaviour change: (1) can, (2) want, (3) be allowed, (4) know and (5) dare. All determinants can be explained by the scheme in Figure 3-6. For example, someone has a positive intention to use the web service, but it is impossible to transform this intention into action (desired behaviour). The problem is related to the first determinant 'can'. The title holder simply cannot conduct the desired behaviour, due to physical restrictions and skills, despite the intention to do so.

The intention in turn is derived from the attitude, the subjective norm and one's own effectiveness. Together they define the perceived possibilities related to behaviour. A negative intention, for example, may be caused by a negative attitude. Someone does not 'want' to conduct certain behaviour due to negative beliefs about the possible impact of that behaviour. Another reason for a negative intention can be the subjective norm. What is the opinion of other people? Is the intended behaviour 'allowed' by others (whose opinion is important to the person that wants to change his/her behaviour)? The third aspect that influences the intention is trust in his/her own effectiveness. Do they 'dare' to try a web service or are they afraid that they do not know how to use it?

At last individual knowledge is of importance. This knowledge forms the basis for attitude, the subjective norm and the own effectiveness. With knowledge, individuals can judge their attitude, the opinion of friends (social norm) or their ability. Knowledge is gained by experience or a way of communication (written, oral or visual).

The described model gives some more background information about the considerations of people with respect to change of behaviour. These aspects can be of use for the feasibility of the introduction of a web service, because it will require a change in behaviour of title holders.

Also in research related to e-governance aspects of communication are recognized. Especially the relation between intended behaviour and actual behaviour is addressed.

In 2006, a survey was conducted in the Netherlands to study the intended use and actual use of e-governance services (Van Dijk et.al., 2008). Intended use was included because not all people do need all provided services or they only need them occasionally. The study showed that intended use was much higher than the actual use. Explanatory factors of this gap between intended and actual use were presented in a theory about the acceptance and the use of government internet services (Figure 3-7).

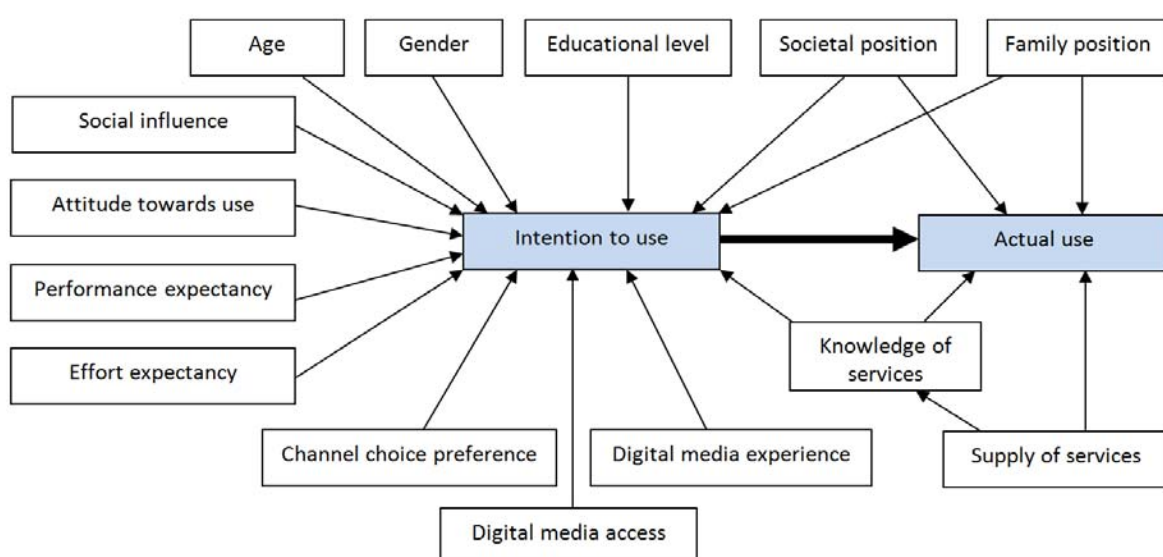


Figure 3-7 Multidisciplinary model of factors explaining the intention to use and actual use of services of the government on the internet (Van Dijk et.al., 2008)

The survey showed that mental and social or demographic factors are negligible compared to the most important factors, which are (Van Dijk et al., 2008):

- Actual government internet service supply is a precondition for people to develop the intention to use these services.
- Government internet service supply does not lead to a direct proportional increase of the actual use of these services.
- The knowledge of the availability of government internet services is an important condition of the intention to use and the actual use of these services by citizens.
- Digital media access is a prerequisite of actual use, and a strong predictor of the intention to use digital channels.
- The interrelated factors of digital media preference, access and experience explain the intention to use government internet services most.
- Digital media experience: the more years of computer and internet experience, the more likely people intend to use government internet services.

The main conclusion of the study is that the intention to use government internet services leads to their actual use provided that the following conditions are right: (1) service supply, (2) knowledge of this supply, (3) digital media preference, and (4) the ability and experience of usage of digital channels. Most of these aspects are also found in the model described by Aarts en Van Woerkum (Figure 3-6). Experience with internet and similar web services and communication about the existence adds to the knowledge of people and this in turn influences the intention to use a new web service.

3.4 The role of maps in web-based services

Maps play an important role to inform titleholders since re-allotment has a strong geographical component (part of the parcels are re-allocated, boundaries have changed etc.). Title holders want to know what has changed; where their parcels are located in the new situation, what the number of parcels is, where their boundaries are, whether the parcels are accessible. In other stages of the project maps may be used to locate leased parcels or to point out objections against the new cadastral situation or the list of financial settlements.

Maps are needed to provide title holders with this spatial information. In addition, administrative data are provided such as the total area of the parcels in the old and new situation and their re-allotment class.

All map use involves both visualisation (visual representation of a phenomenon with a geographic component) and communication (the transfer of information from producer to user). People make maps to get across information that they regard as relevant for a certain user group. However, the use of maps may differ considerably given the context. Variables that are of importance in this context are according to MacEachren and Kraak (1997) private versus public use, high interaction versus low interaction and presenting knowns (simple information retrieval) versus revealing the unknown. The use space can be divided by these three different delineated variables. As can be seen in Figure 3-8 maps can have four different use goals depending on the variables (MacEachren and Kraak, 1997): explore, analyse, synthesise and present. Each use goal requires its own approach and has its own characteristics, which are determined by the position within the use cube. Since a particular map might be used to meet all of the goals, the distinction between the goals is based on the audience, the data relations and interaction level that are typical to achieve the use goal of the map.

The proposed use of maps in the context of a web service aims most at presenting data, which is described by MacEachren and Kraak (1997) as presenting information to the public that is known to the information designer, but not to the user of the visualisation. Maps function in this context as a way of cartographic communication that can answer questions of user such as 'what is it?', 'where is it?', and

'what belongs together?'. Presentation strategies emphasise the transfer of spatial knowledge rather than the creation of new knowledge. A cartographically well designed map supports understanding of the provided information by the intended audience.

More and more maps are available in a digital format, whether on desktop computers via internet or on mobile devices. These technical innovations give way to new map applications and new ways to use maps. Web-based maps can be differentiated into non-interactive and interactive maps. Interactive maps can be adjusted by the user. This ranges from a small amount of interactivity, such as 'clickable maps' that function as an interface to other data, to more advanced forms of interactivity that allow users to zoom in or out, to pan, to switch layers on or off or even to change the way that the data is represented (Van Elzakker et.al., 2003). The level of interactivity is closely related to the role of the web map. For the purpose of presenting information it is sufficient to have maps available to view only. An example is the provided map on the existing web application that allows users to save or print a pdf-map that presents the old or new allotment. However, if analysis or exploration of spatial data is desired, much more interactivity is needed (Van Elzakker et.al., 2003).

These new applications on the internet have put the user in a different position. Generally spoken, the more interactive a map application is, the more likely it is that the map user also acts as map maker (Van Elzakker, 2004). A well known example is the possibility for users to create their own maps ('my maps') on Google Maps.

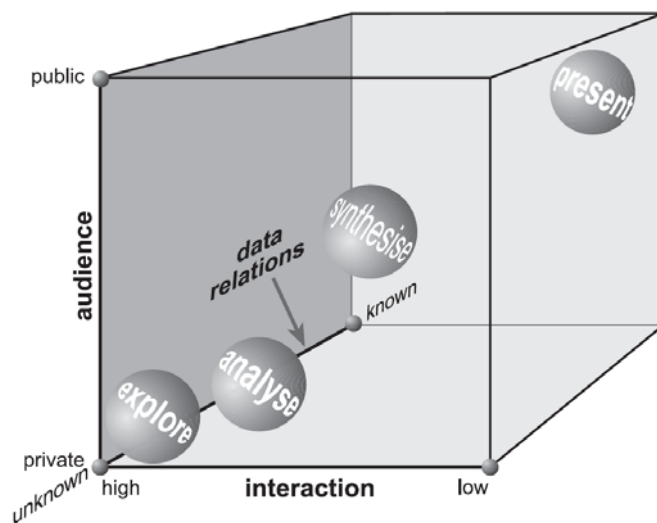


Figure 3-8 Goals of map use that require different visualisation strategies (MacEachren and Kraak, 1997)

The way how maps are displayed also influences the information that is communicated by that map. The interactive cartographic visualization of geodata or the consultation of a number of existing map displays that contain unknown geodata by an individual user in order to stimulate the visual thinking that should lead to a better understanding of these geodata is also called 'exploratory cartography' (Van Elzakker, 2004, p. 22). This type of cartography is positioned in the bottom left hand corner of the map use cube shown in Figure 3-8.

Presenting geodata in a digital format has some advantages and disadvantages over analogue maps. It is out of scope to discuss all pro's and cons here, but it should be noted that the digital way of presenting maps generates more flexibility and interactivity between map producer or geodata provider and the user. In order to develop software that supports the map user in an effective way the purpose of use is important (Van Elzakker, 2004). The purpose defines largely what tasks a user wants to perform and to

which geographical questions he/she wants to get an answer. In turn, these tasks and questions can be translated into functionality.

Another aspect that needs to be taken into account is the experience of the user in using and interpreting maps. It might not be expected that all title holders are spatially literate and are able to think spatially based on the map they see. Spatial thinking constitutes of the following abilities (Kemp, 2008):

- Translating from one dimension to another, namely 2D to 3D.
- Realising distance properties, such as adjacency, proximity, similarity, nearest neighbour, crow-fly distance, or over-the road distance.
- Comprehending orientation and direction.
- Using frames of reference, such as latitude and longitude or local street-numbering systems.
- Realising spatial geographic associations (such as downhill snow skiing and mountains, the relative lack of cities in desert areas, the denser patterning of cities in fertile agriculture areas, or the association between dairy areas and cheese and butter factories).
- Being aware of, and using effectively, the spatial networks of roads and highways.
- Recognising systems of landmarks that anchor ones cognitive maps.
- Developing map-reading skills

One of the issues related to digital map use is the choice for certain reference layers at certain map scales the user comes across when zooming. The maps on the existing web application that disseminated geo-information to title holders consisted of multiple information layers. The prime layer is the cadastral map that shows the old and new allotment for all title holders in a land consolidation project. To enable users to locate the cadastral parcels topography is added for reference purposes. Several maps can be used as a 'background' layer for this purpose such as orthophotos, large scale base map, or topographic map at scale 1:10.000 or smaller. Which map is chosen depends on the purpose of the (prime) map, the information needs of the user, the scale at presentation, the prime information layer (Van Elzakker and Van de Berg, 2009). A combination of two maps is also possible. One topography layer might be selected to present at a large scale, while another topography layer is more suitable when the scale of the viewed map changes towards a small scale map. This enables the user to view the prime map respectively in detail or to capture an overview.

3.5 Web-based GIS in public participation

Web-based GIS has been used now for several years to enhance public participation in for example spatial planning processes (Bugs et.al., 2010; Nuojuua, 2009; Simão et.al., 2008; Van den Brink et.al., 2007; Hanzl, 2007). Web-based GIS or mapmaking in the field of spatial planning is mostly applied to facilitate a participative process for citizens. A true participative approach involves two-way communication between government and citizen, thus not only providing information but also asking citizens for information. Due to the parallel with the existing web application in land consolidation projects and the proposed extension of the web service with the possibility to submit (geo-) information, it is useful to gain insight in the experience of governments with web-based GIS in the context of participatory spatial planning. These web-based GIS initiatives are launched to enhance public participation and include often the submission or publication of geo-information by citizens.

Web-based GIS can enhance an effective participation and communication among experts and non-experts. It supports the use of local knowledge of citizens and the use of user-generated information (Bugs et.al., 2010). Web-based GIS allows non-experts to visualize and manage geographical data interactively, although there are still technical demands of the user in terms of basic GIS skills. Therefore, some people who are not capable, or do not dare, might be excluded to use a web-based GIS application. In web-based approaches, there are fewer opportunities to draw in those without technological access or

skills (Wong and Chua, 2001). This is a point of concern for geo-related web applications without some type of personal contact for support. On the other hand it might enable other people to communicate more freely compared to the traditional forms of public participation that involve personal identification and confrontation at public meetings (Dunn, 2007). Traditional meetings are quite often confrontational and they can be vocally dominated by minority groups (Kingston, 2007).

The introduction of web-based GIS in spatial planning often originates from legislation that requires governments to facilitate participation of citizens in spatial planning processes. In Finland, for example, since 2000 it is obliged (due to the new Land Use and Building Act), to give citizens the right to participate in the spatial planning process from the beginning, which includes the preparatory phase (Nuojuua, 2009). To support this participative process a web-based GIS application has been developed. The application included core functionalities to submit and browse map-based comments and pictures. Citizens could place three different markers on a map to post their comments and pictures. Each marker had a different meaning: red markers were used to point out locations that needed to be developed. Green markers symbolised places the user considered pleasant and worth preserving, whereas yellow markers were used to attach comments to places with some other kind of personal significance for the user. Smileys were added to the marker to facilitate colour-blind people (Nuojuua, 2009). In Brazil a similar application has been developed to facilitate public participation in urban planning. Users could explore relevant geo-information and leave georeferenced comments about the proposed development. Users could label the comments as suggestions, questions, complaints, comments in favour or against (Bugs et.al., 2010). This provides the possibility for a map-based discussion, also known as an argumentation map or argumap. Keßler (2004; et.al. 2005) has developed a prototype argumap that integrates a map and a discussion forum in a single web-based interface (open source). It distinguishes different types of contribution from users, namely a question, suggestion, neutral comment and pro or contra argument. Other functionality includes the possibility to manipulate maps (scaling, panning, selecting layers), to create objects and add written contributions to it, and the exploration of previous contributions either starting from the map or the discussion forum.

A ten year period of experience in the UK with web-based mapping shows that many people nowadays are quite adept at navigating around such an on-line interface (Kingston, 2007). By providing a facility to search for a street name or postcode and then have the map zoom to that location, users can quickly identify their house and navigate from there to other locations by following a known route along a street. Also the provision of points on the map with linked digital photographs and panoramic views of well known landmarks helps users orientate themselves on the map (Kingston et.al., 2000). It may be expected that the general availability of applications, like Google Maps and car navigation systems, also contributed to the familiarity of the general public with interactive maps.

3.6 Case studies

The introduction of a web service that enables two-way communication of geo-information is not a single initiative in the sense that comparable initiatives have been undertaken in the Netherlands and abroad. Similar initiatives exist that also aimed at providing e-governance services tailored to the submission of geo-information, although the focus differs from the focus of this research (land consolidation projects).

In this paragraph, comparable initiatives are described and analysed in order to learn from their experiences in relation to this thesis research project. Two comparable known initiatives are presented, namely (1) the agricultural census web service of the Dutch Regulation Service and (2) a web service to create partial parcels at the Dutch Kadaster. Both case studies are based on literature study and interviews with involved employees from both organisations. The interviews gave the opportunity to gain

more insight in the development of the web services and the learning of the responsible organisation throughout the whole process. A more detailed report of the interviews is presented in Appendix II.

3.6.1 Agricultural census web service of Dutch Regulation Service

The Dutch Regulation Service is responsible for the yearly farm business survey, which is the input for the agricultural statistics and European subsidies. This information is provided by the farmers who can use a web service to upload all relevant (geo-)information, such as the type of crops grown on certain parcels. The Regulation Service has conducted research by means of prototyping to find out how people use the web service, e.g. is it clear how they have to specify geographically the area with crops on their parcels. In other words, what was the usability of the web service from the user's perspective? Based on this research the web service was launched a few years ago. Nowadays it is used more and more by farmers. A similar initiative as the website of the Dutch Regulation Service is known from Norway. However, neither (English) literature is available about this initiative nor the website is known, thus making it difficult to use it as an example for this research. An international comparison could add to this research although specific policy issues differ from country to country.

The web service developed by the Dutch Regulation Service supports data exchange of parcel information and parcel geometry between government and farmers (Janssen et.al., 2007). The common data exchange system aims to provide the farmers with information about the key registry of parcels, which they can use as a basis for the yearly agricultural census data (Janssen et.al., 2007). This way the system has advantages for both parties involved: the Dutch Ministry of Agriculture, Nature and Food Quality and farmers. The use of the key registry of parcels diminishes the work load for farmers to fill in the agricultural census data. The Ministry benefits also, because less mistakes are made due to the use of geo-information from this key registry.

The Ministry is responsible for the acquisition of information for livestock manure policy, agricultural census, and farm subsidies. The Regulation Service executes the work for the Ministry.

Because of the analogue delivery of geo-information by farmers the Regulation Service has had problems with the quality of that geo-information. A web service can prevent some of these problems through adopting (quality) standards the delivered information must meet. Otherwise, the data will not be transmitted. On the other hand, the web service has advantages for farmers. It gives them the possibility to integrate the key registry of parcels in their business system from which they can submit information to the Regulation Service. Another advantage is the decrease in work since only changes in the situation have to be transmitted and processed.

A standard has been developed to support interoperability regarding the parcel information and geometry. This standard supports data exchange between the web service of the Regulation Service and the business system of farmers.

Farmers edit the information in their own business system or directly via the website of the Regulation Service. The advantage of the former is that farmers only have to make the changes once since an application, called GeoBoer, is able to communicate between the business system and the servers of the Regulation Service. Users can choose the background layer themselves (orthophotos or other reference layers). Other functionality includes querying the key registry of parcels (which parcels are in use by the farmer), editing of parcel geometry, optimisation of geometry and validation of parcels (Feijen, 2006). With the validation it is tested whether the parcel meets the quality standard of the Ministry, which is equal to the quality standard of the key registry of parcels (Janssen et.al., 2007). If the offered changes are validated they will be accepted.

A service oriented architecture is used for the web service of the Regulation Service. In line with what has been written down in GIDEON (VROM, 2008) about the adoption of open source software, standards of the Open Geospatial Consortium have been used for the web service.

On the website of the Ministry of Agriculture, Nature and Food Quality clients can view a demo of the developed web service for the yearly submission of agricultural census data via the web-based application (URL 7). Other possibilities to support customers with the digital application are also provided. This ranges from the traditional telephone helpdesk to special meetings that are organised for farmers to help them in person. Employees of the Regulation Service and of the Dutch Federation of Agriculture and Horticulture show farmers how to draw agricultural parcels or split parcels.

An interview was held with the responsible employee of the Dutch Regulation Service to gain more insight in their experience with clients providing geo-information via the internet (see Appendix II for the report). This year it is the fifth year in a row that farmers have the possibility to fill in the yearly census data on internet. Due to an active policy to stimulate the use of the digital application, and lately also to discourage the analogue application, 70% of the clients used internet for the application in 2009. From the introduction in 2006 nearly every year the number of digital applications doubled. Clients that used the internet the previous year did not receive a full set of papers needed for the analogue application in the year thereafter. In order to discourage people to submit the information in an analogue manner, nobody will receive a full set of papers any more unless they ask for it.

As mentioned before, users are supported through different means when filling out the forms. They can contact the helpdesk, staffed with well educated people. Helpdesk staff can view the computer screen of the calling client who can point out the question, but helpdesk staff cannot fill out the form due to juridical considerations. When the question cannot be answered or the problem cannot be solved the helpdesk staff can forward the question or problem to the second or third line helpdesk staff, who can answer dossier related questions about the content of the delivered information.

For the Regulation Service, the main advantage of the internet application is the fact that it leads to fewer errors, data are less incomplete, and contains less unclear information. Before the introduction of the internet application 30% of the analogue forms had to be sent back due to errors, incomplete fields or unclear information. With the digital application this number is reduced to only 1%. Additionally, a major advantage of the internet application is that the information is already available digitally. No data entry is required anymore.

Throughout the whole period the users have been involved by means of a client panel. Currently the panel consists of approximately 450 users. For example, the panel is testing the yearly update of the application. If possible, the comments of the panel regarding all sorts of aspects, e.g. functionality, lay-out and design, are taken into account. Some suggestions require a long term implementation. Another part of suggestions for improvement comes from the regular users that phone the helpdesk or visit one of the special meetings throughout the country. What the users do like most is the pre-printed information on the digital forms based on the previous application of last year, so that they only have to worry about changes in their situation. A point of attention is the geo-related part of the application. Users keep finding it difficult to cope with this part, even though the aim of the Regulation Service has been to design the application as simple or intuitive as possible.

It is important for the Regulation Service to have a solid authentication procedure because the digital application form has a juridical status for the pay of subsidies among others. Users can choose for two different ways of authentication, namely a combination of username and password or DigiD. DigiD stands for Digital Identity and is the national system for e-authentication that is used by Dutch governments to determine the identity of citizens and enterprises. With a DigiD users can access a great number of online

services offered by Dutch government agencies (URL 8). The username and password are valid for all services of the Ministry of Agriculture, Nature and Food Quality and cannot be changed by users. They receive their username and password at the postal address, as known by the Regulation Service. A TAN code, sent by analogue mail to the home address or as a text message to their mobile phone, is used as part of the digital signature to secure the transaction. The DigiD for businesses in its current configuration is going to disappear so it is more likely that they will use the username and password combination to hand in the digital application form. How this DigiD for businesses will be followed up is yet unknown. Ideally it is linked to the registry as held by the chamber of commerce, although it is not expected that this will meet all specific needs of farmers (e.g. a partnership).

3.6.2 Partial parcels web service at Kadaster

Another comparable project is a study called 'preliminary boundaries' that is carried out by Kadaster. It aims to provide notaries the possibility to locate the intended new boundary on a digital map via a web service. This service comes in handy when for example a parcel is sold partly. Both parties can agree on the new boundary based on a visual drawing, instead of a textual description. Also for the Kadaster and its clients it has advantages, because the new boundary is indicated on a map prior to the survey in the field. The application of the new web service is currently under development and it will enable customers to split a parcel geographically on the cadastral map. The customer draws the new boundary that indicates where an existing cadastral parcel should be split. As a result a new parcel is created with a new parcel number. When the proposed method is fully operational, in the end no partial parcels will exist anymore in the cadastral registry. The new method requires a fully digital work process from both customer and Kadaster. Currently, only a new (temporary) number is created when a customer requests to split a parcel. The partial parcel is not represented in the cadastral map because the proposed new boundary is not known. With respect to legal certainty this is not a desirable situation for several purposes.

The development of a web service that will support the new work process is in the pre-pilot phase. At first, only business customers are the target user group. It is expected that they are more capable of using this new web service since they are most experienced and most familiar with cadastral issues. Business customers are for example notary, municipality, waterboard, housing organisation. The adaptation and implementation of the web service for regular citizens will follow later.

An interview was held with the responsible employee of the Kadaster (see Appendix II for full interview report). As the project is still in an early pre-pilot phase of development no extensive user experiences are known yet. Only a small group of customers has been involved by means of a customer panel. The first results with the customer panel showed that business customers desired more functionality than was provided in the first prototype. Consultation of customers in an early phase of the project pays off in terms of getting an overview of user needs and required functionality.

The new web service also required a different work process for the Kadaster. It is absolutely necessary to thoroughly think over the consequences for the organisation and its employees as such. Especially the relation to legal certainty, one of the main purposes of the cadastral registry, is of importance. For example, the request for additional functionality of merging split parcels has consequences for the internal work process in relation to legal certainty. Technically it is not that difficult to add the desired functionality, but from a juridical point of view it is more complicated.

3.7 Conclusions and discussion

All in all it showed that literature describes important theories and background information about exchange of geo-information via web services. Given the user centred approach it is important to know what drives people to start using such services, and thus change their behaviour, and how they handle geo-information on the internet. With respect to this the communication theory in relation to change of

behaviour of Aarts and Van Woerkum (2008) is relevant. Also the role of maps and how they are used are of importance for this research. Web-based applications related to geo-information are known from the field of spatial planning, especially tailored to public participation in the planning process. Land consolidation as such is also related to spatial planning, although it is more focused on the implementation of spatial plans than on drawing up the plans itself. However, the experience about public participation through web services is valuable for this research. Especially issues related to functionality of maps or argumapping as a tool are relevant. Literature showed how this was successfully incorporated in other web services.

The case studies provide useful information about the practical implementation of a web service that enables two-way communication. It provides focus points for user involvement during the development and evaluation of the application. Also it points out conditions for the implementation regarding authentication, user needs and the way how behaviour of people can be changed by means of a set of coherent measures.

4 Government requirements

4.1 Introduction

The user centred design process is adopted as general perspective for this research. The investigation of government requirements is one component of this design process. On the one hand organisations can be regarded as users. They may use the new web service as title holder in a land consolidation project, if applicable, or provinces may use the web service as a means for communication in land consolidation projects. Another role of governments is related to the policy framework that is determined by governments. This chapter will focus on the government requirements, which consist of organisational aspects (paragraph 4.2), stakeholders (paragraph 4.3) and legislation. The legislative framework focuses on freedom of information (paragraph 4.4), the right to privacy (paragraph 4.5) and legislation related to land consolidation (paragraph 4.6). The chapter ends with conclusions and discussion (paragraph 4.7).

4.2 Organisation of land consolidation projects

It is possible to have land consolidation projects organised differently. However, most land consolidation projects involve the same stakeholders regardless of the exact organisation structure. In this paragraph the most commonly used organisation structure of land consolidation projects is considered.

Land consolidation projects are carried out under responsibility of the provinces. Provinces are responsible for strategic and operational policies regarding rural areas. Policy aims may include the realisation of the ecological network, protection of Natura 2000 sites, improvement of the agricultural structure or landscape. Most provinces choose to delegate or mandate their responsibilities to an executive committee. The project organisation can thus differ between provinces, although most provinces choose to have a committee. Figure 4-1 shows the most likely structure of the organisation of a land consolidation project. In this setting is the executive committee responsible for daily management of the project. The executive committee is supported by the Government Service for Land and Water Management (DLG) and the Kadaster. The executive committee accounts for the project to the provincial executives. Some decisions must always be taken by the provincial executives, such as the approval of the land use plan.

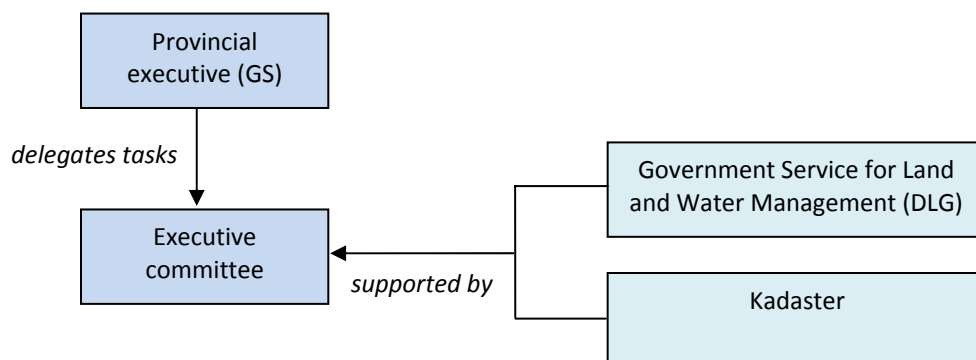


Figure 4-1 Organisation of land consolidation project

The executive committee typically consists of several representatives of stakeholder and interest groups that are involved in land consolidation projects. Municipalities and water boards that are (partial) located in the land consolidation project often have a representative in the executive committee. Also several representatives of the agricultural sector are member of the committee since agricultural interests are at stake in land consolidation. Of course, the committee can not do all the work on their own. They have the Kadaster and Government Service for Land and Water Management on their side to carry out the project. Tasks of both organisations are related to their knowledge and experience. Kadaster is involved due to

their knowledge about cadastral registries (including mortgages, rights in rem and cadastral map). Their role centres on legal certainty related to cadastral registries, which is described in the Kadaster Act and Rural Areas Development Act. Activities are amongst others drawing the (draft) re-allotment plan, (geo)data management and handling of objections against the (draft) re-allotment plan and list of financial settlements. Throughout the whole process Kadaster maintains the (geo)data administration of the project, whereas Government Service for Land and Water Management is responsible for project management in general. In Table 4-1 a more detailed overview is given of activities of the Kadaster in land consolidation projects (see Figure 1-1 for a basic overview of the phases in a land consolidation project).

Table 4-1 Main activities of Kadaster in land consolidation projects

Phase	Activities
Preparation	<ul style="list-style-type: none"> ▪ hearing of wishes ▪ land lease registration
Re-allotment plan	<ul style="list-style-type: none"> ▪ deliver list of title holders ▪ development of (draft) re-allotment plan ▪ support period of hearing of (draft) re-allotment plan ▪ handling of objections ▪ deed ▪ send acknowledgement of deed to title holders
List of financial settlements	<ul style="list-style-type: none"> ▪ prepare list of financial settlements ▪ send acknowledgement of list to title holders ▪ handling of objections

4.3 Stakeholders and the role of provinces

As mentioned in the previous paragraph, several stakeholders can be distinguished in a land consolidation project. These can be municipalities, water boards, the province or organisations such as the forest management agency or other nature conservation agencies. Another important group of stakeholders are the title holders within a land consolidation project. Part of the re-allotment plan is a list of all involved title holders. They can not opt to be excluded. Often, the mentioned organisations are also stakeholder in the project as title holder because they own land, real estate or have other legal rights in the area. However, the primary stakeholders of the proposed web service that enables two-way communication are the title holders. They are the target group and potential users of the web service. The (government) organisations or interests group that are involved in the project in another way, e.g. as sponsor, can be regarded as secondary stakeholders with respect to the proposed web service.

As mentioned in paragraph 4.2, the province is the sponsor of a land consolidation project. The spatial policy for the land consolidation area is laid down in the land use plan. Municipalities and water boards are normally involved in the development of the land use plan as to secure an integral development of the region. Relevant spatial planning issues of these governmental organisations are possibly integrated in this plan. The province consults these organisations in an early stage of the planning process.

In this paragraph special attention goes to the role of provinces as stakeholder. The responsible province sponsors the land consolidation project, thus in the end also sponsors the development of a web service for a project. The introduction of web services in land consolidation projects may also affect provincial activities. Therefore, it is good to investigate whether such a development fits into the e-governance strategy of the provinces or not.

At national level policy regarding e-governance strategy in relation to geo-information has been developed. This national policy, which is described in GIDEON (VROM,2008), also applies to provinces, although it describes the strategy only globally. In GIDEON eight implementation strategies are laid down. With respect to the new web service two strategies are of importance, namely (1) the incorporation of

geo-information in e-services and (2) chain integration in the field of geo-information. The incorporation of geo-information in the governmental e-services requires (VROM, 2008):

- Free availability of geo-information in order to stimulate re-use of governmental data;
- Agreements between different governments about the use of geo-information in e-services;
- Matching GIDEON and NUP (Nationaal Uitvoeringsprogramma Dienstverlening en e-Overheid; Anon., 2008), the national implementation programme for better services and e-government;
- Realisation of a set of generic geo-information services.

With respect to the support of chain integration in the field of geo-information the chain of rural development is of interest. Land consolidation projects are believed to fit in this chain. The ministry of Agriculture, Nature and Food quality and the IPO (interprovincial consultation organisation) have developed a programme plan for the implementation of this chain at province level.

The national policy described in GIDEON has been further tailored to the level of provinces by the IPO organisation. IPO is the umbrella organisation for the twelve provinces in the Netherlands. The provincial strategy regarding e-government initiatives in relation to geo-information are described in proGIDEON (IPO, 2009). In addition to the goals mentioned at national level, provinces aim among others to enhance their principal processes and to increase recognition of the province and their role (IPO, 2009). With respect to this aim it can be questioned whether land consolidation projects belong to the principal processes of a province. Sure, provinces actively implement policy aims as have been described in the so-called investment budget for rural areas. Land consolidation projects are an instrument to achieve the defined goals in the rural area. Thus, these projects can be considered as part of this policy. As such, provinces are the responsible organisation for land consolidation projects. They decide on these projects. An interactive web service as a means of communication in land consolidation projects can support an improved recognition of provinces as sponsor and responsible organisation of land consolidation projects among citizens located within land consolidation projects. Whether it enhances the principal processes of the province substantially is doubted, because the level of active interference of provinces in land consolidation projects varies from province to province. Thus, in some provinces an interactive web service to exchange geo-information will enhance the processes of provinces more than in other provinces.

Besides policy tailored to governmental e-services with geo-information, policy and guidelines about e-services in general have been described for governmental organisations. The national implementation programme for better services and e-government (Anon., 2008) describes the supply of basic facilities such as e-access to the government, e-authentication, numbers, key registries and e-information exchange has priority. Especially e-authentication is of importance for the submission of (geo-)information by title holders through the proposed web service. The implementation programme also determines that all government websites, including those of municipalities, provinces, water boards, must meet the standards of website design per 31 December 2010 as are described in the web guidelines (URL 9). This means that any web service under the responsibility of a province should comply with these web guidelines. Although the guidelines are not tailored in specific to the use of geo-information, they can be useful. Incorporation of these guidelines is considered to have advantages, which are among others (URL 9):

- better accessibility for citizens and search engines
- faster website
- ready for future applications (e.g. on mobile devices)
- high return on investment
- management of governance risks

The described principle in the quality model to separate content and structure of the website from design and lay-out will also apply for the proposed web service.

In order to get a better overview of the state of the art and ambitions of provinces with respect to aforementioned topic, semi-structured interviews have been conducted. Questions covered topics such as the general e-governance policy, disseminated spatial information on the website of the province, advantages of geo-information exchange between public and government in general and for land consolidation projects in particular, and possibilities to exchange geo-information via a web service in land consolidation projects.

It is not needed to interview all provinces because at this stage of research the aim is to get a general impression of the e-governance policy of provinces in relation to the rural area development policy. Therefore, nine provinces have been asked for co-operation. Interviews have been held with three provinces. Two employees were present per interview. Other contacted provinces did not respond or responded negatively. Reasons for non co-operation included practical issues (time) or the lack of need for an interview because the provincial rural development policy does not intend to start new land consolidation projects. Reports of the held semi-structured interviews are attached in Appendix IV.

