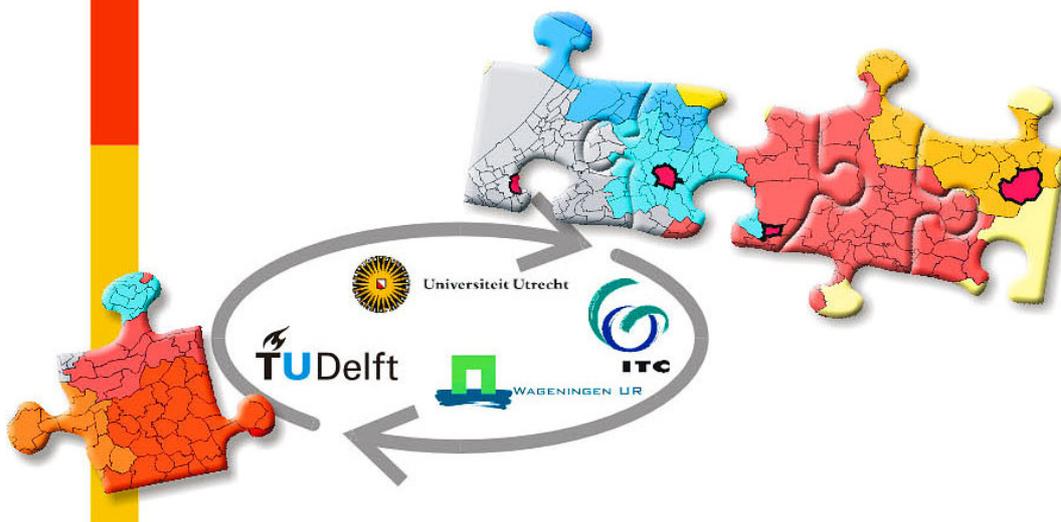


GIMA

Geographical Information Management and Applications

Using log-files to identify uses and users of geo-information provision facilities



Using log-files to identify uses and users of geo-information provision facilities

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Tell me, I forget,
Show me, I remember,
Involve me, I understand.

Carl Orff
German composer and pedagogue
1895 - 1982

Preface

This thesis is the final part of the Master of Science programme Geographical Information Management and Applications (GIMA). Every student has to perform and report on an independent and individual research in the field of the master programme, in my case addressing geographical provision facilities.

I first started this final chapter of the master programme at the end of 2006. Due to changing opinions about the interpretation of the set-up and focus of this thesis, varying interest and intentions of several parties, loss of framework and advisers and especially lack of motivation and changing work environment, it has taken this long to finish this thesis. However, in spite of all these factors, my last remaining advisor and now professor Jaap Zevenbergen has kept me on track in these five years and provided me with positive feedback and directions and enough encouragement to fulfil this journey. I would like to express my gratitude to him for his support. I am also very grateful for the efforts of my other advisor Pepijn van Oort. Until his switch to another division within Wageningen University he has provided me with enthusiastic support and skilled advice and he was also a source of inspiration. Without his input, this thesis would probably never have been completed. Special thanks also goes to Marjolijn Kuyper, who has given me many useful counsels from a technical point of view and to Corné van Elzakker who showed me how to give this thesis the right focus, in order to tailor and clarify its message.

Other people I would like to thank for their pleasant cooperation and for putting everything I asked for at my disposal are: Ries Visser (GVI), Jan Kooiman and Martin Peersman (TNO), Marc Hoogerwerf (Alterra) and Merijn Backx (Dataland). Finally, I would like to express my gratitude to all those people I have contacted during the course of my research.

A special word of thanks goes to Sisi Zlatanova and Ron van Lammeren for giving me the encouragement and directions to finish this thesis.

Zaandam, 28 May 2011

Vincent Brunst

Abstract

For more than 20 years suppliers of geo-information offering applications are encouraging and stimulating potential and present users to become aware of the role geo-information can have for their needs. The rise of the simple-to-use geo-information provision application Google Earth shows that a large public can be reached and bonded by a geo-information provision facility. However, the geo-information provision facilities, with a first and main objective to attract users to inform them about unique and several geo-information themes, can not rely on the highest possible number of visitors. The main reason is that the owners and developers of facilities are technology-driven and consider potential users as GIS-specialists who need to be served with the latest technical possibilities. Next to a prominent role for the geo-information community to bring users and providers together, this problem can also be alleviated when a provider invests in efforts and tools to get in touch with its users.

The objective of this research is to make providers of facilities aware of what the potentials of log-files are and which role they can play in the identification of user requirements, which in turn may lead to higher visitor numbers and interaction with the users about the design and the usage of their facility. To show the providers which contribution log-files can have, the next research question is defined:

What contribution can log-files make to the identification of the usage and the users of geo-information provision facilities?

To find out which considerations providers of facilities make when they launch and maintain a facility, four providers of five different facilities (Gebouwde Omgeving, Groene Omgeving, DINO-shop, Atlas of Amsterdam, Stadsplattegrond) were selected to analyse their facilities on different aspects.

First a methodology to describe the facilities is presented. An analysis of different references which compare geoportals or describe user needs shows that they are based on different aspects or definitions. After the discussion, a total of 23 different aspects, subdivided in 5 groups, are determined for the description of the geoportals. The analysis shows that all the facilities have different strong and weak points, but they all have one strong point in common: the performance is satisfactory. After confronting the providers with this analysis, they show an awareness to keep their facilities ready for changing demand: The introduction of web services and monitoring usability are the most mentioned improvements which need to be implemented.

Secondly, the providers were requested to supply log-files of the covered facilities. These log-files, which dated between 2005 and 2008, were first analysed on their contents and potential to provide information about the usability of the facility and identification of the users. It turns out that every provider collects log information in different ways and the log-files contain different data formats. To process the log-files, different tools and applications were used. These tools were able to deal with different formats, to use online sources and to prevent duplications and produce

overviews and reports with totals and averages. Also, additional information was used, such as findability rates of websites.

The results of the log-files analysis show that there is similarity between the size of the visitor numbers and the number of referring sites. Facilities with low visitor numbers have less referring sites and high exit numbers at different parts of the facility, especially the search tool. Facilities with high visitor numbers can also boast on impressive numbers of referring sites and also high percentages of returning visitors. Another observation is that the logged information could be more accurate and complete if activities from Java scripts are stored in the log-files. Besides this flaw, the analysis can be used to identify users. This was done for all the facilities, except for the Atlas of Amsterdam, where additional information was requested to find out which municipal divisions makes use of the Atlas. The results of the log-files analysis were presented to the facility providers.

Thirdly the providers concerned (TNO and GVI) were requested to participate in a user inquiry. For this study, using questionnaires, users were requested to give their opinion on different aspects of the visited facility. The methodology applied was based on the principles of a survey of satisfaction of Dutch customers. After the formulation of the questions, the examination units and variables for different analysis purposes were determined. The results show that the specialist users of the DINO-shop require a search form and improvements about information quality, navigation, number of added data-sets and support options. The Atlas of Amsterdam is considered to be functional and user-friendly, but the support, print and export functions need more awareness among the users. The users of Stadsplattegrond prefer more support in navigation and personal profiles, but are satisfied about the user-friendliness of this 'map viewer'.

After the results of the log-files analysis were discussed and compared to results from similar studies, a couple of so-called success factors arose. The findability of the different facilities can be derived from log-files analysis and additional usage information. It turns out that only the Atlas and the Stadsplattegrond can be found by their intended and desired user group because of their efforts in publicity and, this explains their high visitor numbers. The navigation of the facilities is an aspect all facilities have to make adjustments to in a greater or lesser extent. The strategy of attracting more users is not needed for the Gebouwde and Groene Omgeving, needs more focus on users outside the work sphere of the DINO-shop and does not need to be adjusted for the Atlas and the Stadsplattegrond.

The results of the user survey show that no parts are entirely absent at the different facilities, but there is much room for improvement. User-friendliness and search methods are popular aspects in which adjustments need to be made. Users are mostly satisfied about the quality and provision of information and do not use support options much.

If it is decided to use log-files, the contents and forms of log-files need to be adjusted for this purpose. But still log-files have limitations which have to be taken into consideration. This makes gathering other user information, like the findability rate of facilities or applying additional methods like user inquiries necessary to meet user requirements. Log-files analysis is suitable as a first preparation to gain

information about usage and user identification, but this should be followed by additional analysis in order to define user requirements.

This study shows that by analysing user activities gathered from log-files, valuable lessons can be learnt, when the limitations are taken into consideration. With additional techniques and tools user requirements can be drawn up and improvements can be made to the geo-information provision facilities.

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1 Introduction

1.1 Background

The rise of Google Earth, which started halfway through the last decade, can be described as sensational. The success can be attributed to two aspects: the accuracy of the used images, which before were only accessible to companies with huge budgets and specific purposes, and the simplicity of the use of the software [Fleximage, 2005].

It is surprising that the simplicity of the software usage attracts so many users, a lot of whom had not used GIS before. Already in 1987 the Geography Awareness Week was launched by National Geographic¹ in the United States, which besides promoting geographic education, focused on awareness of geography amongst the general public [Wellar, 2006]. This was done by demonstrating to the public different GIS applications and processes from different organizations, like governments, businesses, education, etc.

These applications were built during a period in which technology was the most important ingredient of a GIS. Arguments like ‘because it is possible’ and ‘others are doing it’ had more body than ‘WE need it’ [Reeve and Patch, 1999]. By the end of the nineteen nineties this vision started to change. Books like ‘GIS for Everyone’ [Davis, 1999] were published, mottos of GIS applications² and presentations with titles such as ‘CommonGIS; GIS for everyone, from everywhere’ [Perdigão, 1998] and ‘GIS Functionality in Multimedia Atlases; Spatial Analysis for Everyone’ [Schneider, 2001] were held. This implied that the GIS-user was becoming a more important key figure in development processes and that the user would be deciding which functionality was going to be implemented in GIS applications. It was already known that user participation in development processes was efficient and users were going to have more confidence in a developed system if they were allowed to supply suggestions about the design [Butler and Fitzgerald, 1997].

But a lot of success stories about users participating in the development and launch of GIS functionalities after 2000 and how these functionalities increased the availability and usability of geographical information for the general public can not be found. Moreover, developed GIS applications which were based on public participation did not lead to these applications being reached by a wider audience. [Steinmann et al, 2004]. [Tulloch and Shapiro, 2003] think that the efforts all parties should add are more important than access and participation itself. Still this does not explain why Google Earth has been so successful with its simplicity.

Besides the two described success factors, there is also another aspect which benefited the growth of Google Earth: its timing to launch this service for general public use. When Google Earth was launched (June 2005)³, the technology had evolved to a level that a geographic viewer with basic functionalities and high-

¹ <http://www.mywonderfulworld.org/gaw.html> (Accessed on 01/07/2007)

² <http://www.esri.com/news/arcnews/spring00articles/esrirobust.html> (Accessed on 01/07/2007)

³ <http://www.wired.com/news/technology/0,68042-0.html> (Accessed at 01/07/2007)

detailed data, where users can search, retrieve and present desired information with an acceptable performance, was available for everyone with a multimedia computer and standard internet connection. As the evolution of GIS in figure 1.1 shows, this only became possible during the last couple of years, because of improved internet technology and improved availability of spatial data.

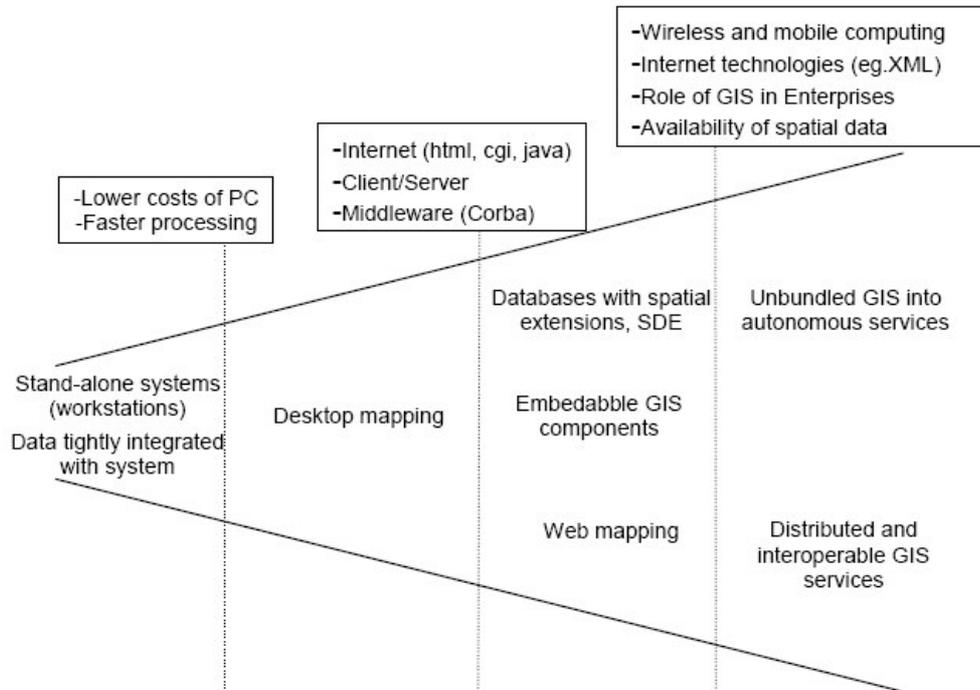


Figure 1.1: Evolution of GIS [Alameh, 2003]

Due to improved internet technology the number of launched facilities, which contain and offer geographical data and services, has risen. The rate of growth was higher in the first five years of the 21st century, mostly because the internet disseminates GIS capabilities beyond the desktop architecture [Tait, 2005].

This can also be supported by investments which were made to develop and launch facilities like geoportals (a geographic variant of a web portal, which represents an entry point to geographic data and services). The average cost of maintaining a geoportal amounted up to €1.5 million per year [Crompvoets et al., 2005] and the expectation was that many more portals were going to be implemented in the years after 2004. [Crompvoets et al., 2004], [Crompvoets and Bregt, 2003]. This implies that there was money available to develop and implement geo-information provision facilities, but the intentions of the facility provider were to show users available possibilities of geographical information. The presence of a large number of geo-information provision facilities would create awareness of methods to make geographical resources available and exchangeable, but the danger of facilities applying as many functionalities as possible may also arise. Aspects like user-friendliness, usability and power of attraction for different types of users (civilians,

data specialists, executives etc.) may get less attention and priority in making a functional design.

However, before launching Google Earth, it was not likely Google made inventories about the requirements of its potential users or established user groups to ensure that opinions of users could be used to evaluate its facility. According to [Grossner and Clarke, 2007] Google's business model was based on displaying advertising messages alongside the information it delivered and the freely available and easy-to-use Google Earth fitted in this strategy perfectly. Still it is interesting to learn from the success factors of Google Earth, compared to other geographical information provision facilities.

1.2 Problem statement

Using GIS is not a specialist activity anymore. Large powerful computers and sophisticated software are no longer needed and GIS has become a part of business critical processes and is linked to other information provision systems [Lieshout and Puylaert, 2002]. Furthermore, users prefer recognizable and easy-to-use interfaces and tools to find and consult their desired geo-information, as is shown by results of research by [Wachowicz et al., 2005]. If the geo-information is served in understandable viewers without too many buttons, unreadable displays and descriptions, users won't get frustrated, as mentioned in [Larson et al, 2006] and users will use the facilities more intensively for different purposes. However, the provider of online geo-information solutions focuses mainly on functionality than on usability of the interface [Aditya and Kraak, 2005a]. In those cases, users become demotivated and will try to find other ways to get their desired information, which in turn means they can be considered as lost as users for the offered geo-information solution.

This problem and also the lack of awareness about the possibilities of geo-information facilities by the greater public [Perdigão, 1998] , [Lavakare and Krovvidi, 2001], [Gajos, 2005] can be considered as the main reason of the low visiting numbers found by different providers of geo-information provision facilities. [Zevenbergen et al., 2006] indicate that these consequences are caused by the failing coordinating role of the geo-information sector to bring users and suppliers together, based on the wishes and demands of the user. The consequence is that suppliers develop geographic data, geo-services or geoportals for their own determined objective, which does not always attract lots of users. For example, advertising was the main objective to build the Google Earth. So the assumption could be made that the providers would have been less interested if their offered service had satisfied the demands of their (targeted) users concerning geo-information. Also, the way the geo-information or functionality is presented, is often based on the opinion and insight of the provider of the service itself. Most facilities have a primary focus on a target group of users they want to reach [Tait, 2005], but it is unlikely that usage statistics are used to monitor the implemented functionalities which should make the facility more known, accessible and user-friendly under potential and existing users. However "free" web statistics are already available for every provider and studies concerning

the value of user participation indicate that the use of data on user behaviour of web facilities usually pays off [Butler and Fitzgerald, 1997].

In summary: Facilities which enable users to discover and consult geo-information are born to fulfil needs of specific groups of users. However, the user him-/herself does not contribute to the way the facility is developed, formed and launched and is not satisfied with the offered solutions, judging from the low visitor numbers. There are possibilities to increase the involvement of the user at the development and maintenance process of a facility, but little is known about who those users are, what their requirements are concerning geo-information and whether these requirements can be used to improve facilities.

1.3 Research question

The problem stated above can be explained twofold: existing users are not satisfied with the facility provider's interpretation of their requirements about geo-information. Therefore they will not use the offered geo-information facilities again. Secondly the facilities have problems to attract new users who also have requirements concerning geo-information.

From existing users, who have the awareness of and the ability to find the matching facilities, it is important to learn what their characteristics are and how they behave regarding the provided geo-information and used functionalities which are made available to them. With this information, user profiles with matching requirements can be drawn up, improvements to the facilities can be generated and strategies to successfully attract new users can be set up.

To be able to identify the requirements of its users, the provider of a facility first has to get insight in who these users are. By analysing log-files, information about users can be obtained. However, it is not known if log-files contain the desired lay-out, usable data and adequate reliability to generate this user information. Also, knowledge about the necessary tools to collect and analyse information from log-files is not present with the providers.

With the answer to the next research question the facility provider will get the necessary insight to which information can be gained from log-files, what the usability rate of this information is and which tools can be used to gain this information:

What contribution can log-files make to the identification of usage and the users of geo-information provision facilities?

1.4 Objectives

To be able to define the contribution of log-files, log-files of different geo-information provision facilities will be collected and analysed. The main objective is to derive conclusions on the usability and accuracy of generated user information from log-files and present methods and tools to analyse log-files.

To be able to determine these conclusions and methods, the next sub-objectives are formulated;

1. Describe the facilities from which log-files will be collected and analysed.
2. Determine which information can be gathered from log-files and what its accuracy is.
3. Describe tools which can be used to collect, analyse and report on user information, generated from log-files.
4. Identify users of these said facilities.
5. Describe how the obtained user information can be used to determine user requirements and can be translated into recommendations to improve the offered facilities.
6. Review the role of log-files to identify user requirements.

In this study, the main focus lies on the log-files and their contribution to identifying user requirements and demands of geo-information provision facilities. The process and possible choices after the usage of log-files to determine user requirements and resulting improvements of facilities will also be highlighted. The results itself also have added value, because actual log-files from the selected facilities are used, but these results are subject to the generic question which contribution log-files can make to the identification of user requirements.

In the context of this research, the term user must be considered as an end-user who does not develop, but sends out a request and expects to receive geo-information in return. The term facility is also used often in this research and in the context of this thesis a facility is a service which gives users access to single or multiple sources of geo-information, its purpose being to use and share geo-information. One type of service, which is considered as a facility is a geoportal which is mentioned earlier in this chapter. More detailed definitions and descriptions will be presented in section 2.1.

1.5 Context of study

This study was started as part of the Geoportal Network project. The purpose of this project, initiated by the Space for Geo Information program of the Dutch government, was to develop an open and transparent network of geoportals within the Dutch Geo-Information Infrastructure [Zevenbergen et al, 2006]. With the diversity and huge amounts of geographical data and services to provide those data nowadays, it would be hard to urge users and suppliers into investing in another new service. But by developing a network of geographical data, services and catalogues, which are open and transparent and have less rules which erect less barriers for providers and suppliers to join the network, a lot of bottlenecks can be overcome. Geographical information will become more accessible to different types of users, because they are given insight into the publicity, attainability and usability of the geo-information. By investigating and defining success factors of geoportals, these portals can further be

developed and built even smarter and aimed at usage by a bigger audience [Hoogerwerf et al, 2004].

One of the items of this project was scientific research, which can be considered as the origin of this study. The study will focus on the role log-files can play in the identification of user requirements of geo-information provision facilities, which in turn can be used to improve the design and development of a geoportal. These recommendations show which strong and weak points a facility has and how weak points can be improved, based on user requirements. This corresponds with making services and data better known and more attainable and contributes to defining success factors for geoportals.

During this study the Geoportal Network project was completed. So this study could not contribute to fulfilling the objectives of the project. However, as can be learned from [Zevenbergen et al., 2009] one of the conclusions is that user demands can determine how information products can be constructed from raw data. So, if providers are able to identify users and extract their requirements using log-files, their information products will be more recognizable and interesting for their users, which in turn makes this study valuable to the results of this project.

1.6 Research relevance

Theoretical relevance

Most designers and providers of facilities are not aware that servers can record user activities into log-files and that log-files can be used to generate reports with general, statistical information about the usage of their facility [Drott, 1998]. According to [Jansen, 2006] this lack of awareness can be attributed to the limited numbers of publications on analyzing transaction logs. In this research the value log-files could have for an identification process of users will be explained. By using already available log-files and additional analytical tools, theoretical information can be generated, which geo-information provision facility providers, but also any other providers of geo-related services on the internet, can use to become aware of the added value of log-files.

In addition, in this study a methodology will be adopted to perform a user needs study, based on the analysis of information from log-files. [Nicolas et al., 1999] already point out that it is necessary to ask the user when information out of web statistics will be used, but they do not tell how the user needs is to be approached. By presenting an approach to find the users and withdraw information about their usage at the visited facility, theoretical information can be given on how providers of geo-information provision facilities can process information gathered from log-files in order to understand and remove users' frustrations and increase the visitor numbers of the facility.

Framework relevance

The intention was to present and offer the above mentioned theoretical information as a contribution to the Geoportal Network project. Because of the completion of the Geoportal Network project in 2008 [Zevenbergen et al., 2009], this intention can not be fulfilled. However, some of the facilities which participated in the framework of Geoportal Network are still on-line in a same or further developed form. Their providers could learn from this study by observing to which extent users experience aspects like publicity, attainability and usability in relation to their facility. Another possible side-effect is that more insight can be obtained into success factors of geo-information provision facilities, which can be shared with other providers both within and outside the framework of Geoportal Network.

Personal relevance

As a manager of GIS-applications at a water board, it is always a challenge to satisfy the needs of users whom I facilitate in using geo-information. The first challenge is to gain relevant information from users about their wishes and dislikes about the provided applications, other than through rumors and hearsay. If log-files can be used easily to get adequate and accurate information about the behavior of users, I see a lot of application possibilities for me as GIS manager to monitor users and apply the gathered information from log-files to improve service to the GIS-users.

Another aspect which interests and inspires me is the availability of already generated log-files and the value they can have for a different way of using them. In my work these log-files are rarely used and only used to generate statistical information about the usage of the web facility. By gathering knowledge from this research, I hope to gain more relevant information about this source which will help me to facilitate the users more effectively.

1.7 Limitations of study

The purpose of this study is to define the contribution log-files can have for the identification of user requirements of geo-information provision facilities. Based on these requirements, improvements can be made to the facilities. Implementing proposed improvements will not be part of this study. The development process of a facility can be described as a cyclic process, as is presented in figure 1.2;

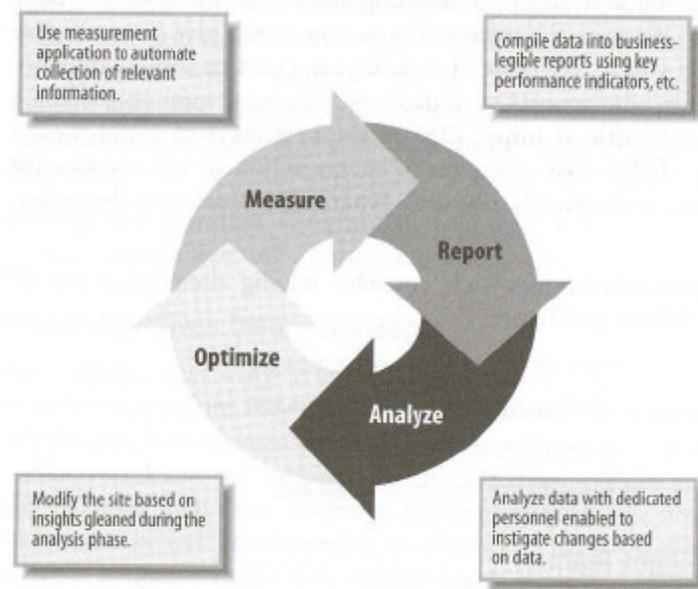


Figure 1.2: The continuous improvement process [Peterson, 2005]

In this study, the measuring and report part of the process will be dealt with to determine the role log-files can have in it. The analysis part of the process will also be discussed, its only purpose being to clarify the contribution of the log-files. Improvements will be suggested, but not be implemented and evaluated. For that, more research and different techniques will be necessary and are not part of the scope of this study.

To investigate and evaluate the role of log-files, a request was made to the selected facilities to deliver available log-files. The format and shape of the log-files which were delivered by the facility provider were not bound to restrictions or conditions. This resulted in log-files containing different types of data and that effected the usability and accuracy of the gathered information. To prevent this aspect, it might have been an option to investigate which type of logging facility activities are used and which data a log-file usually contains. This investigation could in turn have resulted in a log-file prototype, which then could be implemented by the selected facilities. However, such an approach would be too time-consuming and technically complex and there would be no guarantee it would be technically feasible and organisationally possible. For these reasons this aspect is left out of this study.

As said before, in this study the focus is on the role log-files can play to identify uses and users. At the start it was not known where the user was situated. Besides from the homes of individual citizens, most of the visits would probably be made from companies or institutes. Within those organizations there are only a few employees who use geo-information provision facilities. It would be very interesting to find out which employee uses geo-information provision facilities and in which ways the found information reaches others in the organization. Nevertheless, this analysis would be very time-consuming and difficult to perform, would rely on business policies, planning, privacy legislation and would lack direct benefits for the

organization. Therefore, the results obtained from the log-files will be based on user segments, like civilians, municipalities, utilities etc, whereby no distinction will be made within these segments based on positions in the organization.

To evaluate the role of log-files as completely as possible, the user requirements of the different facilities will be drawn up, together with proposed improvements. To be able to define these requirements and improvements, an additional user needs study will be performed and discussed. Besides, user needs studies using questionnaires, which are considered to be the most efficient, cost-redundant and less time-consuming way to gather information from users about the visited facilities, other methods could be used to derive complete and accurate user requirements of geo-information provision facilities. However, this would be a study in itself, including a lot of literature research, to paint a complete picture which methods can be used together with the log-files to identify user requirements of facilities. Therefore, an investigation of these methods is not a part of this study.

1.8 Study methodology

When an organization has decided to offer a web-based facility, one of the most used arguments to justify the investments is to provide useful geographical information to the user [Aditya and Kraak, 2005b]. However, if the facility is launched and becomes available for users, it is important to learn whether the facility keeps on providing useful information after a specific period of time. One of the considerations to monitor whether the argument is still valid, is to use log-files. Therefore, it needs to be clear whether log-files can deliver the desired information, so user requirements can be determined and improvements can be defined.

Actually, the question is whether log-files themselves and the methods to collect and analyze them, can be put in a so-called assessment tool kit as is visualized in figure 1.3:

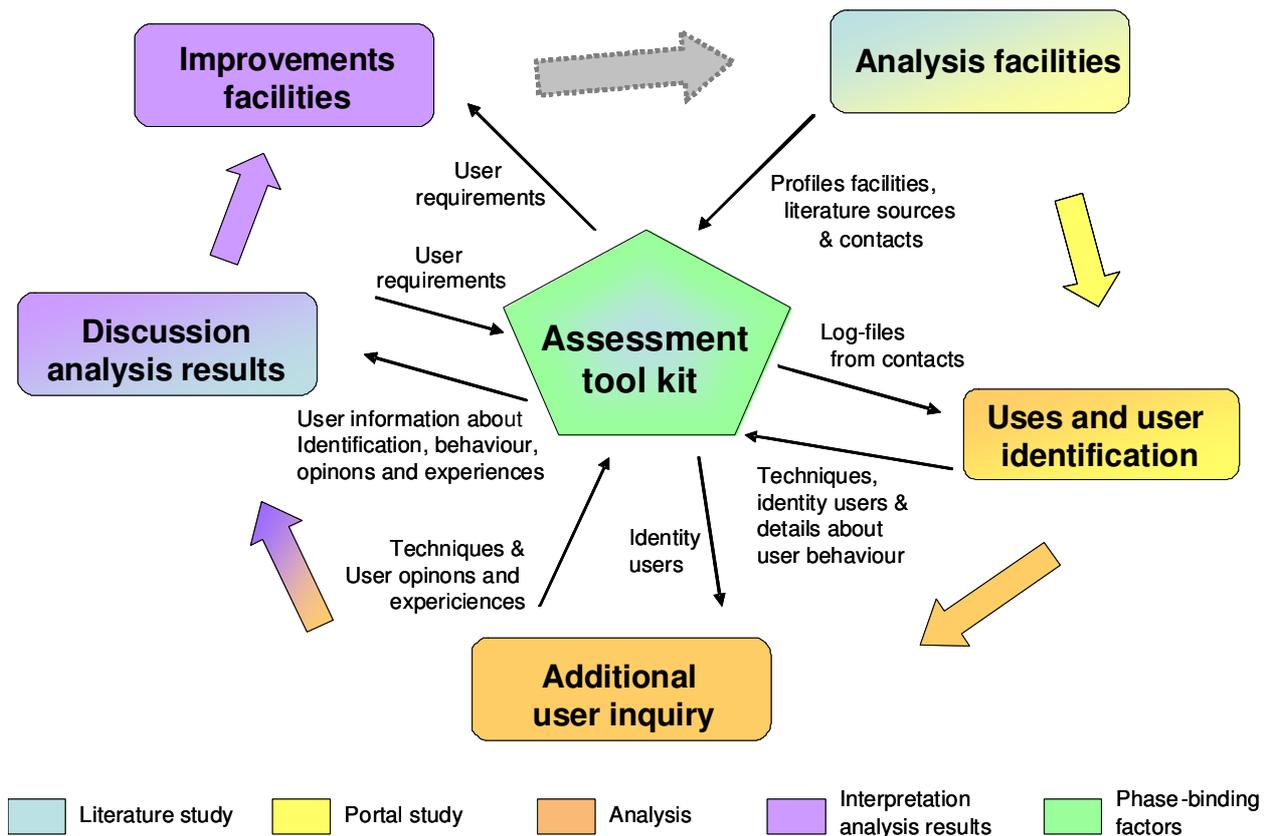


Figure 1.3; Study Methodology

Using log-files to identify user requirements of facilities is not one time operation, but can be looked at as a life-cycle. It needs to be repeated more than once, because technology, demands, wishes and feelings of users change through time, so that they effect the requirements of users towards geo-information provision facilities.

The circle starts at the upper right hand corner where the facilities will be analysed to deliver aspects like facility profiles and theory about log-files and methods to collect and analyse them, to the assessment tool kit. Together with log-files, provided by the facility providers (contacts), analysis of log-files lead to the identification of uses and the users. After using other methods like user inquiries and analysing the results thereof, improvements can be proposed. These improvements can be implemented and changes of the usage numbers and diversity can again be obtained from new log-files.

The process which will lead to the answer how log-files can be added to the assessment tool kit is sub-divided into different chapters as follows:

In chapter 2 the selected facilities will be described. Firstly, descriptions will be given of the used definitions of the terms user and facility. Secondly, the methodology to describe the facilities will be treated. Based on references, different aspects will be discussed and these aspects will be reclassified to create a balanced and weighted list

of aspects to describe the facilities. The five facilities which are selected to be analysed on their user needs and wishes are:

- Gebouwde Omgeving (Built Environment). This geoportal supplies building information of the connected municipalities in the Netherlands. Besides different ways of searching information (geographical and administrative), there are many attributes on which selections can be made to determine the desired dataset. This portal was part of the Geoportal Network.
- Groene Omgeving (Green Environment). This geoportal was also part of the Geoportal Network and offers geo-information about rural and natural areas in the Netherlands from different providers.
- DINO-shop. This geoportal offers geo-scientific information about the Dutch subsurface. The DINO-shop also provides web services and static maps. For the Geoportal Network, a similar portal based on the same web services was built under the name Brown Environment (Bruine Omgeving).
- Atlas of Amsterdam. This portal, which can only be accessed through the intranet of the municipality of Amsterdam, contains several data-sets, like cadastral, topographical, photographic and environmental data. This portal is not part of the Geoportal Network.
- Stadsplattegrond (City map of Amsterdam). The internet-version of the Atlas of Amsterdam contains different but less extensive geographical information of the city of Amsterdam. This portal is not part of the Geoportal Network either.