The interviews revealed that concerned provinces all disseminate geo-information on their website by means of a viewer application. Most information owned by the province was freely accessible. That means without restrictions and for free. Restrictions in spatial data dissemination by provinces only applied on data that involved third parties (terms of delivery) or contained private information. As a consequence these data was not available on the website of the province.

Provinces indicate several advantages related to dissemination of geo-information in general and to exchange of geo-information in land consolidation in particular. It gives all involved people access to the same information. Consequently, it diminishes miscommunication between citizen and government because the communication is based on the same information. For the same reasons, the number of mistakes made in a land consolidation project may decrease. People can see where new parcels are located and what for consequences the location has. In general, a map communicates this information better than an oral description of the location. Improved access to spatial data gives people better opportunities to collect information and judge the (changes in the) situation.

A web service can be used in several phases of a land consolidation project. Mentioned possibilities by the interviewed provinces include mainly the land use plan and the re-allotment plan. The web service can support the submission of objections against both plans, depending of the phase of the project, or it can be used for submission of data concerning wishes, polluted land, or land lease contracts. Although not explicit subject of questioning, in some interviews voluntary re-allotment was also mentioned as an option to use a web service to exchange geo-information. The web service can provide example re-allotments between some farmers as to entice other farmers to set up or participate in voluntary re-allotment of land. Another suggestion was made to offer a sort of game environment that enables farmers to set up a voluntary re-allotment themselves.

All in all, it can be concluded that ambitious aims are laid down in national and provincial policy and guidelines that apply to e-government. Provinces have to take into account general guidelines in relation to e-government services and websites. Also, specific policy for e-government services with geo-information is described. These policies and guidelines also apply for land consolidation projects because provinces are the responsible government organisation for these projects.

The semi-structured interviews showed that provincial e-government services tailored to geo-information have already been developed. This resulted in viewers on provincial websites that enables the public to view the available geo-information of provinces. Furthermore, provinces have a positive attitude towards a further development of these services, including web services for land consolidation projects. However, provinces remarked that benefits should outweigh the extra costs to develop the proposed web service.

4.4 Freedom of information

Although the Rural Areas Development Act and its regulations do specify what information should be provided, it does not specify requirements for the way the information is provided to title holders. So far it has been provided in an analogue manner or in a digital format through employees. The employees use the digital information and title holders are able to view the results. An interactive web service enables title holders to analyse the data themselves, without interference of an employee. So the way of data handling changes. For example it may be possible to combine the available digital spatial data in a different way and this might provide the title holder with more information. Therefore, it is good to have a look at the legislative framework with respect to these issues. The focus lies on publicity, privacy and other relevant legislation related to land consolidation.

The legislative framework is important to consider given the development of a web service. Legislation about publicity of information is laid down in the Dutch Freedom of Information Act (Wet Openbaarheid van Bestuur, 1991). This Act determines the role of government or administrative bodies in relation to publicity of information. The executive committee or provincial executive as mentioned in the Rural Areas Development Act are both an administrative body, which implies that they have to comply with the regulations of the Freedom of Information Act. The Act specifies that an administrative body provides information based on the general interest of public information concerning governance (art. 2). Everybody may put a request for information on account of a governance issue. The administrative body is obliged to provide this information unless it is personal data that may harm the privacy of individuals (Wet Openbaarheid van Bestuur, 1991, art. 10:1.d) or the interest of providing personal information is not in balance with the interest of that individual (art. 10:2.e).

So, the national Freedom of Information Act regulates that all government decisions are public. This also accounts for all decisions of the executive committee or provincial executive, since they are regarded as governmental decisions. The (draft) land use plan, the (draft) re-allotment plan and the (draft) list of financial settlements all are decisions of the executive committee or provincial executive and are thus public. Besides the decision and appendices of this decision, all documents needed to ground the government decision are public as well. All these documents are open for public inspection, if someone requests so. In case of the re-allotment plan this applies for land lease contracts that are offered for registration in land consolidation project. People can choose to register land lease contracts in order to have them taken into account in the re-allotment plan. By doing so they give more or less permission to include this information in the re-allotment plan, thus making it 'public' in the case someone requests to inspect the documents. However, it is not said that all documents should be freely available on e.g. the internet. A distinction could be made between documents that encompass the decision, including the appendices, and the documents that ground that decision. The former information could be provided standard, while the latter could be provided only if someone requests so.

From a legal certainty perspective the supply of information to a wide audience (e.g. title holders) is at certain moments more important than at other moments as people have the possibility to object a decision. The proposed web service aims to inform all title holders at critical stages in the project and has to enhance legal certainty. Basically all project related (geo-)information is public for this purpose, unless it harms individuals in their right for privacy.

4.5 Right to privacy

Privacy is an important topic when publishing personal data on the internet. In this context, the term personal data first must be defined. Personal data is considered to be information related to identified or identifiable individuals (Kabel, 2000). Data are personal data when someone could be able to link the information to a person, even if the person holding the data cannot make that link. Examples are address,

bank statements, DigiD, credit card number etc. The majority of geo-information is considered to be personal data. Cadastral information is captured to support legal certainty in legal transactions. Hence publicity of this information is very important. This principle of publicity and the wish to reuse geo-information often clash with the right to privacy. The availability of new technical possibilities, such as web services on internet that focus on dissemination of geo-information, put another pressure on data privacy (Loenen et.al., 2008).

Not only is the dissemination of geo-information from government to citizen of importance, also submitting or collecting data can clash with privacy regulations. The volume and sensitivity of personal information collected by government websites depends to a great extent on the level (information, transaction or interaction) of the web application. Websites that focus on government to citizen communication will collect little to no personal information at all, whereas at the interaction level more personal information is likely to be collected. Many of the privacy problems that arise from e-government applications have to do with (McDonagh, 2002):

- the method of collection of personal information
- the use of personal information
- disclosure to third parties of personal information collected about individuals
- security of personal information held by governmental agencies.

Issues related to the method of collection encompass the use of cookies, click stream data or application and registration processes (e.g. digital certificates). Click stream data encompass the user's activity on the internet, including every website and every page of every website that the user visits, how long the user was on a page or site, in what order the pages were visited, any newsgroups that the user participates in and even the e-mail addresses of mail that the user sends and receives (Garrie and Wong, 2006). Click stream data is used in order to deliver web solutions to each individual user to a site or to authenticate a user. The information is captured in so-called cookies that enables a web site to record, track, monitor, and generate customised dynamic pages reflecting the stored data. Since it is possible to extract personal information from click stream data, such as IP addresses, cookies or web pages viewed by individuals, it might be considered as personal data and should thus be treated as personal data. Only if data is rendered anonymously in such a way that the data subject is no longer identifiable, an exemption can be made (Garrie and Wong, 2006).

The use of personal information in land consolidation projects is related to a specific project only. It is used to ensure legal certainty of those involved. Disclosure of these (geo-)data to third parties does not happen on principle, unless they are for example involved in an objection as third party (stakeholder). Only those parties involved in a land consolidation project, namely the land consolidation committee and the two organisations that support the committee (Government Service for Land and Water Management and Kadaster) in the execution of the project do have access to the data and use these for the purpose of the project. With respect to data handling and storage the strict security guidelines of the involved organisations apply, which are among others based on European and national legislation.

The principle law at the European Union level regarding privacy in relation to data is the EU Data Protection Directive. The Directive regulates the processing of personal data, regardless if the processing is automated or not. Article 6 of this Directive treats the data protection of personal information. Member states of the European Union should ensure that personal data are:

- (1) processed fairly and lawfully;
- (2) collected for specified, explicit and legitimate purposes and not further processed in a way incompatible with those purposes. Further processing of data for historical, statistical or scientific purposes shall not be considered as incompatible provided that member states provide appropriate safeguards;

- (3) adequate, relevant and not excessive in relation to the purpose for which they are collected and / or further processed;
- (4) accurate, and, where necessary, kept up to date; every reasonable step must be taken to ensure that data which are inaccurate or incomplete, having regard to the purposes for which they were collected or for which they are further processed, are erased or rectified;
- (5) kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the data were collected or for which they are further processed. Member States shall lay down appropriate safeguards for personal data stored for longer periods for historical, statistical or scientific use.

Additionally, data processing should be transparent, which means that the data subject has the right to be informed when his personal data are being processed (Data Protection Directive, 1995, art. 10, 11).

Above described regulations apply to data controllers. A data controller is defined as a natural or legal person, public authority, agency or other body which alone or jointly with others determines the purposes and means of the processing of personal data; where the purposes and means of processing are determined by national or Community laws or regulations, the controller or the specific criteria for his nomination may be designated by national or Community law (Data Protection Directive, 1995, art. 2d).

A government organisation that establishes an interactive website, normally requiring some sort of personal data of the users, can thus be regarded as a data controller according to the definition in the Data Protection Directive. As a consequence, the website operator would have to comply with the European data protection rules.

The article 29 recommendation of the EU Data Protection Directive sets out guidelines primarily in the areas of collection of personal information online. It focuses on the subject of the information to be provided as well as on the manner and timing of provision of such information (McDonagh, 2002). However, the directive is not legally binding for citizens, because EU directives are addressed to the member states. Like all other Member States of the European Union, the Netherlands have transposed the directive into national law. The principal national law in this field applicable to the public sector in the Netherlands is the Data Protection Act from the year 2000. This Act applies to analogue as well as digital data and processing of this data (art. 2:1). Central theme of this Act is the use of personal data. Personal data is defined as any information related to identified or identifiable individuals (Wet bescherming persoonsgegevens, 2000, art. 1a). This means that in general information about enterprises, legal entities and legal persons are not regarded as individual data. Also aggregated personal data is not considered as personal data since it cannot be related to identifiable individuals. The Dutch Data Protection Authority has decided that aggregation at postal code level without house number is sufficient. This implies that most large scale geo-information could be considered as personal data (Loenen et.al., 2008).

Digital data storage and data handling is described in national legislation in the Netherlands. An old ministerial decree from the year 1975 about the security of privacy in relation to automated systems of the government that contain personal data is still valid. It holds certain regulations that are still of importance nowadays. The decree organises for example that the body responsible for the data registry must be described in a regulation (Aanwijzingen inzake de bescherming van de persoonlijke levenssfeer in verband met geautomatiseerde systemen waarin persoonsgegevens zijn opgenomen bij de Rijksoverheid, 1975, art. 1). The responsible body is responsible for the security of the registered data (art. 8). Security measures should be according to the current state of the art with respect to data protection to protect the data adequately. The decree also arranges that the collected data will only be used for the purpose of registry (art. 3). The latter aspect is also mentioned in the Data Protection Act (art. 9), which encompasses all data whether digital or analogue.

Legislation with respect to governmental electronic data handling is described in the General Administrative Law Act. In 2004 a section has been added that regulates electronic correspondence between governmental bodies and citizens. Governments may send a message electronically to one or more addressees if the addressee indicated to have adequate access to this electronic communication device (Algemene Wet Bestuursrecht, 2004, art. 2:14.1). If it concerns a general message, thus not directed to certain specified addressees, electronic publication may only take place if other means of publication are used (art. 2:14.2). Decisions of the land consolidation committee, on behalf of the provincial executive, can be categorised in the latter category. All stakeholders must have the possibility to inspect the decision. Title holders, whose addresses are known, are normally notified by mail that includes a copy of the decision that holds information about their personal situation. Legislation holds no restrictions to send the information electronically when title holders indicate that they are in the position to be contacted through an electronic message and regularly check the incoming messages. The Act also regulates that it is possible to send an electronic message to governmental bodies in case that body has made known that the e-service is available (art. 2:15.1). The governmental body can refuse the electronic message in case confidentiality and reliability is not guaranteed sufficiently (art. 2:15.3). A prerequisite that applies to all electronic (data) communication between governmental bodies and citizens is that the electronic messages are sent sufficiently protected and confidentially given the nature and content of the message and the purpose of it (art. 2:14.3). An electronic signature suffices in case the authentication method is sufficiently reliable. In the Netherlands the DigiD has been introduced for authenticating the identity of the user of e-governmental services.

It can be concluded that the legislation as has been laid down in the General Administrative Law Act with respect to e-government communication opens up possibilities to exchange geo-information between land consolidation committee and title holders. No legislative limitations exist for title holders to submit objections through the web service or to exchange other (geo-)information in case the described prerequisites are met. The publication of the land use plan, the (draft) re-allotment plan and the (draft) list of financial settlements can be done electronically, although it also must be published via other ways as well, e.g. on paper.

4.6 Legislation related to land consolidation

Other legislation that is important originates from the character of land consolidation projects. These projects operate in the field of land consolidation and cadastral data plays an important role. Therefore specific legislation about both topics has been studied.

The Dutch Kadaster collects and handles personal data as it is defined in the Dutch Data Protection Act (2000) for the purposes related to their legal tasks despite other legal prescriptions (Kadasterwet, 1989, art. 3a lid 1). These tasks are in short defined as follows (Kadasterwet, 1989, art. 2a):

- improvement of legal certainty of registered premises
- improvement of an effective geo-information infrastructure
- effective information supply for a good fulfilment of the public tasks
- support and improvement of economic activities

The Kadaster has to provide information as is captured in the public registries if someone requests that information (Kadasterwet, 1989, art. 99). The cadastral information is public due to its role in providing legal certainty. However, it should be noted that for the land consolidation project a separate administration is kept based among others on the public cadastral registries and cadastral map. This project related registry is not part of the cadastral registries and is thus as such not public information. Nevertheless, both registries are related to each other. In the public cadastral registries a notification is for example included if a parcel lies within a land consolidation project. Notaries can ask the executive

committee for more information in relation to the legal status of the real estate in order to support legal certainty.

The Rural Areas Development Act describes the formal procedure and provides regulations for activities related to land consolidation. This Act explicitly refers in article 64 to the General Administrative Law Act, section 3.4, articles 3:10-3:18 that regulates the procedure for public inspection of the land use plan, the re-allotment plan and the list of financial settlements. Article 3:11 of the General Administrative Law Act prescribes that the uniform public preparatory procedure (in Dutch: uniforme openbare voorbereidingsprocedure) will be followed for these decisions, unless article 10 of the Freedom of Information Act applies. This article regulates in which situations the information is not public. Article 10:1 refers to absolute reasons such as reasons of national security, while article 10:2 refers to relative grounds of refusal of publicity such as privacy of the involved person. The information is not published if the interest of publication is not in proportion to the right to privacy.

For the proposed web service it means that the chosen strategy in the existing web application can be followed. Users have to login to view the (geo-)information related to the phase of the land consolidation project. General, cadastral, information is accessible for all users once they have logged in. Every user can view the location of a parcel and the area and owner(s) of that parcel. Specific administrative data from the land consolidation administration, e.g. the total size of all owned parcels, will only be accessible to the person that has logged in. He or she cannot access these data of fellow farmers for instance. Neither can others view his or her administrative data derived from the project administration.

A similar distinction can be made for the submission of (geo-)information. More private data will only be accessible for the person who has logged in. More general information that has been submitted by other title holders, such as the location of possibly polluted parcels, could be shown on the interactive maps to all title holders after they have logged in.

4.7 Conclusions and discussion

The study of government requirements showed that provinces play an important role, both as sponsor of land consolidation projects and as principal responsible organisation with respect to achievement of policy aims and initiator of land consolidation projects. The interviews revealed that most provinces are willing to consider the use of a web service in land consolidation projects. In most provinces this would be a logic development regarding the proGIDEON (IPO, 2009) efforts. With respect to the legislative framework no limitations are expected regarding the right for freedom of information in relation to the right to privacy. Sufficient possibilities exist to vary the way how information will be presented and how much effort users have to put in order to access the data. Geo-information with a public character can be supplied standard to all title holders, while (geo-) information with a more private character can only be shown to the person it concerns. This is in line with the existing web application that disseminates (geo-) information to title holders. A similar approach can be chosen for the submission of data through the web service.

5 Use and user requirements

5.1 Introduction

Besides government requirements, the use and user requirements play an important role in the user-centred design process of a web service. Ideally, the use and user requirements are fulfilled through the web service. Therefore, the use requirements of the title holders, the primary user group, are analysed in this chapter. As appears from the user-centred design process which was described in paragraph 2.2, three types of use requirements can be distinguished. These encompass the use and user characteristics, tasks and preferences. The characteristics of several user profiles and the tasks are described respectively in paragraph 5.2 and 5.3. They have been discussed in a focus group on 31 March 2010. Members of the focus group are the senior project leaders of the spatial planning and consultancy department of the Kadaster. The senior project leaders are regarded as the experts in the field of land consolidation in the organisation. They meet at a regular basis to discuss new developments and innovations. At one of these scheduled sessions the focus group discussion about the stakeholders and their characteristics and tasks took place. The session was recorded (audio). More information about the methodology of a focus group discussion can be found in paragraph 2.3.2.

The preferences of the users have been investigated by means of a questionnaire. The questionnaire provides more generic information about the potential users, their characteristics and their preferences. This part of the research, the results and discussion of the results are presented in paragraph 5.4. Finally, this chapter ends with conclusions and discussion of the results of this chapter that are presented in paragraph 5.5.

5.2 User characteristics

The application of two-way dissemination of geo-information is proposed for land consolidation projects. The information concerns title holders in land consolidation projects. These title holders are to be considered the main stakeholders of the proposed web service. As one can imagine not all title holders have the same interest in a land consolidation project. Depending on their characteristics and interests, several user profiles can be distinguished. Each user type has specific purposes in relation to the information supply and information need. This may affect the user needs, since the purpose of use defines what tasks a user wants to perform (Van Elzakker, 2004). Table 5-1 provides an overview of different user groups as are distinguished by the author and have been discussed in the focus group session.

As was explained in paragraph 2.3.2 certain research themes have been chosen for discussion in the focus group. The themes were prepared in advance in order to avoid a lengthy discussion from scratch. Chosen themes included (1) users profiles, (2) characteristics per user profile and (3) tasks per user profile. The user profiles did not lead to big discussions, whereas the other themes triggered more response in the group. Not all aspects of the themes were extensively discussed, because the group members agreed with each other about most aspects. Also on the aspects that needed discussion, the group members agreed in the end after (short) discussions between the group members. All in all the focus group discussion took about one and a half hours. The results are presented in this paragraph and the next paragraph.

In total six different user profiles have been distinguished by the focus group members. The distinguished user profiles are tailored to the field of land consolidation and are based on experience of the members of the focus group. The group of farmers might be subdivided into three main subgroups according to the type of farming (dairy farm, crop growing, bio-industry). Each subgroup can have some additional interests with respect to the described ones in Table 5-1. These interests are closely related to the adopted type of farm management. In general, a bio-industry farm owns less land. Also it is expected that the location of land is less important than for the other two farm types. On a dairy farm the cattle is

generally milked twice a day. If the cows roam outside on the land, it is necessary that these lands are located close to the farm buildings. Crop growing also desires land close to the farm in order to reduce transport time and costs, although this is in general a less important requirement than for dairy farming if third parties are hired to work the land.

Table 5-1 User profiles

Type of title holder	Description
Farmer	The farmer typically wants a better allocation of land. The farmer thinks in terms of prudential return on investments. To scale up, clustering of land and parcels closer to the farm buildings are needed. Another issue of importance is accessibility.
Private household	Persons living in the rural area typically have a small piece of land surrounding their house. Contrary to farmers they are in general not likely to change the current situation (boundaries, land position etc.) regarding their land position.
Public organisations	Public organisations often have land for public ends, such as roads, waterways, nature. Part of the aims is laid down in the land use plan. In general, these aims are related to public policy, e.g. to realise an ecological network, improve public access by upgrading roads, or allocate land for water management. It is often complex to achieve these aims.
Financial institutions	Financial institutions typically grant mortgages to persons or farms. Land and accompanying buildings are the pledge for the mortgage. They have an interest in the value of land and administrative data, whereby location is not always the most important issue.
Investment trusts	Institutions who consider land as a long term investment. Examples are denominations (ecclesiastical organisations), pension funds, large commercial firms etc. These institutions often lease the land. They are interested in the long term investment, whereby location may be important.
Utility company	Utility companies have infrastructure, either below or above the ground, in the area that intersects the cadastral parcels. Examples are high- tension line towers, sewage network, water supply system, or underground cables for communication. For utility companies it is especially important to check the legal rights that are established on parcels. So that in case of maintenance or emergency they have legal access to the infrastructure.

Each user group has different interests that will be reflected in their user needs. From the point of view of the land consolidation project the same information will be provided to all title holders as is laid down in legislation (Rural Areas Development Act). The current analogue way of providing this information provides little opportunities to tailor the information supply to the information need by means of presentation. The introduction of a web service could change this, although first it is necessary to study the user needs into more detail.

The differentiation in user needs can be explained with a few examples. A private household, for example, lives in the rural area, but income is generated from a job elsewhere. Often such households have a little piece of land next to the house for hobby purposes, e.g. to keep some small animals (chicken, goats etc.) or to have a pony. The experience in land consolidation projects is that this type of user often does not want to change the current situation regarding their land position. With respect to the web service this means that it is important for them to check the current situation and the new situation after re-allotment. Normally they do not feel the need to acknowledge their wishes regarding the new situation, nor do they have to register land lease contracts. The household is in general represented by only one registry number.

Contrary to a private household, a farmer has direct profit from a better land allocation. The land that is used by the business can be owned or leased from a landlord. Also the business may be run by two or

more persons in a so-called partnership (in Dutch: 'maatschap'). As a consequence, farmers often have multiple registry numbers in a land consolidation project. In general, farmers are the user group that is involved most intensively in a project. They register land lease contracts, express their wishes for the future situation, get involved in re-allotment of land, and ultimately have to pay for the improvement.

A financial institution may want to check the current and new situation regarding their supplied mortgages. The main point is to check whether the land (still) is good enough as a pledge. In general, financial institutions themselves do not have any wishes regarding land positions since they normally do not own land. A list with administrative data is most important. Also they do not have a registry number.

Public organisations, such as municipalities, water boards or provinces, do have special needs regarding the re-allotment. For them, re-allotment is an instrument to achieve the policy aims. To realise this, land is bought in advance, often through the Land Management Service (BBL) organisation, which can be used for re-allotment to realise the specified aims as mentioned in the approved land use plan. Also it can be arranged in the land use plan which roads are public. This is especially of importance for municipalities.

Investment trusts can also own land within a land consolidation project. Land is seen as an investment by constant values. The land is frequently leased to interested people, often being farmers. These trusts or institutes have a primarily commercial character although their interest might differ. An ecclesiastical organisation is an example. Such organisations inherit from time to time land from deceased devoted church members. Also commercial trusts, like Shell, or pension funds operate on the same market. Depending on their aim the location of land may be important.

At last, utility companies want to check mainly the established legal rights on parcels in relation to the location of their infrastructure.

An overview of the main characteristics of the distinguished user profiles is given in Table 5-2. It shows in general whether a user type has an interest in re-allotment of the parcels, may have multiple registry numbers, is involved in land lease contracts, has dispersed land or rights in the area, may expect financial settlements at the end of the project or mainly needs administrative data. Some aspects are related to each other. Financial settlements, for example, mostly account for all owners that are involved in re-allotment of land (farmers, public organisations, investment trusts).

Table 5-2 User profiles and their characteristics

Type of title holder	Re-allotment	Multiple registry numbers	Land lease contracts	Dispersed land and/or rights	Financial settlements on map	Mainly need for administrative data
Farmer	Yes	Yes	Yes, as lessee and landlord (lessor)	Scattered, large variance per registry number	Yes	No
Private household	No	Occasionally	No	No	No	No
Public organisations	Yes	Yes	No	Very scattered	Yes	No
Financial institutions	No	No	No	Very scattered	No	Yes
Investment trusts	Occasionally	Yes	Yes, as landlord	Very scattered	Yes	Yes
Utility company	No	Yes	No	Very scattered	No	No

5.3 User tasks

As the examples in the previous paragraph pinpoint, different users can have different needs regarding the web service. Depending on their interest it is likely that they stress different aspects of the provided information during a period of hearing or public inspection. This is reflected in the required functionality of the web service and especially of the provided digital maps.

Table 5-3 User tasks, related to maps, per user profile

	User tasks	Farmer	Private household	Public organisations	Financial institutions	Investment trusts	Utility company
Government to citizen	Locate (owned) parcels in old situation	√	√	√	√	√	√
	Locate (owned) parcels in new situation	√	√	√	√	√	√
	Compare old and new situation	√	√	√	√	√	√
	Assess access of parcels (location relative to infrastructure)	√	√	√		√	√
	Assess distance to parcels (as the crow flies and by road)	√					
	Assess shape of parcels	√		√			
	Verify boundaries	√	√	√		√	
	Verify rights in rem	√	√	√	√	√	√
	Verify area / size of parcels	√	√	√	√	√	
	Verify re-allotment class of soil	√				√	
	Distinguish leased parcels	√		√		√	
Citizen to government	Select and label desired parcels, including an indication to own or to lease	√	√	√		√	
	Select and label leased parcels	√		√		√	
	Draw new boundaries	√	√	√		√	
	Split existing parcels	√	√	√		√	
	Merge parcels	√	√	√		√	
	Calculate total area of all owned and leased parcels	√	√	√		√	
	Provide administrative data	√	√	√	√	√	√
Select and label polluted parcels, easements, other limitations, old native rights, hunting rights etc.	√	√	√	√	√	√	

Besides the user profile and the characteristics per user profile, the user tasks have been discussed in the focus group after preparation of the discussion by the researcher. The defined user tasks of the citizen to government communication were also based, among others, on the results of the sample projects described in paragraph 3.6. For example, the case of the web service that enables the segregation of a partial parcel geographically showed that a function to split a parcel alone is not sufficient. When a party wants to create a new cadastral parcel out of a part of two existing parcels it is necessary to split the two parcels. In addition, it is desired that they can merge these two partial parcels into one parcel as was the initial purpose.

Based on the user profiles and purposes of use described above, in Table 5-3 an overview is provided of user tasks that are likely to be executed by each type of user. In doing so, a distinction is made between user tasks related to get information and tasks related to provide information (from the point of view of the citizen). Citizen is defined broadly in this context and includes both persons as non-persons such as enterprises, non-governmental organisations, or associations. So in this research all six user profiles, being title holders in land consolidation projects, are regarded as citizens.

The user tasks are related to maps, because the majority of information is related to a certain location in the project area (geo-information). Also information that will be submitted to the committee often has a spatial component. Therefore, it is more convenient to use maps as a means of communication on the web service. It is easier to point a location on a map than to describe the same location in words. Hence, the focus lies on user tasks related to maps.

The tasks in relation to the citizen to government communication mentioned in Table 5-3 are mostly described in terms of required functionality of the proposed web application to exchange geo-information. This functionality is needed on top of the functionality provided to execute the tasks in the government to citizen communication as is present in the existing web application. The purposes of the tasks are mostly defined by the process that is followed in a land consolidation project. As mentioned before, title holders, being potential users of the web service, provide the executive committee with (geo)data at certain stages in the project. Early in the project title holders deliver land lease contracts, preferably shown on a map and including administrative data, and they inform the committee about their wishes regarding the new allotment. Besides, the committee always asks the title holders to report any known (soil) pollution, because polluted parcels are not available for re-allotment. To do so in an electronic way requires the above described functionality.

The involved map use at this stage goes one step further than the in literature described sequence of *map reading – map analysis – map interpretation* (Muehrcke & Muehrcke, 1992, In: Van Elzakker, 2004). The term 'map manipulation' could be added as last step. Manipulation refers to the fact that the geodata is manipulated or new data is constructed. For example, new boundaries are drawn to split or merge parcels in order to visualise the existing or desired (future) situation. Also new administrative data, related to the manipulations, may be added.

5.4 User preferences

5.4.1 Questionnaire

One of the aims of this research is to find out whether the title holders intend to use an interactive web service tailored to the dissemination of (geo)information within land consolidation projects. And, if so, what preferences they have. A questionnaire was developed to ask potential users about their preferences. The questionnaire is among others built around the communication theory of Aarts and Van Woerkum (2008) in relation to behavioural changes as has been described in paragraph 3.3. It covers questions related to the (1) can, (2) want, (4) know and (5) dare. 'Be allowed' is not integrated, because it

is difficult to question with this methodology (questionnaire). It is expected that a large group of people will not be aware of this aspect at all, and thus be unable to answer a question as such. Also this aspect is very difficult to measure and people tend to fill in social acceptable answers. Besides that, some general characteristics are asked for, such as age, user type, access to internet etc.

The questionnaire has been distributed by an analogue mailing among an a-select sample of title holders in two different projects, namely 'Land van Maas en Waal' and 'Saasveld-Gammelke'. A pilot with the existing prototype web service that provided the same (Government to Citizen) information as in the office during the period of public inspection (see also next chapter) has been held in the 'Land van Maas en Waal' project, while the title holders in 'Saasveld-Gammelke' are unfamiliar with such a web service. This makes it possible to check if the answers of both sample groups differ significantly. Deceased title holders have been kept out of the survey sample. Although the research has nothing to do with the land consolidation project as such, the project leaders and both land consolidation committees might get questions from title holders. Hence, they have been asked for permission. Both were willing to co-operate and gave permission for the user survey.

Due to logistic reasons first 250 questionnaires have been sent to an a-select sample of title holders in 'Land van Maas en Waal'. The title holders had the possibility to fill in the questionnaire in an analogue way and return the form by means of a stamped address envelope or fill it in on a website (URL 10). Of the 250 questionnaires that have been sent, 46 were returned by mail and 12 were filled in on internet. A response rate of 23%. Because of the low response via internet, in itself an interesting result, and the amount of work involved to get the questionnaire available online it has been decided not to provide this possibility for the second sample in 'Saasveld-Gammelke'. Since 'Saasveld-Gammelke' knows less title holders than 'Land van Maas en Waal', due to the smaller size of the area, 150 questionnaires have been sent. The response rate in 'Saasveld-Gammelke' was 28%, equal to 42 questionnaires that have been returned. In total 100 questionnaires have been filled in, an overall response rate of 25%. No reminder was sent in order to increase the response rate, because of the analogue method in combination with an a-select sample of the population. The addresses, to which the questionnaire was sent, have not been registered. In addition, due to the anonymous character of the user survey, people would have got a reminder while they had returned the form already or had filled in the questionnaire on the internet. It was concluded that the drawbacks of a reminder outweighed the benefits.

5.4.2 Results

The questionnaire and all results are attached in Appendix III. The first part of the survey encompassed questions about the characteristics of the users, since literature (see Chapter 3) showed that among others access to and experience with internet and web-based geo-information applications enhance the actual use of similar applications. Furthermore, it was aimed to verify whether or not the percentage of households with internet connection in agricultural areas is the same as across the Netherlands.

The age of respondents is characterised by a normal distribution, whereby the majority of people is between 50 to 59 years old (Figure 5-1). Furthermore it was asked to what user profile they belong. The majority of respondents consider themselves as private household (54%), while the second largest group were the farmers (30% in total). Figure 5-2 presents the results split up by land consolidation project. It appears that the distribution between private households and farmers differs between the two projects. Relatively more private households responded in Land van Maas en Waal than in Saasveld-Gammelke given the sample size, while the opposite applies for the farmer categories.

91% of the respondents indicated that they have access to internet. The remaining 9% of the sample has no access to internet. This is similar to the average internet access of households across the Netherlands in 2009 according to the CBS (see paragraph 3.2, Figure 3-4). A slightly larger percentage (12%) has no experience at all with internet, although the majority (65%) uses internet on a regular basis. All other

respondents use internet occasionally (16%) or hardly (7%). Also, the majority has experience with transactions (78%) and with interactive maps (73%) on internet.

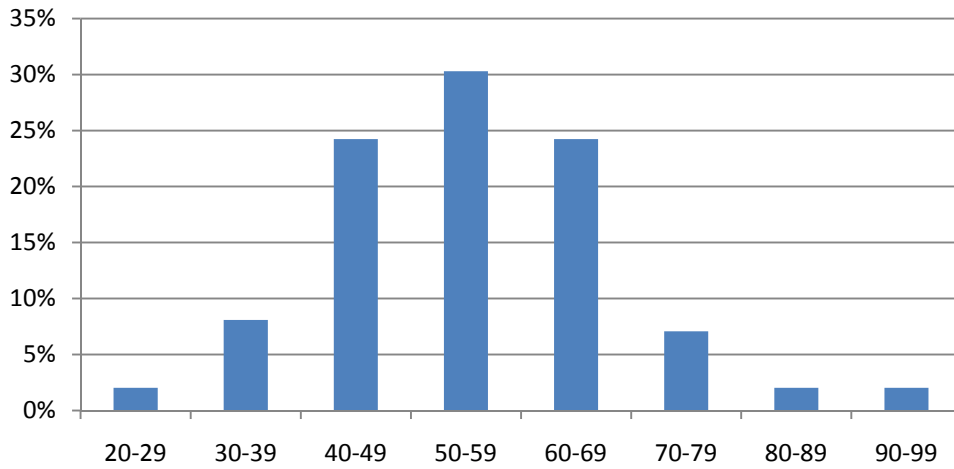


Figure 5-1 Age of respondents

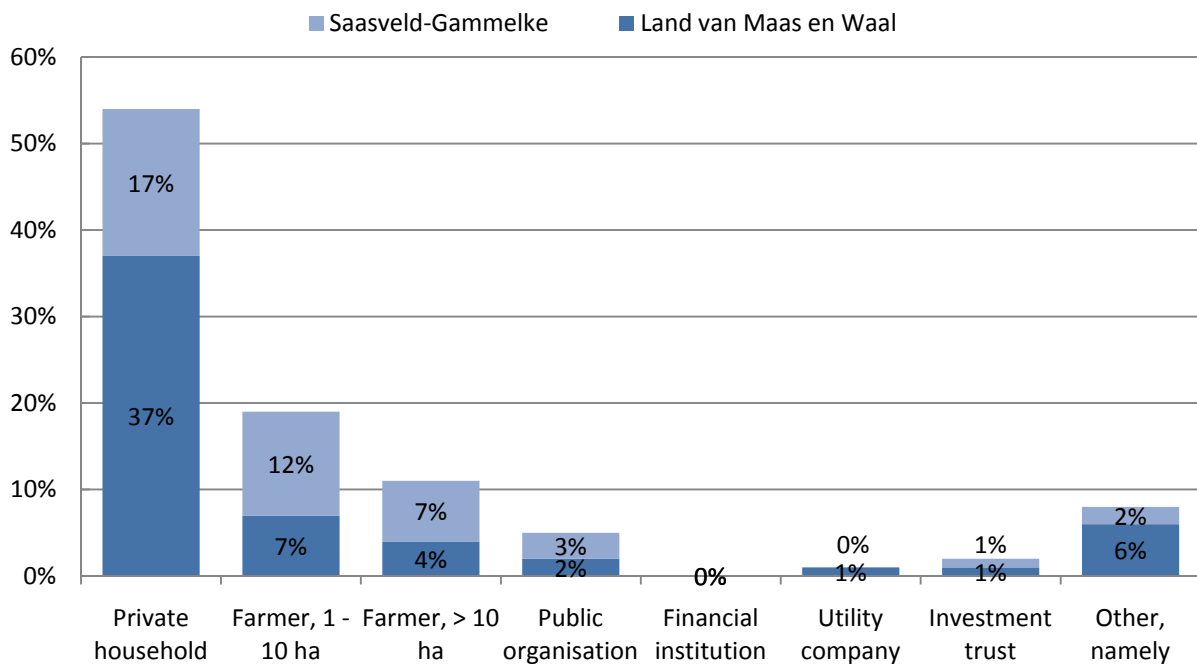


Figure 5-2 User profiles of respondents

The second part of the questionnaire focused on the preferences of the users. What functionality is required for interactive maps according to the users and do they consider submitting geo-information to the committee? If not, why not? And is it desirable to publish information on the re-allotment map about which parcel belongs to whom? The user survey also gave respondents the opportunity to express their opinion. The questionnaire ended with the possibility to express ideas, concerns or other issues not mentioned previously in the questionnaire.

The results show that the most appreciated functionality for web-based interactive maps is zooming in and out. This is followed by respectively panning, an information button, and switching on/off layers

(Figure 5-3). Respondents could give multiple answers. Some other functionality mentioned in the category 'other' includes rotation and printing of maps.

With respect to reference layers users have a clear preference for a topographic map, regardless of the scale of the map. Respectively 72% and 80% of the respondents prefer a topographic map for reference purposes at a large scale (e.g. 1:5.000) and a smaller scale (e.g. 1:50.000). Orthophotos are slightly more popular at a larger scale map than a smaller scale map (18% versus 10%). The large scale base map as reference layer was the least popular at both map scales (both 10%).

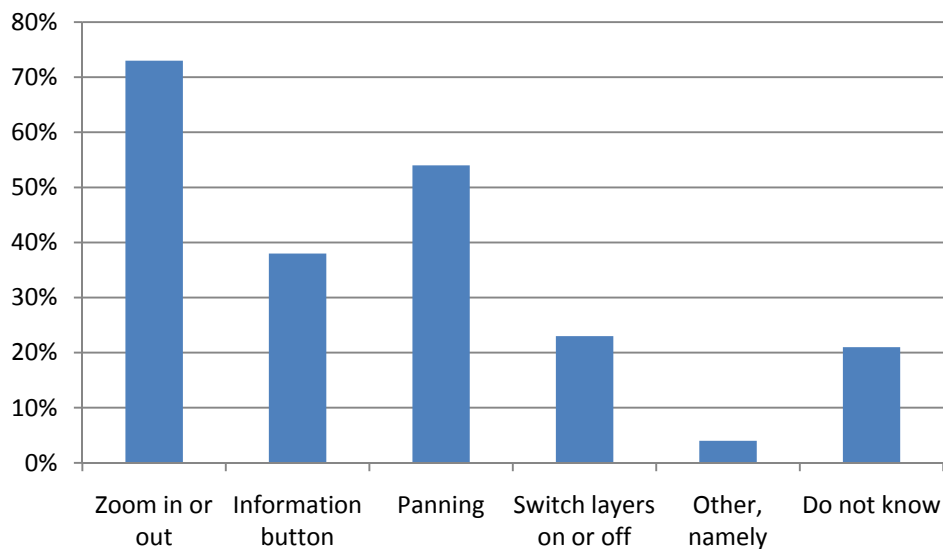


Figure 5-3 Desired functionality by users

Respondents were also asked if they would consider submitting information to the committee via internet if the possibility to do so was offered. Three options were mentioned, namely to submit an objection digitally, to submit a land lease contract digitally, and to draw their wishes for the new allotment on a map. The results are presented in Figure 5-4.

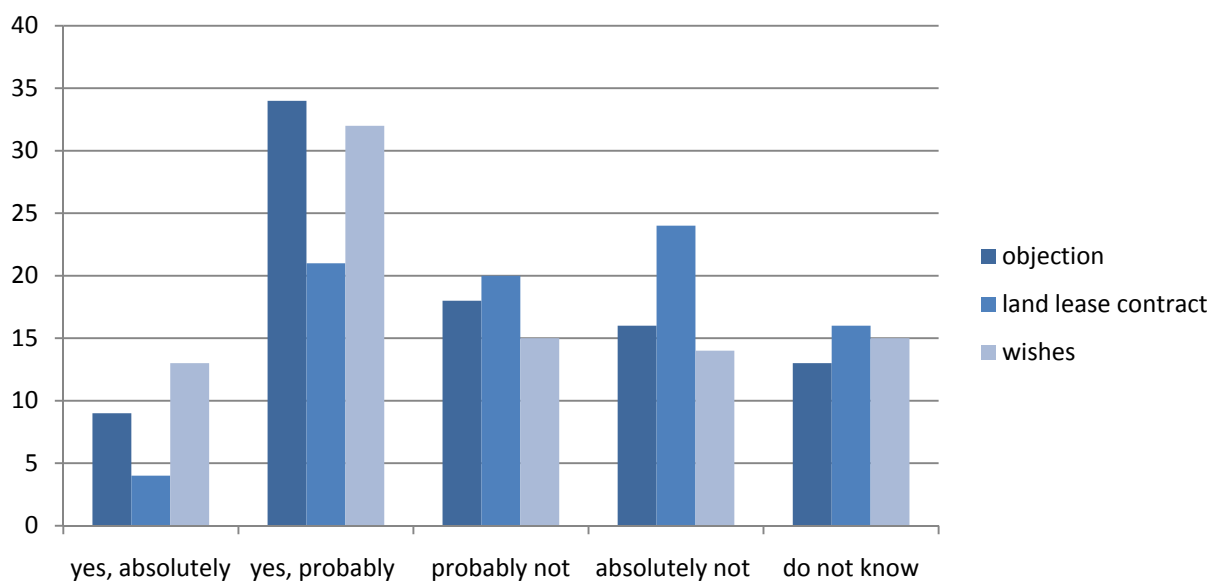


Figure 5-4 Likelihood to submit geo-information in different cases (frequency)

The three options objection, land lease contract and wishes were included as three separate questions. The three questions have different numbers of missing value (no answer given). Therefore, the results are presented in absolute numbers in order to make a fair comparison possible. 13 respondents were sure to submit their wishes on a map, 32 probably would do so, and 15 respectively 14 people responded 'probably not' or 'absolutely not'. People were less positive about the possibility to submit a land lease contract digitally. The same figure applies more or less for the possibility to hand in objections digitally. A positive tendency is recognised with 43 people responding positively (sure or probably yes) versus 34 people responding negatively (probably not or absolutely not). The majority, 44 respondents, indicated probably not or surely not to submit land lease contracts to the committee through internet. Also the no response rate is relatively high compared to the other two items. This might be caused by the fact that a land lease contract is not applicable for the majority of respondents. It is expected that land lease contracts are more used by farmers than by private households. It also appears from the answers that specify other reasons why respondents do not want to submit geo-information. It was named quite often that land lease contracts were not applicable.

In the case of a negative answer respondents were asked for a reason. The vast majority (48%) replied that they prefer another way such as personal contact or regular mail (Figure 5-5). More or less an equal number of other excuses were mentioned such as too difficult, not the right means (e.g. no computer or internet connection), doubts about security. Not pre-specified reasons were also given by the respondents. Most comments refer to the lack of necessity in general or due to the absence of land lease contracts. Relating these results to the change of behaviour theory of Van Aarts and Woerkum (see paragraph 3.3) it appears that the majority of people does not 'want' to submit data to the committee via internet. They prefer another manner and, therefore, their attitude is negative towards the use of the web service. Also some people mentioned that it was too difficult, which means that they do not have enough confidence in their own effectiveness. In other words, they do not 'dare' to use such a web service. Furthermore a small group of people does not have the right means, e.g. they do not have a computer or internet connection. According to Van Aarts and Woerkum they 'can' not effectuate their intention into behaviour.

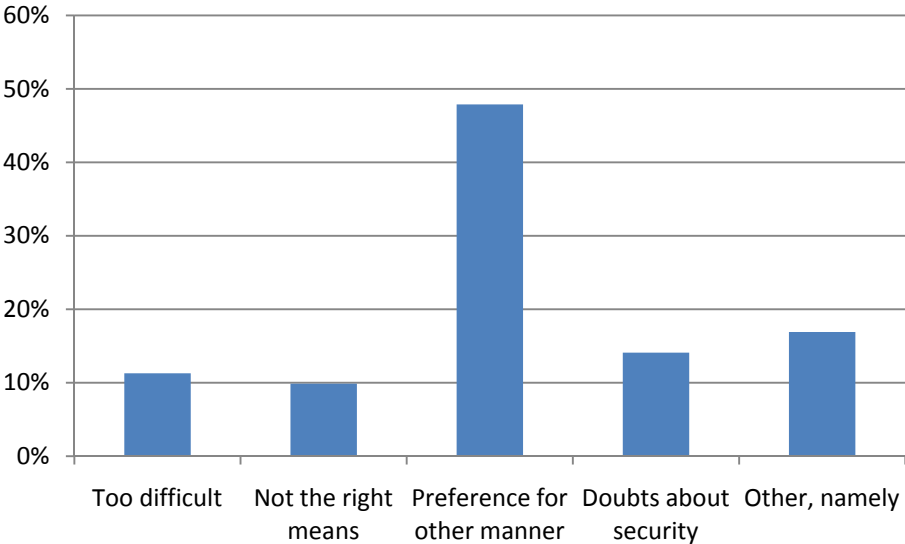


Figure 5-5 Reason of negative opinion about submission of geo-information

In addition, just over a dozen people came forward with a variety of suggestions for other applications, such as more information (owner property, size parcels, length width proportion parcels, survey points,

transactions), confirmation of submission or feedback about the (im-) possibility of wishes for new allotment.

Of course, it is also important to know what potential users consider as advantages or disadvantages for submitting geo-information over the internet to the committee. Advantages prevail over disadvantages among potential users with respectively 67% and 33%. In total 59 reactions about advantages have been posted. The most important aspects according to the respondents are speed, ease, accessibility of (spatial) information, efficient, less paperwork, effective exchange of information, better overview of maps, fewer mistakes. No check on submission, hardware not always reliable (software crash or breakdown), less security, not all people can use it, impersonal are mostly mentioned as disadvantages. Some of these issues were also included in the user survey. It was questioned how important are (1) safety of data storage, (2) safety of data transfer, (3) privacy and (4) reliability when submitting information via internet. As Figure 5-6 shows most aspects are regarded as (very) important. Furthermore, with respect to this topic the user survey showed that it is also important for users that they quickly get response from the committee, a proof of delivery is sent, the application is user friendly and a (online) helpdesk is provided.

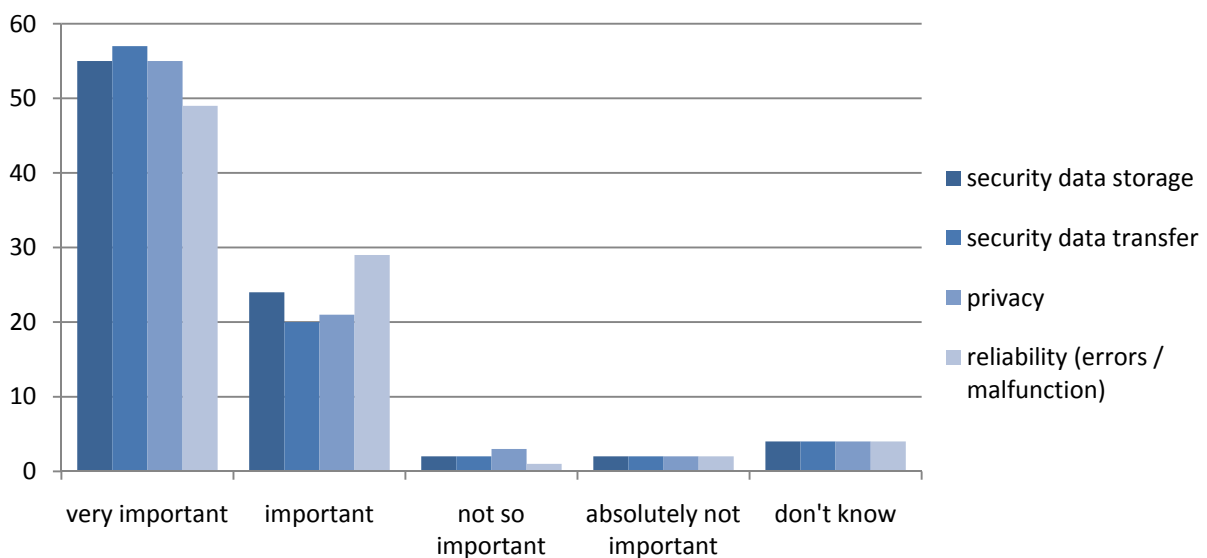


Figure 5-6 Importance of aspects in case of submitting data (frequency)

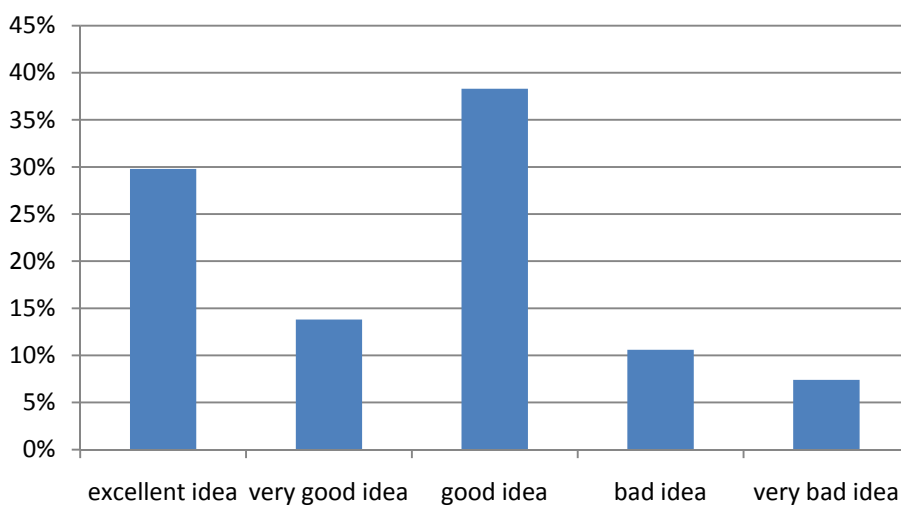


Figure 5-7 Opinion about providing proprietary information of parcels

At last it was asked what respondents think of providing information about who owns each parcel in the old and new situation after re-allotment. Figure 5-7 displays the results. A big majority (82%) would appreciate to have this information available. Only 18% disagrees ('not a good idea at all' or 'not a good idea'). Respondents also motivated their answer. Positive comments included among others that it is transparent to have this information, you know who are (going to be) your neighbours, the information is already public, it gives a good (spatial) overview. Negative remarks with respect to this issue encompass mainly privacy.

The questionnaire ended with the possibility to express any other comments, ideas or tips that respondents wanted to share. Basically, two themes can be distinguished. The first group of comments centres on the wish for personal contact, whether or not in combination with the web service. Another topic that recurred several times is the call for immediate introduction of such services through internet.

5.4.3 Discussion

The results of the user survey showed that, basically, two discourses can be distinguished. One discourse focuses on a positive attitude among title holders towards a website that enables the exchange of geo-information between title holder and committee and vice versa. The other discourse encompasses respondents that doubt about the use of internet in a land consolidation project. They are attached to personal contact and to an explanation about land consolidation issues. These two discourses reveal that it is wise to introduce the web service gradually, whereby it still is possible for people to come to an office to enable personal contact. After several years the latter may be phased out. Also sufficient help functionality should be included at the website, on top of a user friendly design of the application. Another point of attention includes the security and a proof of submission of the data as is possible with analogue mail. Several respondents mentioned these topics or aspects related to these.

Overall, the response was higher than expected. Based on experience with general client surveys of the Kadaster a response rate of 10% to 15% was expected. A reason could be that title holders are committed to the land consolidation project or to the topic of web services. Apart from the results, it was striking that such a little number of respondents in 'Land van Maas en Waal' used the digital questionnaire as was provided on the website of the Kadaster. Only 12 out of 58 respondents replied in a digital manner. That is an interesting fact given the topic and the relatively large group of people that has a positive attitude towards web-based services. On the other hand, the questionnaires were distributed by mail, including a return envelop. This makes it of course very easy to fill in the questionnaire on paper and send it back for free.

With respect to the questionnaire it would have been better to specify also an answer category 'not applicable' in the case of submitting geo-information to the committee through a web-based application. The question was specified for three cases, namely express wishes for new allotment, submit an objection, and submit a land lease contract. It appeared that land lease contracts are not applicable for the majority of respondents. Including an answer category 'not applicable' would have caused less confusion and would have made the results easier to interpret.

Furthermore, the response of farmers in Land van Maas en Waal was lagging behind compared to the response in Saasveld-Gammelke. This could be caused either by chance (sample is not representative), by lack of motivation among farmers to respond or by area characteristics. Land van Maas en Waal has for example several old linear structures across the rural area with a lot of private households. Examples are the old dikes along the rivers and some major roads across the area on the old river banks.

Two different groups of respondents can be distinguished, namely respondents in Land van Maas en Waal and in Saasveld-Gammelke. In Land van Maas en Waal a pilot has been held with the existing web application to disseminate (geo-) information to the title holders during the public inspection of the re-

allotment plan. In Saasveld-Gammelke the application has neither been used during the public inspection of the re-allotment plan nor in other, previous, phases of the project. Therefore, it has been investigated whether the answers differ significantly between the two groups of respondents. The Pearson test can be used for ordinal data to study whether two characteristics within one sample are correlated (Kuipers, 1996). A Pearson chi-square test has been executed in SPSS to test the independence of the outcome of a question for the sample groups from Land van Maas en Waal or Saasveld-Gammelke. Open ended questions and questions with nominal data have been left out of the comparison. With a two-sided asymptotic significance of the chi-square higher than 0.10 it is safe to say that the differences between the two groups of respondents are due to chance variation, thus, no significant difference does exist between the answers of respondents from Land van Maas en Waal and Saasveld-Gammelke. The Pearson test shows that some characteristics between both groups differ significantly (chi-square < 0.10). This applies for the age category, general internet experience, experience with transactions on the internet and how often they use interactive maps on the internet. Respondents from Saasveld-Gammelke have less experience with internet and transactions on internet than respondents from Land van Maas en Waal. Comparatively, respondents from Saasveld-Gammelke use interactive maps on the internet less often than respondents from Land van Maas en Waal. Respondents from Saasveld-Gammelke are significantly older than the respondents from Land van Maas en Waal. This might be an explanation why this group of respondents has less experience with activities on the internet.

No significant differences have been found between the preferences of both groups, e.g. with respect to map functionality and the submission of (geo-)information through a web service. Although no significant differences exist between the answers of both groups with respect to their preferences, the independency is less strong for certain answers. This accounts e.g. for the question why respondents do not want to use the web service for the submission of (geo-)data. Preference for other ways of data submission, for example by mail or by personal hand over, is relatively more popular among respondents of Saasveld-Gammelke although the difference is not significant. This means that differences in experience with the pilot web application between both groups of respondents does not influence significantly their preferences or intention to submit geo-information through a web service.

5.5 Conclusions and discussion

The use and user requirements have been studied based on a focus group meeting and a user survey. Both studies provide useful insights in the characteristics, tasks and preferences of the primary user groups. It is expected that the described characteristics and tasks cover the array of differences among potential users. Although this will be verified with the review of the existing web application as far as it concerns the exchange of geo-information from committee to title holder. Most respondents have experience with the use of internet in general and with specific applications as well (transactions or use of interactive maps). It may be expected that internet is known to a wide audience, which eases the step to use the proposed web service.

The user survey showed that two different user groups may be distinguished based on their preferences. One group is positive about the introduction of a web service to exchange geo-information, while the other group hesitates and appreciates personal contact. Also, the open questions in the questionnaire provided useful information about required functionality such as for example the possibility to print maps. Given the results of the use and user requirements analysis it is aimed to first develop a prototype that meets the needs of all groups. Over time the application can be specified to tailor to the needs of different user types.

6 Usability review of web application Peize

6.1 Introduction

This chapter centres on the review of an already existing prototype application of a one-way communication web service for two land consolidation projects: Land van Maas en Waal and Peize. This review is part of the requirement analysis stage of the user-centred design approach followed in this thesis research. The review was performed with several test persons. As explained in the methodology chapter 2, the aim of the review is to collect data about the usability of the web service. These data will be used as input for the conceptual design of a web service that enables two-way communication between title holders and committee. As such it is part of the requirements analysis. Although the investigated web application does not contain a possibility to submit geo-data to the committee, the evaluation will be useful in terms of general usability issues in relation to the use of geo-information on the internet in a comparable situation.

Paragraph 6.2 introduces the existing web application that will be reviewed and describes the research plan to do so. The next paragraph presents the results of the review. Some design principles are presented in paragraph 6.4, whereas in the last paragraph conclusions are presented and the overall results are discussed.

6.2 Review of web application

The investigated web application basically provides the same information as is provided during the official period of hearing of the re-allotment plan or the list of financial settlements. As yet, the web application has been operational for two land consolidation projects, namely for 'Land van Maas en Waal' and 'Peize'. Figure 6-1 shows the homepage of the website of 'Peize'. Only during the official period of hearing the website was available online. Title holders could view their personal information regarding the old situation and the new situation in an interactive (map) setting after log in. Functionality included among others panning, scaling, and an information button. The old situation and new situation are presented in two different map windows. Users could also opt to scale both maps simultaneously (Figure 6-2). Apart from the information on the interactive maps, a link to static maps of the old situation and new situation was provided (see Figure 6-3). These static maps in pdf-format allow users to save or print a customised map with one or two mouse clicks. Besides the old and new allotment, general information was provided about the period of hearing, the available data, the determined rules concerning re-allotment, a soil suitability map, a map of re-allotment classes, a parcel map and frequently asked questions. The soil suitability map, the re-allotment classes map and the parcel map were all static maps in pdf-format that could be opened in a separate window.

Title holders had to log in by means of their registry number and subject number, whereby it is possible that multiple subject numbers were related to one registry number because rights can be divided among several persons (every person or company known in the cadastral registries has a unique subject number). Agricultural enterprises can have multiple registry numbers, e.g. in case they are based on a partnership. The property is then spread over different registry numbers, which prevents title holders of getting an overview of the whole enterprise at once. They need to check the properties and rights registry number by registry number. The sitemap shows the structure of the existing web application (Figure 6-4).



Herinrichting Peize

Herinrichtingsproject



De herinrichting Peize is ongeveer 5000 hectare groot en gelegen ten zuidwesten van de stad Groningen. De doelstellingen die middels de herinrichting gerealiseerd moeten worden:

- Landbouw; structuurverbetering
- Natuur; realiseren van EHS
- Veiligheid; realiseren van de waterberging in de Eelder- en Peizermeden

Het gebied is gelegen in de gemeenten Noordenveld en Tynaarlo.

Voor verdere informatie kunt u de site www.herinrichtingpeize.nl raadplegen.

Ontwerp ruilplan



- Regels ontwerp ruilplan (pdf)
- Regeling herverkaveling (pdf)
- Kennisgeving (pdf)
- Algemene bepalingen (pdf)
- Nieuws ontwerp ruilplan
- Ruiklassenkaart (pdf)
- Bodemgeschiktheidskaart (pdf)
- Kavelkaart (pdf)
- Bezoektijden en adressen ter inzage legging

[Bekijk uw toedeling](#)

Over het Kadaster



Het Kadaster heeft een wettelijke taak in landinrichtingsprojecten in het waarborgen van de rechtszekerheid en het adviseren van de landinrichtingscommissie vanuit een onafhankelijke positie. De afdeling Ruimte en Advies van het Kadaster is daarom betrokken bij de uitvoering van 'Herinrichting Peize'.

[Naar de webpagina van het Kadaster](#)

Figure 6-1 Homepage of website 'Peize'

Ter inzage legging Plan van Toedeling via Internet

In onderstaande kaart kunt u uw inbreng en toedeling raadplegen. Met de knoppen die boven de kaart staan kunt u in- en uitzoomen, de kaart verschuiven en u kunt indien gewenst beide kaartschalen aan elkaar gelijk stellen.

OpenStreetMap, Data © CC-BY-SA, Uitzicht

[Inbreng kaartje](#)

[Toedelingskaartje](#)

Klik hier voor een kaartje in .pdf-formaat van uw Inbreng of Toedeling. Op de kaartjes wordt eigendom en geregistreerde pacht getoond.

[Geef je mening](#)

Inbreng

Toedeling

■ Inbreng Rnummer op Eigendom
 ■ Toedeling Rnummer op Eigendom

■ Inbreng Rnummer op Fictief Gebruik
 ■ Toedeling Rnummer op Fictief Gebruik

Kadastrale grens
 Zachte topografie zoals wegen en waterlopen
 Harde topografie zoals gebouwen

Overzicht Rnummer: 1010982 (eigendom)
 Naam Rnummer: BRABERS, R.A.G.M.

Oppervlakte	
Inbreng	32.11.35 ha
Toedeling	32.44.35 ha
Verskil	00.33.00 ha (1,0%)

[Toon alle ingebrachte percelen](#)
[Toon alle toegedeelde kavels](#)

Figure 6-2 Interactive maps to view re-allotment

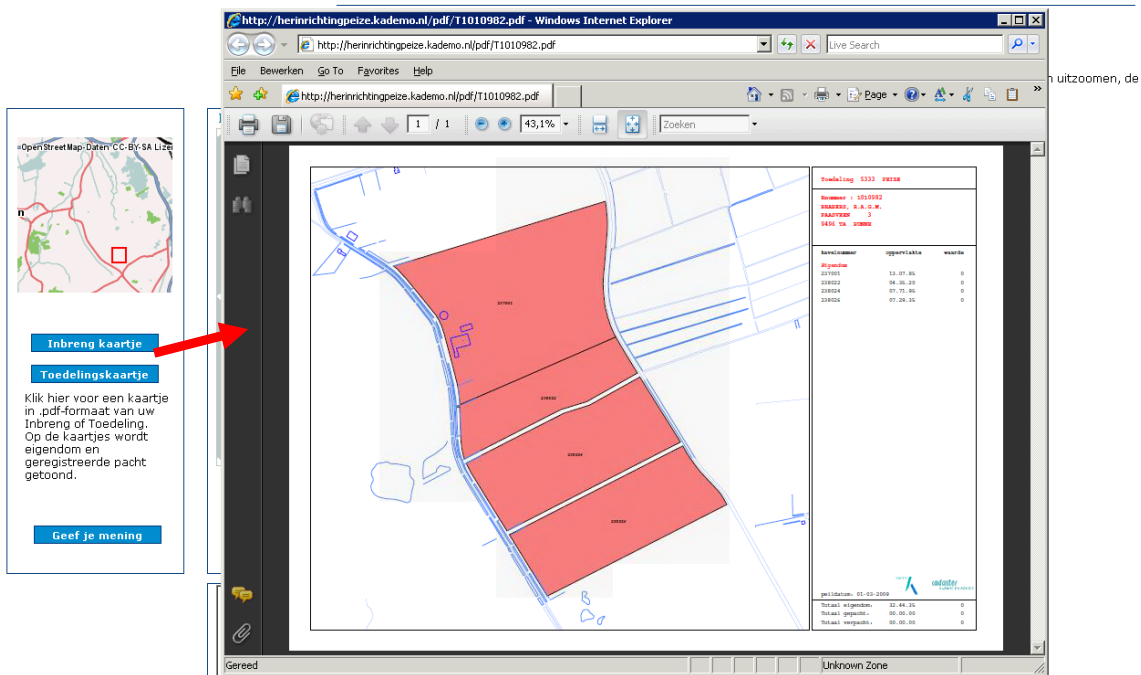


Figure 6-3 Standardised maps in pdf-format

Home
- Land consolidation Peize
- Draft re-allotment plan
- Rules draft re-allotment plan
- Land consolidation regulation
- Acknowledgement
- General terms and conditions
- News about draft re-allotment plan
- Map re-allotment classes
- Map soil suitability
- Parcellation map
- Visiting hours and addresses public inspection
- View your allotment
- Interactive map viewer
- Map old allotment
- Map new allotment
- Give your opinion
- About Kadaster
- Read more
- Webpage Kadaster
- Frequently asked questions
- Give your opinion

Figure 6-4 Sitemap of existing web application of Peize

Aim of the review of the existing one-way communication web application as described above is to test the usability for non-expert users. The collected data will be used for the conceptual design of a web service that enables the exchange of geo-information between title holders and the land consolidation committee (two-way communication). A combination of research techniques (questionnaire, think aloud

method, interview) is used to review the existing web application. In paragraph 2.3.7 was explained why this research strategy has been chosen.

The test took place in the Kadaster office in Arnhem. The website was temporarily accessible for this purpose only. Twelve potential participants from 'Land van Maas and Waal' were contacted by e-mail to ask for co-operation. In the past they had indicated that they would not mind to be contacted for further research regarding the development of the website. Before the start of the test session participants were asked some general questions to capture information about their background. Questions covered the topics gender, age, IT literacy, and previous experience with the web service. This background information is relevant to interpret the test results.

The test consisted of several tasks that had to be executed meanwhile thinking aloud. Afterwards some questions were asked about issues that could not be captured with the think aloud method. This short interview afterwards focussed on (1) any encountered problems during the tests, (2) on general issues (structure and design) of the reviewed web service and (3) on the wishes related to the submission of geo-information. The first part of the sessions, namely the performance of tasks, was video recorded. The tasks are described in detail in Appendix V.

Participants were asked among others to:

- Log in to view the old and new allotment of the given registry number for the use situation.
- To look up information about the location and size of parcels and to compare the total area of land in the old and new situation.
- To look up the (new) neighbours along their parcels in the new allotment.
- To collect information about the re-allotment classes of soil to object to the new allotment.
- To look up general information such as the opening hours of the land consolidation office.
- To download and print a map.

Other questions for the short in-depth interviews after the task execution:

- General:
 - Why did some hesitations/confusions/problems occur during the test (if applicable)?
- Structure website:
 - Is the structure of the website (the site map) logical?
 - Is the information provided at a logical place on the site?
 - Is the lay-out convenient (size screens)?
- Geo-information application:
 - Is the provided functionality sufficient (navigation, zoom, switching on/off layers, information button to view attribute data etc.) or do you need more?
 - Are the buttons and their functions clear and understandable or do you need more 'help'?
 - Is the map 'readable' (use of colours, font size, scale, reference map for orientation)?
- Submitting geo-information:
 - What would be a logical location in the structure of the website to submit geo-information to the committee (homepage or after looking up existing information)?
 - Do you have special requirements in relation to the drawing of geo-information (colour or size of line / point / polygons, functionality such as erase, adapt etc.)?

Before the review sessions were held, a pilot session with two students was organised to practice the research design. This allowed for small adaptations, e.g. in the formulation (mainly terminology) of the tasks. The results of this pilot session are also taken into account in the next paragraph.

6.3 Results

Five persons, including two pilot testers, have reviewed the website at the Kadaster office in Arnhem by means of tasks that were carried out and meanwhile thinking aloud. Some background information of the participants is presented in Table 6-1. The duration of the sessions, including the introduction, ranged from 45 minutes to an hour, whereof the tasks took about 20 to 30 minutes. Participants were thinking aloud without problems during the sessions. The short evaluation of the tasks afterwards provided some useful insights, especially about navigation issues. Also the participants gave some useful suggestions for improving the structure of the website in order to make it easier to find the information they were looking for. All in all it can be concluded that the review of the existing web application with the think aloud method resulted in useful data about the usability.

Table 6-1 Background information of test persons

Question	Answer categories	Number
Age	Not applicable	43, 57, 52, 20, 20
Gender	Male	4
	Female	1
Experience with internet	(Almost) daily	5
	Once per week	0
	Once per month	0
	Hardly	0
Experience with website of 'Land van Maas en Waal'	Multiple visits during period of inspection	1
	One visit during period of inspection	2
	Never visited	2

As literature suggests (Virzi, 1992; Nielsen, 2000) the most obvious use and user problems appeared immediately in the first sessions. After the execution of tasks the test persons were asked some questions about the web service. The results encompass remarks, problems during the test and suggestions of the test persons. Sometimes participants uttered suggestions for improvement already during the tasks. The results are generated through observations of the research leader during the test, through analysing the video recordings afterwards and through questioning the participants afterwards.

The most obvious results of the test sessions with respect to the existing web application are:

- Most test persons skipped reading the text at the login page and went immediately to the fields to fill in the registry number and subject number, or they made comments about the lengthy text.
- Nobody noticed the difference between the situation "ownership" and "actual use". Some people mentioned after the test that it was because they were not aware that they could switch between the two situations. The "actual use" included the registered land lease contracts, whereas the "ownership" only showed the ownership situation. It is possible to switch the map visualisation between the two situations by means of activating one of the two legends. The active legend is highlighted when active. Only one person attempted to switch but clicked on the legend itself instead of the box before. Since nothing happened this attempt failed.
- For most test persons it was not logical that the static maps were available at the homepage. They had to search quite a while to find them or could not find them at all. It was expected to find this information on the pages after login, whether or not in a sort of menu, because it enables one point of access for all available maps (static and interactive). Also it was suggested to include information about the re-allotment classes as a separate layer in the maps. The map itself was also unclear to some, due to the limited legend explanation and the lack of reference points that

disabled people to find their location. A suggestion to include a pdf-icon nearby the link to the static maps on the homepage was made.

- Remarks were made by several test persons about the scroll feature in the box where the administrative data was presented. Some people did not find the two buttons to consult the area of individual parcels due to the fact that they had to scroll down to be able to notice these buttons.
- Several people did not find the information button that allowed for viewing administrative data of the parcels on the map or they found the button later after proceeding with the following tasks. The information button is positioned at the right hand top corner of the map window, a little bit apart from the other map buttons which are positioned at the left hand top corner. Some test persons mentioned that the position is a little bit awkward and easily overlooked due to its position. Instead, some test persons were double clicking on the parcel they wanted to have the information about. Also people searched further on the website and found the administrative data that was presented in a separate box.
- Also other buttons were hardly used, such as the synchronise button or the button to go back to the initial map zoomed to the own situation.
- The overview map was not used by the participants of the test. Only one or two test persons noticed the overview map during the evaluation after the test.
- Both maps showing the old and new situation were clearly interpreted and no serious problems occurred navigating through the maps. Most test persons also indicated after the tasks that the maps were clear regarding the use of colours, offered functionality, size of text, and size of maps.
- The frequently asked questions and general information about the visiting hours of the land consolidation office were easily found by all test persons.
- The general structure of the web service is clear and logic according to most test persons. It was suggested to include breadcrumbs so that the user knows the position within the site structure. Also it could be made clear in the navigation menu on top of the site, e.g. by colour, which pages have been viewed already.