Chapter 3 starts with the log-file itself. By analysing the different parts of a log-file, which is generated when a user visits a facility, insight will be given into which data a log-file can contain and how to interpret them. Furthermore, the tools which are used to retrieve information from log-files will be explained. The different techniques behind the applications will be revealed, together with way these techniques cooperate to create a report with log information. Also, the tools which gather extra information besides log-files will be treated. Then the results of the analysis of the log-files and the tools used will be given. The diversity of gathered information from log-files will become clear, together with the identification of the different user groups found, if identification was at all possible. The chapter will be concluded with user segments that are distinguished for research into user requirements.

In chapter 4 a user needs study will be performed. First the used methodology will be presented and explained in order to indicate why the chosen techniques are appropriate to gain information from which user requirements may be derived. Also the data collection process will be explained to show how users are approached and which effects that has on the response rates. Furthermore, the results of the different questionnaires will be presented and related to pre-defined examination units.

In chapter 5 the results will be discussed twofold. The results from the log-files will be compared to already mentioned and discussed literature sources to determine the impact and reliability of the out-comings. Also, the results of the user needs study will be discussed to underline the role and contribution of log-files to the process of identification of the user requirements. On the basis of the requirements,

Using log-files to identify uses and users of geo-information provision facilities

recommendations to improve the different facilities will be given, and this will be followed by a review of the methods which were used to perform the log-files analysis and the additional user inquiry.

In chapter 6 the conclusions will be presented, grouped by the different objectives. Also recommendations for further research will be given.

2 Definitions and facilities

2.1 Introduction

This chapter will give an overview of the items that were used in this study to identify the users of the selected facilities. First of all it is necessary to know what is meant by a facility and a user in the context of this study. This will be done in the section on definitions. Next the different facilities will be described, but before this can be done, the methodology will be explained. To be able to compare the different facilities, their descriptions need to contain the same aspects, which together must provide a complete picture of the facilities. Furthermore, future plans on how the organizations want to change / improve the facilities to gain more benefits will be discussed. Finally the chapter will be summarized.

2.2 Definitions

In this study the term facility is used frequently. This term represents a service launched and maintained by a public or private provider. This service allows users to gain access to and use geo-information for their own benefits. The different services can be presented to users in different forms and could be subjected to different explanations to explain these services. So there is a chance that the term facility will be used in the wrong context. This chapter will deliver a definition for the term facility which will be used in this study.

Besides the term facility, the term user can also be interpreted in different ways. To provide more clarity on how the term user is used in this study, a definition of this term will also be given in this chapter.

2.2.1 Facility

First of all, the geo-information provision facilities in this study are offered by the providers to users through websites. A website can be explained as follows;

Website

The most common term is the website, which stands for a related collection of World Wide Web files⁴. A separate file can be seen as a page on the screen. Every website has a starting page, which is called home page. From this page all the other pages can

⁴ http://searchwebsiteservices.techtarget.com/sDefinition/0,,sid26_gci213352,00.html
(Accessed on 01/07/2007)

be (in) directly accessed. Another characteristic of a website is that it is maintained by an individual, group or organization, which use the website to give the visitor a collection of information⁵.

Websites can be found by using search engines, like Google, AltaVista, Yahoo Search or MSN Search. Search engines build up databases containing information about websites⁶, mostly found on the home page.

Web service

A component of a website can be a web service. A web service can return desired information to a user as a reaction to a request from the user. A web service can be explained as follows;

There are different interpretations of the definition of a web service ~~is~~. The aspects which are included in the different definitions [Thewessen and Brentjens, 2005], [Alves and Davis Jr., 2006], [Parsons 2003], [Alameh, 2003], [Keller, 2002] are:

- Web services can be described as software components which are modularly built
- Web services can be accessed through the World Wide Web, because of standardised XML messaging
- Web services can be integrated into other applications, clients and web services
- Web services provide functionality and information (this could be spatial information, for instance)
- Web services have one or more interfaces
- Web services are able to make use of external functionality and operations

To realize that web services are able to be used in different applications and environments, a lot of standardisation has taken place. In the description of how web services work, this will become clear.

Making use of a web service requires the availability of three components, which are displayed in figure 2.1.

⁵ <http://www.answers.com/topic/website> (Accessed on 01/07/2007)

⁶ <http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/SearchEngines.html>
(Accessed on 01/07/2007)

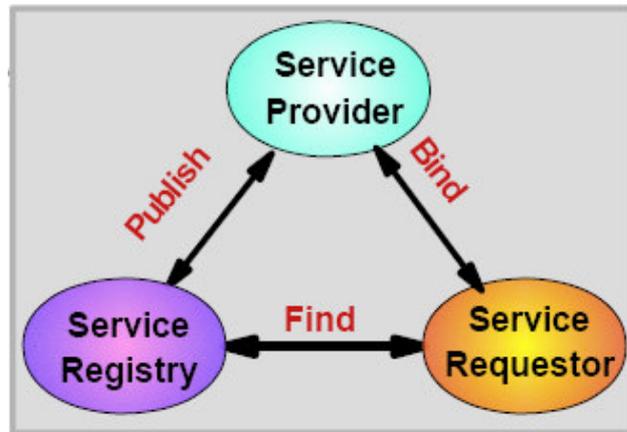


Figure 2.1: Web service components [Colan, 2001]

There needs to be a service requester, mostly a user, who has a particular question and wants to use a web service to find an answer. Due to the service registry, where all the web services are registered and which provides support to publishing and locating services, the service requester is able to find the associated service. The registered service is published by a service provider, who provides certain functionalities and information. When the service requester has found the published service, he will directly access (or connect himself to) this service, so he is able to use the offered functionality and information.

The language that is used between the service requester and the service provider is mostly SOAP, which stands for Simple Object Access Protocol. This is a platform-neutral XML protocol which executes an operation on a server and delivers a method in XML [Colan, 2001]. A user sends a request message in a specific format to a server; where the requested operation is performed and the answer is sent back from the service provider to the requester.

The requester uses a medium to send and receive his SOAP messages. He does this, because he does not prefer to draw up and analyse the SOAP message itself, but likes to see and use readable and usable functionalities and information, which is presented in an interface of the web service.

In a service interface it is possible to use data and functionalities from other web services. This is a result of the implementation of registries like UDDI. UDDI stands for Universal Description, Discovery and Integration and can be considered as a catalogue of internet-based business services and is built up of 200 major software developers and e-business leaders [The Stencil Group, 2002], united in one supporting organization [uddi.org](http://www.uddi.org/) ⁷.

A web service needs an interface to be available to users. A web page (part of a website) can fulfil this role. A web page can also provide information, like geo-information in a map but also reports, graphs or text. The difference is that information on a web page is static, but information in a web service can be changed, based on the operations performed by the user.

⁷ <http://www.uddi.org/>, (Accessed on 01/07/2007)

Besides normal web services, there are also definitions and specifications for geographical web services. These web services can therefore be distinguished from normal web services. Geographical or geo web services can be explained as follows:

Geo web service

A geo or GIS web service provides spatial data and / or functionality, based on the same technology standards as normal web services [Tait, 2005], [Tang and Selwood, 2003], [Alameh, 2003], which makes them interchangeable and interoperable [Vögele et al, 2003]. These standards are provided by the Open GIS Consortium (OGC), which tries to achieve interoperability in geographical web services. OGC defines and publishes open specifications in a way that web services can be developed and implemented whereby interoperability is guaranteed.

There are four different types of geo web services, which are;

- Catalog services which can be used to classify, register, describe, search, maintain and access information about web services [OGC, 2002].
- Data services which offer customized data to users. The most important examples are the Web Feature Service (WFS) Web Map Services (WMS) and Web Coverage Service (WCS). A WFS provides access to the geographic data stored in a database and sends results in GML-format to users who sent out a request [Vögele et al, 2003]. A WCS can be linked to a WMS client to give the user access to spatial 'coverages'. Coverages represent values of properties of geographic locations [Sayer et al, 2005].
- Map services produce maps of geographical locations. The basic Web Map Service (WMS) is the best known example which does not contain data, but represents raw geographical data in raster (jpeg, png, gif etc.) or vector (svg) elements [Sayer et al, 2005].
- Processing services offer operations to process and transform geo-data, such as projection, overlay, classification, rasterization / vectorization etc. [Alameh, 2003].

Websites can also contain web applications which unlock and offer different kinds of (geo-)information sources to users, like web portals and geoportals do. These portals can be explained as follows:

Web portal

As seen defining a definition of a web service, a lot of similarities^{8 9} [Tait, 2005], [Maguire and Longley, 2005], [Bernard et al., 2005], [Tang and Selwood, 2005] can be found in different definitions of a web portal. Only one clear similarity can be found in all the used references;

⁸ http://webopedia.internet.com/TERM/W/Web_portal.html (Accessed on 01/07/2007)

⁹ http://en.wikipedia.org/wiki/Web_portal (Accessed on 01/07/2007)

A web portal can be considered as a starting point, gateway or entrance to a collection of online information sources.

These information sources can be stored at different locations and in different forms, like datasets, cookbooks, tutorials, news, tools, (links to) websites and also web services [Maguire et al., 2005].

Other similarities are not so clearly described in the different definitions. Some definitions talk about availability of search tools which help users to locate information [Tang and Selwood, 2005], that portals exist of advertising which generate income for the owners [Bernard et al, 2005] and that a portal is a web environment where users and suppliers can create consensus about, collect and share information [Maguire and Longley, 2005]. These aspects are all partly related to web portals, but do not give a good overview of what a web portal is.

However a sophisticated web service could also have all these characteristics, thus marginalising what the difference between a web portal and a web service is. A web service can be considered as a script where definitions of operations are stored, but it needs an interface, so users are able to perform these operations. A web portal mostly contains or uses one or more web services (however it is not always obvious to find out) and can contain other functionalities such as search tools, authorizations, payment mechanisms etc.

Geoportal

A geoportal is the geographical variant of a web portal. It represents an entry point to geographical data and services, which can be discovered online [Tait, 2005]. The primary purpose of the website, where the portal is situated, is to discover the geographical data / services. By querying meta-data records for demanded data and services, the user can directly be linked to the data itself by using online services or by ordering / purchasing the data or service [Maguire and Longley, 2005].

There are three types of portals [Tang and Selwood, 2005]:

- *Catalog portals* create and maintain catalogs of meta-data which describe the registered information resources. The catalog(s) can be searched by users on different entrances (map, keywords, lists etc.) , get search results showing properties of the data sets and connects the user to the service they are interested in.
- *Application portals* can be considered as a range of web services. These can be accessed through an interface which are tailored, based on the providers preferences or user requirements. The interface only presents the data and functionalities which are needed and users are able to view, query and analyse geographical information.
- *Enterprise portals* are only available as intranet applications and integrate business enterprise solutions with spatial data and functionalities. Besides geographical information it can also open up other non-geographical information, such as documents, photo's and graphs. Besides making different kinds of

information better accessible to its staff, it also helps to manage these information resources.

Now that the different definitions of the terms for providers' services to offer users access to (geo-)information are discussed, it is not yet clear which terms are covered by the term facility as is used in this study. A geo-information provision facility can be considered as everything which provides a service for users to access single or multiple sources of geo-information, with the purpose to use and share this geo-information.

So, all the defined terms can be considered a facility. Web services and -portals provide information from a single information source (web service) or multiple sources (web portal), which can be presented after users have send out a request. Geo-services and geoportals can use geographical entries to define the requests and present the requested information in a geographical environment, but that does not exclude normal web services and web portals. They still can offer the user geographical information in a certain way. Even websites, which are mostly used to give the user access to web services and web portals, can contain geo-information, which is provided to users, like a static map or just information about quality or release date of geo-information provided by web services or web portals.

2.2.2 User

Besides the facility the term user is and will be used quite often in this research. However this term can be defined quite generally, like the next definition:

A user is a human entity who interacts with a computer, particularly with a computer program¹⁰

When using this definition a user could be anyone without being specified in which way he / she has accessed a facility (directly / indirectly) , what his/her behaviour is whilst using the facility (stays long and visit different pages / stay a short time on one page), how important the provided information / functionality is for the user and what the intention of the user is to visit the facility. This makes the term user confusing. It could easily be mistaken by terms such as visitor, consumer, subscriber and end-user.

For proper use of the term user in this study, it is necessary to give the term some characteristics:

- A user uses a pre-defined facility without worrying about technical specifications, configuration or status. He/she can therefore be considered as an end-user.
- A user initiates a request to a facility¹¹ his/her purpose being to get an answer from this facility.

¹⁰ <http://www.agtivity.com/def/user.htm> (Accessed on 01/07/2007)

¹¹ <http://webdesign.about.com/od/browsers/g/bldefuseragent.htm> (Accessed on 01/07/2007)

- A user can be considered as a source or final destination of user (geo-)information¹²
- A user is a human entity, who can be contacted as their residence and their actions are human events, like accepting cookies through their browser¹³.

By defining which characteristics do not belong to the term user in the framework of this study, the next groups of human entities are excluded:

- A user does not have to be known to the provider of the facility. No distinction will be made between users who have authorized access to particular services and users who do not have these privileges.
- A user does not have to have made previous visits to the selected facilities already. Also potential users who are not aware of the existence of the facility or do not visit the facility will be considered as users in this study.
- A user does not need to use a facility, like a geoportal to reach an other offered service by this facility. Also when he gets access to this service in other ways, he will still be considered as a user.

Based on the references users have characteristics of consumers, visitors and end-users, but because a compilation of different interpretations of the term is used, not all the aspects are needed to call someone an user.

2.3 Approach

In this chapter the different selected facilities will be described. To be able to make comparable profiles of these facilities that can be used for the discussion of the results, it has to be determined which aspects will be described and which aspects will be omitted.

The information which is needed to describe the different aspects is gained by analysing the facilities and making contact with the different providers. First the contacts are approached to return the unknown but important aspects of their facility and make an appointment for an interview. Besides receiving answers to questions and developing a general idea about the involved facilities, an interview also gives the opportunity to make contact with the providers, get to know their attitude towards this study, ask for log-files, and additional information and schedule meetings. Also plans from providers about the future changes to their facilities can be learnt. These plans will be described in detail per facility after the description of the facilities itself.

¹² http://www.atis.org/tg2k/_user.html (Accessed on 01/07/2007)

¹³ <http://www.opentracker.net/en/articles/hits-visitors-pageviews.jsp> (Accessed on 01/07/2007)

2.3.1 Aspects of geo-information provision facilities

To be able to describe a facility in a transparent and coherent way, a selection must be made which aspects will be used for the description of the facilities. In general terms the descriptions must tell what the facility offers users and what is done to facilitate the user in the most efficient and fruitful way. Different references which address comparing or describing facilities, like portals or web services will be discussed, in order to perform a weighted selection process of aspects, which will be formalized in the next section.

[Tait, 2005] does not present a standardised approach to describe his reviewed geoportals, but in his descriptions items like primary focus, purpose, providing organization, structure, target group, working methods, content, usage and benefits are discussed, which must give the reader a general idea of the characteristics and possibilities of the portals.

His descriptions are not standardised, there are aspects which are, regarding to the objectives, important to use when facilities are described. These aspects are primary focus, purpose and target group and indicate the objectives of the providing organization to develop and implement the offered facility. The aspect benefits is also interesting to describe and to discover in general which what the most obvious and visible benefits are. Behind a portal there is a providing organisation, which takes care of the funding, maintenance and implementation of updates and new functionalities. The aspect content is also essential to describe, but this aspect is very diverse. Later on in this section different features which make up the term content will be discussed, this making the aspect content not usable. Also the aspect structure is a very general one, which can be used to describe the technical or the functional structure, whereby the use of terms and the context of the description itself can differ a lot. The aspect usage will be discussed in the next chapter, therefore it will not be discussed in the descriptions of the portals itself. Working methods can also be interpreted in a very broad way and will differ for different types of users. First the users need to be identified, before the working methods of these users concerning the facility can be discussed.

[Larson et al., 2006] mention user-oriented aspects in their article about comparing geo-catalogues, like access and search possibilities, meta-data usage and performance to emphasize that their reviewed portals lack the fulfilment of the needs of clients who are judging catalogues based on these aspects.

In the framework of this study all these aspects have added value when describing the facilities, because they are items which users use to base their decision on whether to use a web facility or not. With the aspect direct access it becomes clear how directly a collection of data can be accessed, which can be represented by the number of mouse clicks. By highlighting the search possibilities, the ability of inserting parameters of different kinds to find and access particular geo-information will be presented. Different search methods use meta-data, which can be considered as the key to opening up the available geo-information. If these three aspects are described, but the performance is bad then this will lead to frustration and premature drop out of users and reduces the offered facility till a less-used and unpopular web object.

In two publications([Crompvoets et al, 2004] and [Crompvoets and Bregt, 2006]) the developments of national spatial data clearinghouses is presented. For the description of these clearinghouses they use pre-defined lists of characteristics. The combined list of these characteristics is presented in table 1. Not all the aspects which were defined in the publications are presented in table 1, because [Crompvoets et al., 2004] also distinguish aspects to learn more about the development process. However, this study focuses more on the impact of the user on the facility, a couple of aspects are very useful, like funding stability, availability of view (web mapping) services and mechanisms for searching, but are not selected for this study. Funding stability (as funding continuity) and availability of view services like web mapping have already been mentioned as aspects in [Crompvoets and Bregt, 2006]. Mechanisms of searching have already been looked at in the discussion of [Larson et al., 2006].

Nr.	Aspect
1	Year of first implementation on the Web
2	Number of data suppliers
3	Monthly number of visitors
4	Level of data accessibility
5	Number of datasets
6	Most recently produced dataset
7	Availability of view services
8	Frequency of web updates
9	Web address change
10	Funding continuity
11	Metadata-standard applied.
12	Number of web references .
13	Languages used.
14	Use of maps for searching.
15	Registration-only access.

Table 2.1: Characteristics for describing clearinghouses [Crompvoets et al, 2004], [Crompvoets and Bregt, 2006]

Because the five facilities named in chapter 1 all meet the description of a geoportal, all the aspects in table 2.1 are interesting as aspect to describe the facility. This is because the term spatial data clearinghouse can be replaced by the term geoportal [Hansen, 2006], nearly all the characteristics of a facility are similar to those of a clearinghouse. However, the aspect ‘web address change’ will not be obtained, because the time period in which the facilities are analysed is short and the portals are already operational for a relatively long period, which weakens the statement of [Crompvoets and Bregt, 2006] to adopt this aspect in the comparison of the analysed clearinghouses.

The two aspects which will not be discussed in this chapter are the monthly number of visitors and the number of references. The visitors of the different facilities

will be discussed in detail in the next chapter. Also the number of web references will be analysed in the next chapter.

The last reference which will be discussed here is an article by [Hill et al., 2000] concerning the user participation in the Alexandra Digital Library project to build an on-line portal to open up different collections. During the evaluation of the different interfaces which were built for this project, users and implementers tested the interfaces and the following items represent the major components of the final interface: collections, meta-data, search, retrieval and user workspace, help support, system support for evaluation and underlying system. Based on user evaluations these aspects can be seen as the most vital components of an information provision facility [Hill et al, 2000].

In this enumeration of components there are three aspects which are different from the other references that have been discussed. First there is a retrieval of user workspace, where users can store search lists, links and images, have more possibilities to search and display meta-data they have their own user folder and are able to print maps. Secondly, there is user support, which is more prominently mentioned than in other references. In this part of the library tutorials, e-mail contact and overviews of the collected content can be found and accessed. Thirdly, there is a system support part of evaluation where on-line surveys, registrations and session logs can be found.

The other mentioned components in this article have already been discussed in other references. A component which is not mentioned in other literature, and which will not be considered an important factor by users is the underlying system with its hardware components. Users are not able to control the system parts that will be used and how it will be implemented.

2.3.2 Final classification

In this section the discussed aspects will be classified and determined as the list which will be used for describing the different facilities. Also the methods on how these aspects will be measured will be discussed. An overview of the selected aspects with their references can be found in Appendix 1.

Some of the aspects in table 2.2 have different descriptions compared to the aspects in Appendix 1, but could cover the same content. An example is direct access and level of data accessibility. Other descriptions cover subdivisions of the same main aspect, like meta-data usage and retrieval and meta-data standard applied. By naming main aspects, a higher level in this reclassification process is added, it becomes clearer which structure will be used for describing the facilities. The different aspects presented in table 2.2 are grouped under the corresponding main aspect and they become parameters of these main aspects. The result of this reclassification process is presented in table 2.2;

Main aspect	Parameter
Origin	Primary focus (Pre-defined) purpose Target group Year of first implementation
Data	Number of data suppliers Number of data sets Availability of view services Most recently produced dataset Frequency of web updates
Search	Search possibilities Use of maps for searching
Metadata	Metadata usage and retrieval Metadata-standard applied
Maintaining organisation	Providing organization Funding continuity Benefits
User-friendliness	Performance Level of data accessibility Languages used Registration-only access User workspace Help support System support for evaluation

Table 2.2; Reclassified aspects used for describing facilities

When different main aspects like user-friendliness and data have more parameters to describe this aspect, this does not mean that this aspect is more important than aspects like meta-data or search (with fewer parameters). All the aspects will be treated with the same level of importance.

Based on these aspects information needs to be gathered from the different facilities. First an analysis of the facility is performed to fill in the aspects which have a quantitative character, like number of datasets or performance. After these analyses have taken place, several aspects are still not filled in, because information to describe these aspects is not visibly available or the aspects cannot be filled in until the reasons for invisibility are known. If this information cannot be gathered from the first interviews, the contacts are approached with a request to fill in the missing information. This approach was used for the investigation of the total solutions as well as for the separate web services, which are described based on different aspects.

The above defined aspects are appropriate to describe total solutions, like web-portals, which contain all facets a user needs to find and consult geo-information. However, for separate web services, other values are important in order to be able to determine whether these web services contribute to user-friendly presentation of geo-information. [Banaei-Kashani et al., 2004] mention a couple of aspects, which describe the possibilities of web services. These aspects, amplified with some of the aspects from table 2.2 will be used to describe the web services. These aspects being;

- *Interoperability*; The web service needs to be able to integrate with other websites, desktop GIS-applications (like ArcGIS) and support different service description standards.
- *Scalability*; The geographical information needs to consult in every scale without lacking performance, like errors or unpleasant response times.
- *Efficiency*; Because web portals are dynamic environments, physical and functional locations of the web service or the documentation can be changed or updated. This must be possible without making changes to the design of the web service or the documents.
- *Providing organisation*; By discussing this aspect, as is done earlier in this section, insights can be presented about the role web services have in the philosophy of the company.
- *Frequency of web updates*; Users prefer geographical data which is up-to-date, otherwise its usability decreases. Identifying the update frequency enhances the usability of web service to integrate them in other geo-information provision facilities.

Of the five selected facilities the available web services will be analysed and described using the above mentioned aspects. These descriptions will give an impression to whether these web services are designed to not only present the intended geo-information, but also to make them available for sharing and using or integrating them in other (web) applications.

2.4 Description of the selected facilities

In this chapter the facilities will be described based on the approach which is explained in section 2.3.

When the facilities were selected, an important criterion was that the providers were willing to contribute to this study, because they needed to deliver information at different phases. Other conditions, like adequate visitor numbers, offered data of different contents and different types of visitors were also important, but not crucial to select a particular facility. Facilities and their providers who had joined the geoportal Network and who had an innovative character were considered more willing to invest into scientific research such as this study. With these thoughts in mind, providers from the different facilities in the Network were approached to contribute to this study. This resulted in contacts with three facilities. Because these three facilities ~~are~~ were theme-oriented and had low visitor numbers, a fourth and fifth portal which ~~are~~ were not part of the Network were approached as well. By adding these two facilities to this study, the results and followed approach are not based on facilities of the geoportal Network alone. Fortunately the newly acquired provider (GVI) was interested in this research and was willing to cooperate.

The description of the facilities is based on the main aspects with the corresponding parameters as is presented in table 2.2. In Appendices 2 and 3, tables are enclosed with an overview of the main aspects and their parameters. Appendix 2

treats the geoportals, Appendix 3 gives an overview of the described geo-services. Per facility a brief interpretation of the parameters is given to present a global and comparable overview of the facilities.

2.4.1 Gebouwde Omgeving

The portal called “Gebouwde Omgeving” (built environment) was founded at the end of 2005 and was made to provide geographical information about buildings in the Netherlands. This information was collected from the participating municipalities and processed in a standardised way, making invisible which municipality delivered which information. The pre-defined purpose was to supply building reports to small local real estate agents and consultancy agencies.

The data is provided by 300 participating municipalities, according to the annual report of [Dataland, 2006], which together cover 90 % of the built area of the Netherlands. Additional information about the buildings is delivered by the Dutch Central Bureau of Statistics (CBS). The offered information can be distinguished in six different data groups; address, location, architecture, usage, finance and environment. This information is presented in one web service, which is used by the portal Gebouwde Omgeving itself. The municipalities are asked to deliver actual building information to Dataland two times a year.

As can be seen in figure 2.2 searching for information can be done in multiple ways. One way is using the map to select the municipalities, another way is to find the municipality name or type in the postal code. After the selection of a building is made on geographical parameters, there are also administrative parameters which can be included in the selection process. Finally, an overview will be generated presenting the number of building objects and corresponding prices and the building information attributes which will be included into the delivery.

After a geographical selection is made, a quality report is available to the user, which indicates which information is provided naming the corresponding supplier and level of completeness and some reference data. The report is not derived from a meta-data standard and it is not known if there will be a meta-data file included with the actual delivery.

The providing organisation of the Gebouwde Omgeving is Dataland. One of its tasks is to realise and maintain a national facility which provides geographical information from municipalities for public and private markets [Dataland, 2006]. The core business of Dataland is to maintain and distribute municipal data, share knowledge about the data, provide it in a geographical information environment and also manage the quality of the data.

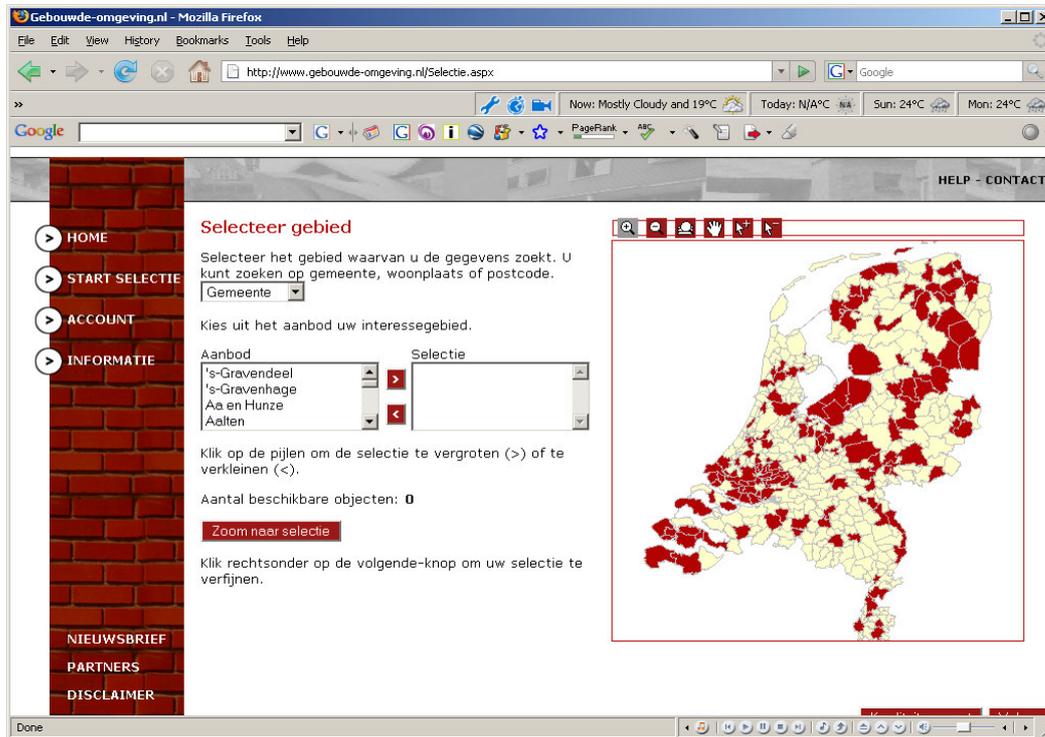


Figure 2.2: Selection screen of gebouwde omgeving

The most important advantages Dataland offers through the Gebouwde Omgeving is that it provides freedom to the user to choose the content of their desired dataset, that the service can be applied in different environments and it has become a product.

Many efforts have been taken to develop an understandable and inviting layout of this portal. The text, buttons and matching labels are normally proportioned and no error reports rises when the user uses the portal. The transition of the screens and the speed of using the map or lists is fast and only one language (Dutch) is used. It is possible to get a subscription to the site, which makes it possible for subscribers to have directly access to the data. Otherwise, an order must first be made, to obtain the desired building information. There is no personal work space for users or ways to evaluate the service, other than sending an e-mail. The help department of the portal is well organised, with an information part, a FAQ and contact possibility.

Web services

Dataland offers one web service which provides the same information and can be used in the same way as the portal. The web service is also used externally the following two applications; on the site of LMV the web service is accessible to the Dutch Association of Real Estate Brokers and Real Estate Experts, where 400 of its members can use it. In another project called the Veluwe Initiative the web service has been used in a pilot in the framework of streamlining base data.

As is described above the web service can be integrated in other environments, however the web service is not accessible for others than subscribers or in-siders.

Also the update frequency of their data (2 times a year) which they have to process from more than 360 providers¹⁴ indicates that Dataland positions the web service as a up-to-date service.

2.4.2 Groene Omgeving

The portal “Groene Omgeving” (green environment) provides geo-information on the green environment and was launched on 1 October 2006. The portal focuses on making geographical information available for different aspects of the rural environment. This portal provides the user, mostly by using services with geographical information which he / she can use to pass on knowledge, on the green environment. These users are expected to be GIS-professionals or otherwise environmentally interested people.

The geographical information is delivered by four organisations, these being;

- Alterra, a knowledge institute for the green environment, which executes research on different aspects of the environment and the social usage of these aspects¹⁵.
- The Government Service for Land and Water Management (DLG), a division of the Dutch Ministry of Agriculture, Nature and Food Quality, which organises developments in rural areas, coordinates land development for the government and controls monetary flows of projects in rural areas¹⁶.
- Dutch Environmental Assessment Agency (MNP), the national institute for strategic policy analysis in the field of environment, nature and spatial planning¹⁷.
- ISRIC – World Soil Information, an independent foundation, founded by the Dutch government. It has the next objectives; educate and inform, analyse land and water resources and serve global soil information¹⁸.

Together they provide 34 data sets, 13 data sets as downloadable data and 21 which can be accessed live by using the map viewer. Meta-data of other data sets has also been published, but can not be presented in the map viewer. 13 of these data sets are presented as a map service and can be used by other portals or by desktop GIS applications. Most of the data sets were published around the time the Groene Omgeving was launched, the most recent one is dated 23/10/2006. The data sets are hosted by their providers and by use of harvesting made available for use in the Groene Omgeving. The providers decide when a data set will be updated, but until now most data sets were not very dynamic. However, the value of the geographical information the Groene Omgeving is providing, is less susceptible to high level of topicality than for instance the information of the Gebouwde Omgeving.

¹⁴ <http://www.dataland.nl/> (Accessed on 03/11/2009)

¹⁵ <http://www.alterra.wur.nl/UK/about/> (Accessed on 12/09/07)

¹⁶ http://www.dienstlandelijkgebied.nl/portalpage?_pageid=120,2697808&_dad=portal&_schema=PORTAL (Accessed on 28/12/10)

¹⁷ <http://www.pbl.nl/en/aboutpbl/index.html> (Accessed on 28/12/10)

¹⁸ <http://www.isric.org/> (Accessed on 12/09/07)

The searching possibilities of the Groene Omgeving are much extended than the other facilities. In figure 2.3 the home page of the Groene Omgeving is presented. Here a choice can be made for a quick search or an advanced search. By using the advanced search there are multiple ways to pre-select a desired data set, illustrated by the 4 w's (when, where, what and who). When the results of the search are presented, the user can sort these results.