The above mentioned observations are described in a random order. They encompass a diverse array of issues. Some issues are related to the structure of the web service, whereas others relate to navigation, design or position of elements in the frame. Some of the encountered problems at the subpage with the interactive maps are visually presented in Figure 6-5.

The review also included a short structured interview of the test persons about the possibility to extend the web service with the prospect to hand in information to the committee. Most respondents answered that a logical place to do so would be either after login, e.g. through a menu that gives the possibility, or to add another box on the homepage that enters a subpage to submit the (geo-)information.

The required functionality to submit (geo-)information was inquired too. To support the submission of wishes it is desirable to have the possibility to select a parcel and to post a text message, e.g. to give a reason for the selected parcel that is requested in the new allotment. Furthermore, it is desired to draw polygons or to split parcels. It was mentioned that it would be nice to have the initial, current situation as reference map in a separate window while displaying the wishes. Also, one test person indicated that it would be nice to know how often a parcel has been wished by other people (identity not of importance). The frequency of wishes for a certain parcel allows for strategic wishes, e.g. to wish a less popular parcel so that it increases the chance to get the parcel assigned to them in the new re-allotment. One test person indicated that it should be possible to range the wished parcel by adding a score to them (from most desired to least desired). When submitting the data it would be convenient to have a print or save button to print respectively save the submitted data.

As appears from the test results, some are related to the functionality of the website whereas other items correlate to the structure, design or navigation of the website. By means of the described tasks participants were triggered to search for some information such as the administrative data of parcels. However, if they would not have had tasks to execute, it is doubted whether they would have found some information. Without the tasks they would not have known that the information was available. Thus they would not have been eager to search for the information if it was not obvious that the information was present. This aspect should be taken into account in the conceptual design of the new web service. The problem can be overcome if an element is included that refers to the available information.

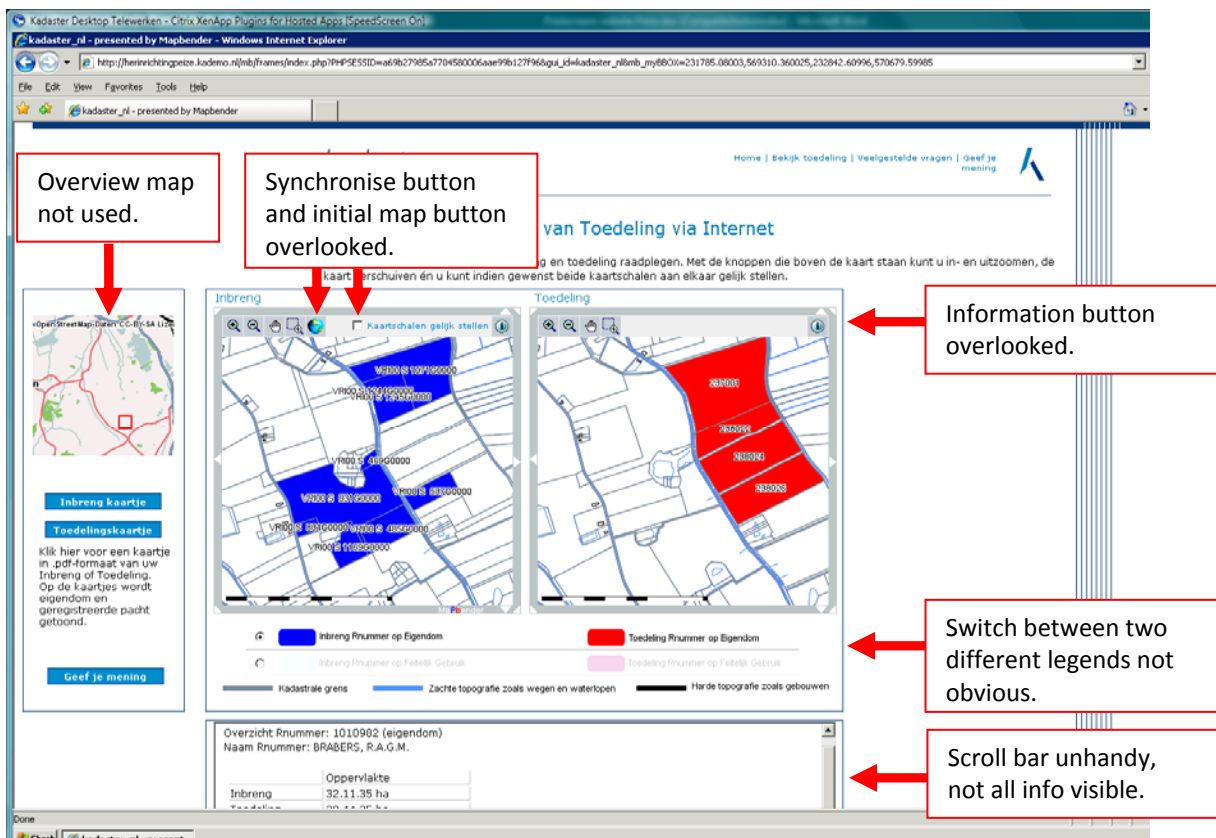


Figure 6-5 Review of website – location of problems

6.4 Design principles

Aim of the review of the existing web application was to collect data that can be used for the conceptual design of a new web service that enables the exchange of geo-information between title holders and the land consolidation committee. The results as described in the previous paragraph are used to formulate design principles for the conceptual design. The list of design principles is not complete since it only includes issues that appeared from the review of the existing web application.

The design principles for the two-way communication web service can be grouped into different subjects, e.g. topics that include design, site structure and navigation, functionality and the submission of geo-information issues.

Design principles:

- Reposition the information button. All functionality buttons should be located next to each other.
- Redesign the button that enables the user to go back to the initial map, which is the situation fully zoomed in to that registry number.

- Redesign and reposition the legend (actual use / ownership situation) and add a legend item for the cadastral parcel layer and other map layers that are included.
- The overview map may be removed in case space on the page is too limited.
- Users of the web service do not know what information is available and where on the site they can find it. If it is not obvious what information is available on the website, people will not search for it. Therefore the design of the website must encompass some sort of clue that guides the users towards the information available.

Functionality principles:

- Include other layers (re-allotment classes and/or soil suitability) in the map that can be switched on or off.
- Include a button to save or print the submitted data.
- Include functionality to draw polygons.
- Include functionality to split parcels.
- Include functionality to select parcels.
- Include functionality to post a text message at a certain location, e.g. linked to the drawn polygon or selected parcel.
- The functionality of synchronising maps may be removed because few users actually use it. Another option is to synchronise both maps automatically without interference of the user.

Site structure principles:

- Users should only have to login once regardless of their navigation through the web service, unless they close all windows or logout.
- On the interactive map, include a link page to the static maps (pdf format) and other general information that is also provided on the homepage.
- Extend the menu at the top of the page and allow for showing the current location on the site.

Submission of geo-information principles:

- Make a pre-structured form for people who would like to hand in an objection. Some fields can be pre-filled with known data, e.g. registry number, date, or name. Other fields can provide a scroll down menu with e.g. subject of objection, parcel numbers or names related to that registry number.
- It is recommended to include a wizard that guides the user through the process of submitting data. This is mostly needed for the submission of wishes, especially if people are asked to submit three alternatives.

The above design principles will be taken into account in the conceptual design for the web service that enables the exchange of geo-information (see Chapter 8).

6.5 Conclusions and discussion

The results of the review of the existing web application are very useful for the conceptual design of the new web service. The collected data can be used to improve the existing web service and to extend the web application with the possibility to submit geo-information.

However, the participants of the test are probably not a representative sample of the population. It is expected that the people who participated do have a positive attitude towards the introduction of a web service that enables the exchange of geo-information between title holders and the land consolidation committee. These so-called early-adopters of new services are likely to navigate with more ease through the prototype and are more tenacious than people with a less positive attitude. Also the rate of

experience affects the results. All participants indicated that they use internet on a daily basis. Because they have already a lot of experience with internet, it is expected that, as a consequence, they are more confident to try new web-based services.

Although most obvious problems in terms of usability are revealed by the review of the web service, it is not clear how many people will encounter the same problems. The variety in the use of the web service is high. It seemed that each test person had a different way of browsing through the site while performing the tasks. Some problems were experienced by more than one test person, although almost half of the number of test persons did not experience that same problem at all because they found another way to look up the information. The size of parcels, for example, could be found on the interactive maps, in the statistics provided below these interactive maps or on the maps that were provided for printing. It appeared that some people easily find a 'work around' method if they encounter problems, or that they do not encounter a certain problem at all because they look up the information differently. Therefore, it is not known which rate of the total population would encounter similar problems in usability. That makes it difficult to draw up design principles as has been done in paragraph 6.4, let alone to prioritise the design principles.

7 Technical feasibility

7.1 Introduction

The research results of the government requirements, the use and user requirements and the review of the existing web application, as described in chapter 4, 5 and 6 respectively, prove that there are sufficient possibilities to exchange geo-information between title holders and the land consolidation committee in a land consolidation project. Therefore, a short technical feasibility analysis will be carried out to study the technical requirements for the exchange of geo-information. The focus lies on the processing of submitted geo-data for the development of the re-allotment plan (paragraphs 7.2 and 7.3) and on security issues related to the submission of geo-data through the internet (paragraph 7.4). The submission of geo-information by title holders in order to develop the re-allotment plan gets special attention, because (1) the development of a re-allotment plan is the fundamental process of land consolidation and (2) because this phase requires special software (Transfer). The submitted information through the web service should be compatible with Transfer. This accounts less for other submitted geo-information, such as polluted parcels or land lease contracts, because these are not processed in Transfer. Given the current state of the art regarding web services no special technical requirements are expected on top of the regular available solutions. Therefore, these issues are not discussed in this chapter.

7.2 Submission of geo-information

The requirements analyses in the previous chapters showed that title holders can submit geo-information to the committee at several stages during a land consolidation project (Figure 7-1). First they hand in land lease contracts, if applicable and if they want to have them taken into account in the re-allotment. Both parties (lessor and lessee) have to agree about registration. Shortly after the registration of land lease contracts title holders can express their wishes, offer old Dutch rights and easements for registration and report polluted parcels. Polluted parcels are not eligible for re-allotment. That is the reason why the committee wants to have this information prior to the development of the re-allotment plan. Furthermore, some old Dutch rights and easements are not registered by the Kadaster. Therefore, title holders have the possibility to register these if they want to have them taken into account in the land consolidation project. The most evident geo-information that title holders provide are their wishes. In addition, this is the part that affects the largest number of title holders, contrary to the other previously mentioned aspects (easements, old Dutch rights, polluted parcels, land lease contracts) that are not applicable for the majority.

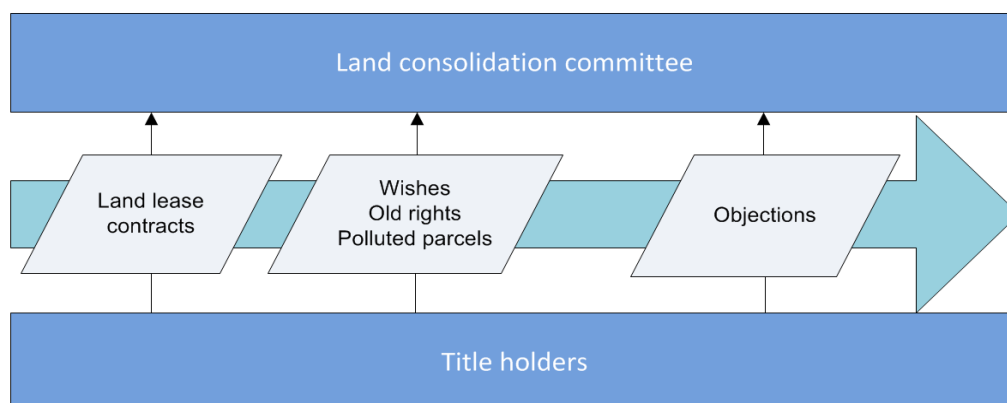


Figure 7-1 Submission of geo-information from title holders to committee

Since all data mentioned have a strong geographic character, it is logical to use a map to get the information across from title holder to committee. The web-based application should enable users to exchange (submit and view) data by means of interactive maps. Part of the submitted data is used for further processing of the re-allotment plan by the existing software Transfer. Therefore, it is important to study whether the delivered geo-information can be used in Transfer. At first, the wishes are the primary target. The reason is twofold. It is expected that this information accounts for the largest amount of information that will be delivered by title holders and, secondly, the expressed wishes are input for the re-allotment plan and are thus used for further processing in Transfer. The number of land lease contracts, old rights and easements and polluted parcels that are offered for registration will be limited compared to the number of wishes, while objections as such are not directly input for further data-processing. Therefore, it is expected that the possibility for automated processing of wishes most enhances an effective and efficient work process. The next paragraph will describe the technical feasibility of (automated) data processing of the wishes with the software Transfer that is used, and has been used for some years now, in land consolidation projects for the development of the re-allotment plan.

7.3 Requirements of Transfer software

The software programme Transfer is used to explore the possibilities for a new re-allotment based on an algorithm that transfers land from one subarea to another subarea. A land consolidation area is divided into subareas based on non-changeable boundaries such as topography of roads and waterways. The programme points out subareas in which there is a higher demand for land than is supplied - and the other way around - in the quest for a better allocation for agricultural businesses. Also, it looks for solutions to level out demand and supply whereby it optimises the solutions in order to create a better allocation to agricultural enterprises.

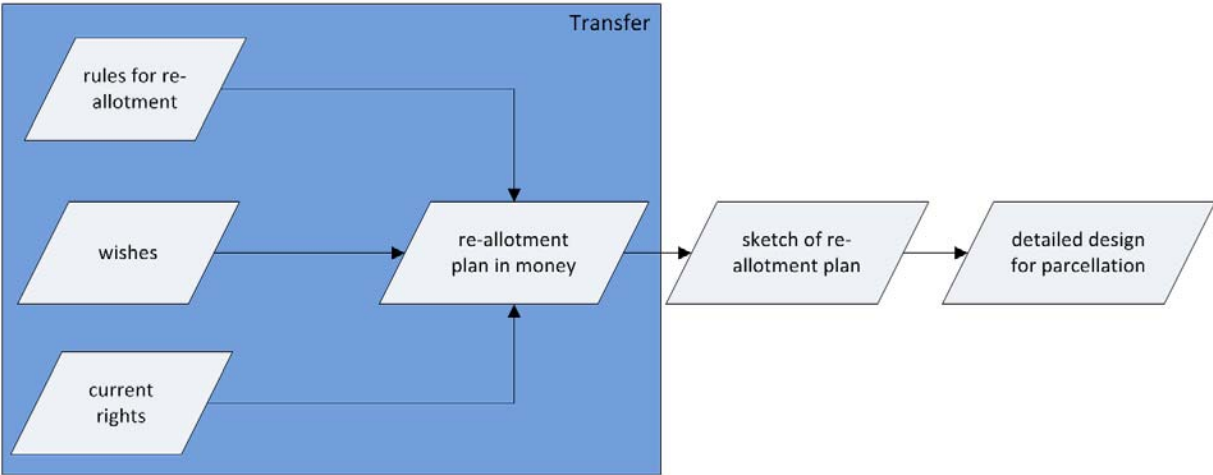


Figure 7-2 Business process with software Transfer

The current business process where Transfer is used is pointed out in Figure 7-2. The re-allotment plan in money analyses the possibilities for a new re-allotment at the level of subareas. This plan in money is not a detailed plan at parcel level, but a more general plan that allocates the parcels or part of the parcels in a certain subarea. So the plan is drawn at the level of subareas and indicates which subareas have a higher demand than supply and vice versa.

The re-allotment plan in money is based on the rules set for re-allotment, the rights in the current situation and the wishes. Wishes can be submitted in Transfer based on the existing cadastral parcels, the

area (ha), and the value (%) of the parcels. Usually, each agricultural enterprise is asked for three wishes regarding the new allotment. See the example below as an illustration of some possible wishes:

- First wish: all land near the agricultural buildings.
- Second wish: enlarge the parcel with agricultural buildings and cluster all other parcels at one location.
- Third wish: keep the parcel with agricultural buildings the same and cluster all other parcels as much as possible at, at maximum, two different locations.

It is also possible to fill in an additional wish if, for example, a title holder does not want a certain parcel to be allocated in their new allotment. These additional wishes are not taken into account by Transfer, but are used by the employee to check the re-allotment plan.

The wishes of each individual enterprise are structured in alternatives for the new allotment. These alternatives are processed in Transfer manually by an employee of the Kadaster. Employees can opt to process the wishes into alternatives by means of manipulating geodata on a map or by manipulating the administrative data or a combination of both. It includes for example the following functionality:

- Parcels that will not be changed can be fixed so that they are kept out of the levelling process. This applies, for example, to parcels that contain (agricultural) buildings.
- It is possible to drag in a map window the current parcels to the desired subarea based on the wishes of the title holder.
- To mutate administratively the current subarea where parcels are located into the desired subarea.
- To give a minimum or maximum size or value of parcels in the new allotment. Based on this information, the software can allocate a combination of (part of) parcels to a certain subarea.
- To combine two or more registry numbers if title holders desire to cast their wishes together.

The processing of wishes into alternatives is laborious because points of view of title holders need to be translated into suitable input for Transfer. Currently it is not possible to automatically import these data in Transfer. The plan in money is used to make a sketch of a re-allotment plan in cadastral software (LIN). The sketch in turn is further detailed in a parcellation design in LIN software, which is the final draft re-allotment plan that will be presented to the public.

The web service should provide title holders with the possibility to make up their own alternatives and submit these to the committee. Also they can give priority to certain alternatives over others, e.g. alternative 1 is the most desired allotment, alternative 2 the second most desired etc. The submitted data can be used for further processing by Transfer to make a re-allotment plan in money in order to analyse possible allotment solutions. As yet, this is not possible.

Basically two solutions for a more automated processing of wishes are possible. One is to design the web service in such a way that it is possible to use the submitted data in Transfer without major software adaptations. This requires that users submit, if applicable:

- one, two or three desired alternatives;
- prioritise these alternatives;
- parcels that will not be taken into account in the re-allotment (fixed parcels);
- the registry numbers that are related to the wishes.

If people do want nothing to change, they can submit this as an alternative. Another possibility would be to submit nothing, which indicates that they do not want to change the current situation.

Another option to enhance a more automated processing of wishes lies in the adaptation of the software Transfer. Transfer works with an algorithm that levels out supply and demand on the level of subareas. The wishes can be submitted at parcel level, being much more detailed. Technically that is no problem, because the software can determine the centre of a polygon and therefore locate it in the right subarea.

However, it is strange to generalise the submitted data first, before detailing it again. The software is currently not tailored to take advantage of a more detailed input. Merging and splitting parcels by users of the web service is of no use if, for example, the location of boundaries is not taken into account in Transfer. Either the software has to be adapted, which is a major mutation, or the users can be asked to submit more general wishes. The adaptation of the software should focus on the development of a more automated process of making the sketch of the re-allotment plan in Transfer, which is currently done in LIN software. Based on the submitted wishes Transfer first makes a 'plan in money', and after that uses the submitted data again to detail the plan automatically into a sketch of a re-allotment plan. However, at this moment this scenario is not yet possible. The programming of Transfer must be adapted if one wants to make a sketch of a re-allotment plan in Transfer.

Whatever decision will be made, it should be a mutually acceptable solution. Both title holders and committee need to be able to work with it. With the currently available information it is best to opt for the scenario where title holders deliver three alternative wishes regarding the new allotment. These can be used in Transfer without essentially altering the software. However, this option might be more demanding for the user although this can be compensated in a simple design of the proposed web application. Chapter 8 discusses the conceptual design in detail.

7.4 Security

Besides the interoperability of the web service with existing software, the security of the exchange of geo-information is of importance as was also pointed out by the user survey. Security and authentication are one of the biggest concerns of stakeholders with respect to web services (Endeshaw, 2003). This is especially true for web services that enable clients, in our case title holders, to submit (geo-) information. Security issues exist where a secure infrastructure for the transmission of personal information is absent. It can, for example, facilitate identity theft allowing others to impersonate people in their electronic transactions with agencies (McDonagh, 2002).

Legislation determines that security measures should be of state of the art standards. This also applies for the proposed web service, whereby variation in the level of security may occur depending on the type of data and the use context (e.g. viewing information or submitting information). Table 7-1 gives an overview of the proposed security levels in case title holders submit geo-information to the committee via the web service. The proposed security level is based on privacy issues, the publicity of information and the legal status of the delivered information. For example, objections require a high security level because they have a formal status as described in the General Administrative Law Act. Based on the same act, the land consolidation committee might even refuse the electronically submitted objection in case the message is not sent reliable or confidentially. The same applies for the submission of wishes regarding the new allotment. These wishes are actually the basis for the new re-allotment. It is one of the important means that title holders have, together with the possibility to hand in objections, to influence the process. Therefore, it must be certain who submits the objection. Identity theft or misuse can not be allowed whether it is an objection or wish for the new allotment that is submitted.

Security levels can be less rigid for the registration of land lease contracts, of old rights and easements. Land lease contracts are checked by the land consolidation committee because both involved parties have to agree on the inclusion of the contract in the re-allotment plan. For the registration of polluted parcels it can be desirable to have no security measure at all, in order to have no threshold for people who want to report pollution. A possible unwanted side effect may be that people misuse this possibility and publish false information about pollution on parcels. As a consequence the reputation of the owner or users of the parcel may be harmed. Although this risk is present, it is not expected that it will often occur. Several measures can be taken in case false messages are suspected. The land consolidation committee has to investigate whether mentioned polluted parcels are actually polluted or not. The outcome of this

investigation can be published on the web service as well. All people can verify consequently whether the original published message was righty or not. Also, title holders can react on the posted message on the web service by posting their own message.

Information about land lease contracts, old rights and easements and polluted parcels will become public as part of the re-allotment plan that will be published when the province decides on it. That said respondents of the user survey found security aspects such as data storage, data transmission and privacy (very) important in case of submission of data to the committee. The security measures taken should be made clear to the user. Title holders will not use the web service if they think it is not safe. Therefore, security measures should be clearly communicated to the title holders to enhance their trust in the application and consequently increase the actual use of the web service.

One of the measures to enhance security is a login. It is desirable to choose for an authentication system that is used by government organisations such as DigiD or the system that the Ministry of Agriculture, Nature and Food Quality uses for the yearly agricultural census survey. DigiD is an appropriate method for e-authentication given the private nature of the data and it complies with the legislative conditions as determined by the General Administrative Law Act (see paragraph 4.5). The use of DigiD has advantages for the users as well as they only have to remember their DigiD and not another set of username and password combination. However, in a land consolidation project both persons and non-persons are involved. Only persons can use DigiD for electronic identity authentication. Non-persons include, for example, agricultural farms, non-profit organisations, and enterprises. As of 1 January 2011 DigiD for enterprises will stop to exist. A structural solution for enterprises will be available mid 2010 (URL 11). This e-recognition system is based on the registry of enterprises of the Dutch Chamber of Commerce. A problem that might arise is that different types of collaboration exist among farmers, which are not always in line with the registration of the chamber of commerce. It could be that not all situations are covered to provide a log in code based on the new system. An appropriate solution is needed to meet the requirements for e-government services as laid down in legislation.

Table 7-1 Security level in case of submission of data

	Security level	Security measure
Land lease contracts	Low	Log in
Wishes	High	Secure log in
Old rights & easements	Low	Log in
Pollution	Low	None
Objections	High	Log in

7.5 Conclusions and discussion

Software requirements and security aspects have been discussed in this chapter. Both topics are of importance for the technical feasibility and implementation of a web service. It showed that two different strategies are feasible to make a future web service and Transfer compatible with each other. Either Transfer could be adapted or the user is asked to deliver the information in a certain format and structure. Both options have advantages and disadvantages. It is preferred to ask users to deliver the (geo-)information in three alternative wishes, so that the adaptations to Transfer will be limited to a minimum. Findings from the review of the existing web application and the user survey did not indicate that users would not be capable to submit the information in such a way.

Security standards for the proposed web service should be according to the current state of the art. This accounts for viewing the information as well as for submitting information. Users should log in to view the

information of the (draft) re-allotment plan or (draft) list of financial settlements. The level of security can vary with the type of information that is submitted. No login is required for submitting information about possibly polluted parcels, whereas for submitting wishes through the new web service would require the highest security level, because the information is very important in the land consolidation process and has a private character. From the user point of view it is doubted whether they feel the need to distinguish between different security levels. The user survey showed that security is considered very important by the users. Whatever security measures will be taken, these measures should always be clearly communicated to the user. This will enhance the user's trust in the application and, in turn, will enhance a positive intention to use the web service for consulting and submitting data.

Of course, special attention should be paid to the design of the new web application to support users as much as possible in submitting geo-information to the land consolidation committee. This is one aspect that should be taken into account in the conceptual design. A more detailed description of the proposed conceptual design of the new web service is presented in the next chapter.

8 Conceptual design of the new web service

8.1 Introduction

In the previous chapters elements of the user centred design process were discussed as well as a technical feasibility study. The gathered information is put together in a conceptual design of the web service enabling exchange of geo-information. This chapter first starts with an overview of important aspects related to the information architecture and navigation (paragraph 8.2). The conceptual design of a web service that enables the exchange of geo-information between title holders and land consolidation committee is described in paragraph 8.3. This initial conceptual design is among others based on the outcome of the focus group session (chapter 5), user survey (chapter 5), and the review of the one-way communication web application (chapter 6). The conceptual design is tailored to two phases in a land consolidation project, namely (1) the preparation of the re-allotment plan and (2) the public inspection of the re-allotment plan. Limitations of the conceptual design are discussed in paragraph 8.4, while the conclusions and discussion are presented in the last paragraph of this chapter.

8.2 Information architecture and navigation aspects

A solid information architecture is the basis of a functional and well-designed web service. The information architecture includes structure and navigation issues of the web service. Structure and navigation must support each other in order to let users find what they need (Nielsen, 2009). Nielsen (2009) made a top 10 of mistakes regarding the information architecture of a site. The top 10 consists of the following items:

Structure mistakes

- no structure;
- search functionality not integrated with the structure of the site;
- missing category landing pages;
- extreme polyhierarchy;
- subsites / microsites poorly integrated with main site;

Navigation mistakes

- invisible navigation options;
- uncontrollable navigation elements;
- inconsistent navigation;
- too many different navigation techniques;
- made-up menu options.

The items from the list which are useful for the context of this research will be discussed here. First, it is very important to have a clear organising principle that structures the website. This enables people to understand where to search for information. Furthermore, Nielsen recommends that sites have a series of categories that each link to their own landing page that gives users a section overview. An overview page can clarify the scope of the site and provide important information about details, products and services. Category pages are also important because they help people to search for a product, service or information. Although this increases the number of site pages, the advantages outweigh this disadvantage. Breadcrumbs are in this case a simple means to help users to navigate through site levels. In line with this it is highly recommended that subsites are integrated with the main site.

With respect to navigation Nielsen (2009) outlines that navigation should permanently be visible on the page. Any feature that users can not see might as well not exist; invisible navigation is thus nearly as bad as no navigation. Additionally, navigation must be consistent. Global navigation serves as a beacon that helps users understand both where they are and how they can easily manoeuvre back to the top of the

site if they lose their way. It is best to choose for one or two navigation techniques. Furthermore, it should be avoided that navigation looks like (advertisement) banners, or that it is located near banners, as people tend to develop certain banner blindness which makes users to screen it out. Also, navigation elements should not move or bounce as this distracts the user from their problem where to go. In summary, care should be taken to reduce navigation to a minimum and make navigation that is left visible, clear and natural.

Besides structure and navigation, the user interface design is also of importance. Nielsen (1994) has developed ten usability heuristics or rules of thumb for user interface design:

- *Visibility of system status*
The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
- *Match between system and the real world*
The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Real-world conventions should be followed, making information appear in a natural and logical order.
- *User control and freedom*
Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Undo and redo should be supported.
- *Consistency and standards*
Users should not have to wonder whether different words, situations, or actions mean the same thing. Platform conventions should be followed.
- *Error prevention*
Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
- *Recognition rather than recall*
Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
- *Flexibility and efficiency of use*
Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Users should be allowed to tailor frequent actions.
- *Aesthetic and minimalist design*
Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
- *Help users recognize, diagnose, and recover from errors*
Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
- *Help and documentation*
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search for, focused on the user's task, list concrete steps to be carried out, and not be too large.

The ten usability heuristics are a good basis for the development of the conceptual design. Some of the items also appeared from the review of the existing web application that disseminates geo-information to title holders. For instance, whilst executing the tasks some users clicked by mistake on items and needed functionality to get it undone.

8.3 Conceptual design

As mentioned in chapter 7 (Figure 7-1) the submission of geo-information may take place at several stages during the project. A conceptual design is developed here for the preparation phase of the re-allotment plan (paragraph 8.3.1) and the public inspection period of the re-allotment plan (paragraph 8.3.2). The list of financial settlements is not included because the conceptual design will be very similar to that of public inspection of the re-allotment plan. Only the content of the documents such as map layers will be different. Therefore, it has been decided not to elaborate on a conceptual design of the list of financial settlements separately.

8.3.1 Preparation re-allotment plan

In this phase of a project the land consolidation committee prepares the making of the re-allotment plan. To do so, they need geo-information both from the cadastral registries and from the title holders. Information needed from title holders includes, for example, their wishes regarding the new situation and land lease contracts they want to have taken into account. The conceptual design is based on the existing web application that has been reviewed. Figure 8-1 shows the proposed sitemap of the web service during the preparation phase of the re-allotment plan. The sitemap of the web service is very similar to the existing web application. The review of the current web service pointed out that test persons did not look on the website of the land consolidation project to search for information. Since most land consolidation projects do not have a website, it has been decided to replace the item on the homepage by other items relevant for the preparation of the re-allotment plan. The same applies for the Kadaster item on the existing web application. Another reason to do so is to keep the homepage clear and minimalistic. An overload of information may distract users as Nielsen (1994) points out in his ten usability heuristics. So both subpages that referred to the website of the project Peize and to the website of Kadaster respectively have been replaced by subpages that enable title holders to submit their wishes for re-allotment and to submit land lease contracts (Figure 8-1 and Figure 8-2). For the same reasons it has been decided not to include a separate frame on the homepage to inform the committee about possibly polluted parcels.

The registration of land lease contracts will not be relevant for everyone, since not everyone has a land lease contract. Because it is expected that the submission of wishes will be used more frequently than the submission of land lease contracts, the item is placed centrally on the homepage. Both subpages consist of interactive maps that allow users to point out the wishes or land lease contracts geographically. Furthermore, it gives users the possibility to comment.

General information is placed on a subpage. This provides users with background information about:

- members of the land consolidation committee and their advisors from Kadaster and Government Service for Land and Water Management;
- how they can submit wishes, e.g. through the web service or with help from employees of Kadaster;
- general guidelines for wishes, e.g. it is not realistic to wish a parcel from the neighbour that has the farm located on it;
- visiting hours and address(es) of the office(s).

The list may be extended if the need is felt to do so. For example, including an overview of all steps in a land consolidation project could enhance a better understanding of the process of a project. It will be up to the land consolidation committee to decide which information is included.

- Home

 - General information
 - About land consolidation committee
 - About submission of wishes
 - General guidelines for wishes
 - Visiting hours and address of submission wishes
 - Submit wishes for re-allotment
 - Interactive map viewer
 - General guidelines for wishes
 - Manual to submit wishes
 - Example of wish
 - Submit land lease contract
 - Interactive map viewer
 - General guidelines for land lease contracts
 - Manual to submit land lease contracts
 - Example of land lease contract
 - Frequently asked questions
 - Give your opinion

Figure 8-1 Proposed sitemap for preparatory phase of re-allotment plan

Also, on the homepage and all other pages a link to the frequently asked questions and a questionnaire is placed. These links are located at the right hand top corner of the homepage. The review of the existing web application showed that the test persons had no problem to find the frequently asked questions. The only change that will be made is to give the link a different colour once it has been used. Figure 8-2 shows the conceptual design of the homepage during the preparation of the re-allotment plan. It is a draft design to point out the elements that should be included and their position on the page. Space is provided to include some pictures that refer to the topic of the frame. All links on the page have the same font colour which corresponds with the colour of the buttons. This improves consistency and thus enhances usability (Nielsen, 1994). It is similar to the homepage of the existing web application, except for the titles of the frames which had the same colour but were not linked to other content.

The subpages that provide general information are not discussed separately. Aim is to have a subpage in line with the overall design that provides users with the information, whereby each link navigates to a separate subpage. It is more interesting to discuss here how users are going to submit information to the land consolidation committee, since this topic is not yet covered in the existing web application that only disseminates geo-information. Similar to viewing information users have to login for security reasons to submit information. The login page will be similar to the existing one except that the amount of text is limited. The review of the existing web application showed that the text was not read by the test users, which is in line with literature (Nielsen, 2005).

After login users will arrive at the subpage that provides relevant geo-information by means of interactive maps and accompanying attribute data. Designing maps for the internet is different than regular paper maps because web-mapping has a highly interactive character (see also Chapter 3). In this research we deal with dynamic maps. Users can adjust the presentation of the map and moreover they make their own map when submitting wishes or land lease contracts. The map design should be tailored to the users needs as discussed in previous chapters. That involves among others that symbolisation tools are provided making it possible for users to make maps based on their own data and to use the maps to explore datasets (Van den Worm, 2001).



Figure 8-2 Homepage during preparation re-allotment plan

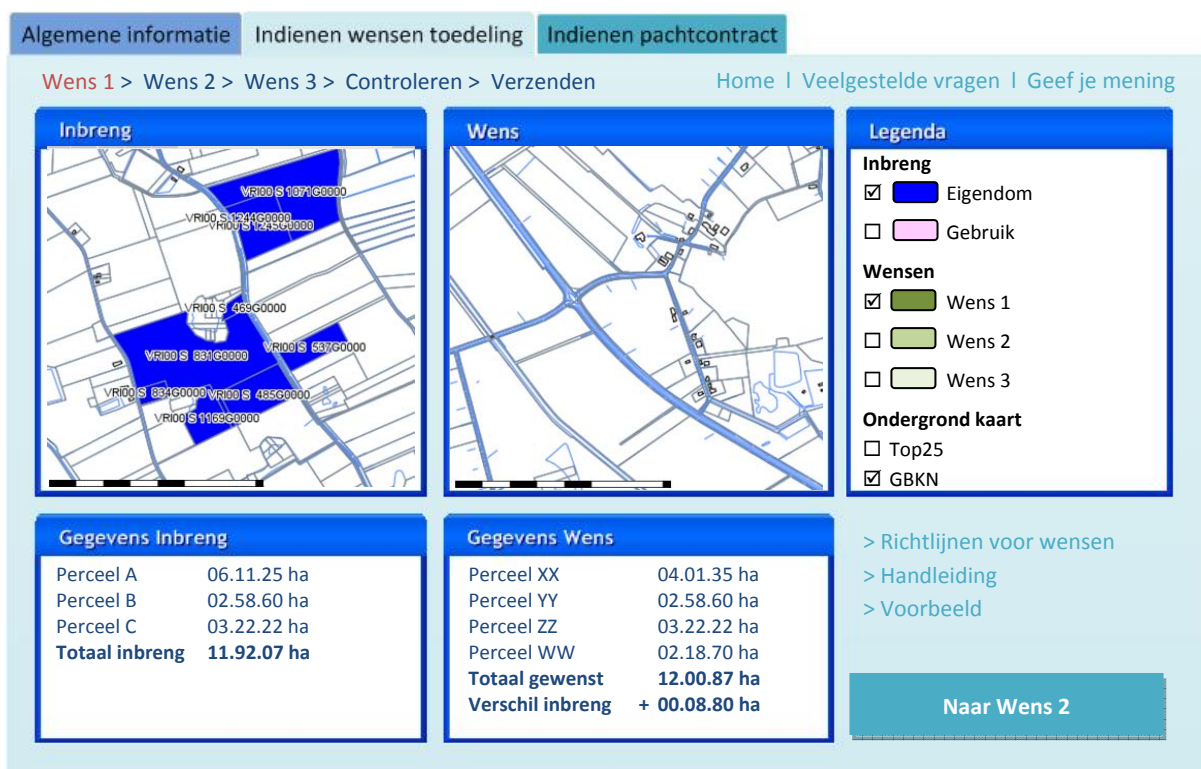


Figure 8-3 Subpage to submit wishes

The subpage to submit wishes (Figure 8-3) has clear tabs on top of the page to integrate the subjects on the homepage and to allow for a fast switch between subjects if the user desires to do so. It is expected that the presence of tabs substitutes the need for breadcrumbs to support navigation through the web service. This is only possible when the structure of the web service is simple. If the web service would be extended, the use of breadcrumbs needs to be reconsidered.

On the left side of the page the current situation is shown with a map as well as with an overview of administrative data. These data can be viewed, but not manipulated. Next to these two frames a map is included that allows the users to express their wishes, or, in other words, to make their own map. The current situation stays on the screen to give users the possibility to compare their wishes continuously with the current situation. This is in line with the 'recognition rather than recall' usability heuristic of Nielsen (1994). The legend on the right hand side shows the layers in both map frames. Users have the possibility to switch layers on or off, but cannot change the colours, so as to keep the web service as simple as possible. It has been decided to give users a choice between the large scale base map of the Netherlands as reference layer or the topographic map at scale 1:25.000. When users zoom in the scale of the topographic map will change accordingly, for example, from 1:25.000 to 1:10.000. Ditto, the representation of the large scale base map of the Netherlands may change when users zoom out to a smaller map scale. In order to keep the map interpretable it is advisable to generalise the presentation. The user survey showed that most people prefer a regular topographic map as reference layer. However, test persons of the review of the existing web application did not indicate that the large scale base map of the Netherlands, used in the existing web application, was not clear. Given the purpose of the map, users should be able to check the current cadastral situation which requires a certain accuracy level. Accuracy is of less importance for the submission of wishes since it is an indication how people would like to have the new allotment. It is expected that users will select mostly existing parcels and make less use of the possibility to split existing parcels. Also from a business perspective high positional accuracy is not required for the submission of wishes, because the used software Transfer will first generalise the submitted wishes to locate them in pre-defined subareas. This is done based on the centre of gravity of a polygon (wished parcel).

To submit wishes users have several tools at their disposal. The focus group provided quite an extensive list of tasks that users need to be able to perform. A large number of tasks has to be performed by means of the tools provided. However, it is tried to keep the number of tools as limited as possible, both to keep it simple for the users and for the maintenance of the web service. Therefore, some tasks have been integrated in one tool.

Besides the regular tools for viewing the data, such as zoom in button, zoom out button, home button and pan button, there are special tools for submitting data. A select button to select parcels and a button to split parcels are provided. The select button can be used to select a wished parcel (click on an unselected parcel) or to unselect a parcel (click on a selected parcel). Simultaneously, the colour of the parcel in the map will change to indicate whether the parcel is desired in the new allotment or not. The tool to split a parcel is based on a line that the user draws, meanwhile splitting the parcel. It is proposed to use the same tool as is used in the pilot of the preliminary boundaries project of the Kadaster.











The design of these buttons is important. Ideally the user should be able to associate the symbol with a real world feature making the symbol self-explanatory (Van den Worm, 2001; Nielsen, 1994). Table 8-1 shows the proposed symbolisation of the buttons / tools. The symbols have been chosen based on the association with the real world phenomenon and expected acquaintance with the users. Regularly used symbols such as print, save, and undo stick to the well-known examples. This benefits users that have some experience with computers. Symbols used for map navigation, such as zooming, panning, selecting and requesting information, have been chosen for the same reason. A 'de facto' standard for navigation symbols will benefit users that have experience with web-based maps. A few new symbols will be introduced as well. The tool to split parcels is only used in a pilot from the Kadaster. It is not expected that any title holder will have experience with such functionality. Therefore, a strong association with the functionality the tool represents is very important. A pair of scissors reflects the possibility to cut one parcel into two pieces. The user can draw a line along which the existing parcel will be split. Application of

the function will create two separate parcels and the new area of both parcels is calculated and shown to the user.

Furthermore, the design of the button to get back to the initial map representation has been changed. The review of the existing web application showed that nobody was triggered to use the button. Apparently the user either did not need the functionality or the association with its functionality was not clear enough. Therefore, the design has been changed in a building silhouette. The design represents the map view that shows the location of all owned or used parcels by the title holder.

The symbols on the left hand side of Table 8-1 will mainly be needed for viewing the data, while the symbols on the right hand side of the table will mainly be used when users submit geo-information to the committee. The buttons will be located in the heading of the map frame(s) as was the case in the existing web application. Due to the limited size of Figure 8-3 they have not been included. The symbols would be illegible. Of course it should be checked when a prototype of the web service will be build if the conceptual design as discussed in this chapter will fit the standards with respect to font size, symbol size, frame size in relation to the amount of data that has to be presented. Based on the existing web application, it is expected that this will not lead to major problems. The map frames held four to six symbols and the test persons in the review did not mention any problems with respect to readability.

Table 8-1 Symbolisation of tools

Button	Explanation	Button	Explanation
	Zoom in		Print
	Zoom out		Save
	Pan		Undo
	View information		Split parcel on defined line
	Initial map view		Select parcel

Users are guided through the process of submitting wishes. It is expected that users in general do have little experience with the subject of land consolidation and the submission of geo-information. Therefore, help items are included in the web service. These include links to:

- guidelines for wishes;
- manual how to submit wishes;
- an example, which can be an animation or a picture with comments that help the users.

As mentioned before, for consistency purposes links do have the same colour as at other locations on the web service.

Besides these help items, users are guided through the process by means of breadcrumbs that clearly indicate what will happen next if they press the button at the bottom right hand corner of the subpage. This gives users an overview of the whole process to submit wishes and it indicates where they are in that process. As the breadcrumbs show, users first have the possibility to formulate three alternatives for their new allotment. After that they can check all information before they actually submit the information. Also at this stage users have the possibility to formulate comments - if they have any - to share with the committee. The user survey pointed out that users feel a high need to be in control and have the possibility to check or print what they have submitted. Therefore, this possibility is included. The red colour of the breadcrumb indicates where users currently are in the process of submitting wishes.

So, how do users navigate from one step to the next in the process? Once users have finished editing their first wish they can press the button 'to wish 2' to express their second best alternative regarding the new allotment. When they click the button, the situation of wish 1 will be saved. Simultaneously, the layer of wish 1 should become inactive and the layer of wish 2 should become active. This will be repeated for

wish 3. If users do not want to submit a third alternative, they can leave the map open. Before the final submission users can check in one overview their expressed wishes, by means of a form that lists in relevant order three maps displaying the expressed wishes geographically and includes the accompanying administrative data like (total) size of the desired parcels.

The subpage that enables title holders to submit land lease contracts will have the same layout and functionality as the subpage to submit wishes.

8.3.2 Public inspection re-allotment plan

After the land consolidation committee has received the wishes from title holders, the land lease contracts, other old rights that have been offered for registration and information about polluted parcels, the draft re-allotment plan can be developed in the software Transfer and LIN respectively. The procedure to import data in this software is comparable to the existing work process. Transfer allows exchange of geo-information with LIN, Mapinfo (which will be replaced by GeoMedia), Word and Excel (Kadaster, 2006).

After the draft re-allotment plan has been developed it will be published giving people the opportunity to inspect the plan and its documents. The period of public inspection normally lasts six weeks (Wet Openbaarheid van Bestuur, art. 3:16). Title holders and other stakeholders have the possibility to object to the draft plan. These objections will be considered by the land consolidation committee whether these will be taken into account in the final re-allotment plan.

Given the changed context, it is suggested to adapt the web service to suit the users' needs in this stage of the land consolidation project. That means that the frames on the homepage refer to different topics. Submission of wishes and submission of land lease contracts have been replaced respectively by the topics 'view re-allotment plan' and 'submit objection'. See Figure 8-5 for the conceptual design of the homepage in this phase of the land consolidation project. From the homepage users have the possibility to login to view the draft re-allotment plan and inspect the changes with respect to their situation. Also they can submit an objection to the land consolidation committee to point out their view on the draft re-allotment plan.

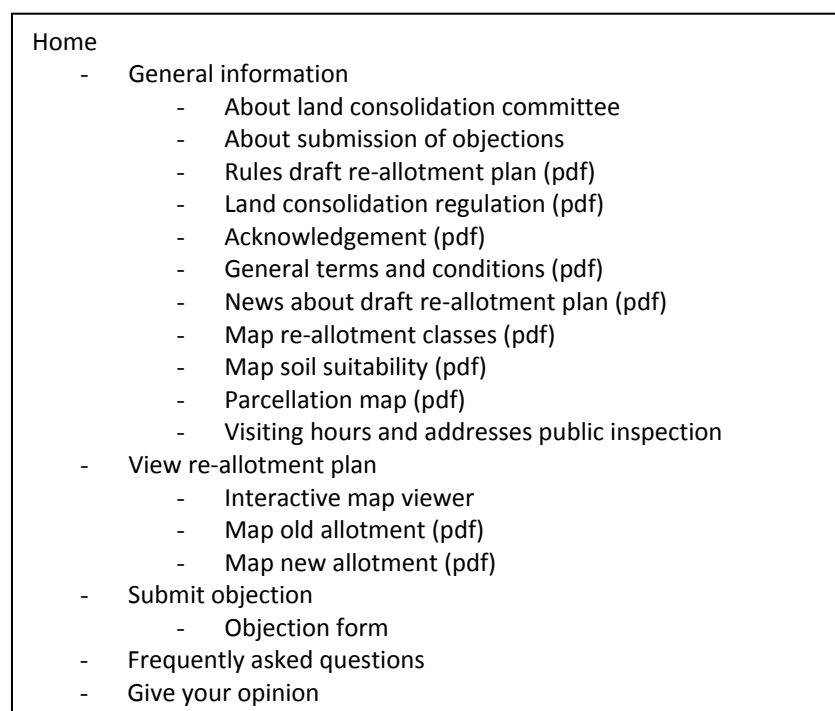


Figure 8-4 Proposed sitemap for public inspection of re-allotment plan

The sitemap of the web service has not changed in structure, which improves continuity and recognisability from a users' perspective. With a few mouse clicks users can browse through the entire web service. However, some changes have been made. These changes are mostly tailored to the content of the web service as different information is required in this project phase (see Figure 8-4). Information from the preparation phase that is not applicable any more has been removed to prevent an overload of information. As will be explained later, the only exception is the possibility to review the wishes and land lease contracts as submitted by the users in the preparatory phase (if applicable).

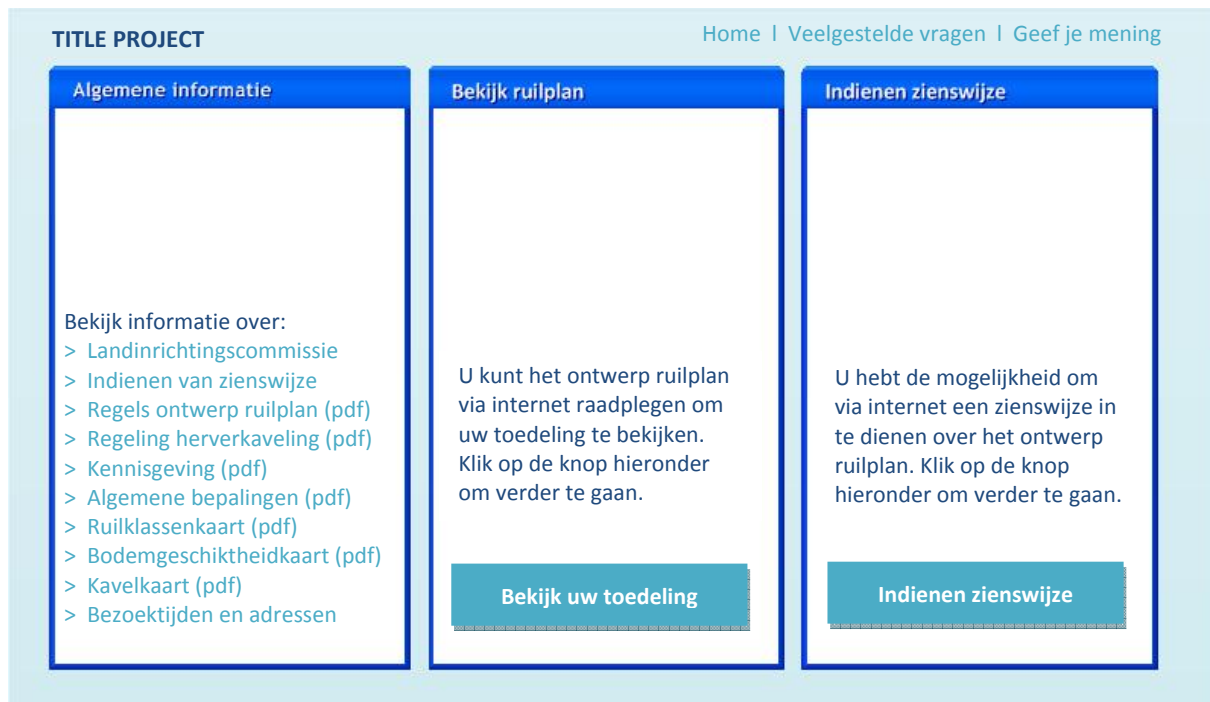


Figure 8-5 Homepage public inspection of re-allotment plan

Figure 8-6 shows the conceptual design of the subpage to view the re-allotment plan. The design is similar to the previous project phase and has the same interactive map frames, a legend, frames to display administrative data and some links to provide additional data or help. Although it is not explicitly shown in the legend, users need to be able to access extra data layers. The review of the existing web application showed that users expected to find additional information, such as the re-allotment classes or soil suitability map on this subpage. Users can access this information via the legend by means of switching the data layer on or off. This has the advantage that people have a reference to find the information that is applicable to the owned or leased parcels. Besides, navigation is improved when all geo-information that can be visualised in maps is clustered on one subpage. In line with Nielsen's usability heuristics (paragraph 8.2) users need not have to recall their submitted wishes or land lease contracts. Therefore, these data layers are also included. Besides increasing usability it improves transparency of the project's process.

Both maps, with the old and new situation, are synchronised. When users switch the legend between 'property' or 'use', both maps are changed simultaneously. Also, the administrative data shown in the two boxes below the maps consequently change. Either the property situation or use situation can be shown, as is similar to the existing web application. A pre-defined map of the old and new situation can be printed. A link to these maps has been included in the right hand bottom corner on this subpage. Experienced users are able to make a print screen on every occasion to capture information they want to

save. However, for less experienced users this might be a hassle. Therefore, a simple click on the link will provide this type of user with the possibility to save and print a customised map including relevant administrative data tailored to their situation.

It is suggested to include the same functionality as in the previous preparatory phase (Table 8-1) to browse through the information. Functionality to manipulate data (right column of the table) is not needed on this subpage and will only distract the user unnecessarily.

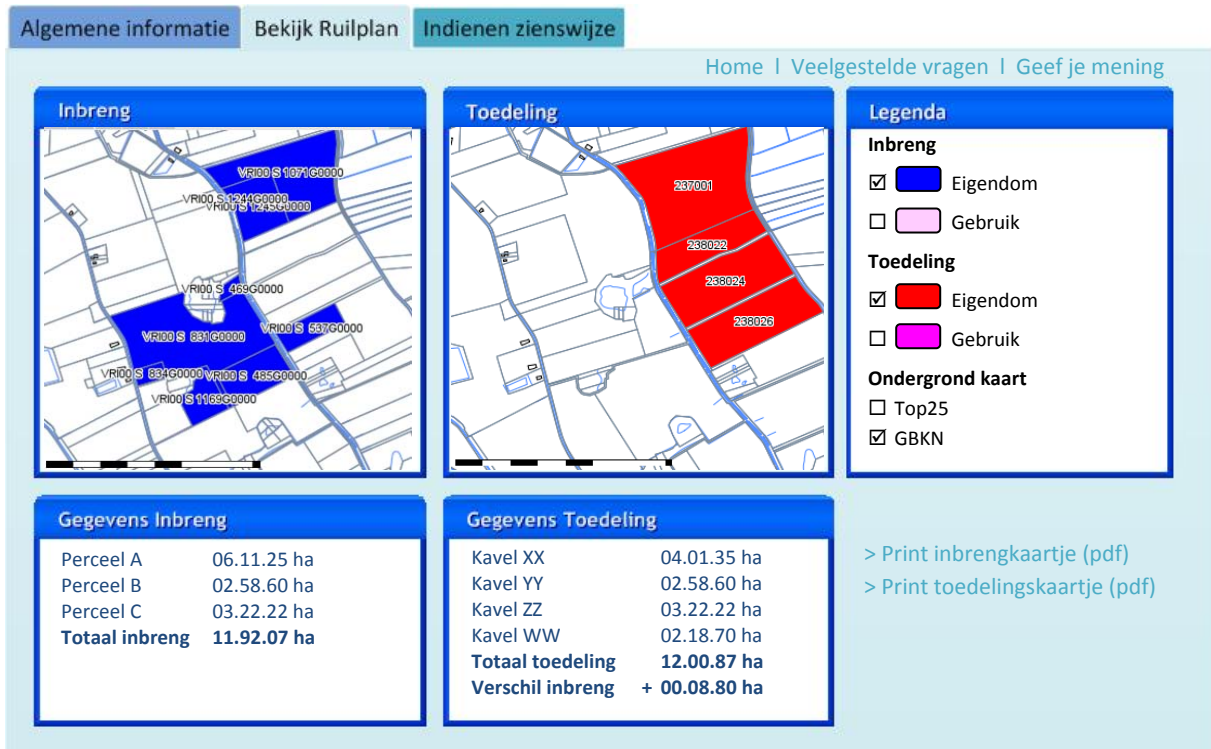


Figure 8-6 Subpage to view re-allotment plan

If title holders do not agree with the new allotment they can object. One click on the tab 'submit objection' navigates users to a form (see Figure 8-7). The information field with general data is pre-filled, because the information is already available due to the login. Pre-filled information also reduces the chance of mistakes, typing errors or missing information. Initially, the conceptual design does not facilitate the user to change the pre-filled data. If users feel the need to mention any changes or to add extra data, they can do so in the text box provided to describe the problem. The main purpose of the text box is to allow users to describe their problem, point of view or objection to the draft re-allotment plan. However, no restrictions are made. If users feel to hand in a lengthy text they can do so.

In addition to the text description, title holders can also use a map to locate the problem if they think it is suitable. The map will not be useful in all objections and can be regarded as an extra option for a specific number of objections. The map can help users to describe the exact location without words, to point out location related problems, such as the lack of proper access to a certain parcel. A drawing pin tool will be provided in the heading of the map frame to pinpoint a location on the map. Multiple drawing pins can be placed if the user wants to show several problems on the map. This technique is familiar in web-based initiatives in the field of spatial planning and can be used here as well.

The process of submitting an objection is in a similar way supported in the conceptual design as in the preparatory phase where users could submit wishes or land lease contracts. Also here breadcrumbs are provided in the top left hand corner of the subpage to indicate the process steps that are needed to actually submit or send the objection to the committee. Furthermore, the breadcrumbs show where the

user is in this process by means of a different colour of the active page. A button at the bottom right hand corner is included on the page to enable people to proceed to the next step as is shown in the breadcrumbs. The used terminology is the same to prevent any confusion among the users.

For novice users help is provided in the form of links to a manual that explains how users can browse through the application to submit an objection, to an example and to background information about the submission of an objection. The legal framework determines, for example, who is allowed to object. This type of information can be found in the background information.

Algemene informatie **Bekijk Ruilplan** Indienen zienswijze

Zienswijze > Controleren > Verzenden Home | Veelgestelde vragen | Geef je mening

Uw gegevens:

R-nummer: XP2356NHL
Naam: Dhr. R. Uiling
Adres: Zandstraat 8
8888 XP Ter Kavel
Datum: 11 januari 2011

Uw zienswijze:

Beschrijf hier zo duidelijk mogelijk uw zienswijze. Indien nodig kunt u rechts op de kaart met de punaise de locatie aangeven waarop uw zienswijze betrekking heeft.

Locatie zienswijze

> Indienen zienswijze
> Handleiding
> Voorbeeld

Controleer zienswijze

Figure 8-7 Subpage to submit objection

After all objections have been discussed within the land consolidation committee, the Provincial executive takes a decision about the final re-allotment plan. In turn, this plan will be available for public inspection. Only those stakeholders who have submitted an objection, or have become a stakeholder as a consequence of changes in the plan, are eligible to appeal against the decision made by the land consolidation committee.

No substantial changes are foreseen to adapt the web service to meet the user needs in this second phase of public inspection. The underlying data have to be updated, so as to include changes made based on submitted objections to the draft re-allotment plan. Also some terminology has to be changed such as the button to appeal against the decision of the Provincial executive.

8.4 Limitations

Because of the limited time available, no prototype of the new web service could be developed. This limited the possibility to test the conceptual design. For example, multiple elements have been changed simultaneously based on the findings of the review. Each single change might offer a proper solution of the problem found during the test of the existing web application. However, in combination with other elements that are changed, it might not work out as expected. Due to a lack of time and the absence of a prototype it was not possible to test the conceptual design.

Furthermore, without prototype it is difficult to judge whether the size of elements and fonts is sufficient or not. A computer screen is larger than half an A4 sheet as has been used in this research to present the conceptual design. Much more information than currently is presented must fit into the map frames and frames for attribute information. The amount of information that has to be presented on the web service differs greatly between title holders. Some title holders may have over 15 parcels, while the majority may have an average of 4 parcels. These variations have not been taken into account yet.

Technical aspects have not been taken into account specifically. Security is of importance as is the storage of submitted wishes. A database is needed to store and process the submitted wishes of title holders. Another technical aspect that certainly has to be implemented relates to the requirement to keep logged in when browsing from one subpage to another. The existing web application failed to do so and this annoyed the test users that performed the review.

The proposed functionality in the conceptual design is limited, so as to keep the interface simple and user friendly. However, it might be desirable, for example, to extend the functionality with a tool that allows users to fix certain parcels. Herewith they indicate that these parcels are not eligible for re-allotment. Currently this functionality is implicitly integrated in the conceptual design when people express their wish regarding the new allotment. Parcels that do not change can be traced by comparing the map that shows the wish with the map that shows the existing situation. Also no separate functionality is included to let users comment on the expressed wish.

8.5 Conclusions and discussion

In this chapter the conceptual design for the new web service was presented. The conceptual design was developed based on the research results of the studied components of the user-centred design process. Besides that, relevant findings from literature were used as a basis for the conceptual design. The design has been worked out in detail for two important phases in a land consolidation project, namely the preparation phase of the re-allotment plan and the public inspection of the plan. Both phases are characterised by the exchange of (geo-)information between land consolidation committee and title holders. It encompassed both the submission of (geo-)information by title holders and the dissemination of (geo-)information by the land consolidation committee.

The conceptual design can be elaborated on certain points. For example, the form to submit an objection could have been included and further detailed. Although it has not been discussed in this chapter, it is expected that sufficient examples from governments are available to base the design of the form on. Findings from these more common practices can be used to extend the conceptual design in a later stage. As was discussed already in the previous paragraph, the study focuses on the user needs and requirements. In turn, these determine the preference for certain technical solutions regarding the required functionality. Given the time frame of the research, the technical requirements to implement the conceptual design have not been discussed. It is expected, based on the findings from the case studies (paragraph 3.6), that available techniques will settle this.

9 Conclusions and recommendations

9.1 Conclusions

9.1.1 Main conclusion

The aim of this research was to study the feasibility of e-governance in land consolidation projects in order to increase an effective and efficient use and exchange of (geo-) information between title holders and government. A user-centred design approach was followed instead of a technical supply oriented perspective to investigate the feasibility. The general research question was:

Is it feasible to use e-governance in land consolidation projects to exchange geo-information between concerned government and title holders (government to citizen and citizen to government) in order to increase an effective and efficient use of geo-information?

A broad definition of geo-information was used in this context, including spatial data and attribute information about these spatial data. Overall it can be concluded that it seems to be feasible to develop a web service that enables the exchange of geo-information between title holders and province or land consolidation committee if tasks are delegated by the province. However, it should be complementary to the existing manners to exchange (geo-)information between involved parties.

This has been concluded based on the user survey that showed that two groups can be distinguished among title holders. One group has a very positive attitude towards the introduction of a web service that enables them to view and to submit (geo-)information to the land consolidation committee or province, while the other group prefers other ways of viewing or submitting data such as face to face personal contact, by mail or by telephone. The user survey also showed that the majority of respondents have experience with the use of the internet. Most of them are experienced users. Experience is one of the factors that determines a positive attitude to the intention to use a new web service. Due to the high number of experienced people in the sample, it may be expected that this positively contributes to a positive attitude to use the proposed web service to exchange (geo-) information. Also, the review of the existing web application did not reveal major problems for the test persons. This strengthens the findings from the user survey and literature.

Furthermore, this conclusion is supported by the attitude and policy of the sponsors of land consolidation projects: the provinces. The launch of a web service to support the exchange of geo-information fits perfectly in the e-governance strategy of consulted provinces. It was not only considered useful in land consolidation projects, but also in voluntary re-allotment projects. Nevertheless, some provinces also felt some hesitation, because all people should have equal chances in a land consolidation project which might not be guaranteed by a web service. The introduction of a web service may exclude certain people that are not capable of using it properly (digital illiteracy) or do not have access to internet or a computer (digital divide). The oral explanation of specific land consolidation issues is regarded very important by some provinces to give every title holder the same chances in the process. If the web service is regarded as complementary to the existing services, the needs of provinces are met.

9.1.2 Other conclusions

The main research question was split up into specific research questions. These questions and the research findings are discussed one by one in this paragraph following as much as possible the research structure. The research results have been integrated in a conceptual model of the proposed web service to exchange geo-information between the land consolidation committee and title holders. Therefore, the last mentioned topic of this paragraph is the conceptual model.

Government requirements

The feasibility of the web service involves basically two parties, namely the responsible government and the title holders. The government requirements have been studied based on the following research question:

How does the development of a web service for land consolidation projects fit into the e-governance policy of the provinces?

E-government services are considered to have advantages for both citizens and government. Advantages for citizens are among others related to better and more accessible services and engage citizens in discussion, debate or decision making. The semi-structured interviews showed that provinces acknowledge in general these advantages. If all stakeholders in a land consolidation project have access to the same information, less miscommunication will take place. Thus, the available (geo-)information is used more effectively. The interviews revealed as well that most provinces have already e-services freely available that focus on the dissemination of (public) geo-information to citizens and other stakeholders. The use of web services on a project basis is not yet widely applied, but could be the next step in the development of e-government services. The development of a web service for land consolidation projects is at least not restricted by provincial policies.

The literature study showed that e-services reflect government performance, and government performance in turn is associated with trust in government. Therefore, it pays off for governments, including provinces, to invest in e-government services providing that these meet the user needs. Adoption of e-government services by citizens is based on the trust citizens have of the internet and of the government as the model of Bélanger and Carter showed. The trust of internet can not be directly influenced by governments, but increasing trust in their governmental organisation can be achieved by minimising the (perceived) risks. Governments can reduce the risk by paying attention to security and reliability of the web service, identity and authentication of the title holder, confidentiality of presented and submitted data, verification, and jurisdiction.

Another aspect of importance regarding the government requirements is the legislative framework. This framework determines the discretionary space of the provinces with respect to the use of web services in land consolidation projects and, more specific, how the (geo-)information is used and presented in the web application. The research question related to this topic was:

What is the legislative framework (privacy, publicity, security) within which the web service has to operate?

For the purpose of this research legislation has been added to the user-centred design approach model as topic to study. It was added because the legal basis for land consolidation projects is laid down in the Rural Areas Development Act. Besides that, provinces operate in a legal environment which might pose prerequisites to the proposed web service that should be taken into account in the feasibility study. The addition of the topic to the user-centred design process proved to be very useful for this research. This might be explained by the e-government and land consolidation context of this research, which has a legislative character. Whether this is just as well for other (research) projects that use the user-centred design process can not be concluded based on this research alone.

The right to privacy and freedom of information are important aspects that are determined in the legislative framework. It shows that both aspects have to be considered in coherence. The right to privacy of individuals has to be in balance with the right to freedom of information. Since most geo-information has a private character and the decisions made in land consolidation projects are public, this is of importance. However, most (geo-)information that will be published through the web service is already public, because it concerns cadastral information, or will be public once the new allotment has been

described in a deed and registered in the cadastral registries. The right to privacy of individuals is secured by means of login. Private information, related to the re-allotment, is only accessible for the person who has logged in. This includes, for example, administrative data related to a certain registry number, e.g. a map and list with all owned or leased parcels. Other title holders cannot access this information at all or the information is fragmented. For example, the cadastral map is public, and providing information about size and owner per parcel through a mouse click on a parcel on a map is legitimate. However, it is not possible to query the data set and show all parcels owned by a certain person. Thus, access to the data and the way these data are presented, vary depending on the private character of information. This is in line with the legislative framework.

Security is another important aspect of the proposed web service. The submission of geo-information should be secure since the delivered information might have an important role in the project or can have a private character. Legislation showed that security levels should be of a current state of the art. Depending on the type of submitted information, security measures of transmission, storage and handling of geo-information can vary. In practice this will only apply for the transmission of data because storage and handling of the data will have the same high standard as is already the case for all used data in a land consolidation project. The potential users of the new web service also considered security to be (very) important. The user survey showed that the majority of respondents find security a point of concern when submitting geo-information to the committee. There was hardly any distinction made between the different types of information (wishes, land lease contracts, objection). In order to enhance the trust of users in the web service, it is required to satisfy the user need for security effectively. In turn, trust in the application will increase the intention to use the application.

Use and user requirements

In addition to the government requirements, the use and user requirements for the proposed web service to exchange geo-information have been studied. The following research question was used as a basis to study this topic:

What is the usability of the web service for the title holders in terms of user requirements?

The user needs (tasks, characteristics, preferences) were an important aspect of this study given the adapted concept of a user-centred design process. These have been studied by means of a focus group session, a user survey, and a review of the existing web service that disseminates (geo-) information. The focus group session with experts centred on the expected user characteristics and tasks that users have to perform to view and submit geo-information. From an expert perspective it can be concluded that users may need a wide array of functionality to perform the tasks, depending on the user profile. A farmer might have other needs regarding re-allotment of land than a private household with hardly any land. The user survey (100 respondents) showed that the vast majority of people (91%) has access to internet and has experience with internet (88%), ranging from little to much experience. Respondents had slightly less experience with the active use of web-based maps (72%). This is important because the literature study showed that experience with internet and similar web-based applications determines among others the intention to use the proposed web service. From this point of view there is no reason to expect that people will not use the proposed web service, provided that it is user-friendly and functions properly.

The review of the existing web application that enables the dissemination of geo-information pointed out that the usability of the application is good already. Some problems were encountered, but it is expected that these can be overcome with minor adaptations of the web application. The purpose of the review was not to evaluate the existing web application, but to collect data for the proposed web service that enables the two-way exchange of geo-information between title holders and government (i.e. the land

consolidation committee). It has been concluded that it is worthwhile to use the existing web service as a basis for the extension of the web service which facilitates the submission of geo-information.

Technical feasibility

Another aspect of importance is the technical feasibility of a web service. The interoperability with existing software that is used in land consolidation projects (Transfer) was the focus of the technical feasibility study.

What are the technical requirements for the implementation of the new web service related to the currently used software Transfer?

The programme Transfer is specifically used to support the process of making the draft re-allotment plan based on the submitted wishes of title holders. Employees interpret the wishes of title holders and draw three different alternatives for the new allotment in Transfer. Based on these alternatives, the programme offers solutions in case some subareas know a higher demand than supply or vice versa. Transfer supports import of spatial data from other software packages in different formats. This is needed because the project administration is based on several data sets that are extracted from other databases or created in other software programmes. Similarly, the output of Transfer can also be exported in different formats, for example to edit or present the data of the (draft) re-allotment plan in a GIS software system (Mapinfo or GeoMedia). The submitted wishes of title holders through a web service can be stored in a database. From here, the data can be imported in Transfer. So, for a smooth process it is required that the submitted data should be stored in an interoperable format for Transfer. Furthermore, information is required about the identity of the title holder who submitted the data in order to process the data, but this can be guaranteed by means of e-authentication as is explained previously.

Is it possible to use the geo-data provided by title holders through the web service as automated input for Transfer?

It can be concluded that the web service can support the processing of submitted data in Transfer if the wishes are delivered in line with the specifications of the application. The programme Transfer is specifically used to support the process of making the draft re-allotment plan. Therefore, it accounts mostly for the submission of wishes regarding the new allotment. Basically, two solutions are possible to accomplish a more automated processing of the submitted wishes. Either users of the web service deliver their wishes in such a format, namely three different alternatives, that it can be used for automated processing in Transfer or Transfer is slightly adapted. The former solution was chosen, because this implies less adaptations of the software and it is expected that users are able to deliver the information in this form if they are guided through the process. The conceptual design is tailored to support users to a maximum to do so.

Conceptual design

With the results of all research components (user survey, focus group, review of existing web application, semi-structured interviews with provinces, case studies) and findings from literature an initial conceptual design has been developed for a web service that enables the exchange of geo-information from title holder to land consolidation committee and vice versa. The existing web service has been used as a basis for the conceptual design, which has been extended with possibilities to submit (geo-) information.

The next step would be to evaluate the conceptual design by potential users by means of a prototype of the web service. In this research the usability of submitting geo-information via a web service has not been covered. However, an evaluation would be needed to improve the design.