The different entries to search the desired datasets are based on the meta-data, which is filled in for every dataset. When a user performs a search or consults the data set list, he already gets a brief overview of the characteristics of the data set, but a total overview of all the meta-information of the selected data set is also possible. The meta-data is based on the ISO 19115 – standard, which is prescribed by INSPIRE [Rase et al, 2004].

The providing organisation of the Groene Omgeving is one of the three data set providers; Alterra. They take care of the technical maintenance of the portal and also manage access to the offered web services. The Groene Omgeving fits in the policy of Alterra to work and do research with new ICT-techniques by introducing and integrating them in the framework of innovative projects in cooperation with other organisations. This guarantees the (funding) continuity. The most important advantage of the Groene Omgeving is that it provides one environment where users can search, browse and view.

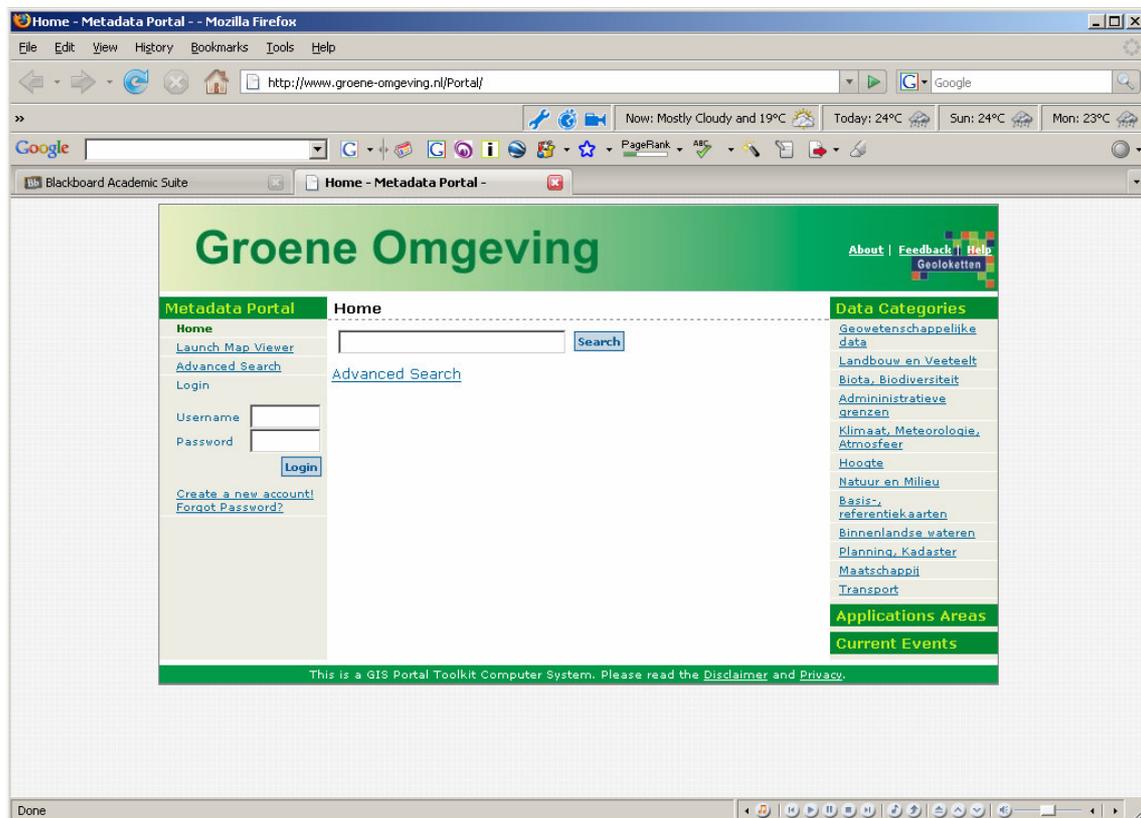


Figure 2.3: Home page of the Groene Omgeving

The interface of this portal is much smaller than the screen, two languages (Dutch and English) are used, though being mixed together, texts are rather small and at first glance it is not clear where to start. However, the transition of the screens is fast and the performance of loading and viewing data sets in the map viewer is moderately fast (4 – 10 sec.). All of the 36 data sets can be directly accessed by using the map viewer or by adding the map service to a desktop-GIS or by downloading the data. The user is able to produce an personal account, which gives him / her access to their personal work space, where they can store complex maps and queries and download additional tools. The help is very extensive and also in English. The Groene Omgeving also has a possibility to provide feedback on the portal, which is an extra function to evaluate and make the site more user-orientated.

Web services

The available web services (13) can be used in multiple ways outside the Groene Omgeving. Mostly the data can be accessed as an ArcIMS Image Service or by a WMS Service. All the ArcIMS Services, which are from Alterra and DLG can be found on 2 web addresses ¹⁹, which provides a 100 % availability to its users. The (WMS) Services of MNP can be accessed by the link given in the details. A fair performance, combined with the level of useful information and less disturbance, the user is able to use these data sets easily in their own GIS environment. A point of interest could be the low level of dynamics of the web services. However, future will decide if the presented data sets can ever be considered as old and not up-to-date. Regarding the intentions of the participating organisations, which all use standards and techniques to share information in own portals and in innovative projects, like the Geoportal Network, the basic thought is that the internal and external use of web services will be continued and enlarged.

2.4.3 DINO-shop

This portal which is called DINO-shop or DINO-loket, which stands for Data and Information of the Dutch subsurface is the longest term facility which is discussed in this study. The portal was established in 01/05/2001 and supplies of geo-scientific data on the shallow and deep Dutch subsurface ²⁰. The intended purpose to start this portal was to create an access port to provide data to Dutch society, increase the accessibility of the data and make the data more uniform [Bakker et al, 2002]. The groups which were expected to benefit the most from this portal were governmental and educational organisations.

The homepage of the DINO-shop, shown in figure 2.4 is divided into three divisions; data, maps and services. This format hides the number of available data sets at this facility, because some of them are presented multiple times in different

¹⁹ www.groene-omgeving.nl or www.natuurgegevens.nl

²⁰ <http://dinolks01.nitg.tno.nl/dinoLks/about/whatIs/whatIsDINOLoket.jsp> (Accessed on 11/08/2007)

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formats. From some of the publicised items it is also doubtful if they can be classified as a dataset. From the data division 18 different datasets can be downloaded. From the data and map division 11 different maps can be found and used. The services division contains three different services and three links to other facilities. The different datasets, maps and web services, which are supplied by TNO are updated yearly and the most recent dataset is dated 06/03/2007.

At the DINO-shop no search possibilities are available. The data, maps and services are presented in the three divisions and can be accessed by clicking on an item of the user's choice.



Figure 2.4; Home page of DINO-shop

The use of meta-data in the different offered products is not unambiguous. Meta-data is supplied with the maps, but is not available with the different datasets. Some of the meta-information, like the data's quality are attached to the data itself. However, a standard for the entry and deliverance of the meta-data has not (visibly) been used.

The provider of all the products and also of the portal itself is TNO, a Dutch organisation for applied nature and scientific research. TNO works at innovation of different territories for companies, government and social organisations. One of these territories is built environment and geo-sciences, which covers the domains oil & gas

and water management & subsurface. A lot of data from these domains are included in the DINO-shop. TNO aims at increasing the accessibility of its (geographical) data for others, especially by making the data more uniform [Bakker et al, 2002]. The development of DINO-shop was funded by the Dutch ministry of Economic Affairs [Bakker et al, 2002], but also by three other Dutch ministries²¹. The portal offers functionality whereby users can personalise the DINO-shop and link it better to their work processes. This is one of the main benefits of the DINO-shop for TNO, the other two have already been mentioned, being the increase of uniformity and better accessibility of data.

However, this portal does not have multiple entries to access the data, the user does not have to make extensive searches to find data sets, maps or services of his / her interest. The transition of the pages works without delays and different overview maps can be viewed within 3 seconds. Downloading the freely available data and maps takes about 10 seconds with an average internet-connection. To access most of the data, a registration is necessary and costs have to be made (€ 81,- for a single request), which is explained on the page where a registration can be applied. For user manuals and explanations on data types, terminology, usage conditions etc. extensive help documents are available. These documents are available both in Dutch and English and are offered by the user selected language version of the DINO-shop. When a user has a registration, he also has access to a user workspace. This workspace can not be used for system evaluation. However, there are user meetings where users are informed about developments and modifications of DINO-shop and can offer suggestions to improve DINO.

Web services

At the DINO Services page there are several web services available. Availability of services fits the strategy TNO has to make their data freely available for everyone who is interested and also gives users the possibility to fit this data in their own work processes.

Three of the web services contain geo-information about oil and gas. The services show respectively the permits, fields and pipes which are used for oil and gas distribution within the Netherlands. These services are offered in the format of Google Earth (*.kml). The different elements (fields and permits) in the services are partly scalable. The data is updated yearly.

Another web service shows the automated groundwater meter points in the Dutch province of North Brabant. The province provides a portal and uses different web services, one of them is from TNO. The service shows a map of North Brabant with the meters as a point symbol. These symbols can be identified, when different geographical and attribute information from the last two years is presented. Their strategic vision on geo-information supply can according to [Hootsmans and Witteveen, 2006] be considered as a framework for all the Dutch provinces. The

²¹ the ministry of Transport & Water management, ministry of Agriculture, Nature & Food Quality and the ministry Housing, Spatial Planning & Environment

geographical information is only available in two map extents, the user can switch between these extents. The information on the measure point of the different service can all be accessed within 5 seconds. The data provided by the TNO-service is updated every week.

The final service contains map layers of gauge wells where groundwater levels are measured. This service is used in the Water Atlas Gelderland. The measure points can be consulted at every scale, without loss of performance. The attribute data can be consulted within 5 sec. This service is built especially for the Water Atlas and will be hard to re-use in other applications. The Dutch province of Gelderland is provider of this portal, where geo-information from other cooperated organisations is also presented. Cooperation is one of main focuses of the province concerning Geo-ICT.

2.4.4 Atlas Amsterdam

The Atlas Amsterdam is an intranet portal which can be accessed by every of the 50 divisions and services of the municipality of Amsterdam (see appendix 9). It was founded on 8 October 2001 by the alderman of ICT and its primary focus is to provide reliable geographical information using a digital map to citizens and civil servants [Nieuwenhuis, 2001]. However, this version can only be accessed by civil servants, which gives them a complete image of a district of their interest [Nieuwenhuis, 2001], without the need to collect data from different municipal divisions.

The 40 data sets of the Atlas can be divided in 7 groups. The data sets are provided by five different data providers, Cyclomedia (surrounding photos) and cadastre being the only external ones. The other three providers are divisions of the municipality Amsterdam²². The access of the database, where the data sets are stored, is custom made for this application. As was said at the launch of the Atlas, the data needs to be reliable. This ambition is made clear by the upgrade frequency. The layer which is liable to a lot of modifications, the cadastral and the small-scale topographical layers, are updated every month. The great-scale topographical layers are updated yearly. Also the other map layers (environmental, area and water level bolts) are updated once a year and the real estate information is updated every working day. At the bottom of the homepage, it is announced when the topographical and cadastre layers will be improved.

Figure 2.5 shows that multiple aspects which can be used to search a position or a person. The map is one of them, but the user is also able to use five different methods to find a desired location. The portal helps with an in-between screen to clarify the requested location before the location is shown. Besides the location in the map, the final selection is also presented in the (second) result screen under the map, where more information is given.

Descriptions of the different map layers are available in meta-data pop-up windows, but these files are not used in the search methods. This information gives

²² the divisions Urban Planning and Environment & Construction Inspection and the division for Geo- and Real Estate Information (GVI)

the user more information about the presented view. The items which are used for the descriptions differ at the different layers and are not based on a meta-data standard.

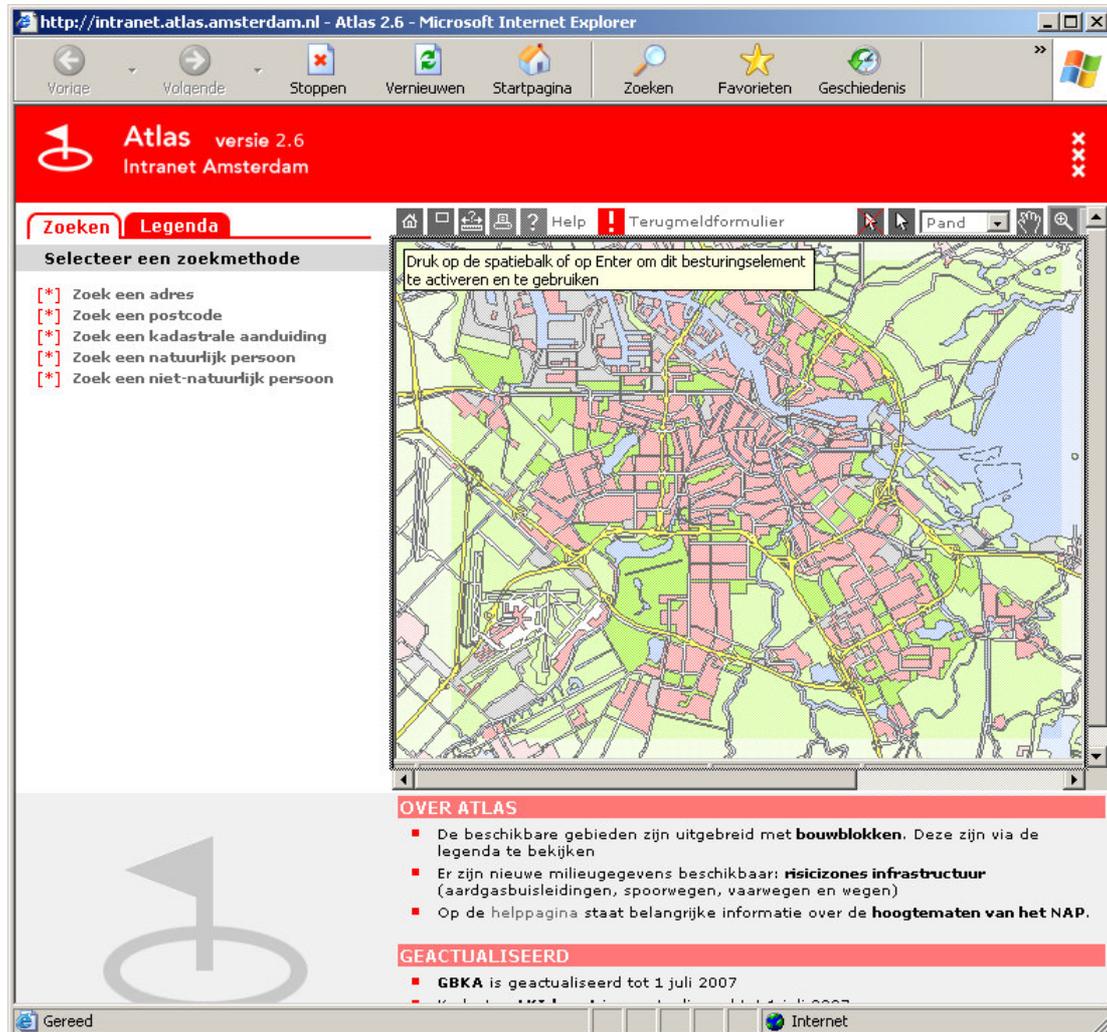


Figure 2.5: Home page of Atlas Amsterdam

The provider of the Atlas (GVI) is an independent division of the municipal service Advise and Maintenance. GVI maintains and provides geo- and real estate information of the municipality area of Amsterdam and its surroundings. One of the core tasks of this service is the maintenance of the registration of addresses, buildings, cadastral parcels and topography²³. GVI has its own budget, of which income from products, such as maps and data delivery are a part, but the funding of its activities is guaranteed by the municipality. Because of the high quality of the offered map layers, in conjunction with a portal which is user-oriented, this portal has high visit amounts and a lot of attention.

One of the characteristics of the Atlas is that it is user-oriented. Multiple means are used to gather information about the requirements of users. There are

²³ http://www.gvi.amsterdam.nl/over_gvi (Accessed on 11/09/2007)

information sessions and courses on the principles of the Atlas. There is also a help-desk a lot of users can use. However, answers to most of the questions can be found in the online manual. GVI also monitors the use of the Atlas, which they evaluate in a meeting every 2 weeks. There are different possibilities for the users to evaluate or comment on the service of the Atlas by using different report forms. All the offered support materials, such as manuals and report forms are presented in Dutch. This also applies to the most others parts of the Atlas, but some property screens are still in English. The data retrieval within the portal is less than 5 seconds. As mentioned earlier, almost all the data is freely available for civil servants, however a subscription is needed to consult privacy sensitive information.

2.4.5 Stadsplattegrond

The City Map of Amsterdam or Stadsplattegrond is the internet sister of the Atlas, but has different map layers and functionalities. However, the primary focus is still the same as the Atlas; the City Map provides reliable information to citizens. With the city map every civilian or interested person can combine different map layers of Amsterdam, which provide him / her insight into what the surroundings of his house, office or point of interest looks like [Nieuwenhuis, 2001]. At the launch of the Atlas in 2001, there were different versions of the same portal, by half November 2003 there an explicit separation between the intranet and internet version was made. The main benefits were that there were only two versions left to maintain, when using the internet version users do not need to use a plug-in and the city map which was prepared in company style replaced the old city map at the website of the municipality [Roos and Visser, 2003].

The City Map contains 20 map layers with public facilities which are not presented in the Atlas, only the topography, aerial photos and environmental layers are the same. Detailed information from the so-called address guide is also available in the city map. The providers of topography (GVI), surrounding photos (Cyclomedia) and a part of the environmental layers (Environment and Construction Inspection) provide the information for the datasets, some with custom-made connections from administrative databases. The frequencies for updating the map layers are the same as the Atlas'. This information is however not given at the homepage, as is the case at the Atlas.

The search possibilities are, compared to the Atlas, more limited. As can be seen in figure 2.6 only the map or the filling in of an address or zip-code can be used to find a position or facility. The city map shows in the map the best match, but also gives the user the opportunity to select another option which is considered a less good match. The results appears in a pop-up window, which is a selection from the address guide.

At the city map every map layer has an extra information window where meta-data is given about the map layer. The meta-data has not been used in search methods and differs per map layer, based on the characteristics of the data. A meta-data standard is not used to determine which aspects are used.

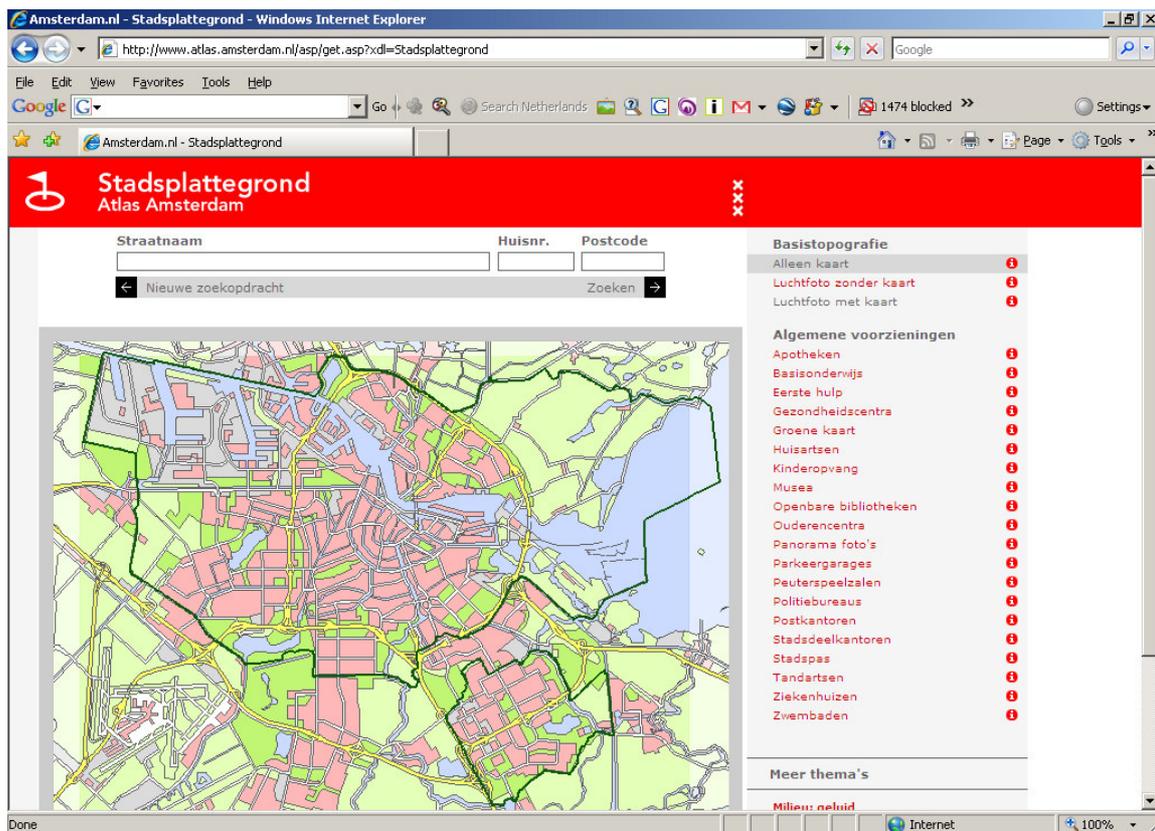


Figure 2.6: Home page of City Map of Amsterdam

The provider of the city map is also GVI, which regards provision of municipal information to every interested civilian as one of their core tasks. Also the city map has high visits rates, which are monitored to determine improvements. Help-desk questions provide GVI space and arguments to improve the portal, thereby enlarging the attractiveness of this portal. It also makes the user familiar with the other websites of the municipality of Amsterdam, because this portal is linked to a lot of municipal websites. The municipality rewards these efforts by taking care of the funding.

The user-friendliness of this portal is primarily based on the simplicity of the portal. The user is not restricted in any way, the site is stripped from all English words and according to [Roos and Visser, 2003] there a lot of effort has been made to improve the performance. However, the support is less extensive compared to the Atlas and GVI can only be contacted by clicking through to their own website. Users do not have ability to use their own workspace.

Web services

No web services are provided by GVI which can be accessed by external applications.

2.5 Future plans of facilities

Besides concerns about maintenance of the facility and the offered data and getting in touch with their users, the providers also have ideas and plans how their facility could be improved to reach imposed standards and framework, user wishes, new technological possibilities and company policy plans. Therefore a short overview is given of the plans that providers have to make their facilities suited for developments in the future.

Gebouwde Omgeving

The portal itself will not have much growth concerning the purchase of data, however the web service has more applications and is used by a more diverse public than was expected at the start. Therefore, the portal needs to be restyled, which will result in a higher level of user-friendliness. Also monitoring the use of the portal and the web service will get more attention, by using Google Analytics rather than custom-made reporting tools.

Groene Omgeving

The portal Groene Omgeving has not announced to improve the portal yet, however within Alterra an intern geoportal will be launched in 2007. At this portal meta-data of all the available data inside Alterra will be published and can be searched with a search tool. This portal will use the same web services as are available in the Groene Omgeving.

DINO-shop

It is the ambition of the involved ministries to connect DINO-shop to the national geo-infrastructure, according to the Service Oriented Architecture (SOA). One of the arguments to put a lot of effort into that is that a lot of data which DINO provides will become a so-called base registration. This means it will be available for every interested person or organisation. To achieve that, a new design for DINO will be made whereby the integration of DINO-map and DINO-data will be stronger. A catalogue service and process services, like a service which can transform the data in other reference systems will also be part of this new application.

Atlas Amsterdam / Stadsplattegrond

GVI is working on another design of their facilities Atlas Amsterdam and Stadsplattegrond. It will be possible for users to have an own user profile and the

portals will get different interfaces based on the data the user is consulting. In the Atlas Amsterdam version 3 (present is version 2.6) web services will be introduced. First a couple of map layers will be available based on web services and this amount will increase in 2008. An investigation will be done to find out if the application, which Atlas and Stadsplattegrond are based on, can be exchanged for an open source map server.

2.6 Chapter summary

In this study, the term facility is considered to be a collective term of services from providers to offer geo-information to users. Different services, like websites, (geo) web services and geo / web portals are able to provide geo-information, but differs in methods to present the desired information based on user requests. The term user refers to an end-user who does not develop, but only makes requests and absorbs uses the results. A user can be contacted, but that is not always known to facility providers.

After the definitions of the terms are established, the method to describe the facilities is discussed. Based on different references which compared different facilities with each other or made an investigation into the users' wishes, the different aspects these references have applied, were identified and discussed.

It is remarkable that the different writers all use different aspects. However, some of them can be categorised to one aspect. These aspects are discussed and categorised in main aspect groups, which are presented in table 2.2. For the description of web services a different list of aspects is made up.

Based on the lists of aspects the different facilities are described, using the geoportal as a starting point. All facilities have different strengths and weaknesses. The Gebouwe Omgeving has a very clear selection procedure and the lay-out of the site is also carefully edited, but the quality report is not based on a meta-data standard. A meta-data standard is used at the Groene Omgeving, where users can use geo-services and have their own work space. But the search possibilities are much more extended, the portal is in two languages and the lay-out is a little bit untidy. DINO-shop contains a lot of different kinds of (geo-) information, with extensive help features which could be found at different places in the portal. DINO is the only portal that directly offers web services and has links to other geoportals and has two language versions. However, there are no search methods and meta-data and the paths to obtain certain documents, data or maps are long and confusing. The Atlas Amsterdam contains a lot of very recent geo-information, report forms and has a lot of search possibilities, detailed information of the search results and help support, but has limited meta-data and is only available inside the municipality of Amsterdam. The Stadsplattegrond provides simplistic functionalities and does not have report standards, but has a very simple design and contains a lot of recent (geo-) information about citizen-oriented objects, like public facilities. One advantage is valid for all the described portals; the performance of requests is in all cases within 5 seconds.

Influences like new technology, users, management and imposed standards and frameworks induce providers to invest in their facilities to keep them suited for

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the changing demand. Most plans include the introduction of web services, which become the engines of geoportals. Putting more efforts in monitoring is also an aspect which is part of a lot of plans.

3 Identification of uses and user information from log-files

3.1 Introduction

This chapter will show which information can be obtained from log-files. First an explanation will be given of the structure of a log-file and which statistics a log-file can contain. Furthermore the tools and approach which are used in this study to obtain information from log-files will be explained. Next the gathered information from the log-files will be presented to give an impression which information can possibly be obtained from log-files. This will be followed by the identification of the users themselves, which will be discussed in a separate section. Finally, a summary of this chapter will be given.

3.2 Statistics from log-files

Log-files are tools to manage a server. These files provide feedback about performance and activity as well as occurring problems²⁴. There are different types of log-files which contain their own format, because different server aspects require different kinds of information. The type of log-files which were delivered by facility providers and used within this study is called a web server log-file. This kind of log-file is a combination of four types of log-files and contains information about access, errors, references and agents [Peterson, 2005]. Web server log-files are used by many web servers like Apache and Internet Information Server (IIS). These log-files contain lines of ASCII characters²⁵, so these files can be read and analysed with text file editors, like Note- or WordPad, but can also be analysed by specialised applications. These analyse applications translate, separate and organise the information which is stored in these log-files into charts and graphs, so it can be used for presentation or further analysis. From the format of a logged server activity certain information can be obtained. From the next example of a logged activity the following information can be gathered;

```
127.0.0.1 – frank [10/Oct/2000:13:55:36 -0700] “GET /apache_pb.gif HTTP/1.0” 200  
2326 “http://www.example.com/start.html” “Mozilla/4.08 [en] (Win98; I ;Nav)”
```

The first aspect (127.0.0.1) of the log-file is the remote host-name of the requester. If the host-name is not available, the IP-address is shown (as in this example). The second aspect (-) is the remote log name of the user²⁶. This element is not used very

²⁴ <http://httpd.apache.org/docs/2.2/logs.html> (Accessed on 17/02/2008)

²⁵ <http://www.w3.org/TR/WD-logfile.html> (Accessed on 02/03/2008)

²⁶ <http://www.w3.org/Daemon/User/Config/Logging.html> (Accessed on 02/03/2008)

much, but it tells if the user who made the request has accessed the server²⁷ before. The third element (frank) is the user-name of the user. If the user has to log in on the site, his login name will be stored here. The fourth element (10/Oct/2000:13:55:36 - 0700) is the time-stamp, which is divided in date, time to the second and the time zone. The fifth element (GET/apache_pb.gif HTTP/1.0) contains the request which is send by the user. In this request the name and location of the requested object is inserted as well as the method and the http protocol of the request [Peterson,2005]. The sixth element (200) is the HTTP status code which is returned to the user. This code tells the user if the object is available or if some error has been generated. The 200 code means that this request was successful. The seventh element (2326) is the response size in bytes of the message which is returned to the user. The eighth element ("http://www.example.com/start.html") contains the referring URL of the requested document on the web server. The last element (Mozilla/4.08 [en] (Win98; I ;Nav)) is the description of the application which made the request. Applications which make requests are web browsers, robots or spiders, so these elements make it possible to classify users and search machines.

Requests of users are registered based on the order (and time) in which the request is made. However, when log-files contain the above described information an analyst is only able to find out which user visited the website at which time, what his request was and if it was a successful one. Analysts could also be interested to learn more about the behaviour of this user, like at which page he or she entered, how many pages per session he/she visited, at which page he/she left the site and other click stream data. A log-file does not offer this kind of information. To get these statistics cookies could be used. A cookie is a file containing information that is stored by the web browser of the user [Peterson, 2005]. There are two versions of cookies; session cookies and persistent cookies. Session cookies are only used for one session and are deleted after the user closes his web browser. Persistent cookies use the same technology as session cookies, but last longer than one session and have an expiration date.

The description of the role of web server log-files and cookies in the process of gaining information about users and their behaviour, could imply that log-files are an accurate source of information and can be completed by information from cookies. It could be suggested that log-files give a complete overview on the identity of the visiting users of a facility and their motivation to visit that facility. However, there is a lot of information which is interesting to a web analyst to have, but can not be concluded from log-files. The data which is stored in the log-files is polluted and the disturbing elements can not easily be filtered out. According to [Randolph et al, 2002] page caching is an important factor of distorting log-file analysis. Caching means that popular web pages are stored on networks closer to the user to increase the requesting speed. By using caches, requested data does not have to be downloaded every time it is requested. Together with [Zaïane, 2001], who also mentions caching as a disturbing factor, requests from engines robots and index programs, but also requests for images, which can be considered as separate documents on the web server, should be filtered out in the log analysis.

²⁷ <http://www.faqs.org/rfcs/rfc931.html> (Accessed on 02/03/2008)

[Zaïane, 2001] also underlines that sessions are different phenomena for users and web servers. Users experience a visit as a session, which can take hours, even days, where periods of intense activity can be alternated by periods of inactivity. For web servers a certain period of inactivity will be followed by shutting down a session. When the user uses his web browser to perform another activity, it will be part of a new session, which in turn will be registered in the web server log-file. The session time-out in case of inactivity is mostly set on the web server at 30 minutes. The session time-out causes more sessions to be registered in the web server log than there are visits by users, so the number of visits in a certain time period will be blurred.

Another element which makes the usability of the web server log-file questionable in the quest to gain insight into users and their behaviour, is the 'who' information. The data which might be gained from the log-file is an IP-address, which can be translated into a DNS Host-name if this option is available on the web server (DNS will be explained later on in this chapter). If the user has to log in to get access to the facility, his login name will also be registered in the log-file. To log the user already has to identify him-/herself, so then usability analysis based on log-files will not be necessary. However, users mostly do not want to identify themselves, so the IP-address or host-name is the only link to the user. [Groves, 2007] points out that an IP-address which is owned by an internet provider or by a business or governmental organisation does not give any information on the characteristics of the user or his/her intentions to visiting the facility. [Groves, 2007] also notes that navigation paths can not be recovered from log-files or cookies and an analysis of results of log-files can not answer questions like which information the user wants to find, if the visit fulfils the needs of the user and what is the rate of success of the facility is. He even suggests not spending too time on doing server log-file analysis for usability purposes, because the results are too inaccurate.

Nevertheless, server log-files, in spite of all their mentioned limitations, still remain the tool which brings the analyst closer to the user in a relatively short period of period. However, with information from log-files alone, not every question concerning user profiles can be answered and the quality of the gained information is doubtful and difficult to interpret.

3.3 Approach and tools

Before discussing the different tools used, it must clear why certain tools are used and which information is given by producing output from these tools.

Different tools deliver different information. Therefore it is necessary to know which information has to be gained, in order to be able to adjust methods and the corresponding tools to analyse log-files. In this study the possibilities log-files have to offer are researched, so every released tool has its value in this interpretation.

However, to apply the presented approach and tools on existing facilities, like done in this study, the analyse results must contain information about the identity of users.