Apart from the fact that the submission of geo-information has not been tested with users, it has also not been evaluated whether the suggested improvements based on the review of the existing web service

were effective. With this review, problems have been detected and a solution to overcome these problems has been included in the conceptual design. Because multiple elements have been changed simultaneously, it is difficult to measure their impact as a whole without user testing. In some cases, one single problem can be addressed based on literature sources only. The most often made mistakes and possible solutions have been described in literature. How multiple problems interact is much more difficult to describe, let alone to find an integral solution. This is of course one of the reasons why testing and improving a prototype is an iterative process as is also described in the user-centred design process. Whether or not the conceptual design really meets the user needs should be subject of further research as will be explained in the following paragraph.

9.2 Recommendations

Of course not everything could be handled in this thesis. The thesis ended with a conceptual design which has been described in the previous chapter. Due to the scope of this research and the given timeframe it was not possible to actually build a prototype to test the design on its usability.

Therefore, the first recommendation is the development of a prototype, so as to be able to evaluate the design. The think aloud method proved to be very useful in this context and it is recommended to use this method again, but now to test a web service that enables the exchange of geo-information between title holders and land consolidation committee. The evaluation also may act as a validation of the research results obtained through the focus group, the user survey and the review of the existing web application, because these results have been input for the conceptual design. Additionally, with an evaluation of the proposed web service justice is done to the adopted user-centred design approach that regards the development of a web service as an iterative process that involves multiple reviews of the prototype in order to improve (the usability of) the application.

Besides that, the technical feasibility has not been studied in depth. Only a general scan has been executed to find out whether the submitted wishes via the web application could be used in Transfer. This is mainly due to the chosen user oriented approach of this research. The user oriented approach of the research is closely connected to a demand oriented development instead of a supply driven initiative as was mentioned in the problem definition. As a consequence, the user needs are leading and determine appropriate techniques for the technical implementation of the web service. Findings from the case studies did not indicate that serious technical limitations occur for the new web service. Therefore, this has not been further studied. Based on findings from the case studies and the interviews with provinces it is recommended that the web service and the interface should be kept as simple and functional as possible to encourage title holders to use the web service. Furthermore, it makes sense to use proven technology in the context of the exchange of geo-information via a web based service. The set of web guidelines as they apply for all governmental websites in the Netherlands provide a good basis as the guidelines aim to make websites more accessible to users and to improve the quality of the web interface. Now that the user needs have been presented in this research in more detail, it is recommended to investigate the best technical implementation and decide on appropriate techniques.

Another subject of further research is the provincial policy framework. Only a limited number of semi-structured interviews has been conducted. Other provinces, that are left out of this study mainly by chance, may have different opinions about the added value of a web service in land consolidation projects to exchange geo-information. Also the umbrella organisation of the provinces has not been consulted. It be useful to contact them as well, because they govern main policy on considered topics that applies to all provinces. Therefore, it is recommended to discuss the proposed web service with a representative of the umbrella organisation of the provinces in order to investigate their point of view.

It was out of scope to investigate the feasibility of web services in voluntary re-allotment. Also in this kind of projects it can be very useful to have web services to exchange geo-information between stakeholders. As some interviewed employees of provinces pointed out, it could stimulate stakeholders to set up a re-allotment because a web service may provide an environment that enables users to 'play' with possible re-allotments. Also it can provide stakeholders with examples of successful re-allotments to create enthusiasm.

The feasibility study did not encompass a business case to balance the costs and benefits of the introduction of a web service for land consolidation projects. It is recommended to first put the initiative in a strategic context. It has to be determined whether the initiative fits with the corporate programmes, strategies and plans. Secondly, the strategic value of the web service has to be determined. Then, the organisation, communication and process for the introduction of a web service have to be established. These aspects are all elements of the strategic business case. The results of this feasibility study can provide input for this strategic consideration. If the strategic business case results in a positive decision about the development of a web service for land consolidation projects, a full business case can be drawn up that includes a more detailed study of among others the business value, investment and operational costs and efficiency savings, the risks involved etc (URL 12).

Literature

- Aarts, N., Woerkum, C. van, 2008. Strategische communicatie – principes en toepassingen. Van Gorcum, Assen, Netherlands.
- Abras, C., Maloney-Krichmar, D., Preece, J., 2004. User-centred design. IN: Bainbridge, W. (ed.). Encyclopedia of Human-Computer Interaction. SAGE Publications, Thousand Oaks, California, USA.
- Anon., 2008. Nationaal uitvoeringsprogramma dienstverlening en e-overheid – Burger en bedrijf centraal. Bestuurlijk Overleg van rijk, provincies, gemeenten en waterschappen over de realisatie van het Nationaal Uitvoeringsprogramma Dienstverlening en e-overheid, The Netherlands.
- Baarda, D.B., de Goede, M.P.M., Kalmijn, M., 2007. Basisboek enquêteren - handleiding voor het maken van een vragenlijst en het voorbereiden en afnemen van enquêtes. Wolters-Noordhoff, Groningen.
- Badri, M.A., Alshare, K., 2008. A path analytical model and measurement of the business value of e-government: An international perspective. *International journal of information management*, 28, 524-535.
- Bauer, K., 2009. On the politics and the possibilities of participatory mapping and GIS: using spatial technologies to study common property and land use change among pastoralists in Central Tibet. *Cultural Geographies*, 16, 229-252.
- Baxter, P., Jack, S., 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*, 13 (4), 544-559.
- Bélanger, F., Carter, L., 2008. Trust and risk in e-government adoption. *Journal of strategic information systems*, 17, 165-176.
- Bertot, J.C., Jaeger, P.T., 2008. The E-Government paradox: Better customer service doesn't necessarily cost less. *Government Information Quarterly*, 25, 149–154.
- Bryman, A., 2004. *Social research methods*. Oxford University Press, Oxford.
- Bugs, G., Granell, C., Fonts, O., Huerta, J., Painho, M., 2010. An assessment of Public Participation GIS and Web 2.0 technologies in urban planning practice in Canela, Brazil. *Cities*, 27 (3), 172-181.
- Burrough, P.A., McDonnell, R.A., 1998. *Principles of Geographical Information Systems*. Oxford University Press, Oxford, Great-Britain.
- Byrne, B., 2004. Qualitative interviewing. In: Seale, C. (ed), *Researching Society and Culture*, 179-192. Second edition, SAGE publications, London, United Kingdom.
- CBS, 2010. ICT gebruik van huishoudens naar huishoudkenmerken. Available from: www.cbs.nl
- Cotton, D.R.E., Gresty, K., 2006. Reflecting on the think-aloud method for evaluating e-learning. *British Journal of Educational Technology*, 37 (1), 45-54.
- Cotton, D.R.E., Gresty, K.A., 2007. The rhetoric and reality of e-learning: using the think-aloud method to evaluate an online resource. *Assessment & Evaluation in Higher Education*, 32 (5), 583-600.
- Davies, N.J., Fensel, D., Richardson, M., 2004. The future of web services. *BT Technology Journal*, 22 (1), 118-130.
- DeLone, W.H., McLean, E.R., 2003. The DeLone and McLean model of information systems success: A ten year update. *Journal of Management Information Systems*, 19(4), 9–30.
- Dijk, J. van, Peters, O., Ebbers, W., 2008. Explaining the acceptance and use of government internet services: A multivariate analysis of 2006 survey data in the Netherlands. *Government Information Quarterly*, 25 (3), 379–399.
- Dunn, C.E., 2007. Participatory GIS – a people’s GIS? *Progress in Human Geography*, 31(5), 616–637.

- Elzakker, C.P.J.M. van, Ormeling, F.J., Köbben, B.J., Cusi, D.R., 2003. Dissemination of census and other statistical data through web maps. In: Peterson, M.P. (ed.), *Maps and the internet*, 57-75. Elsevier, Amsterdam, The Netherlands.
- Elzakker, C.P.J.M. van, 2004. The use of maps in the exploration of geographic data. *Netherlands Geographical Studies* 326. Utrecht / Enschede, Netherlands.
- Elzakker, C.P.J.M. van, and K. Wealands, 2007. Use and users of multimedia cartography. In: Cartwright, W., Peterson, M.P., Gartner, G. (Eds.), *Multimedia Cartography*, 487-504. Springer, Berlin.
- Elzakker, C.P.J.M. van, and W.P.E. van de Berg, 2009. Topografische ondergronden voor plankaarten: een gebruikersonderzoek. *Geo-Informatie Nederland*, (3), 64-69.
- Endeshaw, A., 2003. Web services and the law: a sketch of potential issues. *International Journal of Law and Information Technology*, 11 (3), 251-273.
- Feijen, A., 2006. *Geoboer – Functioneel ontwerp*. Ministerie van Landbouw, Natuur en Voedselkwaliteit, Den Haag.
- Flos, B.J., Oyan, E., Post, W.E.J., TNS NIPO, 2008. E-mailresponsonderzoek 2007 onder (deel)gemeenten, provincies, waterschappen en ministeries. Overheid heeft antwoord, Den Haag. Available from: http://monitor.overheid.nl/ufc/file2/omonitor_sites/moeskoiv/99d62880fdb7d4e2c64accd1745710b/pu/E_mailresponsonderzoek_2007_2.0.pdf
- Flyvbjerg, B., 2006. Five misunderstandings about case-study research. *Qualitative Inquiry*, 12 (2), 219-245.
- Garrie, D.B., Wong, R., 2006. The future of consumer web data: a European / US perspective. *International Journal of Law and Information Technology*, 15 (2), 129-152.
- Gauld, R., Gray, A., McComb, S., 2009. How response is E-Government? Evidence from Australia and New Zealand. *Government Information Quarterly*, 26, 69-74.
- Geonovum, 2009. *Voortgangsrapportage uitvoering – monitoring GIDEON*. Amersfoort, Netherlands.
- Hanzl, M., 2007. Information technology as a tool for public participation in urban planning: a review of experiments and potentials. *Design studies*, 28 (3), 289-307.
- Hartson, H.R., Andre, T.S., Williges, R.C., 2001. *International journal of human-computer interaction*, 13 (4), 373-410.
- Horst, M., Kuttschreuter, M., Gutteling, J.M., 2007. Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-government services in The Netherlands. *Computers in Human Behavior*, 23 (4), 1838-1852.
- IPO, 2009. *Programmaplan ProGIDEON*. Amersfoort, Netherlands.
- Ivory, M.Y., Hearst, M.A., 2001. The State of the Art in Automating Usability Evaluation of User Interfaces. *ACM Computing Surveys*, 33 (4), 470-516.
- Jaeger, P.T., 2003. The endless wire: EGovernment as global phenomenon. *Government Information Quarterly*, 20, 323-331.
- Jansen, E.P.W.A., Joosten, T.H., Kemper, D.R., 2004. *Enquêteeren, het opstellen en gebruiken van vragenlijsten*. Wolters-Noordhoff, Groningen.
- Janssen, H., Feiter, S. de, Menting, T., Spätjens, L., Wal, T. van der, 2007. Boer zoekt web-services – Uitwisseling perceelsgegevens opent nieuwe markten. *Agroinformatica*, 30-33.
- Jokela, T., 2004. Evaluating the user-centredness of development organisations: conclusions and implications from empirical usability capability maturity assessments. *Interacting with Computers*, 16, 1095-1132.
- Jokela, T., Iivari, N., Matero, J., Karukka, M., 2003. The standard of user-centred design and the standard definition of usability: Analyzing ISO 13407 against ISO 9241-11. In: *Proceedings of the Latin America Conference on human-computer interaction with mobile devices and services: 5th international symposium*, 17-20 August, Rio de Janeiro, 53-60.

- Kabel, J., 2000. Chapter 3, GDI from a legal perspective. In: Groot, R., McLaughlin, J. (eds.). *Geospatial Data Infrastructure, concepts, cases and good practice*. Oxford University Press, 57-83.
- Kadaster, 2006. *Transfer – Procehandleiding*. Concernstaf, Apeldoorn, The Netherlands.
- Ke, W., Wei, K.K., 2004. Successful e-government in Singapore. *Communications of the ACM*, 47 (6), 95-99.
- Kemp, J., 2008. Lost in space: on becoming spatially literate. *Knowledge quest*, 36 (4), 32-39.
- Keßler, C., 2004. *Design and Implementation of Argumentation Maps*. Westfälische Wilhelms-Universität Münster, Münster, Germany. Available from: http://ifgi.uni-muenster.de/~kessler/carsten_kessler_diploma.pdf
- Keßler, C., Rinner, C., Raubal, M., 2005. An argumentation map prototype to support decision-making in spatial planning. In: Toppen, F., Painho, M. (eds.). *Proceedings of AGILE 2005 – Eighth Conference on Geographic Information Science*, 26–28 May, Estoril, Portugal, pp. 135–142.
- Kingston, R. 2007. Public participation in local policy decision-making: The role of web-based mapping. *Cartographic Journal*, 44 (2), 138-144.
- Kingston, R., Carver, S., Evans, A., Turton, I., 2000. *Web-Based Public Participation Geographical Information Systems: An Aid To Local Environmental Decision-Making*. *Computers, Environment and Urban Systems*, 24 (2), 109–125.
- Kramers, R. E., 2007. The Atlas of Canada — user centred development. In: Cartwright, W., Peterson, M. P., Gartner, G. (eds.). *Multimedia Cartography*. 2nd Edition, Springer, pp. 139-160.
- Kuipers, F.F., 1996. *Voor de variatie - Inleiding statistiek*. Wageningen Pers, the Netherlands.
- Loenen, B. van, Zevenbergen, J.A., Jong, J. de, 2008. Geo-informatie: wat is het en wat is de juridische context? In: Wees, L. van, Nouwt, S. (eds.). *Recht en locatie; geo-informatie in een juridische context*, pp. 11-33. Den Haag: Elsevier Juridisch (Reed Business bv).
- MacEachren, A.M., Kraak, M.J., 1997. Exploratory cartographic visualization: advancing the agenda. <http://www1.elsevier.com/homepage/misc/cageo/mk/mkintro.htm> (accessed 26.12.2009).
- McDonagh, M., 2002. E-government in Australia: the challenge to privacy of personal information. *International Journal of Law and Information technology*, 10 (3), 327-343.
- Morgan, D.L., 1996. Focus groups. *Annual review of sociology*, 22 (1), 129-153.
- Musso, J., Weare, C. Hale, M., 2000. Designing web technologies for local governance reform: good management or good democracy? *Political communication*, 17, 1-19.
- Nelson, M., 1997. Building trust in cyberspace. *International Information and Library Review*, 29, 153-157.
- Nielsen, J., 1993. *Usability engineering*. Academic press, London, UK.
- Nielsen, J., 1994. Ten usability heuristics. Jakob Nielsen's Alert Box, http://www.useit.com/papers/heuristic/heuristic_list.html
- Nielsen, J., 2000. Why you only need to test with five users. Jakob Nielsen's Alert Box, <http://www.useit.com/alertbox/20000319.html>
- Nielsen, J., 2005. Top Ten Web Design Mistakes of 2005. Jakob Nielsen's Alert Box, <http://www.useit.com/alertbox/designmistakes.html>
- Nielsen, J., 2009. Top 10 Information Architecture Mistakes. Jakob Nielsen's Alertbox, <http://www.useit.com/alertbox/ia-mistakes.html>
- Nuojua, J. 2010. WebMapMedia: a map-based web application for facilitating participation in spatial planning. *Multimedia Systems*, 16, 3-21.
- Olsen, W., 2004. Triangulation in social research: Qualitative and quantitative methods can really be mixed. In: Holborn, M. (ed.). *Developments in Sociology*. Causeway Press, Ormskirk.
- Prattipati, S.N., 2003. Adoption of eGovernment: Differences between countries in the use of online government service. *Journal of American Academy of Business*, 3 (1/2), 386–391.

- Qureshi, S., 2005. E-government and IT policy: Choices for government outreach and policy making. *Information technology for development*, 11 (2), 101-103.
- Robey, D., Sahay, S., 1996. Transforming work through information technology: A comparative case study of Geographical Information Systems in County government. *Information systems research*, 7 (1), 93-110.
- Simão, A., Densham, P.J., Haklay, M., 2009. Web-based GIS for collaborative planning and public participation: An application to the strategic planning of wind farm sites. *Journal of Environmental Management*, 90, 2027-2040.
- Thaens, M., Zouridia S., 2004. Een positiebepaling van de elektronische overheid. *IT Monitor* (February), 11–13.
- Tonkiss, F., 2004. Using focus groups. In: Seale, C. (ed), *Researching Society and Culture*, 193-206. Second edition, SAGE publications, London, United Kingdom.
- Tsai, N., Choi, B., Perry, M., 2009. Improving the process of E-Government initiative: An in-depth case study of web-based GIS implementation. *Government information quarterly*, 26, 368-376.
- Van den Brink, A., 2007. In: A. van den Brink et al., Editors, *Imaging the Future: Geo-visualization for Participatory Spatial Planning in Europe*, Wageningen Academic Publishers.
- Verdegem, P., Verleye, G., 2009. User-centred E-Government in practice: A comprehensive model for measuring user satisfaction. *Government Information Quarterly*, 26 (3), 487-497.
- Virzi, R.A., 1992. Refining the test phase of usability evaluation: how many subjects is enough? *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 34 (4), 457-468.
- VROM, 2008. *GIDEON Basisvoorziening geo-informatie Nederland – Visie en implementatiestrategie 2008-2011*.
- Wang, Y.S., Liao, Y.W., 2008. Assessing eGovernment systems success: a validation of the DeLone and McLean model of information systems success. *Government Information Quarterly*, 25, 717–733.
- Weerakkody, V., Carter, L., 2008. E-government adoption: A cultural comparison. *Information systems frontiers*, 10 (4), 473-482.
- Welch, E.W., Hinnant, C.C., Jae Moon, M., 2005. Linking citizen satisfaction with e-government and trust in government. *Journal of Public Administration Research and Theory*, 15 (3), 371-391.
- Williams, D., Lafrenière, P., 2005. The Atlas of Canada in Education. In: *Proceedings of the joint ICA Commissions Seminar on Internet-based cartographic teaching and learning*. 6-8 July, Madrid.
- Wong, S., Chua, Y.L., 2001. Data intermediation and beyond: issues for web-based PPGIS. *Cartographica*, 38 (3/4), 63-80.
- Worm, J., van den, 2001. Web map design in practice. In: Kraak, M.J., Brown, A. (eds.). *Web Cartography*. Taylor & Francis, London, pp. 87-107.
- Yovcheva, Z.I., 2010. Collaborative mapping and dissemination of spatio-temporal data through a web-based virtual globe application. *ITC*.

Legislation

- Aanwijzingen inzake de bescherming van de persoonlijke levenssfeer in verband met geautomatiseerde systemen waarin persoonsgegevens zijn opgenomen bij de Rijksoverheid, 1975. The Netherlands.
- Algemene Wet Bestuursrecht, 2004. The Netherlands.
- Data Protection Directive (95/46/EC), 1995. Belgium, Brussels.
- Directive on Privacy and Electronic Communications (2002/58/EC), 2002. Brussels.
- Goedkeuringwet Verdrag tot bescherming personen met betrekking tot geautomatiseerde verwerking van persoonsgegevens, 1990. The Netherlands.
- Kadasterwet, 1989. The Netherlands.

Landinrichtingswet, 1985. The Netherlands.
Wet Bescherming Persoonsgegevens, 2000. The Netherlands.
Wet Inrichting Landelijk Gebied, 2007. The Netherlands.
Wet Openbaarheid van Bestuur, 1991. The Netherlands.

URLs

1. RO online <http://www.ruimtelijkeplannen.nl> (accessed 23-07-2010)
2. Landinrichtingsproject Peize <http://www.herinrichtingpeize.nl/publicaties/Plannen> (accessed on 23-07-2010)
3. Case study http://en.wikipedia.org/wiki/Case_study (accessed 23-07-2010)
4. HISGIS <http://www.hisgis.nl> (accessed on 23-07-2010)
5. Mijn akker <http://www.mijnakker.nl> (accessed on 23-07-2010)
6. Wikimapia <http://www.wikimapia.org> (accessed on 23-07-2010)
7. LNV <http://www.hetInvloket.nl> (accessed 15-02-2010)
8. DigiD <http://www.digid.nl/english/> (accessed 26-07-2010)
9. Webrichtlijnen overheid <http://www.webrichtlijnen.nl/> (accessed 26-07-2010)
10. Landinrichtingsproject Land van Maas en Waal <http://www.kadaster.nl/maasenwaal> (accessed 26-06-2009)
11. DigiD <http://www.digid.nl/nieuws/artikel/68> (accessed 02-05-2010)
12. Business Case Guidance <http://www.idea.gov.uk/idk/aio/6055977> (accessed 05-08-2010)

List of figures

FIGURE 1-1 BASIC ELEMENTS OF A LAND CONSOLIDATION PROJECT	4
FIGURE 1-2 MAP (DETAIL) OF LAND USE PLAN PEIZE (URL 2)	5
FIGURE 1-3 EXAMPLE MAP OF RE-ALLOTMENT PLAN	5
FIGURE 1-4 DATA FLOW BETWEEN TITLE HOLDERS AND THE SPATIAL PLANNING AND CONSULTANCY DEPARTMENT	6
FIGURE 2-1 USER-CENTRED DESIGN PROCESS (BASED ON VAN ELZAKKER AND WEALANDS, 2007).....	10
FIGURE 2-2 METHODOLOGY AND STRUCTURE OF RESEARCH	11
FIGURE 3-1 TYPE OF WEB SERVICE	20
FIGURE 3-2 TRUST AND RISK IN E-GOVERNMENT ADOPTION (BÉLANGER AND CARTER, 2008)	21
FIGURE 3-3 INTERNET ACCESS OF HOUSEHOLDS (CBS, 2010)	21
FIGURE 3-4 TYPE OF INTERNET ACCESS (CBS, 2010).....	21
FIGURE 3-5 SUCCESS OF E-GOVERNANCE SYSTEMS BASED ON MODEL OF DELONE AND MCLEAN (WANG AND LIAO, 2007)	22
FIGURE 3-6 COMMUNICATION AND CHANGE OF BEHAVIOUR (AARTS AND VAN WOERKUM, 2008)	23
FIGURE 3-7 MULTIDISCIPLINARY MODEL OF FACTORS EXPLAINING THE INTENTION TO USE AND ACTUAL USE OF SERVICES OF THE	24
FIGURE 3-8 GOALS OF MAP USE THAT REQUIRE DIFFERENT VISUALISATION STRATEGIES (MAC EACHREN AND KRAAK, 1997)	26
FIGURE 4-1 ORGANISATION OF LAND CONSOLIDATION PROJECT	33
FIGURE 5-1 AGE OF RESPONDENTS	48
FIGURE 5-2 USER PROFILES OF RESPONDENTS.....	48
FIGURE 5-3 DESIRED FUNCTIONALITY BY USERS	49
FIGURE 5-4 LIKELINESS TO SUBMIT GEO-INFORMATION IN DIFFERENT CASES (FREQUENCY)	49
FIGURE 5-5 REASON OF NEGATIVE OPINION ABOUT SUBMISSION OF GEO-INFORMATION	50
FIGURE 5-6 IMPORTANCE OF ASPECTS IN CASE OF SUBMITTING DATA (FREQUENCY)	51
FIGURE 5-7 OPINION ABOUT PROVIDING PROPRIETARY INFORMATION OF PARCELS.....	51
FIGURE 6-1 HOMEPAGE OF WEBSITE 'PEIZE'	55
FIGURE 6-2 INTERACTIVE MAPS TO VIEW RE-ALLOTMENT	55
FIGURE 6-3 STANDARDISED MAPS IN PDF-FORMAT	56
FIGURE 6-4 SITEMAP OF EXISTING WEB APPLICATION OF PEIZE	56
FIGURE 6-5 REVIEW OF WEBSITE – LOCATION OF PROBLEMS.....	60
FIGURE 7-1 SUBMISSION OF GEO-INFORMATION FROM TITLE HOLDERS TO COMMITTEE	63
FIGURE 7-2 BUSINESS PROCESS WITH SOFTWARE TRANSFER	64
FIGURE 8-1 PROPOSED SITEMAP FOR PREPARATORY PHASE OF RE-ALLOTMENT PLAN	72
FIGURE 8-2 HOMEPAGE DURING PREPARATION RE-ALLOTMENT PLAN.....	73
FIGURE 8-3 SUBPAGE TO SUBMIT WISHES	73
FIGURE 8-4 PROPOSED SITEMAP FOR PUBLIC INSPECTION OF RE-ALLOTMENT PLAN.....	76
FIGURE 8-5 HOMEPAGE PUBLIC INSPECTION OF RE-ALLOTMENT PLAN	77
FIGURE 8-6 SUBPAGE TO VIEW RE-ALLOTMENT PLAN	78
FIGURE 8-7 SUBPAGE TO SUBMIT OBJECTION.....	79

List of tables

TABLE 4-1 MAIN ACTIVITIES OF KADASTER IN LAND CONSOLIDATION PROJECTS	34
TABLE 5-1 USER PROFILES	43
TABLE 5-2 USER PROFILES AND THEIR CHARACTERISTICS	44
TABLE 5-3 USER TASKS, RELATED TO MAPS, PER USER PROFILE	45
TABLE 6-1 BACKGROUND INFORMATION OF TEST PERSONS	58
TABLE 7-1 SECURITY LEVEL IN CASE OF SUBMISSION OF DATA.....	67
TABLE 8-1 SYMBOLISATION OF TOOLS	75

Appendix I - Compendium

Algemene Wet Bestuursrecht	General Administrative Law Act
Belanghebbende	Claimant, stakeholder, beneficiary, interested party
Bestuurscommissie	Executive committee
Bureau Beheer Landbouwgronden (BBL)	Land management service
College Bescherming Persoonsgegevens	Data Protection Authority
Dienst Landelijk Gebied (DLG)	Government Service for Land and Water Management
Dienst Regelingen	Regulation Service
Erfdienstbaarheid	Easement
Inrichtingsplan	Land use plan
Functioneel ontwerp	Functional design
Gedeputeerde Staten	Provincial executive
Kadasterwet	Kadaster Act
Kennisgeving	Acknowledgement
Landbouwtelling (meitelling)	Census of agriculture
Landinrichtingswet	Land Use Act
Lijst der Geldelijke Regelingen	List of financial settlements
Lijst van Rechthebbenden	List of title holders
LTO	Federation of Agriculture and Horticulture
Maatschap	Partnership
Ministerie van Landbouw, Natuur en Voedselveiligheid	Ministry of Agriculture, Nature and Food Quality
Oud vaderlandse rechten	Old native rights
Ontwerp ruilplan	Draft re-allotment plan
Plan van Toedeling	Allotment plan
Rechthebbende	Title holder
R-nummer	Registry number
Ruiklasse	Re-allotment class
Ruilplan	Re-allotment plan
Ruimte en Advies	Spatial planning and consultancy department
Schetsplan	Sketch of re-allotment plan
Subjectnummer	Subject number
Tervisielegging	Period of hearing
Uniforme openbare voorbereidingspro- cedure	Uniform public preparatory procedure
Vrijwillige kavelruil	Voluntary re-allotment
Wenszitting	Hearing of wishes
Wet Inrichting Landelijk Gebied (WILG)	Rural Areas Development Act
Wet bescherming persoonsgegevens	Data Protection Act
Wet openbaarheid van bestuur	Freedom of Information Act
Zakelijke rechten	Rights in rem

Appendix II – Interviews case studies

Interview with Kadaster

Date: 8 januari 2010

Project: 'Voorlopige Grenzen'

Zijn er verschillende gebruikersgroepen onderscheiden? Zo ja, is de applicatie hierop afgestemd?

Feitelijk worden drie gebruikersgroepen onderscheiden, namelijk: (1) notarissen, (2) zakelijke gebruikers, (3) de burger. Er wordt op dit moment alleen nog maar een applicatie ontwikkeld voor de zakelijke klant (notarissen en overige zakelijke klanten). De burgerdoelgroep volgt later. Dit om het project te faseren en van de eerste fase, de meest ervaren klanten, te leren vooraleer het groot uit te rollen.

Zijn de gebruikers betrokken bij de ontwikkeling van de applicatie van het project 'Voorlopige grenzen'? Zo ja, op welke manier.

Op dit moment is er een klantenpanel dat bestaat uit 5 zakelijke klanten. Het klantenpanel maakt op dit moment gebruik van een prototype applicatie. Het Kadaster volgt wat klanten aanleveren en hoe ze dat doen. Daarnaast worden klantenpanel sessies georganiseerd waar de ervaringen tussen deelnemers en Kadaster worden uitgewisseld. Uit de eerste sessie is naar voren gekomen dat men behoefte heeft om de functionaliteit uit te breiden. Men wil niet alleen percelen kunnen splitsen, maar ook percelen kunnen verenigen. Bedrijfstechnisch gezien is het verenigingsverzoek een andere taak dan het splitsen. Dit zal dus technisch niet geïntegreerd worden in één functie. De klant zal twee aparte verzoeken na elkaar moeten indienen om zo de rechtszekerheid in het proces te kunnen borgen.

De themalaag is de kadastrale kaart. Welke kaart wordt als ondergrond gebruikt ter referentie?

Momenteel zijn er vier verschillende kaartlagen in de webapplicatie beschikbaar ter referentie, namelijk de grootschalige basiskaart Nederland (GBKN), luchtfoto's en top50 en top25. De top25 en top50 veranderen automatisch met het in/uitzoomen van de kaart. De gebruiker kan zelf bepalen of de GBKN of luchtfoto's worden aan- of uitgezet. In de toekomst zullen de referentielagen naar verwachting worden uitgebreid met cyclorama's.

In principe is de topografie niet heel erg nodig voor de zakelijke markt, aangezien de meeste zoekvragen via adres of kadastraal perceel binnenkomen. Daarom is in de gebruikersgroep nog niet besproken welke kaart als ondergrond wordt gebruikt ter referentie. Zoeken naar een locatie via topografie is overigens wel mogelijk.

Welke functionaliteit is in de applicatie opgenomen?

- Referentie kaartlagen aan/uitzetten
- In- en uitzoomen
- Kaart verschuiven
- Informatie opvragen van perceel

- Selecteren van te splitsen perceel (of percelen)
- Het tekenen van de voorlopige grens
- Het splitsen van de percelen
- Het berekenen van de nieuwe voorlopige oppervlakte

In de toekomst wordt dit mogelijk uitgebreid met de mogelijkheid om:

- percelen te verenigen.
- de voorlopige grens op basis van een bepaalde oppervlakte (tussen partijen) in te rekenen.

Wat is de vereiste nauwkeurigheid van de aangeleverde data (voorlopige grenzen) door de zakelijke klant?

De aangegeven voorlopige grens moet binnen het te splitsen perceel of de te splitsen percelen vallen. Verder zijn er geen eisen. De aangeleverde grens is, zoals de naam al zegt, een voorlopige grens. Deze zal altijd in het veld worden aangewezen door partijen, waarna deze wordt ingemeten.

Er moet nog wel een standpunt worden ingenomen over de juridische status van een voorlopige grens. Door de voorlopige grens zijn er drie verschillende oppervlaktes in gebruik; de oppervlakte zoals in de akte genoemd, de voorlopige oppervlakte zoals deze is berekend na splitsing, en de vastgestelde oppervlakte na inmeting van de grens. Tussen deze drie oppervlaktes kunnen verschillen ontstaan. Met name tussen de oppervlakte in de akte en de voorlopige oppervlakte kunnen gemakkelijk grote verschillen ontstaan. Partijen spreken bijvoorbeeld af om een gedeelte van een perceel af te splitsen van een bepaald perceel op een nader gedefinieerde grens. Vaak wordt op basis van inschatting een oppervlakte bepaald. Deze kan later anders blijken te zijn nadat de voorlopige grens via de applicatie is ingetekend. Omdat partijen er in het algemeen belang bij hebben om de oppervlakte zo nauwkeurig mogelijk te bepalen (vaak wordt immers een verrekenprijs per oppervlakte eenheid afgesproken), ligt het niet voor de hand dat men opzettelijk een verkeerde inschatting zal maken.

Hoe is de authenticatie en validatie van de gebruiker geregeld?

De notaris is gemachtigd om een perceel te splitsen namens een klant. Vaak is het de bedoeling dat een deel van een perceel wordt gesplitst, omdat het wordt verkocht. Normaal gesproken zal een klant alleen zijn eigen perceel willen splitsen. Echter, in sommige gevallen kan het wenselijk zijn dat een derde partij een perceel splitst. De eigenaar krijgt in dat geval ook een kennisgeving. Mocht de derde partij het niet eens zijn met de splitsing dan kan hij dat bij het Kadaster aangeven. De situatie wordt dan teruggezet en de initiatiefnemer van de splitsing draait voor de kosten op. Bij splitsen is het risico met het borgen van de rechtszekerheid klein, vandaar dat repressief toetsen in beginsel volstaat. Daarnaast is de klant die het splitsingsverzoek doet bekend, omdat hij inlogt via MijnKadaster waaraan een gebruikersovereenkomst hangt. Als de klant 3x een fout heeft gemaakt, wordt een volgend verzoek niet in behandeling genomen. Hoe de authenticatie bij burgers wordt geregeld is op dit moment nog niet bekend. Het ligt echter voor de hand dat ze bijvoorbeeld via MijnOverheid kunnen inloggen en dat ze alleen hun eigen perceel kunnen splitsen.

Validatie van het splitsingsverzoek is niet nodig omdat er randvoorwaarden in de applicatie zijn ingebouwd (zie hieronder).

Krijgt de gebruiker ook een foutmelding bij bepaalde (niet gewenste) aangeleverde voorlopige grenzen?

De applicatie heeft de volgende randvoorwaarden ingebouwd:

- over en undershoots worden automatisch aangepast;
- lijnen van de nieuwe grens mogen elkaar niet kruisen;
- lijn mag niet buiten het te splitsen perceel of de te splitsen percelen vallen;
- een polygoon mag wel worden ingetekend, dit kan bijvoorbeeld handig zijn bij het afsplitsen van een trafohuisje van een bestaand perceel.

Wat beschouwen de gebruikers als voordelen en wat als nadelen?

De gronduitgifte in nieuwbouwwijken wordt veel gemakkelijker voor betrokken partijen (grond uitgevende organisatie, hypotheekverstrekkers). Aangezien op voorhand kan worden gesplitst is voor alle partijen duidelijk waar het af te splitsen gedeelte van het perceel is gelegen. Verder hoeft ook geen vernummering meer plaats te vinden. Hypotheekhouders weten nu welk deel van het gehele perceel wordt bezwaard met een hypotheek (bepalen waarde onderpand).

Indien de voorlopige oppervlakte redelijk betrouwbaar is, dan heeft het ook voordelen voor het vaststellen van de WOZ waarde. Tevens hebben partijen bij aankoop een redelijke inschatting van de prijs indien op oppervlakte wordt verrekend.

Splitsen van appartementen kan gebeuren doordat het grondperceel op voorhand wordt vastgesteld. Een grondperceel is een voorwaarde voor het uitgeven van appartementsrechten.

Interview with Regulation Service

Date: 29 april 2010

Project: 'Digitale aangifte gecombineerde opgave via internet'

Hoeveel % doet de aangifte van de meitelling / gecombineerde opgave online? Is dit een stijging of daling ten opzichte van voorgaande jaren? Wat zou de reden van de stijging / daling kunnen zijn?

In totaal moeten ongeveer 80.000 boeren een gecombineerde opgave doen. Hiervan heeft het volgende percentage de opgave de afgelopen jaren digitaal via internet ingevuld:

2006	12% via internet
2007	20% via internet
2008	40% via internet
2009	70% via internet
2010	doel: 85% digitaal via internet

Er is dus een duidelijke stijging te zien. Dienst Regelingen heeft het eerste jaar boeren alleen geïnformeerd over het bestaan van de website. De jaren daarna is de digitale opgave sterk gepromoot. Degenen die het voorgaande jaar de opgave online hebben gedaan, krijgen alleen een brief zonder bijlagen om de opgave analoog te doen. De laatste twee jaar is, in combinatie met het aanmoedigen van de opgave via internet, het doen van de aangifte via papier sterk ontmoedigd. Boeren krijgen bijvoorbeeld niet meer standaard de set papieren voor de analoge aangifte thuis gestuurd. Hiervoor moeten ze een speciaal nummer bellen.

Wat voor voordelen heeft de applicatie voor de werkprocessen bij Dienst Regelingen?

Aanleiding voor de introductie van de digitale opgave via internet voor Dienst Regelingen was de wens tot kostenbesparing. De reductie van kosten zit voornamelijk in het verminderen van de administratie nadat de opgaven zijn binnengekomen (orde van grootte: paar miljoen euro). Ongeveer 30% van de papieren opgaven moest worden teruggestuurd vanwege fouten, onvolledigheid of onduidelijkheden. Bij de digitale opgave via internet is dat nog maar 1%. Zaken die verminderd worden door de digitale opgave zijn:

- fouten
- onvolledigheid
- onduidelijkheid
- invoer van gegevens (van analoge opgave)

Zijn er ook nadelen?

Ja, de kosten zijn erg hoog. Het betreft zowel de initiële kosten van het ontwikkelen van de website (programmeren, pionieren d.w.z. geen vergelijkbare projecten voorhanden) als de kosten om de website in de lucht te houden (adaptief onderhoud, hardware, netwerken klaarzetten). De kosten voor het beheer hangen ook sterk af van het aantal gebruikers, met name voor de hardware kosten. In het geval van de gecombineerde opgave betreft het een grote doelgroep van circa 80.000 gebruikers met overeenkomstige kosten voor de hardware. Hoe meer gebruikers, hoe meer hardware nodig is. Dit brengt ook meer beheer met zich mee, naast de aanschaf van extra hardware. De beheerkosten lopen dus op met het aantal gebruikers, maar minder hard dan met de analoge opgave.

Verder blijven beleidswijzigingen altijd plaatsvinden, waardoor de applicatie moet worden aangepast. De basis blijft hetzelfde, maar toch kunnen forse aanpassingen nodig zijn. Om een indicatie te geven van de omvang: om de applicatie klaar te maken voor de jaarlijkse gecombineerde opgave via internet zijn ongeveer 20 personen een half jaar lang bezig met programmeren, aanpassen hardware en het klaarzetten van de netwerken.

Het is de verwachting dat de ontwikkelkosten de komende jaren fors lager worden. Binnen Dienst Regelingen is steeds meer kennis van inhoud en techniek aanwezig en de applicatie is ook functioneel steeds stabiel (we groeien uit de kinderziektes). Het leergeld van de afgelopen jaren begint zich terug te betalen.

Wat werd vooraf door Dienst Regelingen als voordeel beschouwd voor de gebruiker ten opzichte van de analoge aangifte?

In principe wordt gebruik gemaakt van de gegevens van het jaar ervoor. Een groot gedeelte van de opgave is dus al ingevuld / voorgedrukt. De boer hoeft alleen wijzigingen door te voeren indien er het afgelopen jaar wijzigingen zijn opgetreden.

Wat beschouwen de gebruikers als voordeel om de aangifte online via de webservice te doen?

Uit klantonderzoek blijkt dat men erg te spreken is over het feit dat de meeste gegevens al zijn ingevuld. Dit vergemakkelijkt het invullen. Verder is het gemakkelijk dat een waarschuwing wordt gegeven wanneer iets fout wordt gedaan. Deze foutmeldingen helpen de gebruiker verder op weg.

Wat beschouwen de gebruikers als nadeel om de aangifte online via de webservice te doen?

Het GIS gedeelte vindt men erg moeilijk, ook al is geprobeerd om de geo-applicatie zo intuïtief mogelijk te ontwerpen (incl. functionaliteit). De gebruikers willen het nog makkelijker. Een voorbeeld is bijvoorbeeld de mogelijkheid om een perceel van 4 ha naar 7 ha te vergroten door aan te geven welke grens op moet schuiven. Het programma zou dan moeten uitrekenen waar de nieuwe grens komt te liggen afhankelijk van de opgegeven oppervlakte.

Zijn er ooit problemen geweest tijdens de periode van aangifte, bijvoorbeeld dat de web service niet bereikbaar was, of dat delen niet werkten? Zo ja, wat voor maatregelen zijn er toen genomen om dit te voorkomen?

Er zijn veel performance problemen geweest, bijvoorbeeld een lange wachttijd. De stabiliteit wordt met de jaren steeds beter. Door veel testen van tevoren kan een groot deel van de problemen worden voorkomen. Verder is het verstandig om direct een melding van het probleem op de website te plaatsen. Bij het testen moet rekening worden gehouden met het feit dat gebruikers van verschillende software gebruik kunnen maken om de website te benaderen, bijvoorbeeld Firefox of Internet Explorer. Het blijkt dat voor de applicatie van Dienst Regelingen 97% van de mensen Internet Explorer gebruikt en slechts 3% Firefox.

Door gebruikers wordt informatie ge-upload voor de gecombineerde opgave. Hoe vindt authenticatie van deze gebruiker plaats? Wordt hierbij onderscheid gemaakt tussen bedrijven (niet-natuurlijke personen) en personen?

Authenticatie van de gebruiker kan op twee manieren plaatsvinden. Men kan op de beginpagina kiezen voor inloggen via username en wachtwoord of via DigiD. De user name en wachtwoord gelden voor alle e-diensten van het ministerie van LNV. Deze gegevens worden per post verstrekt, op het adres zoals bij Dienst Regelingen bekend, en zijn niet wijzigbaar. Verder wordt gebruik gemaakt van een elektronische handtekening met een TAN code. Deze TAN code wordt per post verstuurd (lijst met 15 codes). In de nabije toekomst kan ook een sms'je naar de mobiele telefoon worden verzonden. Boeren kunnen via een machtiging ook hun opgave laten invullen door bijvoorbeeld een accountant. Voor de gemachtigde is een machtigingssysteem met eigen TAN codes in gebruik.

De landelijke DigiD voor bedrijven komt te vervallen, hoewel deze door een ander soort e-authenticatie wordt opgevolgd. Details daarover zijn nog niet bekend. De wens bestaat dat de Kamer van Koophandel een relatie legt tussen individuen en bedrijven zodat dit bestand door meerdere organisaties gebruikt kan worden.

De transactie van de gecombineerde opgave via internet gaat via een https-site.

In hoeverre wordt de aangeleverde geo-informatie gevalideerd? Zijn bepaalde opgaven bijvoorbeeld niet mogelijk en hoe wordt de gebruiker hiervan op de hoogte gesteld? Kunnen bepaalde percelen (bebouwde) bijvoorbeeld niet worden aangeklikt?

Aan de linkerkant van de applicatie bevindt zich het administratieve gedeelte. Aan de rechterkant van het scherm wordt het geografische gedeelte getoond. Beide zijn aan elkaar gekoppeld.

Verschillende zaken zijn niet mogelijk om een foutieve opgave te voorkomen. In beginsel kunnen gebruikers geen fouten meer maken, omdat dit door de applicatie niet wordt toegestaan. Zaken kunnen wel conflicteren, bijvoorbeeld twee relaties die hetzelfde perceel in gebruik hebben (volgens de opgave van beider relaties). De gebruiker krijgt wel een waarschuwing, maar het is niet onmogelijk om dat perceel op te geven. Dienst Regelingen belt in dit soort situaties naar de relaties om te verifiëren hoe de vork in de steel zit.

Boeren kunnen ook gebruik maken van de applicatie GeoBoer. Deze applicatie communiceert tussen het bedrijfsmanagementsysteem van de boer met de computers van Dienst Regelingen. Hiermee hoeft de boer maar één keer een wijziging in bijvoorbeeld perceelgebruik in te voeren, namelijk in zijn bedrijfsmanagementsysteem. Via GeoBoer kan deze informatie wederom worden gebruikt voor de gecombineerde opgave (eenmalig inwinnen, meervoudig gebruik). GeoBoer valideert de aangeleverde gegevens vanuit het bedrijfsmanagementsysteem en bepaalt of de informatie wel of niet geaccepteerd wordt.

De gebruikers zijn betrokken bij de ontwikkeling van de applicatie. Is de website ook geëvalueerd door gebruikers? Wat zijn aandachtspunten met betrekking tot de gebruiksvriendelijkheid van de website?

De gebruikersgroep is door de jaren heen van samenstelling gewisseld. Op dit moment wordt gebruik gemaakt van een internetpanel van ongeveer 450 mensen. In principe wordt elk jaar de nieuwe, aangepaste applicatie getest. Dit jaar hadden we hier echter onvoldoende tijd voor beschikbaar. We

hebben de test in een kleinere kring uitgevoerd. Niet alle zaken die door het panel worden aangegeven kunnen direct worden meegenomen, maar op termijn worden bepaalde zaken wel aangepast.

Het is erg nuttig om enthousiaste en mopperende gebruikers te selecteren voor het panel. Vaak hebben ze zinnige opmerkingen over hoe het beter kan. Dit verhoogt de gebruiksvriendelijkheid. Verder moet je altijd als uitgangspunt nemen dat de gebruikers geen ervaren mensen zijn voor wat betreft GIS applicaties.

De gebruikers kunnen gebruik maken van verschillende referentielagen. Over het algemeen willen de gebruikers meer informatie, bijvoorbeeld de coördinaten van een bepaalde locatie. Verder is het zinvol om een cartograaf te consulteren voor het kaartmateriaal dat wordt gebruikt in de webapplicatie vanwege hun specifieke ervaring met het maken van kaarten en bijbehorende overwegingen.

Appendix III – User survey

A - Questionnaire

Onderzoek verbetering informatieverstrekking in landinrichtingsprojecten.

Voor het landinrichtingsproject Land van Maas en Waal is bij de terinzagelegging van het plan van toedeling een website gemaakt waarop rechthebbenden hun toedeling konden bekijken. Het Kadaster wil graag onderzoeken welke mogelijkheden er zijn om deze service verder uit te breiden, zodat we u nog beter van dienst kunnen zijn. Hierbij kunt u denken aan het indienen van een bezwaar via internet, het laten registreren van pacht of het uitbrengen van uw wensen ten aanzien van de toedeling.

Aan de hand van dit onderzoek willen we graag uw wensen rondom de informatieverstrekking in kaart brengen. Het invullen van de enquête duurt ongeveer 5 minuten. Alvast hartelijk dank voor uw deelname.

1. Wat is uw leeftijd?

..... jaar

2. Welke situatie is op u van toepassing?

(1 antwoord mogelijk)

- Particulier
- Agrarisch bedrijf, 1 – 10 ha eigendom en/of pacht
- Agrarisch bedrijf, meer dan 10 ha eigendom en/of pacht
- Overheid (waterschap, gemeente, staat, BBL etc.)
- Financiële instelling
- Nutsbedrijf
- (Institutionele) verpachter
- Anders, namelijk

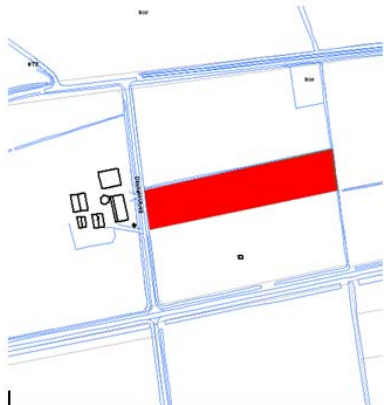
3. Heeft u toegang tot internet?

- Ja
- Nee

4. In hoeverre heeft u ervaring met het gebruik van internet?

- Ik gebruik internet (zeer) regelmatig
- Ik gebruik internet af en toe
- Ik gebruik internet slechts een enkele keer
- Ik heb geen ervaring

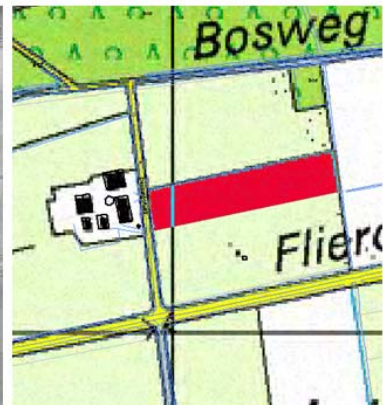
5. Heeft u weleens een transacties via internet gedaan (bijvoorbeeld een boek bestellen, aanvraag bouwvergunning, belastingaangifte)?
- Ja
 Nee
6. Heeft u wel eens een website bezocht waarmee u actief met kaarten bezig bent, bijvoorbeeld inzoomen, uitzoomen of een kaart verschuiven?
- Ja
 Nee
7. Hoe vaak bezoekt u een website waarmee u actief met kaarten bezig bent?
- Regelmatig
 Af en toe
 Zelden
 Nooit
8. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? Meerdere antwoorden mogelijk.
- In- en uitzoomen
 Informatieknop
 Kaart verschuiven
 Lagen aan- en uitzetten
 Anders, namelijk ...
 Geen / weet niet
9. Stel dat het via een website mogelijk is op een kaart **in te zoomen**, welke van de onderstaande kaarten heeft dan uw voorkeur (bijvoorbeeld schaal 1 : 5.000)?



Kaart 1



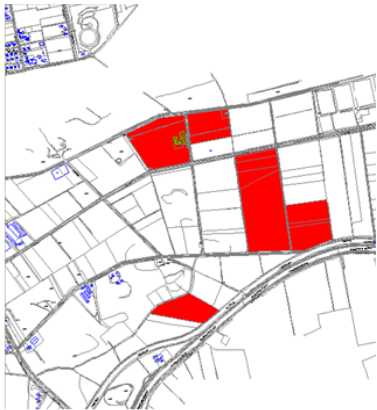
Kaart 2



Kaart 3

- Kaart 1
 Kaart 2
 Kaart 3

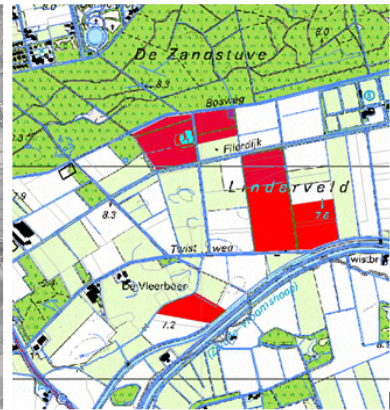
10. Stel dat het via een website mogelijk is een kaart **uit te zoomen**, welke van de onderstaande kaarten heeft dan uw voorkeur (bijvoorbeeld schaal 1 : 50.000)?



Kaart 1



Kaart 2



Kaart 3

- Kaart 1
- Kaart 2
- Kaart 3

11. a. In hoeverre bent u van plan om de volgende toepassingen via de website te gebruiken als ze beschikbaar zijn?

	Zeker wel	Waarschijnlijk wel	Waarschijnlijk niet	Zeker niet	Weet niet
Digitaal een bezwaar indienen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Digitaal een pachtcontract indienen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toedelingswensen op de kaart aangeven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Heeft u nog ideeën over andere toepassingsmogelijkheden voor de website?

.....

.....

12. Waarom niet? (Indien u waarschijnlijk of zeker geen gebruik gaat maken van de toepassingsmogelijkheden die bij vraag 11 worden genoemd). Meerdere antwoorden mogelijk.

- Ik vind het te moeilijk.
- Ik beschik niet over de juiste middelen (geen internetaansluiting, computer, scanner etc.)
- Ik geef de voorkeur aan een andere manier (per post, persoonlijk overhandigen etc.)
- Ik twijfel over de veiligheid om digitaal aan te leveren
- Anders, namelijk

13. Ziet u voordelen en/of nadelen om informatie via internet aan de landinrichtingscommissie aan te leveren?

- Voordelen, namelijk
-
-

- Nadelen, namelijk
-
-

14. a. In hoeverre zijn de onderstaande aspecten voor u van belang als u informatie aan de landinrichtingscommissie verstrekt via internet?

	Zeer belangrijk	Belangrijk	Niet zo belangrijk	Helemaal niet belangrijk	Weet niet
Veiligheid opslag van gegevens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Veiligheid versturen van gegevens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Privacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Betrouwbaarheid (foutmeldingen of storingen)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Zijn er volgens u nog andere aspecten van belang?

.....

15. Wat vindt u van het idee dat iedereen in het landinrichtingsgebied op internet kan zien wie de eigenaar is van een perceel (in de oude of nieuwe situatie)?

- Uitstekend idee
- Zeer goed idee
- Goed idee
- Niet zo'n goed idee
- Helemaal geen goed idee

16. Waarom vindt u dit (g)een goed idee?

.....

17. Heeft u nog opmerkingen, tips of ideeën, dan kunt u die hieronder kwijt.

.....

Hartelijk dank voor uw deelname.

B - Results

Landinrichtingsproject

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Land van Maas en Waal	58	58,0	58,0	58,0
	Saasveld-Gammelke	42	42,0	42,0	100,0
	Total	100	100,0	100,0	

1. Wat is uw leeftijd? (bewerkt naar leeftijdklasse)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-29	2	2,0	2,0	2,0
	30-39	8	8,0	8,1	10,1
	40-49	24	24,0	24,2	34,3
	50-59	30	30,0	30,3	64,6
	60-69	24	24,0	24,2	88,9
	70-79	7	7,0	7,1	96,0
	80-89	2	2,0	2,0	98,0
	90-99	2	2,0	2,0	100,0
	Total	99	99,0	100,0	
Missing	System	1	1,0		
	Total	100	100,0		

2. Welke situatie is op u van toepassing?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Particulier	54	54,0	54,0	54,0
	Agrarisch bedrijf, 1 tot 10 ha eigendom en/of pacht	19	19,0	19,0	73,0
	Agrarisch bedrijf, meer dan 10 ha eigendom en/of pacht	11	11,0	11,0	84,0
	Overheid (waterschap, gemeente, provincie, rijksoverheid etc.)	5	5,0	5,0	89,0
	Nutsbedrijf	1	1,0	1,0	90,0
	(Institutionele) verpachter	2	2,0	2,0	92,0
	Anders, namelijk	8	8,0	8,0	100,0
	Total	100	100,0	100,0	

2. Welke situatie is op u van toepassing? A: Anders, namelijk

1. bestuurder kerkbestuur
2. camping
3. eigenaar landgoed
4. hobbyboer, 1,4 ha eigendom
5. onderneming (vastgoed)
6. particulier met 1 - 10 ha eigendom

3. Heeft u toegang tot internet?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	91	91,0	91,0	91,0
	Nee	9	9,0	9,0	100,0
	Total	100	100,0	100,0	

4. In hoeverre heeft u ervaring met het gebruik van internet?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik gebruik internet (zeer) regelmatig	65	65,0	65,0	65,0
	Ik gebruik internet af en toe	16	16,0	16,0	81,0
	Ik gebruik internet slechts een enkele keer	7	7,0	7,0	88,0
	Ik heb geen ervaring	12	12,0	12,0	100,0
	Total	100	100,0	100,0	

5. Heeft u weleens een transacties via internet gedaan (bijvoorbeeld een boek bestellen, aanvraag bouwvergunning, belastingaangifte)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	77	77,0	77,8	77,8
	Nee	22	22,0	22,2	100,0
	Total	99	99,0	100,0	
Missing	-99	1	1,0		
Total		100	100,0		

6. Heeft u wel eens een website bezocht waarmee u actief met kaarten bezig bent, bijvoorbeeld inzoomen, uitzoomen of een kaart verschuiven?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	72	72,0	72,7	72,7
	Nee	27	27,0	27,3	100,0
	Total	99	99,0	100,0	
Missing	-99	1	1,0		
Total		100	100,0		

7. Hoe vaak bezoekt u een website waarmee u actief met kaarten bezig bent?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Regelmatig	19	19,0	21,3	21,3
	Af en toe	41	41,0	46,1	67,4
	Zelden	15	15,0	16,9	84,3
	Nooit	14	14,0	15,7	100,0
	Total	89	89,0	100,0	
Missing	-99	11	11,0		
Total		100	100,0		

8-1. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? A: In- en uitzoomen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	niet	27	27,0	27,0	27,0
	wel	73	73,0	73,0	100,0
Total		100	100,0	100,0	

8-2. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? A: Informatieknop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	niet	62	62,0	62,0	62,0
	wel	38	38,0	38,0	100,0
Total		100	100,0	100,0	

8-3. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? A: Kaart verschuiven

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid niet	46	46,0	46,0	46,0
wel	54	54,0	54,0	100,0
Total	100	100,0	100,0	

8-4. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? A: Lagen aan- en uitzetten

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid niet	77	77,0	77,0	77,0
wel	23	23,0	23,0	100,0
Total	100	100,0	100,0	

8-5. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? A: Anders, namelijk

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid niet	96	96,0	96,0	96,0
wel	4	4,0	4,0	100,0
Total	100	100,0	100,0	

8-6. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? A: Geen / weet niet

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid niet	79	79,0	79,0	79,0
wel	21	21,0	21,0	100,0
Total	100	100,0	100,0	

8-7. Welke functionaliteiten vindt u belangrijk op een website waarmee u actief met kaarten bezig bent? A: Anders, namelijk

1. draaien zodat situatie ter plekke bekeken kan worden
2. eenvoud in opzet
3. grote van percelen met kadastrnr e.d.
4. uitprinten

9. Stel dat het via een website mogelijk is op een kaart in te zoomen, welke van de onderstaande kaarten heeft dan uw voorkeur (bijvoorbeeld schaal 1 : 5.000)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Kaart 1	9	9,0	9,7	9,7
	Kaart 2	17	17,0	18,3	28,0
	Kaart 3	67	67,0	72,0	100,0
	Total	93	93,0	100,0	
Missing	-99	7	7,0		
Total		100	100,0		

10. Stel dat het via een website mogelijk is een kaart uit te zoomen, welke van de onderstaande kaarten heeft dan uw voorkeur (bijvoorbeeld schaal 1 : 50.000)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Kaart 1	9	9,0	9,9	9,9
	Kaart 2	9	9,0	9,9	19,8
	Kaart 3	73	73,0	80,2	100,0
	Total	91	91,0	100,0	
Missing	-99	9	9,0		
Total		100	100,0		

11-1. In hoeverre bent u van plan om de volgende toepassingen via de website te gebruiken als ze beschikbaar zijn? A: Digitaal een bezwaar indienen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zeker wel	9	9,0	10,0	10,0
	Waarschijnlijk wel	34	34,0	37,8	47,8
	Waarschijnlijk niet	18	18,0	20,0	67,8
	Zeker niet	16	16,0	17,8	85,6
	Weet niet	13	13,0	14,4	100,0
	Total	90	90,0	100,0	
Missing	-99	10	10,0		
Total		100	100,0		

11-2. In hoeverre bent u van plan om de volgende toepassingen via de website te gebruiken als ze beschikbaar zijn? A: Digitaal een pachtcontract indienen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zeker wel	4	4,0	4,7	4,7
	Waarschijnlijk wel	21	21,0	24,7	29,4
	Waarschijnlijk niet	20	20,0	23,5	52,9
	Zeker niet	24	24,0	28,2	81,2
	Weet niet	16	16,0	18,8	100,0
	Total	85	85,0	100,0	
Missing	-99	15	15,0		
Total		100	100,0		

11-3. In hoeverre bent u van plan om de volgende toepassingen via de website te gebruiken als ze beschikbaar zijn? A: Toedelingswensen op de kaart aangeven

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zeker wel	13	13,0	14,6	14,6
	Waarschijnlijk wel	32	32,0	36,0	50,6
	Waarschijnlijk niet	15	15,0	16,9	67,4
	Zeker niet	14	14,0	15,7	83,1
	Weet niet	15	15,0	16,9	100,0
	Total	89	89,0	100,0	
Missing	-99	11	11,0		
Total		100	100,0		

11-4. Heeft u nog ideeën over andere toepassingsmogelijkheden voor de website?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	13	13,0	13,0	13,0
	Nee	87	87,0	87,0	100,0
Total		100	100,0	100,0	

11-5. Heeft u nog ideeën over andere toepassingsmogelijkheden voor de website? A: Ja

1. bij het indienen is een ontvangstbevestiging een vereiste
2. denk om privacy (hypothecaire aktes)
3. digitale kaart onderdelen van o.g. transacties laten zien (schrift onleesbaar)
4. duidelijk aangeven waar wat staat. Alle informatie tonen vanaf begin terinzagelegging.
5. eigenaar van diverse percelen omschreven en grootte van percelen
6. feedback over mogelijkheden of onmogelijkheden mbt toedelingswensen + duidelijkheid omtrent kosten

7. graag straat + plaatsnamen duidelijk vermeld
8. het volgen van de procedure via internet
9. ik heb geen computer
10. meetpunten aangeven en lengte-breedte maten percelen
11. mogelijk beschikbare bouwkevels zoeken
12. Nee liever per post. Niet iedereen heeft een computer houd daar ook rekening mee
13. Tav herinrichtingsplan geeft het betrokkenheid, wanneer de grondtoedelingen in directe omgeving bekend zijn via internet, dwz in relatie met de eigen grond toedelingen die van de naobers

12-1. Waarom niet? A: Ik vind het te moeilijk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nee	51	51,0	86,4	86,4
	ja	8	8,0	13,6	100,0
	Total	59	59,0	100,0	
Missing	-99	41	41,0		
Total		100	100,0		

12-2. Waarom niet? A: Ik beschik niet over de juiste middelen (geen internetaansluiting, computer, scanner etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nee	52	52,0	88,1	88,1
	ja	7	7,0	11,9	100,0
	Total	59	59,0	100,0	
Missing	-99	41	41,0		
Total		100	100,0		

12-3. Waarom niet? A: Ik geef de voorkeur aan een andere manier (per post, persoonlijk overhandigen etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nee	25	25,0	42,4	42,4
	ja	34	34,0	57,6	100,0
	Total	59	59,0	100,0	
Missing	-99	41	41,0		
Total		100	100,0		

12-4. Waarom niet? A: Ik twijfel over de veiligheid om digitaal aan te leveren

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nee	49	49,0	83,1	83,1
	ja	10	10,0	16,9	100,0
	Total	59	59,0	100,0	
Missing	-99	41	41,0		
Total		100	100,0		

12-5. Waarom niet? A: Anders, namelijk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nee	46	46,0	79,3	79,3
	ja	12	12,0	20,7	100,0
	Total	58	58,0	100,0	
Missing	-99	42	42,0		
Total		100	100,0		

12-6. Waarom niet? A: Anders, namelijk

1. aangetekend versturen (ontvangstbevestiging)
2. bestuurlijke besluitvorming nodig
3. komt niet voor / te zelden, dus niet van belang
4. maak er bijna geen gebruik van
5. n.v.t.
6. pacht niet van toepassing, taak van de pachter (?)
7. pachtcontracten komt niet voor
8. particulier en geen agrariër, pachten etc. nvt
9. procedures intern mbt verandering, archivering
10. twijfel over de duidelijkheid bij digitaal indienen
11. volgens mij heb ik er geen belang bij
12. waarschijnlijk niet nodig

13-1. Ziet u voordelen en/of nadelen om informatie via internet aan de landinrichtingscommissie aan te leveren? A: Voordelen, namelijk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nee	36	36,0	36,0	36,0
	ja	64	64,0	64,0	100,0
	Total	100	100,0	100,0	

13-2. Ziet u voordelen en/of nadelen om informatie via internet aan de landinrichtingscommissie aan te leveren? A: Nadelen, namelijk

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid nee	69	69,0	69,0	69,0
ja	31	31,0	31,0	100,0
Total	100	100,0	100,0	

13-3. Ziet u voordelen en/of nadelen om informatie via internet aan de landinrichtingscommissie aan te leveren? A: Voordelen, namelijk

1. 24 uur per dag bereikbaar
2. actuele informatie, antwoorden automatisch verwerken in systeem van het kadaster
3. als extra mogelijkheid om wensen kenbaar te maken, niet als enige mogelijkheid
4. als het niet moeilijk wordt opgezet heeft het voordelen (sneller)
5. bereikbaarheid, inzichtelijkheid
6. beter en directe inzage
7. communicatie is sneller
8. correspondentie wordt vergemakkelijkt. De kavelverdelingen zijn snel overzichtelijk, ook zonder vermelding van grondeigenaar. Natuurlijk wel gevoeligheden (!) bij te veel informatie maar ik neem aan dat de kaarten voldoende geprivatiseerd kunnen worden, dwz toegesneden op de betreffende grondeigenaar.
9. digitaal een pachtcontract indienen
10. direct, makkelijk en snel.
11. directe aanlevering
12. directer
13. eenvoud en sneller voor en milieu (papier)
14. gaat sneller
15. gaat sneller dan informatie per post
16. gemak en snelheid
17. gemakkelijk
18. het ligt vast dat ik deze verzonden heb
19. het werkt sneller en gemakkelijker
20. het wordt sneller gelezen
21. ik hoef er geen aangegeven tijd meer vrij te maken
22. ik zie voornamelijk voordelen voor uw organisatie
23. informatie is direct toegankelijk en communicatie kan snel verlopen
24. informatieverstrekking is en blijft via internet snel en toegankelijk
25. je kunt de info zo inzien
26. kaarten kunnen digitaal uitgewisseld worden, sneller en minder kans op fouten
27. kan ik doen wanneer het mij uitkomt
28. maar dan voor de jongeren dan mij

29. makkelijk, snel
30. makkelijker
31. past in deze tijd, werkt snel
32. snel
33. sneller
34. snel, duidelijk, efficiënt
35. snel, info-uitwisseling, schakelen
36. snel, minder papierwerk
37. snel, niet aan tijd gebonden, thuis te doen, alle informatie bij de hand
38. snelheid
39. snel
40. snelheid en zelf altijd direct weer de verstrekte informatie ter beschikking hebben, geen zoekwerk in mappen
41. snelheid informatieoverdracht, kosten / tijdsbesparing
42. snelheid voor beide partijen: moderne communicatie..je ontkomt er niet aan
43. snelheid, gemak
44. snelheid, ook andersom van landinrichtingscommissie naar grondeigenaren / gebruikers
45. snelle communicatie
46. sneller
47. sneller op de plek van bestemming
48. snelheid
49. sneller, directer
50. sneller, eenvoudiger en geregistreerd
51. sneller, maar zie graag ook altijd nog iets schriftelijk (per post) tegemoet komen
52. sneller, makkelijker
53. snellere manier van communiceren
54. tijd
55. sneller
56. toegankelijk binnen organisatie voor meerdere personen
57. veel sneller
58. snelheid
59. via de kaarten sneller en beter overzicht

13-4. Ziet u voordelen en/of nadelen om informatie via internet aan de landinrichtingscommissie aan te leveren? A: Nadelen, namelijk

1. (on)duidelijkheid
2. als de computer gecrasht wordt ben je alles kwijt
3. als ik het niet gezien heb
4. ben bang dat ik er (nog) niet zo handig in ben
5. bij bestuurlijke besluitvorming niet wenselijk cq. onmogelijk
6. blijft het bewaard? Heb het graag op papier
7. controle op duidelijkheid voor de ontvanger, onzekerheid over de ontvangst

8. de computer kan ook kapot gaan (en dan heb je niks ontvangen)
9. de info digitaal is nooit compleet genoeg, bij inzenden met ontvangstbevestiging of een stempel meer juridische zekerheden.
10. digitaal een bezwaar indienen liever per post
11. geen
12. geen controle op afname / binnenkomst, per post kan aangetekend worden verzonden (controle)
13. ik geen ervaring heb met computers
14. ik kijk 1 maal per maand op de computer, geen ervaring
15. ik wil graag een bevestiging op papier hebben
16. inbreuk op privacy, men kan namelijk nog altijd alles van je zien
17. Je bereikt niet iedereen op deze manier
18. kaarten moeilijk printbaar
19. liever persoonlijk contact, over en weer meer mogelijkheden om te communiceren
20. niet fijn lezen, liever op papier
21. omdat ik niet over internet beschik
22. onpersoonlijk
23. persoonlijk contact heeft de voorkeur
24. rechtsgeldigheid
25. stukje zekerheid
26. u staat nu al te ver van de agrariërs. Tafelgesprekken veel belangrijker en luisteren naar de mensen in het veld.
27. vaak moet iets goed mondeling besproken worden. Dat kan niet via internet. Mondeling is duidelijker.
28. veiligheid bij versturen gegevens is iets dat goed geregeld moet zijn
29. wel een ontvangstbevestiging krijgen
30. zekerheid, uitprinten ivm dossiervorming

14.1 Veiligheid opslag van gegevens

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zeer belangrijk	55	55,0	63,2	63,2
	Belangrijk	24	24,0	27,6	90,8
	Niet zo belangrijk	2	2,0	2,3	93,1
	Helemaal niet belangrijk	2	2,0	2,3	95,4
	Weet niet	4	4,0	4,6	100,0
	Total	87	87,0	100,0	
Missing	-99	13	13,0		
Total		100	100,0		

14.2 Veiligheid versturen van gegevens

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zeer belangrijk	57	57,0	67,1	67,1
	Belangrijk	20	20,0	23,5	90,6
	Niet zo belangrijk	2	2,0	2,4	92,9
	Helemaal niet belangrijk	2	2,0	2,4	95,3
	Weet niet	4	4,0	4,7	100,0
	Total	85	85,0	100,0	
Missing	-99	15	15,0		
Total		100	100,0		

14.3 Privacy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zeer belangrijk	55	55,0	64,7	64,7
	Belangrijk	21	21,0	24,7	89,4
	Niet zo belangrijk	3	3,0	3,5	92,9
	Helemaal niet belangrijk	2	2,0	2,4	95,3
	Weet niet	4	4,0	4,7	100,0
	Total	85	85,0	100,0	
Missing	-99	15	15,0		
Total		100	100,0		

14.4 Betrouwbaarheid (foutmeldingen of storingen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zeer belangrijk	49	49,0	57,6	57,6
	Belangrijk	29	29,0	34,1	91,8
	Niet zo belangrijk	1	1,0	1,2	92,9
	Helemaal niet belangrijk	2	2,0	2,4	95,3
	Weet niet	4	4,0	4,7	100,0
	Total	85	85,0	100,0	
Missing	-99	15	15,0		
Total		100	100,0		

14-5. Zijn er volgens u nog andere aspecten van belang als u informatie aan de landinrichtingscommissie verstrekt via internet?