Besides names or location of users, behaviour also characterises users. So it is interesting to investigate which aspects of a facility have an impact on the behaviour of users. According to [Rosenfield and Morville, 1998] lay-out, findability of

information and utilization of used technology and information are the key factors which rate the success of a web-based facility. Especially findability is crucial, because one of the main objectives of a geo-information provision facility is that geo-information can be found. [Palmer, 2002] supports these findings, but focuses more on performance, navigation and organisation of the information which is presented by a facility. He also underlines that every aspect is of equal importance. [Peterson, 2005] who speaks of key performance indicators, which can differ based on the nature of the facility, points to information find conversion rate, percent new and return visitors, average pages viewed per visit and average time spent on site as factors which rate success.

In summary a lot of factors could have effect on the behaviour of the user when he visits a facility. However, the format and the content of the log-files which were provided by the facility directors was unknown, so it was not sure if these files contained information about these aspects. So, besides the most important aspects as the identification of the user and number of requests within a certain period of time, other sources than the provided log-files are chosen, like the organisation and findability of the facility.

To convert IP-addresses into names and contact information of the users the program Visualroute was used. The program Deep Log analyser was used to analyse and gather session and user information. To research the findability of the facility the program SEO Spyglass was used. The output from these three programs was then inserted into a Microsoft Access database, where calculations and queries were executed and adapted reports were produced, which were in turn used for discussions with facility providers. Also Microsoft Power Point was used for preparing relation schemes of the facilities.

The reports containing information about users and their behaviour, together with the relation schemes were used for discussion with the facility provider. In this discussion the results were tuned to the provider's expectations, striking results explained and user groups determined.

3.3.1 VisualRoute

VisualRoute can be used for tracing a route to a given IP-address and return with user information. VisualRoute, which is a VisualWare product, groups data from network utilities like traceroute, ping, WHOIS and reverse DNS [Kumar, 2004] in a table and a geographical map (Figure 3.1). The nodes that are on the route must lead to the physical location of the owner of an IP-address. With traceroute, a tool for networks, determines the route that a data package has taken. Thus the route to an IP-address can be exposed. Ping, which stands for Packet InterNet Groper is used to verify that a data package can be send to a network address like an IP-address without errors²⁸. With ping the IP-addresses which belong to the nodes in the route can be verified²⁹. When an IP-address is approved, the protocol called WHOIS can be used to execute a

²⁸ <http://www.computerhope.com/jargon/p/ping.htm> (Accessed on 02/03/2008)

²⁹ <http://en.wikipedia.org/wiki/Traceroute> (Accessed on 02/03/2008)

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query to a database and the query results will be returned to the user. In this database, which is divided among different servers on the continent where the IP-address is physically located, information about the name of the owner and how he can be contacted, but also the network provider and the name of the DNS-server is stored³⁰. Domain Network System (DNS) servers translate a domain name into an IP-address, such as www.example.com into 207.77.188.166. By using this system in reverse an IP-address can be translated into a domain name.

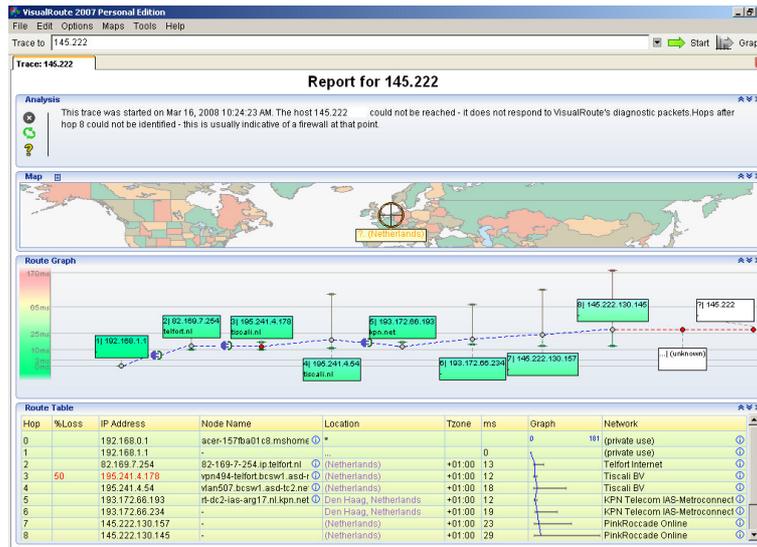


Figure 3.1: Overview IP-address Report in VisualRoute

By bringing together all these methods into one program, it seems possible to determine the owner and the contact information of every IP-address. However, many users of facilities use Local Area Networks (LAN) of their employers. On a lot of these networks blocks are set for receiving data packages used by the ping command. In this situation VisualRoute can determine the access node (like a server hosting a website of the organisation), but can not present information about the nodes which lay beyond this access node [Sanders, 2003]. This means that only the organisation with whom the user is associated to can be recovered, but the identity of the individual user can not be obtained. However, VisualRoute is considered the leading internet utility to trace routes [Kumar, 2004].

3.3.2 Deep Log analyser

This program is able to analyse web server log-files from different web servers. The data from the log-files is stored in a Microsoft Access database (*.mdb) which makes it possible to enter the database with other software programs and make customised queries and reports. From the data stored in different tables in the database, different

³⁰ <http://en.wikipedia.org/wiki/Whois> (Accessed on 02/03/2008)

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theme reports can be generated. The main report about general statistics (Figure 3.2) gives information about hits, visits, visitors, page views, references and technical aspects and supplies the website director with a general overview of the performance of the facility. The various reported values in the general statistics report are based on other reports, which are; resources, site navigation, visitor's activity, visitor's system info, references and search engines and diagnostic. These categories contain more detailed reports, which can be found by clicking the links in the general statistics report.

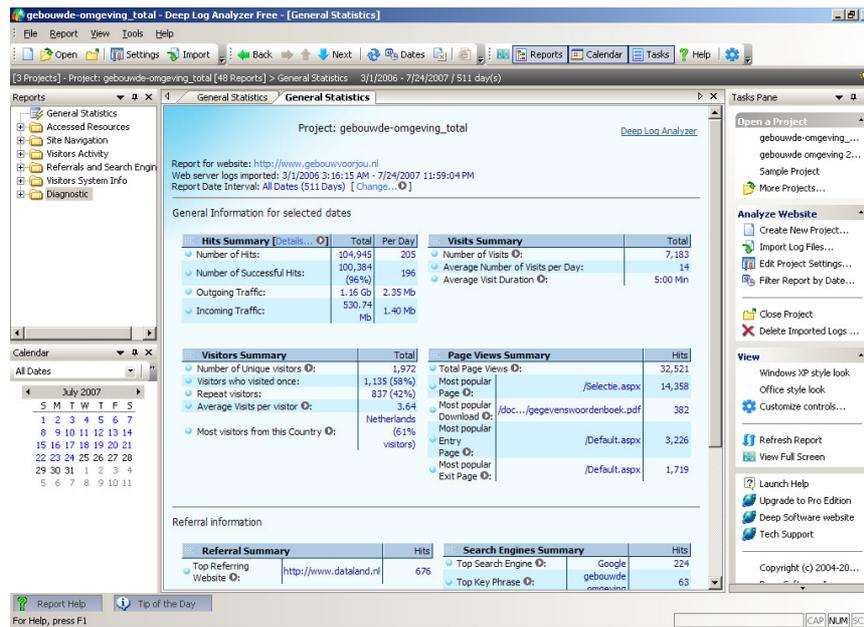


Figure 3.2; General statistics report in Deep Log analyser

Deep Log analyser uses an self-made technology called Deep Tracker to be more accurate on the measurements of the different website metrics. It checks sessions and visitors by using cookies, overcomes caching and collects information about the system of the user in order to be able to detect returning visitors more accurately. Deep Log analyser can also recognise most of the search engines and spiders and leave them out of the visitor reports.

3.3.3 SEO Spyglass

SEO Spyglass, a product of the Link Assistant Company is a research tool for back links on websites which can be found by search engines. Back links are incoming links on a web facility and are an indication for the popularity of the facility³¹. Organisations or private persons, who have hyper-links on their websites or blogs to facilities, can be considered as loyal visitors. Therefore it is important that directors

³¹ <http://en.wikipedia.org/wiki/Backlink> (Accessed on 24/03/2008)

make sure their facility can be accessed easily by users [Constantinides, 2004]. By searching back links of their or other (competitive) facilities, the facility provider gets insight into which types of visitors have easy access to the facility, based on the type of website that placed the link and the expected type of visitors this website attracts. This program searches all the back links that were placed by the user selected search engines and gathers information about the search engine, the page where the link is found and the properties of the found link. A screen-shot of one of the reports which can be generated with SEO Spyglass is presented in figure 3.3;

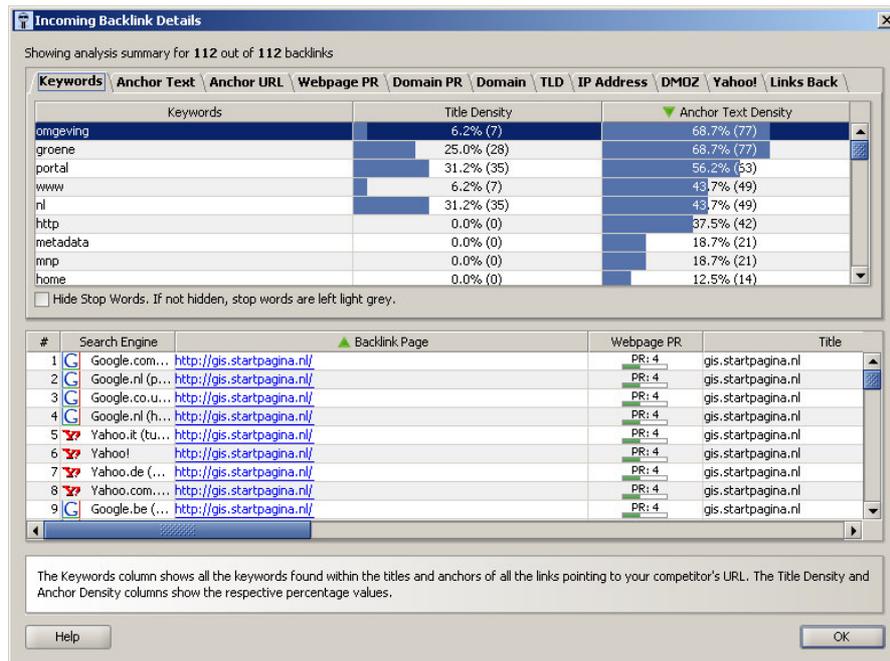


Figure 3.3: Overview of reported aspects of found back links by SEO Spyglass

The reports made by SEO SpyGlass can also be stored as Excel Spreadsheets for further analysis.

3.4 Gathered information from log-files

In this section the log-files which were provided by the facility directors will be discussed, together with the used methods and the difficulties which were faced. The directors of the facilities gather and store information about who is using their facility in different ways. So, per facility different approaches and tools are used. Using different types of information and formats-presents different difficulties that have to be overcome in order to be able to identify users and gather other useful information about them and their behaviour. The identification of users will be discussed in a different sections

3.4.1 Gebouwde Omgeving

Dataland, provider of the Gebouwde Omgeving provided a set of log-files, which dated between 1 March 2006 and 24 July 2007 and which described the daily activities during this period. By analysing the log-files with the program Deep Log analyser, the next information could be extracted;

- the number of visits of the IP-addresses
- the number of page views
- a list of entry pages
- a list of exit pages
- a list of referring sites
- number of occurred errors

The results of the analysis of these information items will be discussed in more detail in the following sections.

List of visits per IP-address

During the period of time the log-files describe 1972 unique visitors have visited the portal and have made a total of 7183 visits. 16% of these visits were from visitors who visited the portal only once, the other 84% are repeating visitors.

In the group of repeating visitors a lot of search engines were used, having a total share of 41% of all the visits. Together with the group who did not make enough visits, only 17% of all the visits came from interesting visitors. Due to the fact that the use of a single IP address does not tell us how many people use it, it is recommendable to select users with a high number of visits to make sure these users can be selected for further analysis. Because not all the interesting visitors were traceable, only 7% of them could be identified, the name and contact information of the organisation that made the visit had to be recovered. An overview of these numbers is presented in table 3.1;

Group	Number of organisations	Total visits	Percentage of total visits
Total visitors	1972	7183	100%
Unique visitors	1135	1135	16%
Repeating visitors	837	6048	84%
Search engines	202	2919	41%
Visitors with 10 or more visits	148	3454	48%
Interesting visitors	53	1255	17%
Traceable visitors	20	517	7%

Table 3.1; Overview of amounts of visitors and visits (source: Deep Log analyser)

Based on these results it can be concluded that a lot of visitors can not be identified. A possible explanation could be that a lot of governmental organisations, especially municipalities visit the Gebouwde Omgeving. However, these organisations use networks which are set-up to have secured data communication with external parties. The impose of conditions which are the foundation of these secured set-ups of the network is a result of the Data Protection Act, which is lid down in a Book of Frameworks Information Security of SUWI Municipalities ³². One of these conditions is that privacy sensitive information can only be sent by networks with external control and where proper security measures have been arranged. By analyzing IP-addresses, which are used by governmental organisations to have external communication, the name and contact information of these external controllers could be found.

Besides the portal there are also user statistics from the web service. This web service is used by the portal of the Gebouwde Omgeving, but can also be used by other portals. From the supplied log-files it became clear that 7 unique visitors made 4534 visits using this web service. 4 of the 7 unique visitors were traceable, however from only one of these traceable visitors could be determined that they were using geo-information that was provided by the web service. Besides the IP-addresses and their visits, no information was available about the behaviour of the users of the web service.

List of page views

By analysing the number of views per page, general paths which users take through the facility can be exposed. With this information popular, but also hardly found pages can be distinguished. By making relation schemes of the pages, the relations between them and the numbers of page views, an overview can be created which gives insight into how a user moves through the facility. The relation scheme for the Gebouwde Omgeving can be found in appendix 4.

Besides information about user behaviour, the relation schemes also give an indication if every path within the facility that can be tracked. When a combination of web pages and Java scripts is used, the views of the web pages can be logged, but the number of executed Java scripts is not an item which is stored in a log-file. The fact that Java scripts are used in the Gebouwde Omgeving, can be concluded from the graph in Figure 3.4;

³² http://www.bkwi.nl/fileadmin/informatiebeveiligingsplan/docs/Richtlijnen_html/index.html
(Accessed on 28/12/2010)

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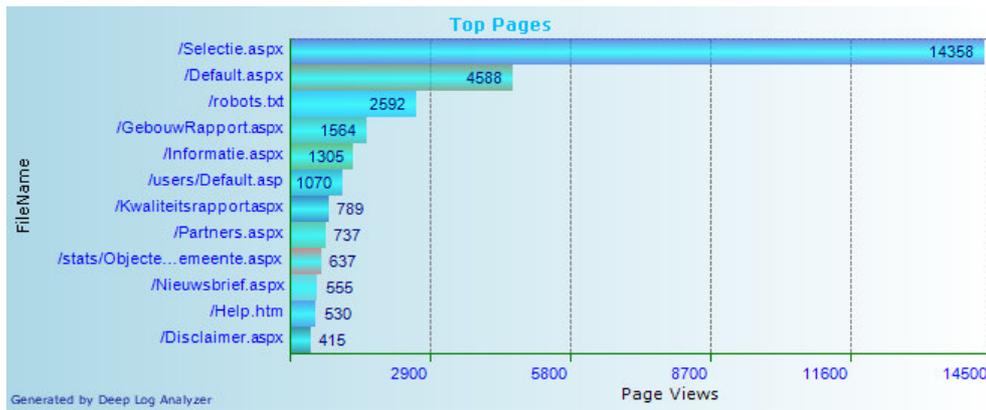


Figure 3.4; Overview of the most viewed pages of the Gebouwde Omgeving (source: Deep Log analyser)

The page which is viewed second to most (Default.aspx) is the home page of the Gebouwde Omgeving, but the page of the selection process (Selection.aspx) is viewed more than 3 times more. In the facility this page contains six different appearances and multiple tools to make or refine a selection of buildings. A change of appearance could be achieved by running a Java script.

List of entry pages

By making a list of entry pages, insight can be gathered as to where users enter the facility. Every facility puts a lot of effort into their home page to attract visitors and to give them overview on the facility and what it can mean for them [Nielsen, 2002]. If a lot of users enter the facility at other pages than the home page, for example by using self-made bookmarks, it indicates that the home page lacks of attractiveness and certain pages and functionality may be used less. Fortunately the Gebouwde Omgeving does not face these issues, as Figure 3.5 shows, because the home pages is by far the most important entry point of this facility.

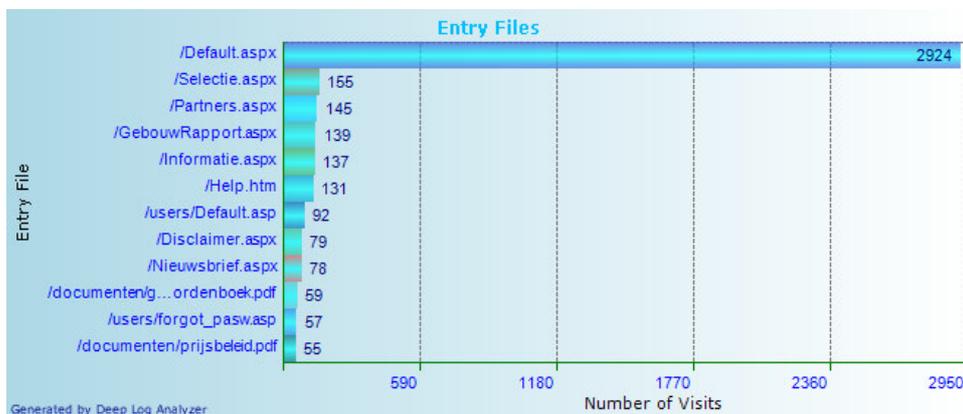


Figure 3.5; Overview of the entry pages of the Gebouwde Omgeving (source: Deep Log analyser)

List of exit pages

The list of exit pages represents the points where users leave the facility. Especially for geo-information provision facilities, it is of great importance that users leave the facility when they have obtained the required information and not before. When the number of exits per page, presented in figure 3.6 is

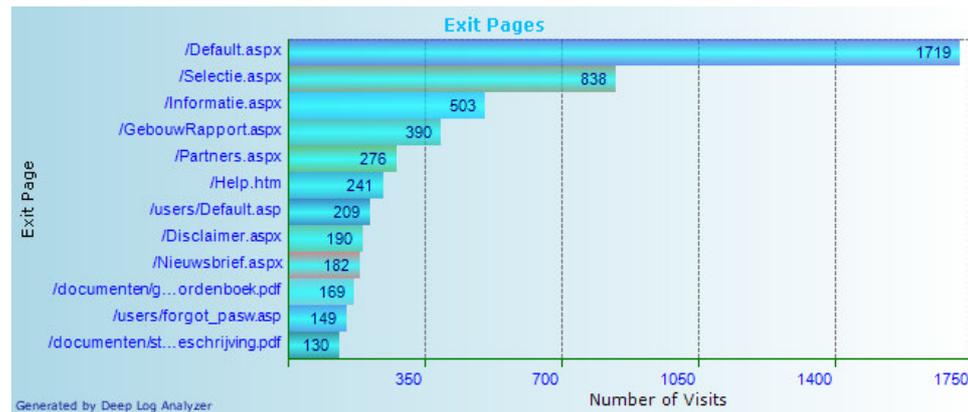


Figure 3.6: Overview of the exit pages of the Gebouwde Omgeving (source: Deep Log analyser)

compared to the entry pages, almost 60% of the visitors who enter the Gebouwde Omgeving at the home page also leave the site at this page. This indicates that the home page does not satisfy the needs of a lot of visitors who visit this facility.

List of referring sites

When a lot of sites have references or links to the Gebouwde Omgeving, it is easy to find and access this facility. A high position in the search results of search engines will also stimulate users to visit the Gebouwde Omgeving. That Dataland has to work on this aspect is shown in figure 3.7.

By far most of the users come from the website of the provider. The second site which is used by users to enter the Gebouwde Omgeving implies that these users are familiar with the Geoportal Network. However, the website of the geoportal Network does not contain links to the separate geoportals anymore, which means that Dataland loses an important entry gate to their facility.

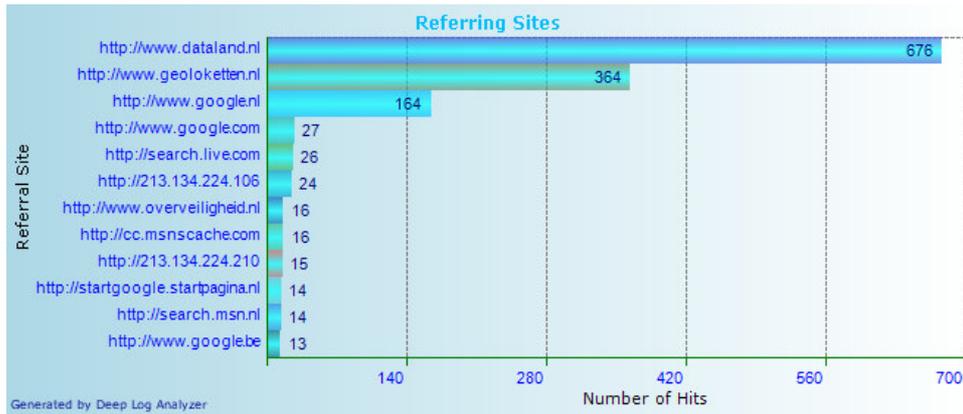


Figure 3.7: Overview of the referring sites of the Gebouwde Omgeving (source: Deep Log analyser)

The share of the search engines in this overview is very low, which indicates that less people are able to find the Gebouwde Omgeving by using search engines. This image is confirmed by the overview of SEO Spyglass, which is presented in table 3.2;

Domain	%	Naar site	Normal
http://www.data-land.nl	50.0% (22)	www.gebouwvoorjou.nl	2
http://www.onderzoekinformatie.nl	29.5% (13)	www.gebouwvoorjou.nl	1
http://www.Overveiligheid.nl	20.4% (9)	www.gebouwvoorjou.nl	1
http://www.onderzoekinformatie.nl	28.9% (22)	www.gebouwde-omgeving.nl	2
http://www.gismagazine.nl	21.0% (16)	www.gebouwde-omgeving.nl	2
http://www.data-land.nl	18.4% (14)	www.gebouwde-omgeving.nl	2
http://www.gebouwvoorjou.nl	10.5% (8)	www.gebouwde-omgeving.nl	1
http://www.geoloketten.nl	10.5% (8)	www.gebouwde-omgeving.nl	1
http://www.kennisonline.wur.nl	10.5% (8)	www.gebouwde-omgeving.nl	1
Total			13

Table 3.2: Overview of referring sites (Source: SEO Spyglass)

This overview shows that only sites from the provider itself or those with scientific contents occur. The sites which can attract potential users for the Gebouwde Omgeving like sites of real estate agents or advice agencies should be considered as potential clients but are not listed in this overview.

List of occurred errors

In the log-files errors which have occurred during the sessions are also registered. An overview can indicate if and how many problems users experienced during their visits to the Gebouwde Omgeving. If this percentage is very high, users will leave the facility, because they get frustrated about the functionalities of the facility. There are plenty of reasons why a certain request could not be made. The causes can be found at the web server itself, the computer of the receiver or the connection between them, but it is hard to pinpoint where the error comes from. However, it is more interesting to analyse how many requests could not be completed. Figure 3.8 gives an overview of these incomplete requests;

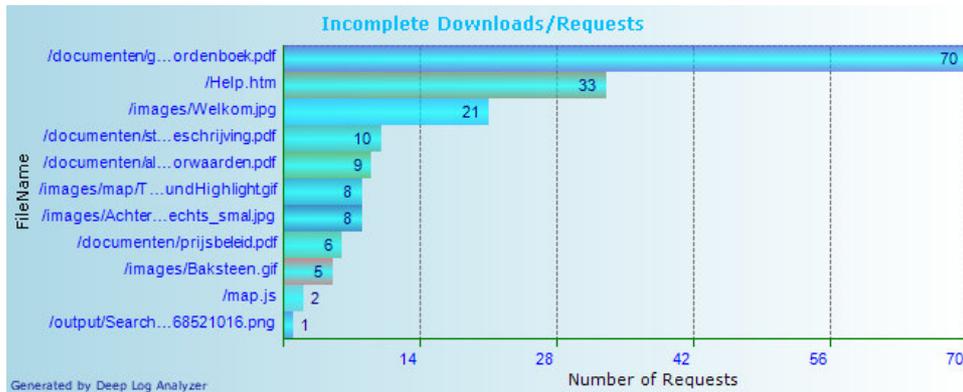


Figure 3.8: Overview of incomplete requests from the Gebouwde Omgeving (source: Deep Log analyser)

This overview shows that requests for PDF-documents, containing examples, conditions or support contribute the largest share in the numbers of incomplete requests, but the numbers of these requests are marginal compared to the number of server errors.

3.4.2 Groene Omgeving

Getting an insight into the activities of the Groene Omgeving, Alterra also uses server log-files. But instead of analysing these log-files themselves, the decision was made to let Google Analytics analyse and report the activities at the facility. Google Analytics is a service of Google free of charge, which presents user statistics in detailed reports³³. A big advantage is that these reports can be used to optimize the advertising and marketing strategy of Google AdWords. AdWords, another service of Google offers pay-per-click advertising. Furthermore Google Analytics can supply reports about trends, loyalty and technical information of users, referring sites and page views.

To obtain information about users and their behaviour of the Groene Omgeving the next reports of Google Analytics are used;

- Network locations of users
- Page reproductions
- Important entry pages
- Important exit pages
- Referring sites
- Refusal percentages

Alterra is starting to use Google Analytics for monitoring the Groene Omgeving on 1 October 2006 (launch date of the facility). By analyzing the reports of one year, a good overview can be obtained about the number of visitors the Groene Omgeving

³³ http://en.wikipedia.org/wiki/Google_Analytics

attracted directly after the launch and if these numbers in- or decreased in time. So the different reports describing users and their behaviour are made up out of statistics from between 1 October 2006 and 1 October 2007.

The outcome of the comparisons of the different reports will be discussed in the next sections.

Network locations of users

In the analysed period of time 198 visitors visited the Groene Omgeving. 76 of them visited the facility only once, while 182 visitors comes back more than once. When the numbers of the unique and the repeating visitors are added up, the total number of visitors should be 258, which conflicts with the number of total visitors (198). However, within an organisation which has the same host-name, different employers can use the Groene Omgeving. These visitors are reported separately, but carry the same host name of their organisation, so are considered as the same user in this study.

Group	Number of organisations	Total visits	Percentage of total visitors
Total visitors	167	1229	100.0%
Unique visitors	90	90	7.3%
Repeating visitors	77	1139	92.7%
Search engines	0	0	0.0%
Visitors with 10 or more visits	17	920	74.9%
Interesting and traceable visitors	8	631	51.3%

Table 3.3; Overview of amounts of visitors and visits (source: Google Analytics)

Most of the visits (75%) are made by visitors who visit the Groene Omgeving more than 10 times. However, the number of organisations that visit the Groene Omgeving more than 10 times is very low (17), which makes it hard to select interesting visitors. Moreover, not all the 17 visitors are traceable and that is why the number of interesting visitors is as low as 8.

Page reproductions

In Google Analytics there are two reports which report the page reproductions; based on URL and on page title. The page reproduction report based on URL looks like the table as is shown in appendix 5, table 1. Based on the URL a number of reproductions can be given, which should indicate which page will be visited the most. However, the Groene Omgeving uses Java scripts to start up different representation of a page or making (search) requests for a certain action by the facility, which obscures the given numbers of page reproductions.

The page reproduction report based on page title looks like the table as is shown in appendix 5, table 2. This list reports the number of visits to the advanced

search page and the page with the search results (not reported in appendix 5). The used language of the user's browser has an impact on how the title is presented in the top bar, so different titles of the same page are registered.

However, with all the limitations, the two Google Analytics reports can still be used to construct a relation scheme, which can be found in appendix 6. This scheme shows that the data categories are used more intensively than the search tool of this facility. The user-defined profile is also not very popular among the visitors. A lot of pages (which are coloured grey) are not provided with a page reproduction number, so it can not be measured.

Important entry pages

The home page is by far the most important entry point, as is shown in appendix 5, table 3. Other pages where visitors enter the facility are the meta-data page and the data categories pages, but these do not have the same number of entries as the home page, which implies that the home page is the most attractive to users.

Important exit pages

Beside the most important entry point, the home page is also the most important exit point, as can be seen in appendix 5, table 4. However, because of possibly executed Java scripts, it is possible that users perform activities and find geo-information before they leave the facility. Users also leave the facility from the pages of the data categories and the meta-data page, which are pages where geo-information is presented to them.

Referring sites

Google Analytics also reports from which sites visitors come before they enter the Groene Omgeving. As appendix 5, table 5 shows, less users come from other sites, which indicates that less needs to be done to make the Groene Omgeving findable for potential users. This finding is based on the very low number of sites, whereby only one of them (gis.startpagina.nl) is known by the audience who are interested in GIS-related sites. At five of the nine sites³⁴ the link to the Groene Omgeving can not be found.

Almost 9% of the users use a reference on the above-mentioned sites to enter the Groene Omgeving, while the other 91% directly access the Groene Omgeving. A very small number of users (0,16 %) use a search engine to find the Groene Omgeving.

³⁴ ioggeo.blogging.com, sesg0113, ioggeo.blogplugs.com, localhost:1758 and mousemedia.nl

SEO Spyglass was also used to analyse the back-links. Although it found some other sites which have a reference to the Groene Omgeving, the general overview stays the same. As can also be concluded from appendix 5, table 6, the number of referring sites is very low and the sites are only known to a very small public of specialists, with exception of gis.startpagina.nl.

Refusal percentages

The Groene Omgeving has an average refusal percentage of 35%, as appendix 5, table 7 shows. This means that 35% of all the requests in the first year can not be completed, so out of every three requests made, one fails. If the refusal percentage of all the requests at the Groene Omgeving of one day is taken in consideration, in less than half of the days in this year all requests are completed. In 10% of the days (38, more than a month) almost all the requests fail. However, it must be commented that not only the facility is to blame when a request fails. Performance issues, network connectivity or actions of users during the request processes are also effecting factors. However, the confidence of the user decreases when he or she experiences different failed requests.

3.4.3 DINO-shop

The user statistics of the DINO-shop are reported in monthly documents, containing a certain number of items. These reports show the number of users who have a registration at the DINO-shop per group (business, private and student), the number of users who made request in that month, the number of requests and per dataset, a top10 of requests per user and a top10 of requested entities. However, from not all the datasets the requested entities were reported. The reports contain the following datasets;

- Drills
- Probes
- Drill hole measurements
- VES-measurements
- Ground water quantity
- Surface water quantity
- Quality data

For this study the monthly reports of the year 2005 and 2006 were provided. Because the monthly reports also contained privacy-sensitive information like e-mail addresses requests, a secrecy arrangement with TNO was made that privacy-sensitive information will not be published.

The monthly reports were provided in *.mug files, which were converted into Microsoft Excel spreadsheets, so they could be analysed and reported by using of Microsoft Access. After the analysis the following reports could be made up;

- Number of requests per user
- List of requests per dataset

To gain an overview of the referring sites, SEO Spyglass was used to make up a report.

To get an impression where the different datasets could be found, a relation scheme was made up. For this inventory the reports could not be used, because it did not contain page visit statistics, so the relation scheme was made up by visiting the DINO-shop. This relation scheme is presented in appendix 7.

To find out if new and potential users can find their information in DINO-shop, the different lists of requests will be discussed in the next sections, together with the overview of referring sites.

Number of applications per user

During the analysed two years 421 unique users made a total of 24782 requests to the DINO-shop. However, these numbers are based on the top10-lists of the monthly reports over two years. The monthly reports also report how many requests are made in total, which amounts to 38594. If the ratio of the top10 lists between users and requests is used, around 656 unique users made one or more requests at the DINO-shop. That is an average of 3169 registered users, so only 21% of the registered users have used their registration to make request to the DINO-shop. However, that does not mean that the other 79% of the users do not use DINO-shop. The registration can also be used for consulting geo-information without downloading the information. These requests are unfortunately not reported, which means that with the present methods of logging facility activity information of a very large group of users can not be traced.