1. actueel is zeer belangrijk
2. Afweging.... niet alles is wenselijk per internet: internet kan erg onpersoonlijk overkomen.

3. altijd afschrift
4. anonimiteit
5. Belangrijk is dat duidelijk is welke persoonlijke informatie van grondeigenaren wel en niet vermeld kunnen worden op een internetsite die algemeen toegankelijk is. Wanneer de site toch enige mate geprivatiseerd is analoog aan andere persoonlijke sites.
6. ben niet zo thuis met de pc
7. bevestiging van ontvangst
8. gebruiksvriendelijk, intuïtief goed
9. helpdesk online
10. inzage eigen kavel
11. nee, want ik doe het toch per post
12. neen
13. perceptie van de ontvanger(s)
14. snelle opvolging cq reactie van de commissie
15. snelle respons op het ingestuurde of bevestiging
16. terugmelding van goede ontvangst van de gegevens door de ontvanger en responstijd opgeven.

15. Wat vindt u van het idee dat iedereen in het landinrichtingsgebied op internet kan zien wie de eigenaar is van een perceel (in de oude of nieuwe situatie)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Uitstekend idee	28	28,0	29,8	29,8
	Zeer goed idee	13	13,0	13,8	43,6
	Goed idee	36	36,0	38,3	81,9
	Niet zo'n goed idee	10	10,0	10,6	92,6
	Helemaal geen goed idee	7	7,0	7,4	100,0
	Total	94	94,0	100,0	
Missing	-99	6	6,0		
Total		100	100,0		

16-1. Waarom vindt u dit een goed idee?

1. Als de informatie maar overeenkomt met de kaarten en overige stukken die terinzage liggen. Ook later gemakkelijk bij inzien eigen percelen
2. als er vragen zijn je deze aan de perceeleigenaar rechtstreeks kunt vragen
3. als je belang hebt bij dat stuk grond kun je naar die persoon toe
4. anders moet je het op een veel ingewikkeldere weg opvragen. Het is en blijft openbaar dus hoeft er geen belemmering (onleesbaar)
5. beschikbaar- en toegankelijkheid in principe ok
6. dan weet je precies hoe het ingedeeld wordt
7. dit kan iedereen nu ook zien!
8. duidelijk en openbaar voor iedereen

9. een goed idee ivm duidelijkheid van plaatselijke situatie
10. eenvoud om bij aankoop te weten met wie je moet onderhandelen
11. eigenaar evt. aanspreekbaar
12. geeft duidelijkheid
13. geeft duidelijkheid + overzicht
14. Geeft duidelijkheid en men kan rechtstreeks de eigenaar/pachter benaderen indien er vragen of problemen zijn.
15. gegevens kadaster zijn altijd al openbaar geweest
16. handig voor het overzicht
17. het brengt een stuk duidelijkheid, hoef je niet meer te raden van wie en wat
18. het gaat om onze grond, vervolgens heb je automatisch te maken met je 'buurman'.
19. Het goede idee is dat kavelindelingen zichtbaar gemaakt kunnen worden.
20. het is toch geen geheim van wie een stuk grond is?
21. I.v.m. onderbouwing en alternatieven voor bezwaren
22. ik zie geen bezwaar maar ik zie ook niet dat het heel veel voordelen op kan leren
23. ik zie geen reden waarom het niet bekend zou mogen zijn wie eigenaar van grond is.
24. Informatie is daardoor sneller beschikbaar.
25. is gemakkelijk
26. is toch al openbare informatie, nu gemakkelijk toegankelijk
27. is voor iedereen duidelijk
28. Je weet meteen relevante informatie, die je anders zou moeten achterhalen. Met name een goed idee wanneer de overheid eigenaar is van een perceel
29. kan iedereen zien wat de mogelijkheden zijn
30. kun je beter begrip tonen voor de eventuele toedeling en zelf alert regeren op evt. misverstanden, overlegsituaties etc.
31. kun je eventueel contact zoeken met de mensen anders kost het tijd en geld om op te vragen
32. maakt onderling overleg over bepaalde gemeenschappelijke aspecten veel directer en eenvoudiger
33. makkelijk
34. meedenken mogelijk maken
35. mogelijkheid om overleg te plegen bij aangrenzende percelen. Mogelijk bij calamiteiten de eigenaar te benaderen.
36. net als kadaster, alles is toch openbaar
37. nu is duidelijk van wie het echt is anders is suggereren
38. openheid
39. openheid / duidelijkheid
40. openheid van zaken. geen spookverhalen in het veld.
41. openheid, geeft meer ideeën, je praat er gemakkelijker over met je collega's
42. privacy
43. stel je wilt grond aankopen, weet je van wie 't is en waar je moet zijn
44. tijdbesparend

45. transparantie
46. verschaft duidelijkheid / waarom niet?
47. voor de toekomst en voor de computer mensen en dat ben ik in het totaal niet, voor mij is het noodzakelijk kwaad
48. zoals de vraag gesteld is

16-2. Waarom vindt u dit geen goed idee?

1. belachelijk, nergens voor nodig
2. criminaliteit
3. een ander weet al sneller iets dan jijzelf
4. privacy
5. heeft iedereen niet wat mee te maken
6. Het niet zo goede idee is algemene openbaarheid. Bepaalde instanties, okay, maar de hele 'markt lijkt mij te veel. Beperkte vermelding van eigenaren. Grondgegevens zijn net als bankgegevens die horen niet op straat te liggen. De ethiek van het Kadaster is een volgende enquête waard.
7. i.v.m. privacy
8. ik ben eigenaar, met mijn man heeft verder niemand iets mee te maken (privé). Ik vind het vervelend dat iedereen kan zien hoe je woont. Vooral in mijn werk als iemand dat wil nagaan.
9. privacy
10. ik haat het dat gegevens van mij op internet te vinden zijn
11. ivm privacy
12. ivm privacy
13. niet iedereen hoeft te weten waar ik woon, privacy
14. privacy
15. omdat ik geen interesse heb aan computers
16. privacy
17. privacy overwegingen.
18. soms is het privé

17. Heeft u nog opmerkingen, tips of ideeën, dan kunt u die hieronder kwijt.

1. als het over ruilen of eigendomsgerelateerde onderwerpen gaat heeft het de voorkeur om dat in een persoonlijk overleg te voeren.
2. bij het ontwerp ruilplan bleek een verschil van 1 m2 bij inbreng en toedeling, terwijl bij het toedelingsregister inbreng en toedeling gelijk waren. Bovendien een betaling van €949 terwijl alles hetzelfde blijft. Waarom geeft men niet aan waar dit vandaan komt? Dit kon men ook niet verklaren op het regiokantoor. Dit punt komt bij rel. veel eigenaren voor en veroorzaakt veel zienswijzen dus werk.
3. deze mailing digitaal te doen
4. Een meer persoonlijke benadering en onafhankelijke ondersteuning tijdens het hele ruilverkavelingsproces zou wenselijk zijn.
5. eerst persoonlijk benaderen (via post of persoonlijk) dan pas op internet
6. geen ervaring met internet

7. Ik denk dat er door de landinrichtingscommissie veel geld over de balk wordt gegooid. Ook door alle dure brochures die we regelmatig ontvangen en die door weinig mensen gelezen / gewaardeerd worden
8. ik heb misschien iet alles goed ingevuld maar bij ons gebeurd er ook niet veel
9. Ik vind 't heel jammer dat alles tegenwoordig met internet gaat, en niet meer via post of telefoon, heel onpersoonlijk en lastig.
10. laat de site eenvoudig zijn, logisch van opbouw
11. laat mij de uitslag van deze enquête per mail of post weten
12. nee, ga maar digitaal scheelt jullie ook veel tijd en geld
13. neen
14. niet alles via internet. Goede mondelinge afspraken, dan op papier.
15. snel mogelijk mee beginnen
16. snelheid ruilverkavelingen omhoog
17. Soms is een persoonlijke benadering beter inzake informatieverstrekking: aan het management de taak om telkens weer de overweging te maken, succes hiermee!
18. sta op achter het bureau en ga in het veld met de agrariërs om tafel, bbereik je meer dan alles op afstand willen regelen. Na een inrichtingsplan zijn jullie weg. De ingezetenen blijven dan achter die moeten dus tevreden zijn.
19. Toesnijding op beperkte gebieden met meer informatie. Geen algemene toegang site, maar wel voor overheden en hun adviesorganen. Speciale ingang met mijn kadaster gegevens. Welke ethiek heeft het kadaster tov de markt, projectontwikkelaars etc.
20. zo snel mogelijk invoeren

Appendix IV – Interviews provinces

Interview I

Past het binnen het beleid van de provincie om beschikbare geo-informatie te ontsluiten via internet voor (bepaalde groepen) burgers? Om welke geo-informatie gaat het dan? En op welke manier wordt het ontsloten (downloaden vs bekijken)?

De provincie heeft een convenant om geo-informatie via internet te verstrekken aan derden. De provincie heeft een eigen georegister van beschikbare datasets. Het provinciale georegister is nog in ontwikkeling, maar volgt zo snel mogelijk. Deze registers zijn voor eenieder via internet toegankelijk door middel van een viewer. Tevens kan een deel van de bestanden al worden gedownload. De rest van de bestanden volgt waarschijnlijk later. Eigenlijk alle beschikbare geo-informatie (bodem, water, natuur, milieu, wonen, cultuurhistorie etc.) wordt beschikbaar gesteld en ontsloten via internet, met uitzondering van persoonsgebonden informatie.

Deze ontwikkeling is deels geïnspireerd op Europese en nationale wetgeving en beleid, bijvoorbeeld Wet van Aarhus (milieu) en INSPIRE.

Zo ja, wat ziet u als voordelen voor de provincie om dit te doen? Met andere woorden: welk belang heeft de provincie om geo-informatie toegankelijk te maken voor eenieder?

Uiteindelijk verhoogt het de kwaliteit en efficiency van het werk binnen de provincie en verdient de investering zich terug. Er is één bronbestand waar naar verwezen wordt en iedereen kan dat raadplegen en heeft dus toegang tot dezelfde informatie.

Zijn er randvoorwaarden waaronder de provincie geo-informatie aan (bepaalde groepen) burgers verstrekt via internet, bijvoorbeeld inloggen of een kleine financiële bijdrage?

De bestanden worden om niet beschikbaar gesteld. De provincie kan om verstrekkingkosten vragen, maar doet dit niet bij opvraging via internet. Persoonsgebonden informatie wordt niet verstrekt. Dat is eigenlijk de enige randvoorwaarde.

Zou de provincie overwegen om ook op projectbasis, te weten wettelijke herverkavelings-projecten, web services te ontwikkelen om zo beter tegemoet te komen aan de wensen van de burger of zijn er al initiatieven op dit vlak uitgevoerd bijvoorbeeld in het kader van ketenintegratie ILG?

De provincie staat positief tegenover het initiatief. Wel is het zo dat de informatie ook altijd analoog beschikbaar moet zijn. Dat wordt intern voorgeschreven en geldt dus ook voor dit initiatief. Verder is het verstandig om een procesbeschrijving te maken, met rollen en verantwoordelijkheden van alle betrokken partijen in een WILG project. Als keten is het beter om met één gezicht naar buiten toe te treden. Ook moet duidelijk zijn wie waarvoor verantwoordelijk is.

In de provincie wordt gewerkt met gebiedscommissies. De inschatting is dat gebiedscommissies zeker ook de toegevoegde waarde zullen zien van inzage van de stukken via internet. Aandachtspunt, ook voor het aanleveren van geo-informatie door rechthebbenden, is de beschikbaarheid van internet. Een aantal

rechthebbenden zal geen toegang tot internet hebben en een ander gedeelte zal niet met het medium overweg kunnen, waardoor het slechts als aanvulling kan dienen op de huidige werkwijze. Het zou een goed idee zijn om de rechthebbenden bijvoorbeeld de mogelijkheid te bieden om tijdens de reguliere wenszitting op kantoor hun ideeën door medewerkers vast te laten leggen om diegenen op weg te helpen die er moeite mee hebben. Rechthebbenden kunnen thuis later dan nog eens inloggen en eventueel wijzigingen aanbrengen. Door de applicatie dicht te bouwen, om fouten te voorkomen, beperk je de creativiteit die met name rond het kenbaar maken van de wensen van belang is.

De ambitie is om rechthebbenden in wettelijke herverkavelingen ook de mogelijkheid te bieden om informatie aan de commissie te verstrekken via internet, bijvoorbeeld ten behoeve van de pachtregistratie, het uitbrengen van wensen of om zienswijzen in te dienen.

Wat voor voordelen kan dit hebben voor de provincie?

De informatie is gelijk digitaal beschikbaar wat efficiënter werken bevordert. Verder biedt het extra service omdat men van huis uit toegang heeft tot de informatie en informatie kan aanleveren. Een betere dienstverlening dus. Daarnaast kan het een kwaliteitsverbetering van het proces opleveren. Dit geldt met name voor vrijwillige kavelruil. Bij een wettelijke herverkaveling is dit nog onduidelijk, omdat het proces erg ingewikkeld is en de mondelinge toelichting / uitleg van de medewerker op het landinrichtingskantoor toch ook erg belangrijk is.

Wat is het beleid inzake beveiliging van de gegevens (two-way communication)? Wordt hierbij verschil gemaakt tussen openbare en niet-openbare gegevens?

Binnen de provincie wordt gewerkt met het PKI certificaat dat aangeeft dat de bron (in dit geval de overheid) te vertrouwen is. Bij de mogelijkheid tot het indienen van de zienswijze zou idealiter deze beveiliging ook moeten plaatsvinden, maar dit is van burgers redelijkerwijs niet te verwachten. Voor DigiD zijn verschillende authenticatieniveaus, waaronder een sms naar de telefoon in aanvulling op de handtekening. Burgers kunnen zonder problemen gebruik maken van DigiD. Voor maatschappen kan de e-herkenning een probleem zijn, omdat ze als bedrijf niet altijd ingeschreven zijn in de Kamer van Koophandel terwijl e-herkenning op de gegevens van de Kamer van Koophandel zijn gebaseerd.

In het kader van digitale zienswijzen is het zinvol om het initiatief rondom de nWRO in de gaten te houden. De provincie moet haar zienswijze op ruimtelijke plannen van andere overheden baseren op de digitale plannen. Door middel van een annotatie, waar de inhoudelijke opmerking kan worden geplaatst op de kaart kan de zienswijze worden beschreven.

Wat is het beleid inzake het koppelen van verschillende geo-informatie bestanden van verschillende bronhouders? Wil de provincie haar geo-informatie beschikbaar stellen voor dit soort doeleinden?

Via de provinciale webservices kunnen koppelingen worden gemaakt op de beschikbare geo-datasets. Wel moet duidelijk in kaart worden gebracht wie bronhouder is van de data en dus de verantwoordelijkheid heeft. Dit dient goed afgestemd te worden met alle betrokken partijen bij het WILG-project.

Heeft de provincie (op termijn) financiering beschikbaar voor het ondersteunen van een wettelijk herverkaveling door middel van een webservice waar rechthebbenden info kunnen inzien en kunnen uploaden?

Burgers verwachten op een gegeven moment dat zaken digitaal geregeld kunnen worden. Daarom is het een logisch initiatief. De webservice moet echter wel een toegevoegde waarde hebben en niet te veel kosten.

Wat zijn eventuele wensen van de provincie ten aanzien van de webservice?

Het zou erg leuk zijn om van het wenszittingsproces een soort van spel te maken waar boeren onderling grond kunnen ruilen. Maak er een game van.

Aandachtspunt is wel hoe om te gaan met de taakstellingen vanuit het beleid, bijvoorbeeld realisatie EHS. Moeten de voor dat doel aangekochte gronden eerst op de juiste plek worden gelegd, voordat de boeren aan het gamen kunnen, of zou de provincie juist een flexibeler houding moeten tonen ten aanzien van de locatie van de te realiseren doelen zodat meer ruimte ontstaat voor het verbeteren van de landbouwstructuur.

Interview II

Past het binnen het beleid van de provincie om beschikbare geo-informatie te ontsluiten via internet voor (bepaalde groepen) burgers? Om welke geo-informatie gaat het dan? En op welke manier wordt het ontsloten (downloaden vs bekijken)?

Ja, de provincie heeft nu al interactieve viewers op haar website die eenieder kan raadplegen. Hierop staat ook reconstructie informatie, bijvoorbeeld hindercirkels of zoneringsinformatie, bijvoorbeeld de structuurvisie ruimtelijke ordening. De viewer wordt veel gebruikt voor overleg tussen provincie en gemeenten en intern binnen de provincie. Of de viewer ook regelmatig door burgers of andere partijen wordt gebruikt, is onduidelijk.

Zo ja, wat ziet u als voordelen voor de provincie om dit te doen? Met andere woorden: welk belang heeft de provincie om geo-informatie toegankelijk te maken voor eenieder?

Het is veel makkelijker om het beleid uit te beelden op een kaart dan om het in woorden te omschrijven. Bovendien is het digitaal veel eenvoudiger om bestanden te combineren.

In het geval van een WILG project zijn er ook mogelijke nadelen: de toelichting ontbreekt en daardoor krijg je meer vragen van rechthebbenden. Communicatie is erg belangrijk. Vóór de wenszitting moet een heel duidelijke toelichting worden gegeven. Dit vergt een extra (tijds)investering. Verder kost het meer om een webservice in de lucht te houden gedurende het project.

Zijn er randvoorwaarden waaronder de provincie geo-informatie aan (bepaalde groepen) burgers verstrekt via internet, bijvoorbeeld inloggen of een kleine financiële bijdrage?

Via de viewer van de provincie is het mogelijk om algemene geo-informatie te raadplegen. Het is echter niet wenselijk om vertrouwelijke informatie of privacy gevoelige informatie te publiceren. In een landinrichtingsproject zou het bijvoorbeeld niet wenselijk zijn om de uitgebrachte wensen van iedereen openbaar te maken. De informatie op de website moet zoveel mogelijk op de persoon zelf (die het bekijkt) zijn toegesneden. Verder moet het wel mogelijk zijn om de toedeling te controleren.

Zou de provincie overwegen om ook op projectbasis, te weten projecten in het kader van de WILG, web services te ontwikkelen om zo beter tegemoet te komen aan de wensen van de burger?

Het kan zeker bij vrijwillige kavelruil een stimulans betekenen voor de mensen in het gebied als ze bijvoorbeeld zien wat kavelruil voor andere partijen heeft betekend. Op een website kan een aantal uitgevoerde ruilen worden gepubliceerd om anderen ook enthousiast te maken.

Verder is het in de huidige keukentafelgesprekken voor betrokkenen best moeilijk om het proces tot de nieuwe toedeling te volgen zoals dat door de 'professional' wordt getoond op de laptop. Doordat het voor leken (te) moeilijk is, wordt het proces ook minder transparant. Een website waarop men zelf met ruilen aan de slag kan gaan, met bijvoorbeeld een simpel ruilspel, zou dit verbeteren. Het vereist echter wel een simpele en gebruiksvriendelijke interface.

In een wettelijk herverkavelingsproject kan het een bijdrage leveren aan het verbeteren van het proces van de wenszittingen, hoewel een persoonlijke toelichting heel belangrijk is. Het gevaar bestaat dat met

de website niet iedereen gelijke kansen krijgt, doordat de toelichting ontbreekt. Een deel van de doelgroep kan zonder die toelichting, maar een deel ook niet, wat de ongelijkheid vergroot. De provincie vindt het belangrijk dat iedereen in het gebied dezelfde kansen heeft. Bij een wenszitting op kantoor krijgt iedereen een gelijke behandeling en heeft dus dezelfde kansen. Met een webservice is dit niet het geval. De rol van de website zou in dit kader meer informatief moeten zijn. Als opdrachtgever is het wel een goed middel om zicht op het proces te houden.

De ambitie is om rechthebbenden in wettelijke herverkavelingen ook de mogelijkheid te bieden om informatie aan de commissie te verstrekken via internet, bijvoorbeeld ten behoeve van de pachtregistratie, het uitbrengen van wensen of om zienswijzen in te dienen. Wat voor voordelen kan dit hebben voor de provincie?

Het is duidelijker om bijvoorbeeld vervuiling op een kaart aan te geven dan de locatie in woorden te omschrijven. Met andere woorden het voorkomt spraakverwarring. Maar er moet nog steeds onderzoek worden gedaan om de melding te verifiëren. Dus het levert in die zin geen tijdwinst op, maar het draagt wel bij aan een kwaliteitsslag.

Verder kan het aanleveren van geo-informatie via internet de betrokkenheid bij een project vergroten, wat op zijn beurt weer een positief effect heeft op het draagvlak in de streek.

Voor het registreren van onderlinge pacht kan een webservice wel uitkomst bieden, omdat het grondgebruik dynamischer is dan uit pacht en kadastrale gegevens blijkt. Het gaat dan vooral om grondgebruiksverklaringen van 1 jaar die buiten de reguliere pacht vallen. Reguliere pacht is meestal wel goed beschreven, zeker als het gaat om een gemeente die de grond verpacht. Zonder webservice komt deze informatie ook wel boven water, omdat commissieleden over het algemeen goed weten wat er in de streek gebeurt.

Wat is het beleid inzake beveiliging van de gegevens (two-way communication)? Wordt hierbij verschil gemaakt tussen openbare en niet-openbare gegevens?

Er is algemeen beleid door de ICT afdeling van de provincie opgesteld dat van toepassing is. Besluiten in een wettelijke herverkaveling zijn besluiten waar iedereen kennis van mag nemen op grond van de Wet Openbaarheid van Bestuur. In hoeverre dit ook actief naar buiten wordt gebracht kan verschillen. Belanghebbenden kunnen bijvoorbeeld inloggen op een website om relevante informatie over het besluit te raadplegen, terwijl burgers naar het reguliere loket van de provincie worden doorverwezen. Om geo-informatie te kunnen aanleveren is inloggen door middel van wachtwoord en gebruikersnaam voldoende. Idealiter wordt een koppeling gemaakt met één landelijk account voor de burger, bijvoorbeeld door een koppeling te maken met de inloggegevens die ook voor diensten van het ministerie van LNV (bijv. gecombineerde opgave voor Dienst Regelingen) wordt gebruikt.

Wat is het beleid inzake het koppelen van verschillende geo-informatie bestanden van verschillende bronhouders? Wil de provincie haar geo-informatie beschikbaar stellen voor dit soort doeleinden?

Vanuit het gevoerde provinciale beleid is het geen probleem om bestaande geo-informatie die de provincie in huis heeft zoals bodemkaart, grondwatertrappen, of AHN, te combineren met andere geo-informatie in een WILG project. Dit geldt in ieder geval voor het raadplegen van informatie. De bestanden zelf zijn niet te downloaden. Alle geo-informatie met betrekking tot milieu is openbaar, vanwege

wetgeving (Aarhus). Het gaat zelfs zo ver dat in het vergunningenbestand per bedrijf kan worden bekeken hoeveel milieurechten deze heeft.

Heeft de provincie (op termijn) financiering beschikbaar voor het ondersteunen van een wettelijk herverkaveling door middel van een webservice waar rechthebbenden informatie kunnen inzien en kunnen uploaden?

Er is geen aparte financiering beschikbaar voor het landinrichtingsproces als zodanig of de middelen die daarvoor worden ingezet. Het Investeringsbudget Landelijk Gebied (ILG) is namelijk gebaseerd op doelrealisatie, bijvoorbeeld agrarische structuurverbetering. Als het proces door een webservice efficiënter ingericht kan worden, dan is de investering wellicht te verantwoorden.

Heeft de provincie nog (andere) wensen ten aanzien van de webservice voor wettelijke herverkaveling?

Het biedt de mogelijkheid om je als opdrachtgever te profileren. Wel worden hier normaal gesproken afspraken over gemaakt met de betrokkenen bij het project.

Interview III

Past het binnen het beleid van de provincie om beschikbare geo-informatie te ontsluiten via internet voor (bepaalde groepen) burgers? Om welke geo-informatie gaat het dan? En op welke manier wordt het ontsloten (downloaden vs bekijken)?

Beschikbare geo-informatie van de provincie wordt zoveel mogelijk ontsloten via de website van de provincie door middel van een viewer waarmee de geo-informatie is te raadplegen. Informatie over natuur en landschap is één van de terreinen waarover de provincie informatie verstrekt via internet. Bovendien kunnen gebiedscoördinatoren informatie aanleveren aan de provincie, bijvoorbeeld als ze namens een boer in het gebied subsidie willen aanvragen in het kader van het subsidiestelsel natuur en landschap dan kunnen ze via internet de contouren intekenen. Hiervoor moet de gebiedscoördinator wel inloggen.

Wat ziet u als voordelen voor de provincie om dit te doen?

De informatie is voor iedereen op elk moment op elke locatie met internettoegang te raadplegen. Verder geeft het gebruikers de mogelijkheid om data te combineren waardoor men makkelijker toegang heeft tot bepaalde informatie. Vooralsnog is het niet mogelijk om de geo-informatie te downloaden, maar dat zal een kwestie van tijd zijn.

Voor de provincie zelf heeft het voordelen wanneer de informatieketen verder wordt gestroomlijnd. Het is bijvoorbeeld van toegevoegde waarde om te zien op welke locatie de PMJP (Provinciaal Meerjaren Plan) doelen zijn gerealiseerd. Nu wordt een administratief overzicht gegeven dat aangeeft hoeveel hectare natuur is gerealiseerd, maar niet waar dit ligt.

Zijn er randvoorwaarden waaronder de provincie geo-informatie aan (bepaalde groepen) burgers verstrekt via internet, bijvoorbeeld inloggen of een kleine financiële bijdrage?

In principe zijn er geen randvoorwaarden. Iedereen kan gratis bij de beschikbare geo-informatie van de provincie die door de viewer wordt ontsloten. De enige randvoorwaarden die door de provincie worden gesteld aan publicatie van de data op internet zijn privacy of eventuele leveringsvoorwaarden van data waar andere partijen bij zijn betrokken. Privacy gevoelige data wordt niet beschikbaar gesteld via internet. Hetzelfde geldt voor data waar dit gezien de leverings- en gebruiksvoorwaarden niet toegestaan is.

De ambitie is om rechthebbenden in wettelijke herverkavelingen ook de mogelijkheid te bieden om informatie aan de commissie te verstrekken via internet, bijvoorbeeld ten behoeve van de pachtregistratie, het uitbrengen van wensen of om zienswijzen in te dienen. Wat voor voordelen kan dit hebben voor de provincie?

De mensen in het gebied hebben zelf vaak creatieve ideeën die bruikbaar kunnen zijn in het landinrichtingsproces. Biedt hen dan ook een mogelijkheid om deze ideeën naar voren te brengen door bijvoorbeeld een web service. Er moet dan wel een mogelijkheid zijn om onmogelijkheden of foute invoer te herkennen, zodat de gebruiker gevraagd kan worden om de informatie anders aan te leveren of te

wijzigen. Het kan voorkomen dat iemand huiskavelvergroting wenst en dit via internet aangeeft. Echter, dit gaat ten koste van de huiskavel van het bedrijf van de buurman. Het is dus een irreële wens. In dat geval zou er een melding moeten verschijnen of zou de betreffende kavel waarvoor de wens negatieve gevolgen heeft bijvoorbeeld rood kunnen kleuren. In de huidige werkwijze wordt het proces van de wenszitting begeleid door een ambtenaar en krijgt de indiener van de wens gelijk te horen of een wens reëel is of niet.

Een ander voordeel voor de provincie ligt in een mogelijke tijdbesparing waardoor minder DLG of Kadaster capaciteit nodig is.

In welke fase van een landinrichtingsproject kan zo'n web service het beste worden ingezet?

Het begint bij het inrichtingsplan. De bezwarenbehandeling zou deels digitaal, via internet, kunnen worden afgehandeld. Geef mensen de mogelijkheid om digitaal een bezwaar in te dienen in plaats van op papier.

Verder kan, zoals eerder genoemd, de web service vooral z'n toegevoegde waarde bewijzen bij het ruilplan en de lijst der geldelijke regelingen. Kortom de web service kan ingezet worden bij alle wettelijke procedure onderdelen.

Wat is het beleid inzake beveiliging van de gegevens voor zowel het verstrekken als aanleveren van geo-informatie? Wordt hierbij verschil gemaakt tussen openbare en niet-openbare gegevens?

Het verdient aanbeveling om van bestaande technieken gebruik te maken, bijvoorbeeld zoals deze zijn gebruikt bij de uitwisseling van bestemmingsplannen. De web services zelf moeten ook worden beveiligd. Bij het aanleveren van informatie door rechthebbenden in een landinrichtingsproject kan DigiD worden gebruikt. Beveiliging van de web service en data uitwisseling is een belangrijk aspect voor potentiële gebruikers. De mensen moeten het idee hebben dat het veilig is om de web service te gebruiken. Dit is een randvoorwaarde voor succes.

Wat is het beleid inzake het koppelen van verschillende geo-informatie bestanden van verschillende bronhouders? Wil de provincie haar geo-informatie beschikbaar stellen voor dit soort doeleinden?

Er kan gebruik worden gemaakt van de huidige voorziening (viewer) op de website van de provincie. Het is mogelijk om een applicatie te ontwikkelen waarmee deze informatie kan worden geïntegreerd in de eigen web service om zo data te kunnen combineren.

Hoe ver reikt de verantwoordelijkheid voor de beschikbaar gestelde data met het oog op de WILG (bijvoorbeeld terinzagelegging op kantoor vs internet, of zienswijze analoog vs digitaal)?

Uiteindelijk zijn Gedeputeerde Staten verantwoordelijk voor de beschikbaar gestelde data. Het is bekend welke data moet worden gebruikt, maar hoe deze informatie beschikbaar moet worden gesteld aan rechthebbenden is niet nader gedefinieerd.

Heeft de provincie (op termijn) financiering beschikbaar voor het ondersteunen van een wettelijk herverkaveling door middel van een webservice waar rechthebbenden informatie kunnen inzien en kunnen uploaden?

De voordelen moeten opwegen tegen de nadelen. Dit betekent bijvoorbeeld dat de proceskosten lager zullen moeten uitvallen met het gebruik van een web service om het rendabel te maken. Niet alle voordelen zijn in financiën uit te drukken. E-governance vergroot bijvoorbeeld de zichtbaarheid van de provincie en haar activiteiten.

Zijn er vanuit de provincie nog wensen met betrekking tot de web service?

- Geef op een kaart vaste (topografische) grenzen aan die niet mogen worden veranderd, zoals steilranden. De gebruiker kan hiermee dan rekening houden bij het uitbrengen van de wensen.
- Maak ook duidelijk welke kortingselementen zijn aangewezen en wat de begrenzing hiervan is. Mensen moeten kunnen controleren in hoeverre deze kortingselementen hun eigendom raken.
- Je zou de mensen kunnen informeren over de geldende bestemming conform het bestemmingsplan, zodat ze dit kunnen vergelijken met de gewenste situatie zoals beschreven in het inrichtingsplan.

Appendix V – Review of website

A – Test session

Inleiding

In de landinrichtingsprojecten 'Land van Maas en Waal' en 'Peize' is een proef gehouden met een website tijdens de tervisielegging van het plan van toedeling. Op de website was voor rechthebbenden informatie te raadplegen over de nieuwe toedeling.

Het doel van het onderzoek vandaag is om de gebruiksvriendelijkheid van de website te beoordelen. Hiervoor krijgt u een aantal opdrachten, waarbij we u vragen tijdens het maken van de opdrachten hardop na te denken. De resultaten worden gebruikt voor het verbeteren van de website.

Situatieschets

U bent rechthebbende in het landinrichtingsproject 'Peize', omdat u in dit gebied verschillende stukken grond in eigendom heeft. Er is met de gronden geruild en op de website kunt u de nieuwe toedeling bekijken, zoals deze in het Plan van Toedeling is vastgelegd.

Opdrachten

Hieronder staan een aantal opdrachten beschreven. Neem rustig de tijd om deze uit te voeren en vergeet niet om hierbij hardop na te denken.

1. Log in om de inbreng en toedeling te bekijken van het feitelijk gebruik van het R-nummer dat u heeft gekregen. Zoek de volgende informatie op:
 - a. Wat is de oppervlakte van elke kavel die u nieuw toegedeeld heeft gekregen?
 - b. Wat is de totale oppervlakte van de percelen die u heeft ingebracht?
 - c. Wat is de totale oppervlakte van de kavels die u toegedeeld heeft gekregen?
2. U weet niet precies wat de term 'feitelijk gebruik' betekent. Kunt u een toelichting van deze term vinden op de website?
3. U wilt zien wie de nieuwe eigenaren zijn rondom uw veldkavels. Zoek dit op.
4. U bent het niet eens met de nieuwe toedeling, omdat de grond niet dezelfde kwaliteit en gebruiksmogelijkheden heeft. Kunt u op de website informatie vinden om dit te onderbouwen, bijvoorbeeld met behulp van de ruilklassenkaart?
5. Ondanks de informatie op de website wilt u toch graag nog met een commissielid spreken. Wanneer is het landinrichtingskantoor geopend?
6. U wilt graag een bezwaar indienen tegen de nieuwe toedeling. Hiervoor heeft u het volgende nodig:
 - a. het adres van de bestuurscommissie
 - b. de termijn tot wanneer u een bezwaar (zienswijze) kunt indienen
 - c. een geprinte kaart van de toedeling van uw R-nummerZoek deze informatie op de website op.

EINDE

B - Questions after test session

Algemeen:

- Waarom twijfelde u of had u problemen bij tijdens de test?

Opbouw website:

- Vindt u de opbouw van de website (sitemap) logisch?
- Vindt u dat de informatie op een logische plaats op de website staat?
- Is de lay-out voldoende duidelijk (bijvoorbeeld grootte schermen)?

Geo-informatie applicatie:

- Is de beschikbare functionaliteit voldoende (navigatie, zoom, lagen aan/uit zetten, i-knop)?
- Zijn de knoppen en de functies duidelijk of heeft u meer hulp nodig?
- Is de kaart duidelijk (kleurgebruik, lettertype en grootte, referentiekaart)

Aanleveren van geo-informatie aan de commissie:

- Wat zou een logische plek zijn in de structuur van de website om geo-informatie aan te leveren (link vanaf homepage, of na het raadplegen van geo-info)?
- Hebt u wensen met betrekking tot het intekenen van geo-informatie (kleur lijn/punt/polygoon, functionaliteit zoals uitgummen of 'undo')?