The most registered users and also the group which have made the most requests for geo-information are the business users, as is presented in table 3.4;

	Business	%	Private	%	Student	%	Total
Average registered users	1852	58%	984	31%	333	11%	3169
Users who made applications (assumed)	297	51%	192	33%	92	16%	581
Made applications	35322	92%	2213	6%	1059	3%	38594

Table 3.4; Division of type of users and made applications at the DINO-shop

Business users are representatives of an organisation (could be a governmental one) who need to pay for their registration on contract basis. Private users can get a registration free of charge, however to obtain geo-information the provision costs need to be paid. For students it is possible to use the registration of the education institute to access and use geo-information.

The business users take care of 92% of all the requests and by far the most interesting group of users. Because their registered contact information is extensive,

TNO can easily approach them for further analysis on their needs towards the DINO-shop. Private users are only registered by name and e-mail address, but their intentions and requests can not be gained easily.

At first glance students do not seem to be a very interesting group, because they will probably only apply for data in the framework of a project or their education. After they finish, they will never use it again. However, the group students also contain educational assistants and researchers, who have a permanent appointment at the education institution and are aware of aspects as standards, quality, completeness and performance, so they are a very interesting group of people to approach for further analysis.

List of applications per dataset

Besides the number of requests per user, the requested datasets are also reported in the monthly reports. An overview can be made which data he recalls. By creating total overviews, directors can anticipate on which datasets are the most popular and improve the service providing for these datasets at the DINO-shop.

As has already been made clear in the previous chapter and which is supported by the overviews in appendix 8, tables 1 and 2, the business users are the largest group of applicants which make the most requests. The private users are second, but not with so much difference from the students when the number of registrations of this group is considered. For a couple of datasets the student users (probes, surface water quantity and quality data) make more requests with more applicants (for probes and surface water quantity) than the private users.

For every type of user the drills, which describe the compilation of the subsurface on a specific location and the ground water quantity, which describes the quality of the subsurface, are the most popular datasets. These datasets receive by far the most request. Vertical Electric Probe measurements (VES) and drill hole measurements seem to be the least popular datasets.

Referring sites

The number of sites which have a reference (hyperlink) to the DINO-shop are quite extensive, as can be seen in appendix 9, which means that the DINO-shop can be found and accessed by many users who come from multiple directions. However, the majority of the referring sites is scientifically related and focuses on informing their users. This objective corresponds just partly with the objective of DINO-shop, which besides transmitting knowledge also focuses on increasing the accessibility of their (geo-)information, so the diversity of users who visits the DINO-shop becomes larger.

3.4.4 Atlas van Amsterdam \ Stadsplattegrond

The Geographic and Real Estate service (GVI) of the municipality of Amsterdam has supplied several reports for the study which have been derived from log-files from both the Atlas of Amsterdam as the Stadsplattegrond. These reports contain the following information;

- IP-addresses
- Requested pages
- Entrance pages
- Exit pages
- Referring sites
- Depth and length sessions

The reports with the IP-addresses from the Atlas and the Stadsplattegrond were logged between 1 January 2007 and 19 June 2007. The other reports containing logged information dated from 1 January 2006 until 10 August 2007.

The reports were supplied in txt-format, but to be able to analyse and query the different reports, the original reports were converted to Excel-files and stored in an Access-database.

IP-addresses

In a period of time of 6 months and 19 days the Atlas attracted 710 visitors, which totalled more than 50330 visits altogether. Only 0,2% of the visits to the Atlas came from visitors who visited only once. This means that the Atlas mostly attracts users who have embedded the information into their work processes. This is confirmed by the percentage of visits by users who make more than 50 visits, which is more than 87% of the total. Because the Atlas can not be used by external users, there are no IP-addresses belonging to search engines.

Unfortunately none of the IP-addresses could be traced. As is discussed before, the municipality of Amsterdam uses an externally controlled network with proper security, which does not make it possible to track the used IP-addresses back to their origins. To get insight into which municipal divisions use Atlas, a request was made to the municipal network directors to return the domain names corresponding to a sent list of IP-addresses. The municipal divisions which could be traced are listed in an overview list of the divisions of the municipality of Amsterdam and can be found in appendix 10. A remark must be made that in the sent list to the network directors IP-addresses of the Stadsplattegrond were also inserted, so it is not clear which divisions actually use which facility. However, the assumption can be made that all the given divisions use the Atlas, because it contains all the information of the Stadsplattegrond. As table 3.5 shows, the number of divisions which use the Atlas is 37 out of 57. Because it is not clear which IP-address belong to which division the number and percentage of visits of this group of visitors can not be given.

Group	Number of visitors	Total visits	Percentage of total visits
Total visitors	710	50330	100.0%
Unique visitors	121	121	0,2%
Repeating visitors	589	50209	99,8%
Search engines	0	0	0,0%
Visitors with 50 or more visits	81	44072	87,6%
Traceable visitors	37	?	?

Table 3.5; Overview of amounts of visitors and visits of the Atlas of Amsterdam

In the same period of time as the Atlas, the Stadsplattegrond attracted almost 49.646 visitors who made 377517 visits. 96% of the visits were made by repeating visitors. This percentage indicates that the Stadsplattegrond fulfil specific needs of many users with different backgrounds and interests. Fortunately, only a small part of these visits are made by search engines (almost 2%), which purifies the list of visitors. This statement is supported by the high percentage of visits that was made by traceable visitors out of the investigated selection of visitors who made more than 50 visits (67%). If an IP-address could not be traced, in most cases it belonged to the municipality of Amsterdam or a private visitor, who could be traced back to their internet provider.

Group	Number of visitors	Total visits	Percentage of total visits
Total visitors	49646	377517	100.0%
Unique visitors	14698	14698	3,9%
Repeating visitors	34948	362819	96,1%
Search engines ³⁵	39	7156	1,9%
Visitors with 50 or more visits	398	60600	16,1%
Traceable visitors	167	40787	10,8%

Table 3.6; Overview of amounts of visitors and visits of the Stadsplattegrond

Requested pages

Using the number of requested pages a relation schemes could be constructed, which can be seen in appendix 11 (Atlas of Amsterdam) and appendix 12 (Stadsplattegrond).

The relation scheme of appendix 12 only shows one number for requests of the home page. The reason can be found in the fact that most of the information and functionality can be found in one page with one URL. Therefore, an overview can only be given of the pages and the relations between them, while the relation scheme of the Atlas also contains the general paths.

The relation scheme of the Atlas shows that the search tools are used very often. Based on the number of visits in 2 year (187492) the search tool is used more than three times on average per visit. The Cyclomedia photos can also be considered popular because more than 82 photos are consulted per visit. Map selections of houses

³⁵ information extracted from list of visitors with 50 or more visits

and cadastral parcels and selection reports are also in great demand by users. A couple of activities can not be reported, because of the use of Java scripts which does not change the URL of the page during or after the activity.

Entrance pages

The visitors are able to find the Atlas van Amsterdam at several pages. However, the main port to enter the Atlas is the home page. The page with Cyclomedia photos and searching for addresses also receive a lot of visitors. An overview of the entries is given in the relation scheme, which can be found in appendix 13.

The list of entrance pages of the Stadsplattegrond shows less diversity, most of the activities take place at the home page (/asp/get.asp), which is also the place where most visitors enter. However, a lot of entry pages have been logged incorrectly, as appendix 15, table 1 shows.

Given URL-addresses like '/', '/1.asp/', '/asp', '/asp/', and '// can not be traced back to the visited page, which indicates that a lot of visited pages are not logged properly.

Exit pages

In line with other facilities, the home page of the Atlas is also the most important exit page. Appendix 14 shows the exit numbers at from different pages. Around 44% leave the facility at the home page; however it is not clear if a lot of users leave before or after they have found their desired information. A lot of other visitors leave the facility at pages where they have received information, if the exit numbers at the search results after selection in the map or after using the search tools are taken in consideration. Another indication that a lot of users find information they are searching for are the low exit numbers at the search tools, which can be interpreted as a sign that users are satisfied with the results they receive after performing a search at the Atlas.

Unlike the overview of entry pages, the list of exit pages of the Stadsplattegrond shows more diversity. However, it is not clear if the users get the desired information they came for after they leave from a certain page, as appendix 15, table 2 shows.

Referring sites

Two different data sources show that from log-files of both the Atlas as well as the Stadsplattegrond a huge list of referring sites can be produced. The annual reports show that the referring sites of the Atlas is limited to sites belonging to the municipality of Amsterdam, however, some external home pages are also listed, as can be seen in appendix 15, table 3;

Table 3 shows the number of visits which started from the given URL. The most visits (82%) were made without any reference being used. When a reference is used, the most users use the main intranet page of the municipal site (16%) to enter the Atlas.

The overview of referring sites of the Stadsplattegrond (appendix 15, table 4) shows that most users start up the Stadsplattegrond directly or use a shortcut (58%). Other pages from which a lot of users use the reference link to enter the Stadsplattegrond are municipal sites, where the main focus is traffic / infrastructure or promotion of the city. It is remarkable that a lot of municipal sites which are related to traffic have many reference links to the Stadsplattegrond, due to the fact that the Stadsplattegrond does not contain tools to calculate routes or information about road constructions and diversions. That the type of data and tools do not predict which kind of sites will insert references to the Stadsplattegrond, is proven by the real estate and housing corporation sites. While the Stadsplattegrond offers detailed and unique information about public facilities, less sites use the Stadsplattegrond to show their clients at kind of neighbourhood their house of interest is located.

The discussed image of the referring sites of the Stadsplattegrond is confirmed by the results of SEO Spyglass, which are brought together in appendix 16. However, SEO Spyglass only selects present external reference links, which can be traced at the moment of making up the report ³⁶ which totalled 400 links altogether. From the first 27 sites only one site (blog-site) was not related to the municipality of Amsterdam. The site with the most links focused on environment and construction; the next 6 sites were related to traffic. The list also contains tourist -, education – and GIS-relation sites, but these sites only have one reference to the Stadsplattegrond.

Depth and length of visits

With an insight into the depth of visits, an indication can be acquired if the user uses the Atlas and Stadsplattegrond for one or several searches. An aspect that can also be considered, is the number of viewed pages per visit. If the number is high it means the facility can keep its users interested, which in turn results in more searches. According to [Jansen and Spink, 2003] 30% of the users only view the first search result to find out if the results match with their query and 66% of the user do not view more than 5 search results. This indicates that the first search results need to satisfy the needs of the user.

Reviewing the depth of the visits of the Atlas, which is presented in appendix 15, table 5, the percentages of visits which included 20 or more pages is almost 77%. This indicates that different search requests are made per visit, because the facility does not contain more than 10 unique pages.

The satisfaction of user requirements by the Atlas is furthermore confirmed by the overview of the length of the visits, which is presented in appendix 15, table 6. Less than 30 percent of the users leave the Atlas within 1 minute, which indicates that

³⁶ 29 June 2007

they only took the time to make a single request. The majority of the users take the opportunity to make several search requests and obtain the subsequent information.

The overview of the Stadsplattegrond concerning the depth of the visits (appendix 15, table 7) show differences to the Atlas, because only 18% of its users requests 20 or more pages during their visit. This can be explained, because the Stadsplattegrond has less pages and is probably used more often by external users who want to find answers using just one search request. Another observation which can be made is that the percentages of the even pages are substantial higher than the percentages of the odd pages. This implies that most users leave the Stadsplattegrond after they have received a search result and consulted the given information.

When the length of the visits (appendix 15, table 8) is reviewed, around 50% of the users finish their visits within 1 minute and nearly 75% of the users take less than 3 minutes to fulfil their visits, which confirms the assumption that the Stadsplattegrond is used for just one search request per visit.

3.5 Identification of the users

In the previous sections different kinds of information which can be gathered from log-files was discussed, but for this study a very important statistic is been not yet been addressed; which users use the different facilities. In the previous sections it has already been determined that identification of users depends on how facilities log web statistics concerning user activities. The DINO-shop obligates users to expose themselves before they can access the facility, the other facilities only log their IP-addresses, which is therefore the only source for identification of users.

In this section only the groups of identified users will be presented and not the individual names or found individual identification of users will be published. When privacy-sensitive information is published by another parties for another purposes than the purpose for which the information was gained, the holder of the information need to be notified and asked for their permission [Kabel, 2002]. In conjunction with the expressed wishes from some of the directors not to publish identifiable information of users, only the groups which were formed, based on matching origins, backgrounds or web behaviour of users are presented.

Gebouwde Omgeving

The facility Gebouwde Omgeving has, using the overview in appendix 17, table 1 only four user groups containing users, which can be traced back sufficiently to approach these users. The two groups with the highest numbers of visits (search engines and internet solutions) do not contain traceable users. The other groups have less visits compared to the first groups and visits were made by very few unique users.

Groene Omgeving

The overview of the user groups of the Groene Omgeving, which is presented in appendix 17, table 2, contains more different user groups and more unique visitors compared to the Gebouwde Omgeving. A lot of visits were made by groups with non-traceable users (privates and internet solutions), so all the attention focussed on the group of research institutions. However, in the discussion with the directors of the Groene Omgeving it turned out that web services used by the facility, are also used by an another facility (called WOT) from a national operating organisation. However, the IP-addresses of these users could not been logged.

DINO-shop

The overview of user groups of the DINO-shop, which is presented in appendix 17, table 3 is based on requests instead of visits, because this characteristic was used in the supplied reports. These reports already contained the identity of the user, so the groups could be defined quite accurately. Appendix 17, table 3 shows that environment and water agencies made the most requests by far, probably because they are interested the most in varied accurate geo-information on the Dutch subsurface of all the groups and it is the most extensive group. It is also remarkable that the group of construction companies / agencies is also extensive, but it makes far less requests. These companies probably have less specialists per company who have an interest in geo-information from the DINO-shop. Between municipalities, nature organisations and water pipe organisations there is room for increasing the popularity of the DINO-shop.

After discussion with the directors of the DINO-shop a selection from these organisations was made for further analysis of the user requirements of the DINO-shop. Not all the organisations with the highest number of requests per group were selected, because some of the organisations are member of the DINO user group. This group has a couple of meetings a year, where they discuss developments, wishes and improvements concerning the DINO-shop. So their requirements are already known to the providers. However, still three members of the DINO user group were selected, because they were willing to cooperate and had specific ideas on user requirements concerning DINO-shop. The list of user groups which were involved in further analysis about user requirements is presented in table 3.7;

Selected user groups	Number of made requests	Number of organizations
Construction company / agency	465	1
Education & Research institute	1793	2
Energy providing agency	4417	1
Environment and water agency	1544	1
Geotechnical agencies	2353	3
Nature organization	137	1
Province organization	130	1
Water board	116	1

Table 3.7; Overview of the selected user groups of the DINO-shop

Atlas of Amsterdam / Stadsplattegrond

Like other facilities, the users of the Atlas of Amsterdam should also be grouped according to their identity. However, the identity of every user of the Atlas could not be determined, so no overview can be given.

The Stadsplattegrond has a lot of traceable users, which can be divided in a lot of groups, which is presented in appendix 17, table 4. Besides groups with untraceable users, like private users and search engines, the group which made the most visits is the municipality of Amsterdam itself, which means they are also not traceable. It is remarkable that these users also have access to the Atlas of Amsterdam, but use the Stadsplattegrond for gaining geo-information about ‘their’ city. The next group with the highest number of visits is police and people working within the judiciary. However, it is doubtful if the members of this group want to reveal their identity. The other groups with traceable users which made a lot sessions were banks and insurance companies, probably because of the accuracy and completeness of the offered geo-information. The high number of visits from publishers and social institutions is also surprising, because the Stadsplattegrond does not contain specific theme information for these groups.

After discussion with the providers of the facilities a selection was made which users could be approached for further analysis about their user requirements. The outcome is presented in table 3.8;

Selected user groups	Number of made visits
Banks & Insurances	2370
Education and Research institutions	524
House corporations	330
Legal and Financial services	306
Publishers	385
Real estate agencies	534
Social institutions	468
Utilities	220

Table 3.8; Overview of the selected user groups of the Stadsplattegrond

3.6 Chapter summary

This chapter started with an introduction and an explanation of the construction of log-files. Log-files exist in different types. The format of a logged activity determines which information can be gathered. Because other user information can be gathered from cookies, their role was also discussed. Furthermore, the limitations of log-files and cookies were discussed and put into perspective.

After that, the information which can be gained from log-files was treated, because not every aspect of a log-file or analysis method yields the information which leads to uses and / or user identification. Due to differences in formats and contents of

the log-files of the facility providers, it was necessary to work with tools that can gather information from other sources than the provided log-files.

For the log-files analysis three different kinds of tools were used. To analyse log-files, the shareware program Deep Log analyser was used. To analyse IP-addresses and tracing them back to identifiable user information, the program VisualRoute was used. Particularly for rating the findability of a portal, a tool called SEO Spyglass was used. To analyse different lists or reports, Microsoft Excel and Access were also used. These last two were also used to combine, query and calculate totals and averages.

The log-files and the gained information differed per facility. The number of traceable and usable users of the Gebouwde Omgeving was low. Based on the constructed relation scheme the part of the facility which was used the most, was the search tool. A lot of tracing could not be done because of the use of Java Scripts. These scripts prevent activities being stored in log-files. This aspect also plays a role in other facilities. Besides being the page for the most entries, the home page is also the page where most users leave the site. Furthermore, fewer sites refer to the Gebouwde Omgeving which makes this facility's findability limited.

The reports of the Groene Omgeving do not show high visit numbers. The data categories are used much more than the very advanced search tool to find desired geo-information. Next the findability of the Groene Omgeving needs to be increased and the refusal percentages needs to be brought down in order to increase the attractiveness of the Groene Omgeving to its users.

A facility which shows high visit numbers in specific areas of expertise is the DINO-shop. The identity of users is already known, because every user has to log on to make information requests. Only the number of made requests and delivered information is logged, so only an extensive list of referring sites could be added.

The Atlas of Amsterdam shows a lot of visits, but none of the logged IP-addresses were traceable, fortunately a list of using municipal divisions could be recovered. The number of returning visitors is very high with 99,8%. It is remarkable is that a lot of municipal sites which focus on traffic have links to the Atlas, while no functionality or information about traffic is offered. The length and depth of visits to the Atlas shows that it is able to attract and sustain all kinds of users.

The analysis of the Stadsplattegrond produce similar overviews when compared to the Atlas. In a 1 year and 7 months period of time almost 1,5 million visits were made, a lot of them being traceable. The overview of the referring sites is also similar to the Atlas, although tourism, education and GIS-related sites also have back links to the Stadsplattegrond.

After analysis and discussions with directors of the facilities, the facilities DINO-shop and Stadsplattegrond were going to be analysed further to learn more about the requirements of their users.

4 Additional analysis to define user requirements

4.1 Introduction

In the previous chapter one of the main conclusions was that analysis of log-files alone is not enough to determine user requirements of geo-information provision facilities. With log-files names of organisations or providers with whom users are affiliated to can be revealed and aspects of displayed behaviour at facilities can be explained, but it is unknown what the requirements and expectations of these user are towards the facility and why consumers behave as the log-files show.

To find out if the information gathered from log-files can be used to determine the user requirements of facilities, additional analysis will have to be carried out. The most efficient and quickest way to gather as much response from users as possible is by sending questionnaires. According to [Gennip et al, 2005] questionnaires are appropriate to measure opinions and experiences, can be used on a large scale and is relatively cheap to carry out. Furthermore, users can participate voluntarily and do not have to make appointments or travel.

First the followed methodology to set up the questionnaires will be presented, next the process of formulating questionnaires and sending them to the users of the different facilities will be discussed. Before the qualitative results of the questionnaires per facility is presented and described, it will be investigated whether the different questions are mutually correlated. With the description of the results, including remarks added by users, the rejections for not participating in the questionnaires will be discussed. Finally a summary is given of this chapter.

For three facilities (DINO-shop, Atlas and Stadsplattegrond) the user requirements will be defined, based on log-files analysis and additional analysis in the form of a user inquiry. The expectation was that the response among users of these facilities would be sufficient, because of their high visitor numbers. Further the providers of these facilities were willing to cooperate and were able to offer support to approach users and send the questionnaires.

4.2 Methodology

For setting up a questionnaire, the choice was made for an approach which had been developed based on experiences with Dutch-orientated surveys. This, because only Dutch users will be approached and asked for their opinion. Therefore the first idea for setting up a questionnaire was based on the principles of a customer satisfaction survey, explained by [Berg and Dooren, 2004]. In this publication seven steps are distinguished, which will be followed to set up the survey, these steps being;

- Orientation phase
- Preliminary investigation

- Appoint research method
- Formulate questions
- Execute research
- Analyse results
- Action plan with measures of improvement

In the orientation phase the aim of the inquiry needs to be determined. The aim of the inquiry is to determine user requirements of geo-information provision facilities, based on information gathered from log-files.

The next step is to determine how the inquiry will be performed. Two different methods will be used; at the DINO-shop specific users will be selected and requested to fill in and return the questionnaire, at the Atlas and Stadsplattegrond the questionnaires will be available at the facility itself with the request to all the users to fill in and return it.

The last part of the orientation phase is getting support from the facility providers to distribute a questionnaire amongst their users. By involving the providers in defining the questions and the way the users are approached, user information for further analysis can be gathered. Another advantage is that the user's attention will be drawn to the fact that providers take the trouble to innovate and care about the user's opinion.

According to [Berg and Dooren, 2004] a preliminary investigation will go through the global experiences of the user. However a log file analysis already took place which gives insight into these experiences, a investigation will not be executed again.

The third step of setting up a survey is appointing a research method. Because the instrument of investigation has already been chosen in the orientation phase (questionnaire), the random check dimension will only have to be determined. For the user inquiry of the DINO-shop the users have already been selected in the log-files analysis. The dimension of approached users at the Atlas and the Stadsplattegrond is not known beforehand, but regarding the high visitor numbers and the average length of the visits the assumption is made that sufficient users will participate.

After the research method has been chosen, the questions need to be formulated. Before this can be done, it needs to be clear that the given answers will contribute to the aim of the inquiry. According to [Dijkstra and Smit, 1999] two parameters need to be determined, on which the questions can be based; examination units and variables. Examination units carry properties, which will be filled in by the variables. For the DINO-shop and the Atlas and Stadsplattegrond together the examination units and variables are made up and can be found in appendix 18, tables 1 and 2. The questionnaires of the Atlas and the Stadsplattegrond are based on the same units and variables. A reason for this could be that Stadsplattegrond contains less datasets in number and less sophisticated functionalities than the Atlas, but the form and classification of how geo-information is presented to the user is the same and is maintained by the same provider. Differences in opinion and experiences between Atlas and Stadsplattegrond can easily be noticed when the variables are the same.

Based on the examination variables and units, the questions can be formulated. The value of each variable can be gathered from answers of at least one question, so each examination unit is based on at least two questions.

For the DINO-shop the questionnaire of the TNO held customer satisfaction survey was studied [Jellema and Hooghart, 2005] and several questions from this survey were added. The questionnaire for the DINO-shop, which is enclosed in appendix 19 consists of 20 multiple-choice and open questions and finishing one questionnaire will take around 15 minutes. To inform and ensure the user that the questionnaire was sent with the cooperation of TNO, an accompanying letter was devised by TNO and was sent to the selected users along with the questionnaire. TNO was curious if potential users who were not familiar with DINO-shop would respond in the same way as registered users would do, so some potential users were also selected and approached. In total 16 registered users and eight potential users were selected. For the registered and potential users different accompanying letters were used. These letters can be seen in appendix 20 and 21.

For the Atlas and Stadsplattegrond the identity of the users could not be determined, so the choice was made to publish the questionnaire online for all users and requesting users to participate during their visit. The questionnaire would be available for 4 weeks. The questionnaire of Atlas, which is enclosed in appendix 22, contains 19 multiple-choice questions and one open question and will take a respondent approximately 10 minutes to finish. The questionnaire of Stadsplattegrond which is enclosed in appendix 23, contains 18 multiple-choice questions and one open question and also takes around 10 minutes of the respondent's time.

The results of the questionnaires will be analysed in twofold, quantitatively and qualitatively. The quantitative analysis will be executed with the computer program SPSS (Statistical Package for the Social Science) version 11.5. If the data meets the set conditions, the questions will mutually be tested on correlation (Spearman's rank correlation). Normally a test on independence (chi-square test) is also part of the quantitative analysis. However, a random check points out that by testing any question pair the conditions to perform a successful test would not been met.

Next the answers are presented after a qualitative analysis, based on their examination units. With the results of the quantitative analysis, the qualitative results of the separate questions can be related to each other, which in turn supports informed conclusions. The last step is making an action plan for measures of improvement. These last two steps will be discussed after the results have been presented and discussed in the next chapter.

4.3 Results

Using the answers of the respondents, it must become clear if user requirements can be made up together with the results out of the log-files analysis. To be able to put the results together, the answers need to be converted into user statements of the variables and the corresponding examination units. This conversion process will be executed in the qualitative analysis. Taking that question pairs, especially when they are based on the same variable could correlate with each other, also this test is also performed in the quantitative analysis. In the next chapter the results of the quantitative and qualitative analysis will be combined to find out what relationship they have to the results of the log-files analysis.

4.3.1 Quantitative analysis

Before a statistical analysis can be executed it is common to inspect the sample size to get an indication of the level of representativity [Langers and Vreke, 2003]. According to [Sander, 1978] there are several examples in previously published studies that the sample size does not support the statements that were made. [Stokking, 1998] also indicates that a large sample size increases distinctive capacity and the risks on accidentally extreme outcomes decrease. When the numbers of response are taken into account, which can be considered as the sample size of the user inquiry, the compilation of the sample sizes is presented in table 4.1;

Facility	Returned questionnaires	Responded, but not return questionnaire
DINO-shop	6	2
Atlas of Amsterdam	11	1
Stadsplattegrond	48	0

Table 4.1: Overview responses requests for return questionnaires

These numbers indicate that only a statistical analysis of the answers from the returned questionnaires of the Stadsplattegrond will give a reliable insight into which questions are related to each other.

To be able to calculate connections in SPSS the answers need to be converted into scores. The order of the answer in the questionnaire is equivalent to the score. The measuring scale of the questions (nominal, ordinal, interval or ratio) enables scores to be related to an order, which means that a score 2 is higher or lower than a score 1. The questionnaire of Stadsplattegrond contains 6 questions with nominal distribution, 6 questions with ordinal distribution and 7 questions with scale (interval or ratio) distribution. The last open question is considered as a question with nominal distribution, because respondents can have comments or not.

A technique which can be used to calculate correlations between variables is Spearman's Rank Correlation, which is very useful in this study, because it has no conditions concerning measuring scale in contrast to other techniques like Pearson's correlation or regression analysis. The Spearman rank correlation coefficient (r^2) can

adopt a value of -1 to 1. A high correlation means that there is coherence between two variables, this can be positive (high on one variable, is also a high score on the other variable) or negative (high on one variable, means a low score on another variable). This technique is applied to all the 19 questions and the results of these analysis can be found in the correlation matrix in appendix 24. In accordance with [Langers and Vreke, 2003] $r^2=0,45$ (plus or minus) will be considered as boundary, which means that the correlation has a determination percentage of 20%. This means that 20% of the correlation is explained, which according to ³⁷ can be considered as sufficient. Table 4.2 shows that five out of the 171 pairs of questions correlate sufficiently with each other;

Question 1	Question 2	Correlation	Determination
In which level are u a supporter to provide such a functionality on the Stadsplattegrond?	Are you satisfied with the way the Stadsplattegrond provides you the information?	-0.461	21.3%
In which level invites the appearance of the site you to use the Stadsplattegrond?	Are you satisfied with the way the Stadsplattegrond provides you the information?	0.466	21.7%
How often do you use the supporting options?	Are you satisfied with the way the Stadsplattegrond provides you the information?	-0.498	24.8%
In which level the searching methodes supports you to find a location?	In which level do you think there is enough reference in the map to find a certain location?	0.475	22.6%
Do you think that the Stadsplattegrond is user-friendly?	In which level the searching methodes supports you to find a location?	0.457	20.9%

Table 4.2: Set questions with absolute correlation coefficient > 0,45

Table 4.2 indicates that respondents' answer to the question 'Are you satisfied in the way the Stadsplattegrond provides information' gives an indication to answers on three other questions. The answer to the question 'At which level did the searching methods support you to find a location' does the same for answers on two other questions. Only one pair of questions (the fourth pair in table 4.2) are derived from the same examination unit.

The effect of these results will be discussed in the next chapter.

4.3.2 Qualitative analysis

The results of the qualitative analysis will be presented per facility grouped by the examination units. An general overview of the opinions will be given.

³⁷

http://cbdd.wsu.edu/edev/NetTOM_ToT/Resources/Other/TOM606/page33.htm
(Accessed on 09/08/2009)

DINO-shop

The general opinion on the different examination units of the DINO-shop (appendix 18, table 1) is based on six completed questionnaires. Two approached users responded, but did not send back a questionnaire. Tables with the results of the separate questions can be found in appendix 25.

The users can be considered as specialists who visit the DINO-shop intensively and can find the DINO-shop quite easily. These users assess the design of the DINO-shop as functional and adequate to provide information, when the paths to find this information are known. A remark was made that the registration system scares off less specialised users from using DINO-shop. The users are not unanimous about the provision of information. The used methods are not bad, but can be improved, for instance with a free data viewer. On the other hand, a very clear message is that personalising user-profiles is not favoured by the respondents. The quality of the information needs to be improved according to the respondents. On both actuality as well as completeness the offered data-sets are not at the desired level. The search methods can be improved, but the current division of categories must be upheld. A search form could do the trick, especially when meta-information is used and the form is complete and has been tested. The information is mostly used for commercial purposes, such as presenting the information for clients or finding locations for performing actions, but also for preparation purposes. The respondents also have a lot of ideas about adding missing information, soil and topographical information being the most popular ones. Considering support the results show that overview in available manuals and support possibilities of the DINO-shop is missed. The maps offered by DINO-map require the most support, but also other divisions could use more relief.

Atlas van Amsterdam

Users' opinion about the examination units of the Atlas Amsterdam (appendix 18, table 2) consists of 11 questionnaires which were received from unknown users. One user was willing to return the questionnaire, but was not able to save the answers and sent back the filled-in questionnaire. Tables with the results of the separate questions can be found in appendix 26.

The Atlas is mostly known because colleagues tell users about its existence. Most users return more than once a week, however the URL address is a tough one to remember. The Atlas can be considered as user-friendly and will be recommended to others, however some improvements can be made to the appearance, which is regarded as functional but not inviting. When the screens with detail information and output functionality get more acknowledgement, the user will be facilitated better. The functions itself fit users' expectations well for the users who can find them, who are enthusiastic about personalising user profiles. The quality of the offered information of the Atlas is characterised as adequate, this applying to actuality and completeness.

The present search entries already satisfy the needs and the map window also gives enough reference to find a certain location, although more entries, like business names, schools and buildings would help. The Atlas supports most of the respondents in their own work, mostly as preparation. Furthermore, there are many desired data-sets, like urban zone plans, traffic information and street furniture which could be added to the Atlas. The support options are not used much, however the ambiguity of the actuality of the images and the reliability of the cadastral information could be taken away with improvement of support.

Stadsplattegrond

48 completed questionnaires are used to determine the general opinion of the examination variables (appendix 18, table 2) of the Stadsplattegrond. Tables with the results of the separate questions can be found in appendix 27.

The Stadsplattegrond can be found by a link from a website or by colleagues. A lot of users need their favourite-setting to find the Stadsplattegrond, but when they do, its use is normally distributed. The Stadsplattegrond can be considered as user-friendly, because of the easy retrieval of addresses and the clear, actual and detailed map. The screens with detail information are not used much, the wish to implement user profiles is much wider supported. The respondents label the quality of the offered information as adequate. The search methods of the Stadsplattegrond also receive good reviews, especially the map reference, which is satisfying. However, improvements, like implementing Google-navigation tools and more search entries could still be made. Most of the information is used to find a certain location, to make work-related preparations and to gain detail information. However, the user would be supported even better if information could be transferred to office-applications. Furthermore, adding more different data-sets is a popular remark of users, especially traffic information and urban zone plans are missed. The support options are hardly used, but users want to be supported more in navigation in the map.

4.4 Chapter summary

The chapter started with an introduction, which emphasized that log-files analysis alone is not enough to determine user requirements and additional analysis is necessary. Therefore spreading questionnaires was chosen to obtain user opinions about different aspects of the discussed facilities. Because of high visitor numbers and participating providers, this user inquiry was only performed amongst users of DINO-shop, Atlas of Amsterdam and Stadsplattegrond.

To set up the questionnaires a methodology was chosen which was based on a user satisfaction survey. First, issues like how to approach users, which users will be approached and on which aspects the questions will be based were determined. These aspects were called examination units and were divided in measurable variables. Together with the opinion of providers and former questionnaires the questions for this user inquiry were determined and made available to the (selected) users. To

approach DINO-shop users accompanying letters were made up and sent directly with the questionnaires. Users of the Atlas of Amsterdam and Stadsplattegrond could download a questionnaire from the facility and return the filled-in questionnaires by e-mail.

The answers of respondents were analysed in two-fold. First the answers were converted to quantitative scores and the correlation between question-pairs were analysed. These analysis resulted in 5 pairs of questions which correlated rather well with each other.

Furthermore, statements of the different examination variables based on respondents answers were given for every facility separately. The DINO-shop attracts specialists with commercial purposes, who consider the DINO-shop as functional, but not user-friendly and does not satisfy the needs for provision of information for everybody. Furthermore, quality of information, search methods and overview in support options need to be improved and more data-sets also need to be added. The Atlas is mostly known because of colleagues, who can not find the Atlas at once, but use the facility more than once a week. Atlas of Amsterdam can be considered as user-friendly, but detail information screens and output functionalities can not be found easily. Respondents are satisfied about the quality of information, search methods and the way the information is presented, although many data-sets could be added. The users of the Stadsplattegrond find the facility by website-links or colleagues and show a normal distributed pattern of number of visits. Stadsplattegrond is characterised as user-friendly, but is only used as a map viewer, so the detail information screens are found less easily. Personalising user-profiles can only harvest enthusiasm from Stadsplattegrond users, other facilities have been advised against implementing such functionalities. The quality of information is adequate, just like the search methods. However improvements in navigation and search entries are mentioned. The support options of Atlas and Stadsplattegrond are not used much, but could be improved.

5 Log-files and determining user requirements

5.1 Introduction

In this chapter the results of the different analysis, which have been performed in this study, will be brought together, reviewed and discussed. First the results from the log-files analysis will be discussed, based on literature review where possible. After that it will be made clear whether or not user requirements can be devised when combining log-files analysis and the results of the user inquiry. From these user requirements improvements will be defined for each facility. Finally, the role of log-files as part of the process to determine user requirements will be determined.

5.2 Discussion log-files analyse results

In this section the results of the log-files analysis will be discussed, based on literature review. The results of the log-files analysis will be analysed and discussed based on the facility.

Chapter 3.2 shows that a lot of aspects can be gained from log-files and several aspects can be considered as success factors. But are these success factors present at the discussed facilities and can the necessary information be obtained from log-files, who all have different contents and form?

[Rosefield and Moreville, 1998] emphasize that findability of information is a critical factor. Findability of information out of Gebouwde Omgeving can be obtained from different gained aspects. The list of visits can tell us that almost half of the users make 10 or more visits and a minority of the visits come from one-time visitors, which implies that the majority of the visitors is satisfied with the retrieved information and come back for more. The page view table shows that the selection page is the most visited one, however the URL of this page is logged during the selection process which consists of nine steps with six different page appearances. The overview of occurred errors also shows that requests for downloading manuals cause most errors, so requested information can be retrieved without a lot of problems. The relation scheme (appendix 4) which is constructed based on the list of page views shows that the navigation of this facility is kept simple to guide the user through the site. According to [Palmer, 2002] navigation is an important success factor, however the overview of exit pages shows that a lot of users leave the site before or during the selection procedure, which can be interpreted as a call for improvement for Gebouwde Omgeving's navigation. Another aspect which needs to be improved is the consistent strategy of the Gebouwde Omgeving, which take care of the findability of the facility on the web, according to [Constantinides, 2004]. The number of back links, which is very low, indicates the level of findability of the Gebouwde Omgeving.

Findability of information is also a problem for the Groene Omgeving. The list of visits shows that most of the users who find the Groene Omgeving return, however the overview of page representations shows that the sophisticated search tool is not often used to find the desired data-sets. Unfortunately, the log-files can not be used to gather information if these users also actually retrieve information, because of the use of Java scripts which is not logged. A lot of statements about the navigation of the Groene Omgeving can not be made, because this information is not logged. The refusal percentages show a very large percentage of failed requests, so it is very likely users are confronted with faltering functionalities, low performance and failed request to retrieve desired geo-information. Also the findability of the facility itself needs a boost, regarding to the large percentage of users which access the facility directly and the low number of links to the Groene Omgeving.

The log-files of the DINO-shop, which are actually usage reports, contain less information about the behaviour of the users. A statement about the findability of the information can be made when regarding the number of requests users make to find desired information. This number is very high, so users are able to retrieve desired geo-information about subsurface. However, this number must be placed in perspective when combining it with the percentage of the users who made just one application, which is 22%. As the relation scheme (which is made up without the usage of log-files) shows the navigation of the DINO-shop can become quite confusing to users. DINO-shop can be reached from a extensive list of sites, however the strategy can be improved, due to the lacking of back-links to customers websites.

The percentage of repeating visitors of the Atlas of Amsterdam is almost 100%, which indicates that almost all users which find the facility are satisfied and come back for more. This conclusion can be confirmed by other results of the log-files analysis. The list of requested pages shows that around 37% of the requested pages will be used to execute a search for information, which means that 1 out of 3 pages is used for searching information. The overview of depth of the visits shows us that more than 95% of the visits consists of 4 requested pages or more. The overview of entry pages shows that most users enter at the main page, which means that the main page is adequate findable. The overview of exit pages shows that the a majority (79%) of the users leave the Atlas after gaining the desired information. The list of requested pages together with the relation scheme also show that the navigation of the Atlas of Amsterdam is an aspect which users become familiar with quite easily, which makes the threshold low to use this facility. If a strategy for increasing the findability of the Atlas should be needed, the most important objective should be that awareness must be created about the existence and possibilities of the Atlas, which according to [Nieuwenhuis, 2001] can be obtained with publicity. The overview of the referring sites shows that this strategy is not necessary, because 82% of the users directly access the facility without using an another website. Another aspect which can be learned from this overview is that other divisions of the municipality of Amsterdam refer to the Atlas on the intranet to stimulate other municipal colleagues to use the Atlas.

The percentage repeating visitors of Stadsplattegrond who have no access restrictions is just a couple points lower (96%) compared to the Atlas, so the findability of information can be considered adequate. However, the percentage of visitors with 50 or more visits is just 16%, which can be explained by the limited number of geo-information datasets and the diverse number of users, which use this facility for a wide range of purposes. This assumption is supported by the lists of depth and length of visits, which shows request less pages and spent less time by users. Because of the use of Java scripts there is only one requested page mentioned in the log-files where all the information is searched, retrieved and consulted, so from these log-files it does not become clear if users appreciate the navigation. However, the navigation have to be simple and easy-to-use to attract a lot of users. A facility like the Stadsplattegrond which has simple navigation and therefore high visitor numbers confirms that. The strategy to increase the findability of the Stadsplattegrond does not need to be changed, when regarding to the high percentage of visits which start directly by opening the browser and the number of links (400) from other sites referring to the Stadsplattegrond.

5.3 From analyse results to user requirements

This section reveals how the results from the log-files analysis, together with the results from the user inquiry, can be transferred into user requirements. Based on the examination units, described in chapter 4 the user requirements are questioned, so these units will also be used as basis to determine the requirements. However, examination units were not devised for all the facilities, the units for facilities where additional analysis was performed are the same, so these units will be used for the other facilities as well. If the user requirements have not been fulfilled, improvements will be given to fulfil them.

Gebouwde Omgeving

The Gebouwde Omgeving has a small group of interested and traceable visitors who are able to retrieve their information. The group size is not extensive, because potentially interested users have less opportunity to find this facility, based on the limited numbers of links to the Gebouwde Omgeving. A recommendation is to develop a strategy to expand the findability of the facility and attract more customers. With the products that the Gebouwde Omgeving has to offer, which are characterised by a large geographical density and high accuracy of the offered building information which makes them unique in the Netherlands, the ingredients are in place to start a successful campaign to create awareness on the possibilities of the Gebouwde Omgeving.

From the log-files it could not be deducted at which point the user enters of leaves the facility and if they retrieved the desired information. By dividing the search process in traceable divisions, more insight can be gained into where users drop out

and if the exit is induced by satisfaction on the returned information or out of frustration of not finding the desired set of geo-information.

Groene Omgeving

What applies to the Gebouwde Omgeving with regards to the diversity of users, applies even more to the Groene Omgeving, the group of interested and traceable visitors who also return is small, but loyal. By composing a strategy to attracting more visitors, whereby data providers can help by inserting links from their websites to the Groene Omgeving a start can be made to create more awareness. With the possibilities the Groene Omgeving has for the experienced GIS-users, like obtaining web services and data-sets which can be accessed in a desk-top GIS-programme (ArcGIS), Groene Omgeving supplies services not many other facilities can offer.

Lots of activities made at the facility are not traceable in log-files, so valuable information about where users enter and leave is lost. By logging the activities of the Java scripts, which according to [Atterer et al., 2006] can be done by adding JavaScript code to the source code of the facility, information can be gathered were users enter and leave with or without gaining information.

The search functionality has a very scientific approach. The user already needs to know what to look for and which search keys need to be entered. By improving appearance and fit the functionality with well-referenced maps, pick-lists and suggested inputs, the search functionality can attract more users, which in turn will find more multiple data-sets than they do now.

Another rather negative observation is the high percentage of refusals, one in every three requests fail. A point of interest to improve the facility is to recover the causes of failures and to find solutions to decrease the refusal percentage.

DINO-shop

The most important conclusion which can be made, is that the average user who make a request for geo-information, comes back for more. It seems that users are satisfied by the findability of the information, but that users are not satisfied with the navigation of the DINO-shop. So, advice for improvements could be to add a search form (which can use meta-information). Improvements on appearance and user-friendliness and creating overview in support options can also be made. Another advancement can be found from the relation scheme of the DINO-shop which shows that no centre-oriented pages are appointed to become the backbone of the facility, so other pages can only be accessed by one of the backbone-pages. To follow the wishes of the users to ensure the main classification of DINO-shop, the homepage, together with the pages of DINOMap, DINOData and DINOServices can be used as the essential backbone-parts of this facility.

From helpdesk-calls and results of an earlier customer satisfaction survey remarks and suggestions for improvement concerning the quality of information offered have already received the facility provider. These remark are confirmed by the

user inquiry. By informing users which improvements are feasible and what plans are made to improve quality, a lot of discontent can be taken away. The platform to inform the users is already available, with the own DINO user group, user meetings, helpdesk and last but not least the DINO-shop itself.

DINO-shop attracts a lot of users, who are able to find the facility. However, most users know the DINO-shop from scientific-oriented sites with the main objective to inform their users. To attract visitors from other spheres links to DINO-shop needs to be available at other types of sites, like sites of registered users or sites informing about national projects in which TNO participates. By changing the strategy (if there is one), the awareness and attractiveness of DINO-shop can nationally be enhanced.

With regards to the helpdesk, which is widely used under the registered users and the initiatives to meet the received user needs of DINO-shop (meetings, user groups), TNO shows it takes users' opinions seriously. The call to improve the appearance has already been carried out and as figure 5.1 shows the lay-out shows more overview;



Figure 5.1: New appearance of DINO-shop

A last recommendation concerns the user accounts. Some users report that the registration system is confusing and time consuming. An 'improvement' which should not be introduced to make the registration method more attractive to those users who are criticizing it, is to embed functionality to personalise user profiles. Especially specialist users will be annoyed by suggestions or pre-suggested search keys.

Atlas of Amsterdam

Almost all users of the Atlas receive at least one search result, together with the fact that every user returns, indicates that users are familiar with probably every part of the Atlas. An exception can be made for the support pages, which because of the user-friendliness of the facility, the well-equipped search functionalities and well rated map reference, will not be consulted that much. The process scheme shows that functionalities like a screen with detail information and export are 'at the back' of the facility together with relatively low visit numbers. By informing the users about the awareness and possibilities of these less used tools, the user increases his / her possibilities to process the gathered information and the support pages will also be visited by more experienced users to get more information about these functionalities. A news flash at the bottom of the screen beneath the map can already do the trick.

The Atlas of Amsterdam uses Java scripts, which means a loss of useful information about the use of the search functionalities, where users drop out and also the unknown detailed information screens and output functionality. By making adjustments to the source code these activities can be logged, which gives more insight into the behaviour of the users.

However, visitors spend a relatively large amount of time at this facility and request to visit a lot of pages, they always ask for more geo-information from the Atlas. As mentioned before zone plans, traffic and street furniture information are the most requested items. Considering the number of datasets the Atlas of Amsterdam contains, it will not be a problem to add more geo-information, however it would be confusing if too much information is presented. Clustering of data sets in theme groups, which is already used, would be preferable.

Stadsplattegrond

The Stadsplattegrond is by far the most visited facility of this study, with almost 50.000 traceable users, but they are less loyal regarding the spent time and number of visits of one user. A suggestion to increase users' loyalty is to use a web-address which is easier to remember. Users are attracted by the appearance, completeness and the accuracy of the datasets of the Stadsplattegrond. By adding several new data-sets, which are created by the municipality itself such as zone plans (which according to the new Dutch law for spatial planning need to be drawn up and exchanged digitally³⁸), traffic information such as road constructions and direction of traffic flow and street furniture, users will spend more time at the Stadsplattegrond and will return sooner.

As the relation scheme of the Stadsplattegrond shows, none of the activities performed by users can be traced to find out which search entry visitors use the most or which percentage of visitors leave the facility after retrieving information, because Java scripts are used to perform these activities. By making adjustments to the source

³⁸ <http://www.geonovum.nl/dossiers/rostandaarden> (Accessed on 10/08/2009)

code of the Stadsplattegrond these activities can also be logged and been used to improve the functionalities.

Another similarity with the Atlas is that a lot of users consider the Stadsplattegrond solely as a map machine, which shows images of certain locations, based on entering search keys. The functionality whereby a screen with detail information about the public facilities can be displayed and consulted is not familiar with a lot of users. To support this functionality more prominently, the users will have to be facilitated in more ways than the user would expect beforehand. For instance implementing personalised user profiles and ways to retrieve geo-information in their own computer environment could help.

The most common motivation which leads users to the Stadsplattegrond is to find a certain location. To find this location search keys can be entered, but the map can also be used to geographically find the location. That both methods influence the success of the search methods within a facility is demonstrated by the correlation between the matching questions in the questionnaire. By adding an administrative unit or border users have more reference to find their desired information. Also functionality to support users to enter the correct street name or zip code by advising suggestions facilitate the user in finding the desired location.

The support pages are used less, however users suggest that especially navigation in the map should be supported better. Comparisons to the navigation tools of Google Maps are made more than once. It needs to be explored if these tools can be adopted in the Stadsplattegrond or if the support pages need to be improved on this point.

5.4 Role of log-files in process of defining user requirements

Now that the user requirements have been made clear, the role of the log-files in the process to establish user requirements can be determined.

When a log-files analysis is scheduled, a lot of preparations are involved which have to be in tune with each other to distillate the appropriate information. Of course long studies can be precede the start of logging server activities where information needs to be gathered, which could be based on different strategies [Peterson, 2005]. However, log-files do not contain reliable information for every desired aspect of the user's behaviour that needs to be gathered. By understanding which information is necessary from website users, the facility provider is able to characterise its users and can distinguish differences between user groups. An overview which information can be gathered, is based on market segmentation variables and is presented in figure 5.2;

The 5 Ws	Traditional Market Segmentation Information	Web Site Visitor/Consumer Segmentation Information
Who are they?	Demographics and Psychographics	About the visitor as a Web site user
Where are they?	Geographic	About the visitor's Internet address/access path, etc.
What do they do?	Behavior	About the specific information sought
When do they do it?		About Web site usage temporal behavior
Why do they do it?	Benefit	About the reason/motivation for visiting the Web site

Figure 5.2: The 5 W's Classification of the WWW Consumer Information Needs. [Padmanabhan et al., 1996]

Table 5.2 shows which information is useful for providers to perform market segmentation. Two aspects deal with users' behaviour; which information (or which page) is sought and retrieved and how much time does the visitor spend on the facility. Together with information concerning the identity of the user is, it is important to find out if these information can be gained from the log-files. Precondition is that these statistics are logged and stored inside log-files. This is not yet the case with regards to the log-files received from the different facilities.

So the required information needs to be adjusted to the contents of the log-files. However, it is not known beforehand which content of the log-files is going to be needed, so requirements about the contents could not be passed to the facility provider. When it is clear that log-files will be used by the provider to gather information about user requirements, the contents of log-files could be focused and adjusted to this purpose.

But even when the form and contents of log-files is adjusted to gather information on user requirements, this study shows that analysis of log-files alone is not sufficient to determine user requirements. Even if tools are used which contain different techniques to scan every part of a log-file record and convert it to useful information, two aspects reduce the suitability rate of log-files. The form and contents of the log-files which were made available by the different facility providers differed significantly, this should always be taken into account before a strategy is made which information log-files must log. However when it is determined that a log-file contains desired elements, different limitations of log-files can limit the reliability of the gathered information.

Therefore results from log-files analysis are suitable as preparation of additional analysis. Information for example to identify users or stipulate popularity rates of pages can be supplied by log-files, but the motives to explain these phenomena can only be gained by additional user enquiry. Also other methods to gather user information can be used to supplement information from log-files, like the findability of facilities. These numbers characterise the popularity of the facility and can be gained without the use of log-files, but with a software programme and internet access.

5.5 Chapter summary

This chapter started with showed a discussion on the results of the log-files analysis, based on a literature review. Then with the results of the user inquiry the user requirements were presented. Finally the role of log-files as part of the determination of user requirements was highlighted.

The different literature sources determine success factors of facilities where results of log-files analysis indicate rate of satisfaction. One success factor is that the facility is findable for the user. From the discussed facilities the Gebouwde Omgeving, the Groene Omgeving and also, despite their large numbers of visitors, the DINO-shop are only found by specialist users within their own work sphere. However it has potential for several reasons to be interesting to users outside these work spheres. DINO-shop is aware of this aspect and tries to become familiar with other user groups through active user support. The Atlas (within the municipality employees) and the Stadsplattegrond have already fulfilled this factor, when regarding their high visitors numbers and their efforts in publicity. Another factor is navigation within facility. The facilities can all improve on this factor, where Gebouwde Omgeving and Atlas of Amsterdam only need small adjustments, Stadsplattegrond must put in more effort and Groene Omgeving and DINO-shop have to take serious steps to improve this aspect. Another important factor is the strategy to attract more (potential) users to their facility. The Gebouwde Omgeving and Groene Omgeving are hard to find for potential users and need to improve strongly on this point. The other facilities have an impressive number of back-links and only need to focus on new potential user groups.

To determine the user requirements the examination units were used as basis. When these requirements were not fulfilled, improvements were suggested. All the facilities contain interpretation of every unit, however there is a lot to be improved. Users can be identified and traced with exception of the Atlas. User-friendliness is a popular aspect where adjustments can be made to attract more users. However, users of Gebouwde Omgeving and Atlas are satisfied the most. The methods to find information can always be more sophisticated, however the Groene Omgeving has made an overkill. When the information is found, the provision is generally adequate, however a lot of meta-data is missing. The quality of information is adequate, however specialist users have more requirements regarding this issue. Users can process the information adequately and support is not used often, but can be improved.

If it is decided to use log-files for monitoring users and you want to be able to use log-files for determining their requirements, the contents and forms of log-files need to be adjusted to this purpose. But still log-files have limitations which have to be taken in consideration, because using tools can only partly overcome these limitations. This makes gaining other user information, like findability rate of facilities or additional methods like user inquiries necessary to obtain user requirements. Log-files are suitable as preparation by targeting these methods.

6 Conclusions and recommendations

6.1 Main conclusions

Involving users in the development or improvement of geo-information provision facilities can be done in several ways, even when the users are not known beforehand. From this research it appears that log-file analysis alone is not enough to identify users, in view of their different appearances and the reliability of the stored raw data. Particularly when you want to know more about the user requirements, additional methods and tools are necessary to measure and better describe aspects found during the log-file analysis.

Despite this main conclusion, this study shows that log-files are suitable for deriving use and user information and can supply tools and methods to fill the assessment tool kit of the research framework (figure 1.3). So a reflection on the main research question, which is; *What contribution can log-files make to the identification of the uses and the users of geo-information provision facilities?* can be given based on the findings and conclusions which are presented in this thesis. By going back to the six sub-objectives which were formulated to find out whether and how the main research question can be answered, these findings and conclusions will be presented. Also some recommendations for further research will be given.

The first sub-objective is to *describe the facilities of which log-files will be collected and analysed*. After the term facility and user were determined, a literature review was performed. Based on this review, several main aspects with matching parameters were used to describe the facilities separately in detail. The required information was gained by visiting every facility and obtaining information about every parameter whenever possible. Missing information, which could not be obtained from the facility itself, was gathered by consulting the facility providers.

The second sub-objective is to *determine which information could be gathered from log-files and what its accuracy is*. First a log-file was decomposed and based on the shape of the components the generated information was explained. However every provider supplies log-files with different formats and contents, so different tools and techniques were needed to explore these log-files. The discussion of the results of the analysis shows which different types of information a log-file can contain and which interpretation is needed to process this information. The accuracy of information gathered from log-files is questionable. Factors like caching, session time-outs and tracing possibilities of IP-addresses present difficulties to estimate the value of log-file information. However, with user information and different analysis techniques the effect of inaccuracy can be reduced to a minimum and make the information more useful for further processing.

The third sub-objective is to *describe tools which can be used to collect, analyse and report on user information generated from log-files*. The different formats of the log-files require different tools. Qualification requirements to use a specific tool for analysing log-files is the ability to combine different techniques, like using “trace route”, “ping”, WHOIS and reverse DNS for tracing IP-addresses or using cookies and system information of users and to overcome caching by analysing log-files. Besides collecting and analysing, also reporting tools are needed to process all the gathered data into understandable tables and graphs.

The fourth sub-objective is to *identify users of these said facilities*. By using server log-files, an attempt is made to gather identification information of users. However, only IP-addresses or user names can be logged when the users behind it are visiting a facility. Facilities like DINO-shop and Gebouwde Omgeving only distribute geo-information if a user identifies himself by using a user account. So, these facilities have detailed information about user requests for geo-information. To trace the users of freely accessible functionalities like the search tool of the Gebouwde Omgeving, the executors of these activities can only be identified by their IP-address. Most of these IP-addresses, from for example, municipalities or private citizens can be extracted to the provider and there the trail stops. The consequence is that approximately half of the visitors can be identified.

The fifth sub-objective is to *describe how the obtained user information can be used to determine user requirements and translated into recommendations to improve the offered facilities*. Based on the results of the log-files, which were not sufficient to determine user requirements, additional analysis is carried out by performing a user inquiry. By approaching users to fill in a questionnaire, which was based on different aspects of the facility captured in examination units and variables, the opinions and experiences of users were obtained. By analysing the answers of respondents in qualitative and quantitative ways, additional information is gathered which together with the results of the log-files analysis are translated into user requirements. These requirements are also based on the examination units. When a unit was not fulfilled, a recommendation could be defined.

The sixth sub-objective is to *review the role of log-files to identify user requirements*. Log-files can most effectively be used when the formats and contents are adjusted to the purposes for which the log-files are used. For the identification of users, components which record IP-address, host name or location need to be part of a log-file. On the other hand, characteristics of behavior of users, like session time, page views or entry pages need to be logged. Still, the suitability of log-files depends on the applied techniques and tools to analyze them and whether other sources which are capable of gaining additional user information are available. Further additional analysis is needed to confirm assumptions and expectations made up from log-files and deliver enough information to be able to determine user requirements.

Although it is not always possible, regarding the format and contents of the log-files, to gather the desired information for the identification of user requirements and the

information does not always have an adequate level of accuracy, this study shows that by analysing user activities gathered from log-files valuable lessons can be learnt. Together with additional analysis, user requirements can be drawn up and improvements can be suggested for the geo-information provision facilities. So, for gathering information from already freely available log-files, knowledge, tools and methods are needed to gather useful purposes and user information. This information can, by using additional analysis, be used to determine user requirements of geo-information provision facilities.

6.2 Recommendations for further research

The following recommendations for further research can be made:

In this study only Dutch facilities are discussed. By the identification of users a lot of visitors, mostly from governmental organisations could not be traced, because they use protected networks, restricted by Dutch laws. It would be interesting to find out if this issue also occurs when non-Dutch facilities are investigated. Also other issues with regards to the identification of users which could not be revealed at the selected facilities could come up, but are as yet unknown.

To use log-files in the most effective way, the contents and formats of log-files should be adjusted to fit their purpose, which in this study is the identification of users and their behaviour in order to derive user requirements. It would be interesting to find out how to perform these adjustments to log-files themselves and the ways to collect them at some of the facilities beforehand. Then conclusions could be made if such investments would pay off.

In this study the conclusions from the additional user inquiry were based on the analysis of three facilities, whereas the log-files of five facilities were analysed and discussed. If the users of the facilities Groene Omgeving and Gebouwde Omgeving could also have been approached and queried about their opinions and experiences with these facilities, additional user requirements might have been produced, which could clarify the role of log-files in the determination of user requirements even more.

The additional user inquiry shows that the used methodology for approaching users strongly affects the response rate. By linking up the two methods used, the interpretation of both of these factors will probably be more satisfying for the researcher. However, not much literature can be reviewed on unusual side-effects that could occur if methods are linked up. By performing more user inquiries with applying both discussed methods, facility providers could experience whether the response rate would be enlarged.

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Appendix 1: Selection of aspects for describing facilities

Nr.	Description	Reference
1	Primary focus	Tait, 2005
2	(Pre-defined) purpose	Tait, 2005
3	Providing organization	Tait, 2005
4	Target group	Tait, 2005
5	Benefits	Tait, 2005
6	Direct access	Larson et al, 2006
7	Search possibilities	Larson et al, 2006
8	meta-data usage and retrieval	Larson et al, 2006
9	Performance	Larson et al, 2006
10	Year of first implementation	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
11	Number of data suppliers	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
12	Level of data accessibility	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
13	Number of data sets	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
14	Most recently produced dataset	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
15	Availability of view services	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
16	Frequency of web updates	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
17	Funding continuity	Crompvoets and Bregt, 2006
18	meta-data -standard applied	Crompvoets et al, 2004 & Crompvoets and Bregt, 2006
19	Languages used	Crompvoets et al, 2004
20	Use of maps for searching	Crompvoets et al, 2004
21	Registration-only access	Crompvoets et al, 2004
22	User workspace	Hill et al, 2000
23	Help support	Hill et al, 2000
24	System support for evaluation	Hill et al, 2000

Table 1; Selected aspects with references to describe facilities

Appendix 2: Overview aspects and parameters geoportals

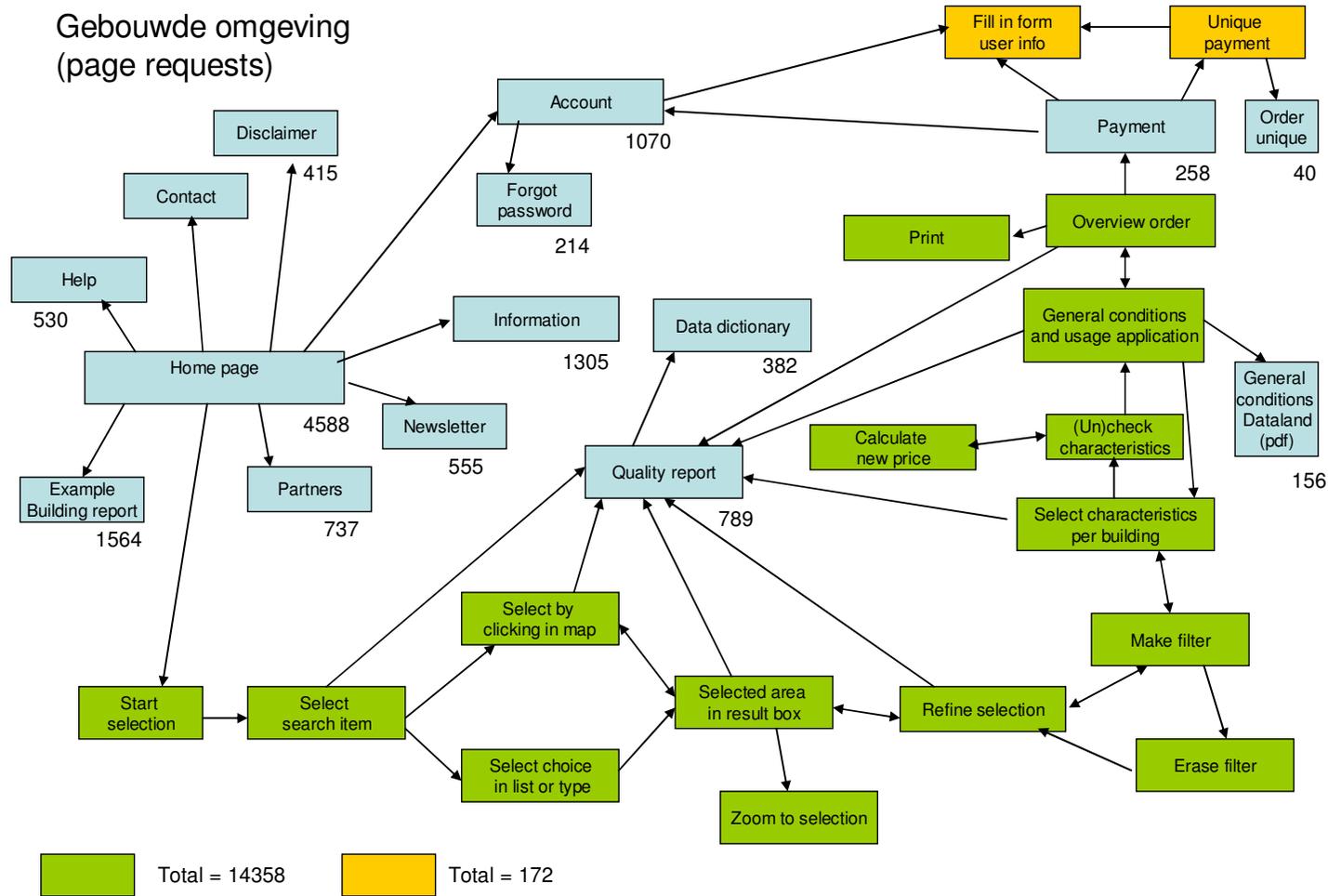
Main aspect	Parameter	Gebouwde omgeving	Groene omgeving	DINO-loket	Atlas Amsterdam	Stadsplattegrond
Origin	Primary focus	collect and make available of municipal building information	make geographical data of green environment available	supply lithological soil data via internet	providing of reliable geographical information to civil servants [Nieuwenhuis]	providing of reliable geographical information to civilians
	(Pre-defined) purpose	supplying building reports to small companies	provide geographical data (mostly by services) to professional for passing on knowledge about green environment	transmit knowledge about soil, uniform offering of information which makes it better available for usage by others [Harder]	civil servants can use Atlas to get an complete image about a district of Amsterdam [Nieuwenhuis]	make it able for civilians to combine different data sets in Amsterdam
	Target group	small real estate agents and small advise agencies	professionals and interested persons of green environment	governmental agencies and education	Atlas Amsterdam only for divisions of municipality of Amsterdam	every civilian and interested person in the municipality of Amsterdam
	Year of first implementation	End 2005	1/10/2006	1/5/2001	8/10/2001	Half november 2003
Data	Number of data suppliers	300 municipalities (90% coverage of the Netherlands) and CBS	4	1	4	7
	Number of data sets	6	21	26	40	34
	Availability of view services	yes	yes	yes, for google earth	Only for internal use within GVI	No
	Most recently produced dataset	?	23/10/2006	6/3/2007	1-may-2007 (5 june 2007)	?
	Frequency of web updates	twice a year	yearly	yearly	yearly / monthly / daily	yearly / monthly / daily
Search	Search possibilities	by map or choosing different geographic areas	5 different ways: map, entries, time, publishing organisation, kind of data	no	by keyword (5 ways) and map	by keywords (2 ways) or map
	Use of maps for searching	yes	yes	no	yes	yes
Metadata	Metadata usage and retrieval	Yes, but not very extensive	yes, extensively by every	only for maps, metadata-items are stored with the data	Only for information supplying to users	Only for information supplying to users
	Metadata-standard applied	?	yes	no	no, will be used in next ver	No
Maintaining organisation	Providing organization	Dataland	Alterra	TNO	GVI	GVI
	Funding continuity	data will be supplied freely by municipalities and is delivered to a non-profit holding. Dataland will supply usage reports in return	WUR take care of funding	different ministries take care of funding	Atlas / Stadsplattegrond is a product of the municipality of Amsterdam, which takes care of the funding	Atlas / Stadsplattegrond is a product of the municipality of Amsterdam, which takes care of the funding
	Benefits	choice freedom of content dataset, generic appliance of service, short built and application time	Collection of search, browse and view in one environment	Uniform databank, data can be supplied to everyone who is interested	high level of actuality, saving of gaining information, efficient	high level of actuality, made for users, user needs are processed, site in company style
	Performance	Good	Good	Good	Good	Good
User-friendliness	Level of data accessibility	Data need to be ordered first	Depending on data	Maps and some data are free available, other data sets cost money	High, the map can directly used	High, the map can directly used
	Languages used	1 (Dutch)	2 (Dutch and English)	There are two versions, one totally Dutch and one totally English	1 (Dutch)	1 (Dutch)
	Registration-only access	Yes, by IP-adress which is registered	No	Yes, with login	atlas amsterdam only within departments of municipality of Amsterdam	No, Stadplattegrond is available everywhere,
	User workspace	No	Yes, when u sign up u can	No	No	No
	Help support	Yes, very extended with data dictionary	Yes, in English extensively support under help, an overview under content	Yes, a lot of documents about content and working procedures can be found	yes, extensive with documents, on-line help menu and helpdesk	yes, extensive with documents, on-line help menu and helpdesk
	System support for evaluation	No	Yes	No, but there are user meetings	yes, a back report form	No

Appendix 3: Overview aspects geo-services

Aspect	Gebouwde omgeving	Groene omgeving	Oil and Gas services	groundwater level North Brabant	Water atlas Gelderland
Interoperability	Yes	Yes (WFS / WMS)	Only for Google Earth	No, custom-made for this application	No, custom-made for this application
Scalability	Every extent in any application	Every extent in any application	Every extent	Only two extents	Every extent
Efficiency	Yes, used in different applications	Yes, used in different applications	Yes, usable on any computer with Google Earth	No, custom-made for this application	No, custom-made for this application
Providing organization	Dataland	Alterra / DLG / MNP	TNO	province North Brabant	province Gelderland
Frequency of web updates	twice a year	yearly	yearly	weekly	weekly

Appendix 4: Overview facility Gebouwe omgeving

Gebouwe omgeving
(page requests)



Appendix 5: Overviews Groene Omgeving

URL	Page reproductions
/Portal/ptk	3214
/Portal/	1564
/Portal/meta-data.do	258
/Portal/ptk?command=openchannel&channel=41	209
/Portal/ptk?command=openchannel&channel=6	125
/Portal/DiscoveryServlet	99
/Portal/ptk?command=openchannel&channel=42	86
/Portal/jsp/Publish/record_add_xml.jsp	71
/Portal/ptk?command=openchannel&channel=1	67
/Portal/ptk?command=openchannel&channel=3	63

Table 1; Overview of page representations (source: Google Analytics)

Page title	Page reproductions
Channel - meta-data Portal -	1486
Home - meta-data Portal -	1443
Home - GeoPortaal -	718
Pagina - GeoPortaal -	569
Advanced Search - meta-data Portal -	456
Groene Omgeving	377
Uitgebreid Zoeken - GeoPortaal -	348
Manage meta-data - meta-data Portal -	248
Publish Results - meta-data Portal -	76
Record - meta-data Portal -	73

Table 2; Overview of page representations (source: Google Analytics)

Entry page (URL)	Number of entries
/Portal/	1026
/Portal/ptk	148
/Portal/DiscoveryServlet	22
/Portal/index.jsp	16
/Portal/jsp/Publish/record_add_xml.jsp	3
/Portal/ptk?command=openchannel&channel=6	3
/Portal/ptk?command=openchannel&channel=41	2
/Portal/meta-data.do	1
/Portal/meta-data.do?cmd=list	1
/Portal/ptk?command=mymaps&act=showopen&dtx=1176821347424	1

Table 3; Overview of entry pages (source: Google Analytics)

Exit page (URL)	Number of exits
/Portal/ptk	532
/Portal/	500
/Portal/ptk?command=openchannel&channel=41	47
/Portal/ptk?command=openchannel&channel=6	30
/Portal/ptk?command=openchannel&channel=42	18
/Portal/DiscoveryServlet	15
/Portal/ptk?command=openchannel&channel=2	10
/Portal/index.jsp	8
/Portal/meta-data.do	8
/Portal/ptk?command=openchannel&channel=45	8

Table 4; Overview of exit pages (source: Google Analytics)

Referring sites	Visits from site
gis.startpagina.nl	32
ioggeo.blogging.com	25
sesg0113	21
isric.org	18
ioggeo.blogplugs.com	5
localhost:1758	3
onderzoekinformatie.nl	2
portaal.healthandsafety.nl	2
mousemedia.nl	1

Table 5; Overview of referring sites (source: Google Analytics)

Domain	%	To site	Normal
http://ioggeo.blogplugs.com	31.2% (35)	www.groene-omgeving.nl	2
http://gis.startpagina.nl	18.7% (21)	www.groene-omgeving.nl	2
http://ioggeo.blogging.com	6.2% (7)	www.groene-omgeving.nl	1
http://nlr-gis.nlr.nl	6.2% (7)	www.groene-omgeving.nl	1
http://superi.info	6.2% (7)	www.groene-omgeving.nl	1
http://www.isric.org	6.2% (7)	www.groene-omgeving.nl	1
http://www.kennisonline.wur.nl	6.2% (7)	www.groene-omgeving.nl	1
http://www.onderzoekinformatie.nl	6.2% (7)	www.groene-omgeving.nl	1
http://xn--myv653h.com	6.2% (7)	www.groene-omgeving.nl	1
http://xn--v6q831cn7ynog.com	6.2% (7)	www.groene-omgeving.nl	1
Total			12

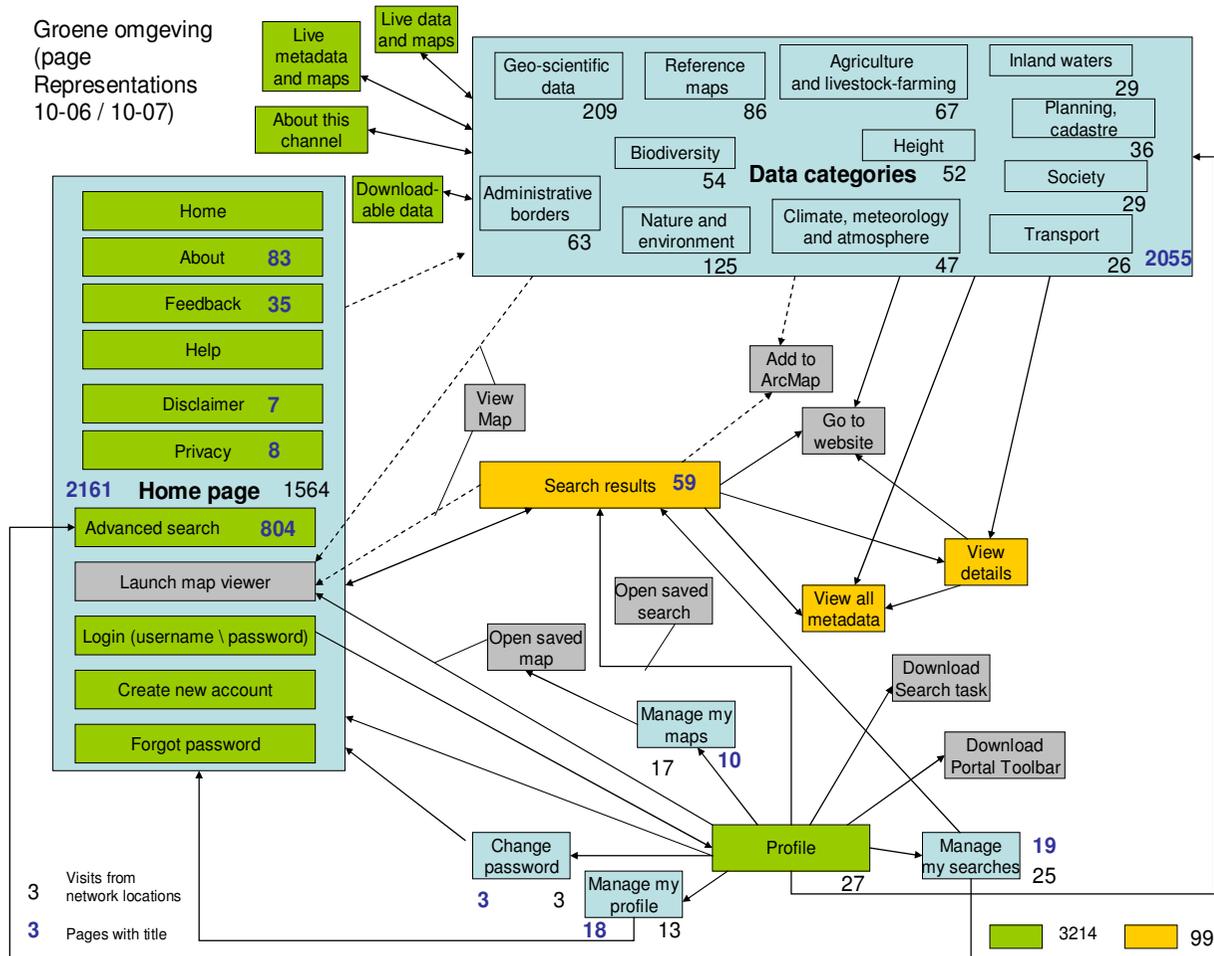
Table 6; Overview of referring sites (Source: SEO Spyglass)

Refusal percentage	Days	Year percentage
0%	169	46%
1-10%	3	1%
11-20%	23	6%
21-30%	20	5%
31-40%	42	11%
41-50%	41	11%
51-60%	9	2%
61-70%	12	3%
71-80%	7	2%
81-90%	2	1%
91-100%	38	10%
Total	366	100%

Table 7; Overview of refusal percentages per day

(Source: Google Analytics)

Appendix 6: Overview facility Groene omgeving



Appendix 8: Overviews DINO-shop

Item	Business applicants	Private applicants	Student applicants	Total applicants
Drill hole measurements	117	19	7	143
Drills	1619	306	150	2075
Ground water quantity	1976	245	122	2343
Probes	492	57	60	609
Quality data	489	34	24	547
Quantity data	85	6	1	92
Surface water quantity	168	13	14	195
VES-measurements	108	15	14	137

Table 1; Overview applicants per dataset

Item	Business applications	Private applications	Student applications	Total applications	Delivered data units
Drill hole measurements	163	23	12	198	1130
Drills	15054	1342	524	16920	1021280
Ground water quantity	16615	668	318	17601	312953818
Probes	1263	83	88	1434	69221
Quality data	1823	63	75	1961	
Surface water quantity	261	19	28	308	
VES-measurements	143	15	14	172	

Table 2; Overview applications per dataset

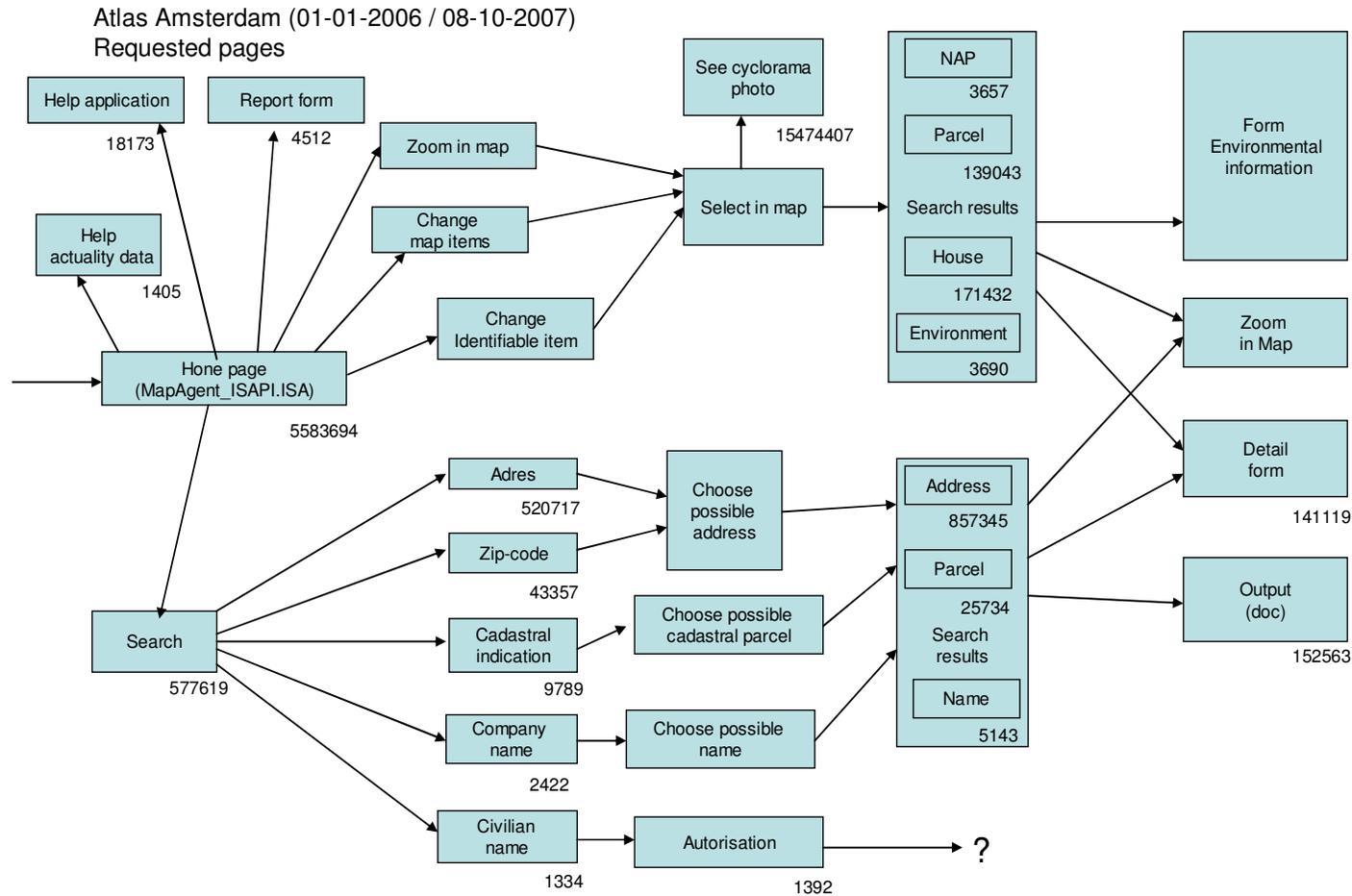
Appendix 9; Reference sites to DINO-shop

Domain	%	To site	Topic	Organization	Total	Nonimal
http://www.encyclo.nl	46.2% (235)	dinoloket.tno.nl	Online Encyclopedia	Encyclo	235	17
http://www.wetenschapsforum.nl	10.8% (55)	dinoloket.tno.nl	discussion forum, alternative for newsgroups	Miels van Schaik	55	4
http://dinoloket.tno.nl	8.2% (42)	dinoloket.tno.nl	DINO-shop	TNO	42	3
http://www.sikb.nl	5.5% (28)	dinoloket.tno.nl	de kwaliteit van de uitvoering van archeologie en het (water-)bodembeheer te verbeteren	SIKB	28	2
http://hardware.verzamelgids.nl	2.7% (14)	dinoloket.tno.nl	site about hardware suppliers	Networking4all	14	1
http://oddens.geog.uu.nl	2.7% (14)	dinoloket.tno.nl	site about different kinds of maps on the whole world	University Utrecht	14	1
http://www.brabant.nl	2.7% (14)	dinoloket.tno.nl	web site about Dutch province North Brabant	Provincie Noord-Brabant	14	1
http://www.excite.co.uk	2.7% (14)	dinoloket.tno.nl	English web site with Dutch links about geo sciences	Excite	14	1
http://www.excite.fr	2.7% (14)	dinoloket.tno.nl	French web site with Dutch links about geo sciences	Excite	14	1
http://www.google.com	2.7% (14)	dinoloket.tno.nl	American search engine with Dutch links about geo sciences	Google	14	1
http://www.nitg.tno.nl	2.7% (14)	dinoloket.tno.nl	DINO-shop	TNO	14	1
http://dutgeo.ct.tudelft.nl	0.9% (5)	dinoloket.tno.nl	Geo-Engineering Section	Technical University Delft	5	1
http://nl.wikipedia.org	0.9% (5)	dinoloket.tno.nl	encyclopedia site about river deposition	Wikipedia	5	1
http://www.engineering360.nl	0.9% (5)	dinoloket.tno.nl	news and discussion platform about infrastructure, environment, water and construction	Engineering 260	5	1
http://www.geonet.nl	0.9% (5)	dinoloket.tno.nl	news and discussion platform about geo-technical	Geonet	5	1
http://www.hoeckmann.de	0.9% (5)	dinoloket.tno.nl	German site about different maps in the Netherlands	Hoeckmann, books and tra	5	1
http://www.internetadressengids.nl	0.9% (5)	dinoloket.tno.nl	Dutch web site with links about drilling	internetadressengids	5	1
http://www.lexadin.nl	0.9% (5)	dinoloket.tno.nl	world law guide, about different kinds of law	Lexadin	5	1
http://www.natuurinformatie.nl	0.9% (5)	dinoloket.tno.nl	site offers biological and geological information	21 Dutch research institutes, including TNO	5	1
http://www.terramarebeheer.nl	0.9% (5)	dinoloket.tno.nl	site from heath electrician	Bogro	5	1
http://www.vrom.nl	0.9% (5)	dinoloket.tno.nl	site from Dutch ministry of Public Housing, Urban Planning and Environment		5	1
http://dinoloket.tno.nl	15.1% (42)	dinoloks01.nitg.tno.nl	DINO-shop	TNO	42	3
http://www.sikb.nl	10.0% (28)	dinoloks01.nitg.tno.nl	de kwaliteit van de uitvoering van archeologie en het (water-)bodembeheer te verbeteren	SIKB	28	2
http://hardware.verzamelgids.nl	5.0% (14)	dinoloks01.nitg.tno.nl	site about hardware suppliers	Networking4all	14	1
http://oddens.geog.uu.nl	5.0% (14)	dinoloks01.nitg.tno.nl	site about different kinds of maps on the whole world	University Utrecht	14	1
http://www.brabant.nl	5.0% (14)	dinoloks01.nitg.tno.nl	web site about Dutch province North Brabant	Provincie Noord-Brabant	14	1
http://www.cs.uu.nl	5.0% (14)	dinoloks01.nitg.tno.nl	links for research project for university	University Utrecht	14	1
http://www.excite.co.uk	5.0% (14)	dinoloks01.nitg.tno.nl	English web site with Dutch links about geo sciences	Excite	14	1
http://www.excite.fr	5.0% (14)	dinoloks01.nitg.tno.nl	French web site with Dutch links about geo sciences	Excite	14	1
http://www.google.com	5.0% (14)	dinoloks01.nitg.tno.nl	American search engine with Dutch links about geo sciences	Google	14	1
http://www.nitg.tno.nl	5.0% (14)	dinoloks01.nitg.tno.nl	DINO-shop	TNO	14	1
http://www.raayland.nl	5.0% (14)	dinoloks01.nitg.tno.nl	educational site about geo science	Raayland, secondary scho	14	1
http://www.library.tudelft.nl	2.8% (8)	dinoloks01.nitg.tno.nl	newssite from applied earth science knowledge center	Technical University Delft	8	1
http://bodem.pagina.nl	2.5% (7)	dinoloks01.nitg.tno.nl	site with links for soil information	Startpagina	7	1
http://geo.citg.tudelft.nl	2.5% (7)	dinoloks01.nitg.tno.nl	Geo-Engineering Section	Technical University Delft	7	1
http://www.dekoepel.nl	2.5% (7)	dinoloks01.nitg.tno.nl	site with theoretical research information	De Koepel, national organization to support knowledge exchange about astronomy, weather and space travel	7	1
http://www.ggsd.com	2.5% (7)	dinoloks01.nitg.tno.nl	Geotechnical and geo-environmental software directory	GGSD	7	1
http://www.stumbleupon.com	2.5% (7)	dinoloks01.nitg.tno.nl	blog-site	stumbleupon	7	1
http://www.theoil drum.com	2.5% (7)	dinoloks01.nitg.tno.nl	discussion forum, about energy and world's future	the oil drum	7	1
http://nl.wikipedia.org	1.4% (4)	dinoloks01.nitg.tno.nl	encyclopedia site about paleo geography	Wikipedia	4	1
http://www.biells.nl	1.4% (4)	dinoloks01.nitg.tno.nl	site about soil information and the methods to gain information	TNO	4	1
http://www.dinoloket.nl	1.4% (4)	dinoloks01.nitg.tno.nl	DINO-shop	TNO	4	1
http://www.dinoshop.nl	1.4% (4)	dinoloks01.nitg.tno.nl	DINO-shop	TNO	4	1
http://www.ez.nl	1.4% (4)	dinoloks01.nitg.tno.nl	site about life security	Dutch ministry of Economic	4	1
http://www.geodelft.nl	1.4% (4)	dinoloks01.nitg.tno.nl	site about conference of soil activities	Geodelft, research institute	4	1
http://www.vensteropdevecht.nl	1.4% (4)	dinoloks01.nitg.tno.nl	geo portal about river the Vecht	University Utrecht and Vechtplassen commission	4	1
http://www.xs4all.nl	1.4% (4)	dinoloks01.nitg.tno.nl	site about geology and travelling	vuurberg, journalism and geo-education	4	1
http://dinoloket.tno.nl	14.0% (42)	dinoloket.nitg.tno.nl	DINO-shop	TNO	42	3
http://oddens.geog.uu.nl	9.7% (29)	dinoloket.nitg.tno.nl	site about different kinds of maps on the whole world	University Utrecht	29	3
http://www.sikb.nl	9.3% (28)	dinoloket.nitg.tno.nl	de kwaliteit van de uitvoering van archeologie en het (water-)bodembeheer te verbeteren	SIKB	28	2
http://www.brabant.nl	6.0% (18)	dinoloket.nitg.tno.nl	web site about Dutch province North Brabant	Provincie Noord-Brabant	18	2
http://www.natuurinformatie.nl	5.3% (16)	dinoloket.nitg.tno.nl	site offers biological and geological information	21 Dutch research institutes, including TNO	16	2
http://hardware.verzamelgids.nl	4.6% (14)	dinoloket.nitg.tno.nl	site about hardware suppliers	Networking4all	14	1
http://www.excite.co.uk	4.6% (14)	dinoloket.nitg.tno.nl	English web site with Dutch links about geo sciences	Excite	14	1
http://www.excite.fr	4.6% (14)	dinoloket.nitg.tno.nl	French web site with Dutch links about geo sciences	Excite	14	1
http://www.google.com	4.6% (14)	dinoloket.nitg.tno.nl	American search engine with Dutch links about geo sciences	Google	14	1
http://www.nitg.tno.nl	4.6% (14)	dinoloket.nitg.tno.nl	DINO-shop	TNO	14	1
http://www.vinden.nl	3.3% (10)	dinoloket.nitg.tno.nl	site with links about geo science	webgids vinden.nl	10	1
http://www.delftcluster.nl	3.0% (9)	dinoloket.nitg.tno.nl	site about the development and distribution of interdisciplinary and validated knowledge for the Soil, Road and Hydraulics sector	Delft Cluster	9	1
http://www.geofoon.nl	2.6% (8)	dinoloket.nitg.tno.nl	site about geology in the Netherlands	infosite geofoon	8	1
http://www.nicole.org	2.6% (8)	dinoloket.nitg.tno.nl	forum on contaminated land management in Europe	Nicole	8	1
http://www.xs4all.nl	2.6% (8)	dinoloket.nitg.tno.nl	site about Biostratigraphy of The Netherlands	J&G Consultants	8	1
http://dmoz.org	1.6% (5)	dinoloket.nitg.tno.nl	link site about geo sciences	dmoz	5	1
http://sheba.geo.vu.nl	1.6% (5)	dinoloket.nitg.tno.nl	research site about Quaternary geology / Fluvial sedimentology	Phd Candidate from Free University Amsterdam	5	1
http://www.falw-old.vu.nl	1.6% (5)	dinoloket.nitg.tno.nl	research site about Quaternary geology / Fluvial sedimentology	Phd Candidate from Free University Amsterdam	5	1
http://www.vanessen.com	1.6% (5)	dinoloket.nitg.tno.nl	site about online grondwater data	TNO	5	1
http://civiele-techniek.startkabel.nl	1.3% (4)	dinoloket.nitg.tno.nl	link site about civil techniques	startkabel	4	1
http://myspace.com	1.3% (4)	dinoloket.nitg.tno.nl	blog site	myspace	4	1
http://waterbouw.startkabel.nl	1.3% (4)	dinoloket.nitg.tno.nl	site about water construction	startkabel	4	1
http://www.delosgaia.nl	1.3% (4)	dinoloket.nitg.tno.nl	personal website about travel and science	private	4	1
http://www.geo.vu.nl	1.3% (4)	dinoloket.nitg.tno.nl	research site about Quaternary geology / Fluvial sedimentology	Phd Candidate from Free University Amsterdam	4	1
http://www.natuurloket.nl	1.3% (4)	dinoloket.nitg.tno.nl	site about information about threatened animal species	Natuurloket	4	1
http://www.ncgi.nl	1.3% (4)	dinoloket.nitg.tno.nl	site about the Dutch geo information structure	ravi	4	1
http://www.nkam.nl	1.3% (4)	dinoloket.nitg.tno.nl	link site about geo sciences	NKAM	4	1
http://www.library.tudelft.nl	45.8% (99)	www.dinoloket.nl	newssite from applied earth science knowledge center	Technical University Delft	99	8
http://dinoloket.tno.nl	12.9% (28)	www.dinoloket.nl	DINO-shop	TNO	28	3
http://www.alterra.wur.nl	10.6% (23)	www.dinoloket.nl			23	2
http://dov.vlaanderen.be	6.4% (14)	www.dinoloket.nl			14	1
http://www.bodemambities.nl	6.4% (14)	www.dinoloket.nl			14	1
http://www.iporivm.nl	6.4% (14)	www.dinoloket.nl			14	1
http://www.bgs.ac.uk	2.7% (6)	www.dinoloket.nl			6	1
http://www.bodemdata.nl	2.7% (6)	www.dinoloket.nl			6	1
http://www.geo.uu.nl	2.7% (6)	www.dinoloket.nl			6	1
http://www.nitg.tno.nl	2.7% (6)	www.dinoloket.nl	DINO-shop	TNO	6	1

Appendix 10: Overview Municipal divisions

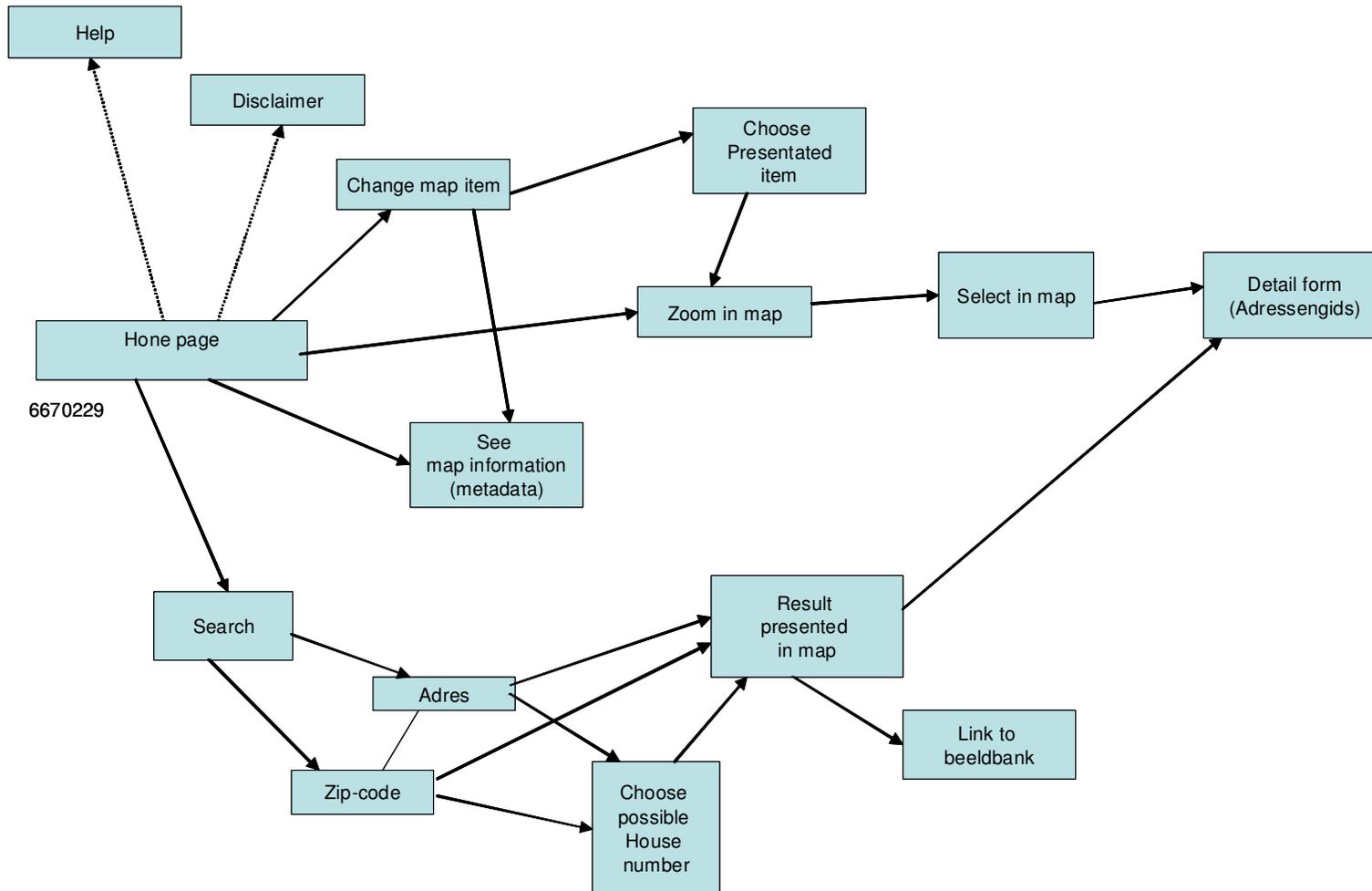
Municipal division	Make usage of Atlas / Stadsplattegrond
Accountancy & Advies (ACAM)	X
Afval en Energie Bedrijf Amsterdam	X
Amsterdams Historisch Museum	X
Bestuursdienst	X
Binnenwaterbeheer	
Brandweer	X
Dienst Advies en Beheer	X
Dienst Belastingen	X
Dienst der Was- Schoonmaak-, Bad- en Zwembadinrichtingen (W.S.B.Z)	
Dienst Economische Zaken	
Dienst Infrastructuur Verkeer en Vervoer	X
Dienst Maatschappelijke Ontwikkeling	X
Dienst Maatwerk	
Dienst Milieu en Bouwtoezicht	X
Dienst Musea voor Moderne Kunst	
Dienst Onderzoek en Statistiek	X
Dienst Persoonsgegevens (DPG)	X
Dienst Ruimtelijke Ordening	X
Dienst Stadstoezicht	X
Dienst Verzekeringszaken (VGA)	
Dienst Werk en Inkomen (NV Werk, Maatwerk, SDA)	X
Dienst Wonen	X
Facilitair Bedrijf Amsterdam	X
Food Center Amsterdam	
GEAM	
Gemeentelijk Pedagogisch Instituut	
Gemeentelijk VervoersBedrijf (GVB)	X
Gemeentelijke Ombudsman	
Gemeentelijke Sociale Dienst	
GG&GD	X
Havenbedrijf	X
Ingenieursbureau Amsterdam	X
Omegam	
Ontwikkelingsbedrijf Gemeente Amsterdam	X
Openbare bibliotheek Amsterdam	X
Project ManagementBureau	
Rokin Groep	
Servicehuis Personeel	X
Stadsarchief Amsterdam	X
Stadsbank van Lening	
Stadsdeel Bos en Lommer	X
Stadsdeel Centrum	
Stadsdeel de Baarsjes	
Stadsdeel Geuzenveld-Slotermeer	X
Stadsdeel Noord	X
Stadsdeel Oost-Watergraafsmeer	X
Stadsdeel Osdorp	X
Stadsdeel Oud West	X
Stadsdeel Oud-Zuid	X
Stadsdeel Slotervaart-Overtoomse Veld	
Stadsdeel Westerpark	X
Stadsdeel Zeeburg	
Stadsdeel Zuideramstel	X
Stadsdeel Zuidoost	X
Stadsdrukkerij	
Stadsschouwburg	
Waternet	X

Appendix 11: Overview requested pages Atlas Amsterdam

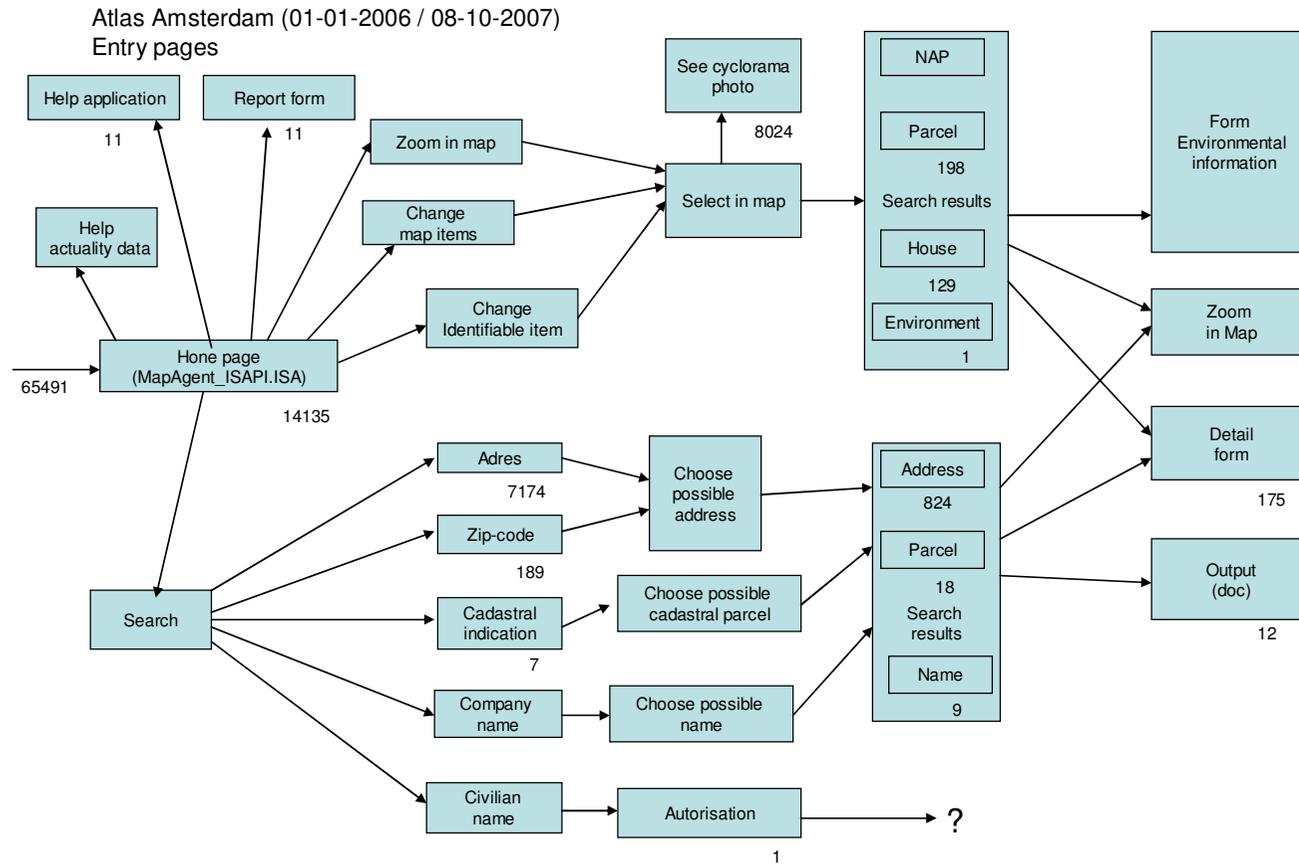


Appendix 12: Overview facility Stadsplattegrond

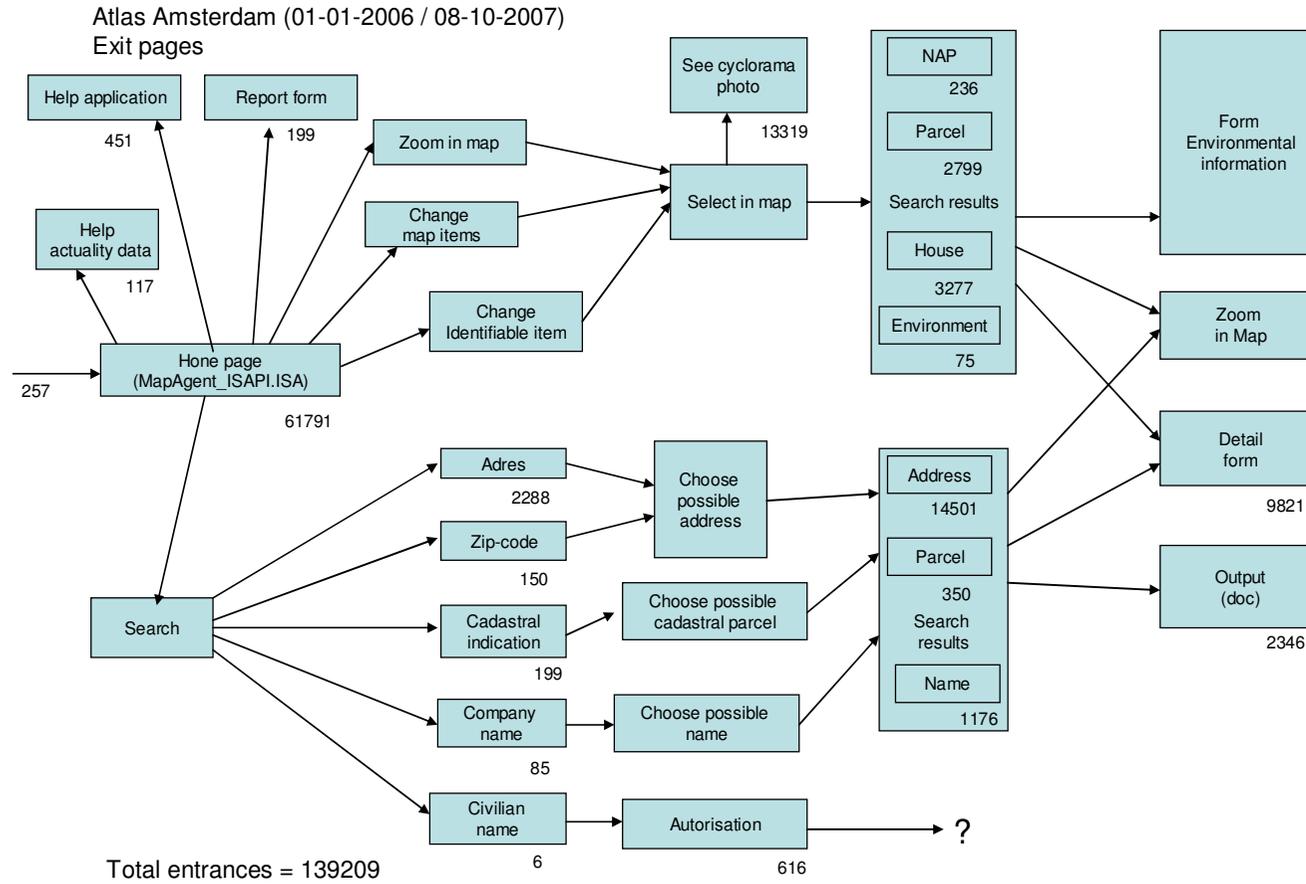
Stadsplattegrond (01-01-2006 / 08-10-2007) Requested pages



Appendix 13: Overview entry pages Atlas Amsterdam



Appendix 14: Overview exit pages Atlas Amsterdam



Appendix 15: Overviews Atlas of Amsterdam & Stadsplattegrond

URL	Number of entries
/	932890
/asp/get.asp	503906
/servlet/MapGuideLiteView	28966
/cgi-bin/spd	8340
/scripts/mapagent_isapi.isa	1261
/1.asp	323
/donkerblauw.htm	304
/mainframe.htm	245
/rechtsonder.htm	140
/asp	25
/asp/	18
//asp/get.asp	14
//	10

Table 1; Overview of the entry pages of the Stadsplattegrond (more than 10 entries)

URL	Number of exits
/servlet/MapGuideLiteView	724915
/asp/get.asp	401822
/cgi-bin/spd	313595
/	15185
/rechtsonder.htm	10085
/1.asp	8354
/scripts/mapagent_isapi.isa	1285
/donkerblauw.htm	815
/mainframe.htm	275
/asp	72
/asp/	21

Table 2; Overview of the exit pages of the Stadsplattegrond (more than 10 exits)

URL	Number of visits
(no referral)	153570
intranet.amsterdam.nl/main.asp	29886
dw-intranet/	2100
gvi008/geo/	434
dnnapp/musit10/default.aspx	351
www.startpagina.nl/	300
amsterdam.asp4all.nl/	306
129.243.165/doc/links.php	59
dmb.amsterdam.nl/ipp/main.asp	40
222.5.134/intra_fin/main.asp	25
amsterdam.asp4all.nl/minisites/sites/g/geo_en_0/atlas_amsterdam	50
dro.amsterdam.nl/smartsite.dws	18
vra.amsterdam.nl/GouwVastgoed/kaart/kaartviewer.jsp	19
amsterdam.asp4all.nl/nieuws/archief/nieuwsarchief	15
managersinsite.amsterdam.nl/main.asp	11
Total: 72 URL's	187483

Table 3; Overview of the referring sites of the Atlas (more than 10 visits start from the URL)

URL	Number of visits
(no referral)	997512
www.amsterdam.nl/	352981
amsterdam.nl/	17845
www.amsterdam.nl/algemene_onderdelen/functies/adressengids	14822
www.ijburg.nl/index.cfm	13215
homepages.cwi.nl/~steven/amsterdam.html	13028
centrum.amsterdam.nl/smartsite.dws	12372
www.amsterdam.nl/algemene_onderdelen/sitemap	10730
bereikbaar.amsterdam.nl/live/main.asp	8914
stadstoezicht.amsterdam.nl/live/index.jsp	6357
www.iamsterdam.com/	6229
www.naaramsterdam.nl/live/main.asp	6097
www.bereikbaaramsterdam.nl/live/main.asp	5949
route.startpagina.nl/	5372
www.google.com/search	5210
osdorp.amsterdam.nl/live/index.jsp	5205
zuidoost.amsterdam.nl/live/index.jsp	4853
www.google.nl/search	4810
oudwest.amsterdam.nl/live/index.jsp	4607
Total: 8684 URL's	1722144

Table 4; Overview of the referring sites of the Stadsplattegrond (top20)

Number of pages	Number of visits	Percentage
1	3046	1.6%
2	4291	2.3%
3	1635	0.9%
4	3440	1.8%
5	1316	0.7%
6	1500	0.8%
7	1279	0.7%
8	1394	0.7%
9	1935	1.0%
10	2391	1.3%
11	2043	1.1%
12	2423	1.3%
13	2440	1.3%
14	2562	1.4%
15	2588	1.4%
16	2434	1.3%
17	2389	1.3%
18	2414	1.3%
19	2353	1.3%
20 or more	143619	76.6%
Total	187492	

Table 5; Overview of the depth of the visits of Atlas

Length of visits	Number of visits	Percentage
0-10 sec	21073	11.2%
11-30 sec	16988	9.1%
31-60 sec	17205	9.2%
1-3 min	30169	16.1%
3-10 min	30347	16.2%
10-30 min	33280	17.8%
30+ min	38430	20.5%
Total	187492	100%

Table 6 ; Overview of the length of the visits of Atlas

Number of pages	Number of visits	Percentage
1	126357	8.6%
2	206694	14.0%
3	55888	3.8%
4	156738	10.6%
5	54217	3.7%
6	126338	8.6%
7	40312	2.7%
8	95787	6.5%
9	33144	2.2%
10	69608	4.7%
11	26603	1.8%
12	53918	3.7%
13	21641	1.5%
14	40733	2.8%
15	17392	1.2%
16	32367	2.2%
17	14747	1.0%
18	26321	1.8%
19	12403	0.8%
20 or more	265262	18.0%
Total	1476470	

Table 7; Overview of the depth of the visits of the Stadsplattegrond

Length of visits	Number of visits	Percentage
0-10 sec	347130	23.5%
11-30 sec	198021	13.4%
31-60 sec	209241	14.2%
1-3 min	336505	22.8%
3-10 min	232801	15.8%
10-30 min	118578	8.0%
30+ min	34194	2.3%
Total	1476470	100%

Table 8; Overview of the length of the visits of the Stadsplattegrond

Appendix 16: Referring sites to the Stadsplattegrond

Domain	%	Organization	Founder	Total	Norm
http://www.dmb.amsterdam.nl	15.2% (820)	Dienst Milieu- en Bouwtoezicht	Municipality of Amsterdam	820	59
http://www.noordzuidlijn.amsterdam.nl	13.7% (740)	Project Noord-Zuidlijn	Municipality of Amsterdam	740	53
http://www.iw.amsterdam.nl	7.5% (406)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	406	29
http://www.iamsterdam.com	5.1% (277)	Promotion-site Amsterdam	Municipality of Amsterdam	277	20
http://www.taxi.amsterdam.nl	4.5% (244)	Taxi-site Amsterdam	Municipality of Amsterdam	244	18
http://www.coördinatiestelsel.amsterdam.nl	4.1% (224)	Overzicht wegwerkzaamheden in stad	Municipality of Amsterdam	224	16
http://www.baarsjes.amsterdam.nl	3.9% (210)	Stadsdeel de Baarsjes	Municipality of Amsterdam	210	15
http://www.bereikbaar.amsterdam.nl	3.9% (210)	Bereikbaar Amsterdam (over verkeersmobi	Municipality of Amsterdam	210	15
http://blogger.xs4all.nl	3.5% (190)	Blog-site	XS4all	190	14
http://www.slotervaart.amsterdam.nl	3.5% (190)	Stadsdeel Slotervaart	Municipality of Amsterdam	190	14
http://www.bereikbaaramsterdam.nl	3.1% (168)	Bereikbaar Amsterdam (over verkeersmobi	Municipality of Amsterdam	168	13
http://www.westpoortbeheer.amsterdam.nl	2.8% (154)	Dienst Advies en Beheer	Municipality of Amsterdam	154	11
http://www.stadstoezicht.amsterdam.nl	2.6% (140)	Dienst Stadstoezicht	Municipality of Amsterdam	140	10
http://www.naaramsterdam.nl	2.4% (134)	Bereikbaar Amsterdam (over verkeersmobi	Municipality of Amsterdam	134	10
http://www.parkerenamsterdam.nl	2.3% (126)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	126	9
http://www.ijsei.amsterdam.nl	2.1% (118)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	118	9
http://www.nzlijn.amsterdam.nl	2.0% (112)	Project Noord-Zuidlijn	Municipality of Amsterdam	112	8
http://www.verkeer-en-vervoer.amsterdam.nl	2.0% (112)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	112	8
http://www.stadspas.nl	1.9% (104)	Stadspas	Municipality of Amsterdam	104	8
http://www.amsterdam.nl	1.8% (98)	centrale stad	Municipality of Amsterdam	98	7
http://www.fiets.amsterdam.nl	1.4% (78)	Bereikbaar Amsterdam (over verkeersmobi	Municipality of Amsterdam	78	6
http://www.westerpark.amsterdam.nl	1.3% (70)	Stadsdeel Westerpark	Municipality of Amsterdam	70	5
http://www.ijtram.amsterdam.nl	1.0% (56)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	56	4
http://www.topstad.amsterdam.nl	0.7% (42)	Promotion-site Amsterdam	Municipality of Amsterdam	42	3
http://www.parkeren.amsterdam.nl	0.5% (28)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	28	2
http://www.wibautas.amsterdam.nl	0.5% (28)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	28	2
http://oddens.geog.uu.nl	0.3% (21)	Kaartenbibliotheek universiteit Utrecht	Universiteit Utrecht	21	2
http://www.cs.vu.nl	0.3% (18)	afdeling Informatica, faculteit der exacte w	Vrije Universiteit Amsterdam	18	2
http://dmb.asp4all.nl	0.2% (14)	Dienst Milieu- en Bouwtoezicht	Municipality of Amsterdam	14	1
http://geografie-nederland.startpagina.nl	0.2% (14)	Links over geografie in Nederland	Startpagina	14	1
http://gis.startpagina.nl	0.2% (14)	Links over GIS in Nederland	Startpagina	14	1
http://www.amsterdam2000.nl	0.2% (14)	Amsterdam Link Site (voor toerisme)	Wiersma Website productions	14	1
http://www.autovrijedag.amsterdam.nl	0.2% (14)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	14	1
http://www.baarsjes.nl	0.2% (14)	Stadsdeel de Baarsjes	Municipality of Amsterdam	14	1
http://www.dpg.amsterdam.nl	0.2% (14)	Dienst Persoonsgegevens	Municipality of Amsterdam	14	1
http://www.noordzuidlijn.nl	0.2% (14)	Project Noord-Zuidlijn	Municipality of Amsterdam	14	1
http://www.parkeeradvies.amsterdam.nl	0.2% (14)	Dienst Infrastructuur, Verkeer en Vervoer	Municipality of Amsterdam	14	1
http://www.photodam.com	0.2% (12)	Web-log and tourist information web-site	Photodam	12	1
http://www1.phys.uu.nl	0.2% (14)	Faculteit Betawetenschappen	Universiteit Utrecht	14	1
http://members.aol.com	0.1% (7)	Blog-site	America Online	7	1
http://wilswebstek.spaces.live.com	0.1% (7)	Blog-site	Microsoft	7	1
http://www.abc.amsterdam.nl	0.1% (8)	Amsterdams Bureau voor Communicatie	Municipality of Amsterdam	8	1
http://www.athaia.com	0.1% (7)	Tourist web site about cities and counties	athaia	7	1
http://www.simplyamsterdam.nl	0.1% (6)	Search for hotels and apartments in Amsterdam	The Amsterdam Tourist Information Page	6	1
http://www.sociosite.net	0.1% (7)	online informatiesysteem voor sociale wetenschappers (studenten en docenten)	Albert Benschop	7	1
http://www.tonie.net	0.1% (7)	personal site of freelance journalist en radiomaker	Tonie van Ringelestijn	7	1
http://www.viajeros.com	0.1% (9)	South American travel-site		9	1
http://au.answers.yahoo.com	0.0% (2)	Yahoo answers		2	1
http://carol.wins.uva.nl	0.0% (3)	faculteit Natuurwetenschappen, Informatica	Universiteit van Amsterdam	3	1
http://del.icio.us	0.0% (5)	Social Bookmarkings site	del.icio.us inc.	5	1
http://members.virtualtourist.com	0.0% (5)	Site about experiences of travellers	virtualtourist.com	5	1
http://rabbel.nl	0.0% (4)	links of mainly Dutch and Belgian genealogical, cultural, historical, linguistic and topographical websites	the Car park	4	1
http://sg.answers.yahoo.com	0.0% (2)	Q&A-site for Singapore	Yahoo	2	1
http://staff.feweb.vu.nl	0.0% (4)	Faculteit der Economische wetenschappen en Bedrijfskunde	Vrije Universiteit	4	1
http://users.fmg.uva.nl	0.0% (4)	faculteit der maatschappij- en gedragswetenschappen	Universiteit van Amsterdam	4	1
http://uutgrun.nl	0.0% (5)	startpagina for groningen	uutgrun	5	1
http://www.freewebs.com	0.0% (3)	website creating site	freewebs	3	1
http://www.greenmap.org	0.0% (2)	Green Map ® System promotes inclusive participation in sustainable community development around the world, using mapmaking as our medium.	Green map	2	1
http://www.postwarmedia.nl	0.0% (3)	personal site of designer, writer and director	SG Collins	3	1
http://www.pre.nl	0.0% (5)	Life cycle consultancy and software solutions	PRé Consultants	5	1
http://www.science.uva.nl	0.0% (2)	faculteit der natuurwetenschappen, wiskunde en informatica	Universiteit van Amsterdam	2	1
http://www.vrolijk.nu	0.0% (3)	Gay & Lesbian Bookshop	Vrolijk	3	1
Total links				5380	400

Appendix 17: Overview visits different user groups

Group Name	Number of Visits	Number of unique users
Advisory agencies	215	5
Education and Research institutions	125	8
Governmental organizations	67	6
Internet Solutions	943	0
Municipalities	341	19
Real estate agencies	19	3
Search Engines	2919	202
Social institutions	8	1
Utilities	5	1

Table 1; Overview of user groups of the Gebouwde omgeving

Group Name	Number of visits	Number of unique users
Advisory agencies	48	21
Education institutions	37	13
Internet Solutions	378	63
Municipal organizations	24	10
National Organizations	28	9
Police & Judiciary	1	1
Privates	166	48
Provincial organizations	74	14
Public Relations	2	2
Research institutions	607	16
Social institutions	2	2
Transport organizations	13	2
Utilities	10	8
Various	6	6
Water boards	7	5

Table 2; Overview of the user groups of the Groene Omgeving

Group names	Number of requests	Number of organizations
Construction company / agency	1933	20
Education & Research institute	4127	17
Energy providing agency	4619	10
Environment and water agency	8103	26
Geo-technical agencies	3057	16
Municipality	117	8
National organization	322	5
Nature organization	17	1
Private	1002	1
Province organization	625	11
Various	217	8
Water board	597	17
Water pipe organization	46	4

Table 3; Overview of the user groups of the DINO-shop

Group	Number of sessions	Count Of Organizations
Advisory agencies	574	8
Banks & Insurances	5143	11
Construction company	907	9
Cultural Institutions	780	8
Education and Research institutions	2166	12
Governmental organizations	673	10
House corporations	2155	9
Internet Solutions	3769	31
Legal and Financial services	1288	10
Municipality of Amsterdam	9183	10
Police & Judiciary	6570	3
Privates	8898	5
Public Relations	407	5
Publishers	1554	9
Real estate agencies	1170	7
Retail Trade	919	7
Search Engines	7156	4
Social institutions	3801	23
Tourism	172	2
Transport organizations	552	4
Utilities	1936	12
Various	837	8

Table 4; Overview of the user groups of the Stadsplattegrond

Appendix 18: Examination units and variables

Examination unit	Variable
User type	Acquaintance DINO-shop
	Typify user
User-friendliness	Functionality
	Lay-out
Provision of information	Information presentation
	Usage of meta-data
Information quality	Actuality
	Completeness
Searching methods	Used selection methods
	Classification data sources
Applications of offered information	Present applications
	Diversity of information
Support options (help, helpdesk, disclaimer)	Current use of support
	Lacks in support

Table 1: Examination units and variables for the DINO-shop questionnaire

Examination unit	Variable
User type	Acquaintance Atlas
	Typify user
User-friendliness	Functionality
	Lay-out
Provision of information	Reports (detail information)
	Storing search questions
Information quality	Actuality
	Completeness
Searching methods	Administrative searching
	Geographical searching
Applications of offered information	Current applications
	Future applications
Support options (help, helpdesk, disclaimer)	Current use of support
	Lacks in support

Table 2: Examination units and variables of Atlas and Stadsplattegrond questionnaire

Appendix 19: Questionnaire DINO-shop (in Dutch)

Vragenlijst DINO-loket

Beste deelnemer,

Deze vragenlijst is onderdeel van een scriptie onderzoek naar portalen die geo-informatie presenteren en hoe deze kunnen inspelen op de eisen en wensen van zijn gebruikers. Het doel van het onderzoek is om aanbevelingen aan te dragen die het gebruikersgemak van deze zogenaamde geoportalen kunnen verbeteren. In deze vragenlijst wordt u gevraagd uw mening via onderstaande vragen te verwoorden, er zijn geen goede of foute antwoorden. U wordt verzocht bij elke vraag één hokje aan te kruisen, tenzij anders is vermeld. Alle antwoorden zullen *vertrouwelijk* worden behandeld en zullen *anoniem* gepubliceerd worden. Het beantwoorden van de 20 vragen duurt ongeveer 15 minuten.

Met vriendelijke groeten,

Vincent Brunst

MSc. programma: Geographical Information Management and Applications

Technische Universiteit Delft (TU-Delft) \ Wageningen Universiteit en Researchcentrum (WUR)

Kennismaking

1. Waar heeft u voor het eerst gehoord van het DINO-loket?

- Via mijn werk
- Via mijn opleidingsinstituut
- Via een vlakblad
- Via een internet-site, zo ja welke;
- Via dit onderzoek
- Anders, namelijk;

Typ hier uw tekst

2. Als u het DINO-loket zou gebruiken, als welk type gebruiker ziet u uzelf?

- Informatie-analyst
- Beleidsmedewerker \ adviseur
- Ad-hoc gebruiker
- Anders, namelijk;

Typ hier uw tekst

3. Vindt u dat het DINO-loket (www.dinoloket.nl) makkelijk te vinden is op het internet?

- Ja, het internet-adres is makkelijk te onthouden en ik zou op elke computer het DINO-loket kunnen opstarten.
- Het kan beter, want ik kan ook via andere internet-adressen het DINO-loket opstarten en dat maakt het verwarrend.
- Nee, ik zou het internet-adres snel vergeten.

Toepassingen

4. Waarvoor zou u de via het DINO-loket verkregen informatie kunnen gebruiken?

- Onderzoeksdoeleinden
- Zoeken naar een geschikte locatie voor werkzaamheden
- Maken van (analyse-)rapporten voor klanten
- Anders, namelijk;

Typ hier uw tekst

5. Welke informatie mist u op dit moment bij het DINO-loket?
(er zijn meerdere antwoorden mogelijk.)

- Bodemkaart
- Topografische informatie
- Hoogteinformatie
- Meteorologische informatie
- Anders, namelijk;

Typ hier uw tekst

Zoekmethoden

6. In hoeverre vindt u de gekozen indeling (kaarten, data en services) van het DINO-loket logisch?

- Erg logisch, want deze indeling geeft overzicht welk soort informatie beschikbaar is en hoe ik deze informatie kan gebruiken.
- Logisch, maar wel in combinatie met een onderverdeling in thema's, zoals dat nu bij het DINO-loket gebruikt wordt.
- Niet logisch, want de inhoud van de op te vragen informatie is belangrijker dan de vorm waarin de informatie wordt aangeboden.

7. In hoeverre ondersteunt de indeling van het DINO-loket u bij het vinden van informatie?

- In voldoende mate, ik kan vrijwel altijd snel de informatie vinden die ik zoek.
- Het kan beter, maar omdat ik na een aantal keer uitzoeken weet waar de informatie staat die ik nodig heb, kan ik ermee overweg.
- Ik ben nog vaak aan het zoeken waar ik de door mij gewenste informatie kan vinden.

8. Op dit moment is het niet mogelijk in het DINO-loket om via een scherm met verschillende zoekfunctionaliteiten informatie op te zoeken. In hoeverre vindt u dat een dergelijk zoekscherm binnen het DINO-loket beschikbaar moet komen?

- Ik ben tevreden met de huidige opbouw van het DINO-loket en zie de meerwaarde niet van een dergelijk zoekscherm.
- De vorm hoe dit zoekscherm binnen het DINO-loket beschikbaar zal komen, zal voor mij heel erg bepalend zijn of ik van het zoekscherm gebruik ga maken.
- Ik denk dat een dergelijk zoekscherm de vindbaarheid van de informatie zoals deze binnen het DINO-loket aanwezig is, sterk zal verbeteren en ik zal zeker gebruik maken van dit zoekscherm.
- Ik denk dat een dergelijk zoekscherm vooral een goed overzicht geeft welke informatie beschikbaar is binnen het DINO-loket. Dit overzicht kan ik goed gebruiken bij het inplannen van werkzaamheden, waarvoor ik gebruik maak van informatie dat op het DINO-loket beschikbaar is.

9. Een andere manier om informatie te ontsluiten is gebruik maken van meta-informatie. In hoeverre bent u voorstander om meta-informatie te gaan gebruiken binnen het DINO-loket?

- Groot voorstander, ik denk dat meta-informatie zowel essentiële informatie geeft over de verschillende informatie-bestanden als dat het gebruikt kan worden om informatie binnen het DINO-loket beter vindbaar te maken.
- Voorstander, maar alleen door de zoekfunctionaliteiten te baseren op meta-informatie.
- Voorstander, maar alleen door meta-informatie te leveren bij af te nemen informatie-bestanden.
- Geen voorstander, ik denk dat meta-informatie geen meerwaarde heeft voor zowel informatieverstrekking over informatie-bestanden als het beter vindbaar maken van informatie.

Kwaliteit van de informatie

10. Er wordt veel zorg besteed om de (kaart)informatie die via het DINO-loket wordt gepresenteerd zo actueel mogelijk te houden. In hoeverre bent u tevreden met de actualiteit van de gepresenteerde informatie?

- Erg tevreden, de informatie die ik via het DINO-loket ophaal is voldoende actueel voor mijn toepassing.
- Tevreden, er zijn echter wel hier en daar wat foutjes te ontdekken, maar deze zijn niet storend.
- Niet tevreden en niet ontevreden, de actualiteit zou hier en daar verbeterd moeten worden.
- Niet tevreden, het komt nog weleens voor dat ik gegevens ophaal van het DINO-loket, terwijl ik weet dat er actuelere gegevens beschikbaar is.
- Helemaal niet tevreden, ik check de verkregen informatie altijd met andere bronnen om er zeker van te zijn dat de informatie niet achterhaald is.

11. De informatie die is terug te vinden op het DINO-loket, kent verschillende schaalniveau's zowel in geografische dichtheid als in tijdreeksen. Er wordt naar gestreeft om dit zo compleet mogelijk bij te houden. In hoeverre vindt u dat DINO hierin slaagt?

- Ik ben erg tevreden over de compleetheid van de aangeboden informatie, van zowel de geografische dichtheid als de tijdreeksen.
- Ik ben tevreden, maar van een aantal data-sets zou de geografische dichtheid wel wat verbeterd mogen worden.
- Ik ben tevreden, maar van een aantal data-sets mis ik tijdreeks gegevens.
- Ik ben niet tevreden over de compleetheid van de aangeboden informatie en in het bijzonder over de geografische dichtheid van verschillende datasets.
- Ik ben niet tevreden over de compleetheid van de aangeboden informatie en in het bijzonder over ontbrekende tijdreeksen van een aantal datasets.

Wijze van informatieverstrekking

12. Voor het ophalen van data via DINOdata dient u in te loggen, vervolgens een selectie te maken, waarna er een data-bestand wordt aangeleverd. In hoeverre bent u tevreden met deze manier van het verkrijgen van data?

- Zeer tevreden, ik kan op deze manier snel over de data beschikken en ze gebruiken in mijn werkproces.
- Tevreden, maar ik vind het wel een omslachtige manier om over data van het DINO-loket te kunnen beschikken.
- Niet helemaal tevreden, want de data is niet beschikbaar in het formaat dat ik wens of bevat niet de gewenste attribootgegevens die ik nodig heb voor mijn analyses.
- Niet tevreden, want ik wil de data alleen maar raadplegen met een viewer. Een online viewer of de informatie beschikbaar stellen via web services zal mij veel meer helpen.

13. Als u data wil bestellen op het DINO-loket, dient u zich te registreren, waarna u een gebruikersnaam en een wachtwoord krijgt. Voor particulieren, overheid en onderzoeksinstituten is deze registratie gratis, terwijl het bedrijfsleven voor de registratie betaalt (als het bedrijf data teruglevert, hoeft er minder betaald te worden). In hoeverre bent u tevreden met deze manier van registratie?

- Erg tevreden, want hierdoor is een goede afhandeling van het verkrijgen van informatie gewaarborgd. Daarnaast kan DINO de gegevens gebruiken om het DINO-loket te verbeteren.
- Tevreden, hoewel ik liever anoniem wil blijven als ik informatie opvraag bij het DINO-loket.
- Niet tevreden, het registratie-systeem is onnodig lastig en ik zie niet in hoe DINO gegevens kan gebruiken om het DINO-loket te verbeteren.
- Niet tevreden, want ik vind dat alle data die DINO beschikbaar stelt voor iedereen gratis beschikbaar moet zijn, zonder dat ik me daarvoor bekend hoeft te maken.

14. Zoals u mogelijk kent van sites als bol.com of marktplaats.nl, is het mogelijk om uw profiel te verpersoonlijken met eigen gekozen functies en opties. In hoeverre bent u voorstander om uw profiel in het DINO-loket te verpersoonlijken?

- Ik ben een groot voorstander, hiermee kan ik gericht en sneller informatie opvragen en kan ik zelf bepalen welke functies voor mij interessant zijn.
- Ik ben voorstander, maar de vorm waarin dit beschikbaar komt zal erg bepalend zijn of ik er gebruik van ga maken.
- Ik ben geen voorstander, hiermee wordt het DINO-loket nodeloos ingewikkeld en ik verwacht niet dat een persoonlijker profiel mij gaat helpen.

Gebruiksvriendelijkheid

15. Er is geprobeerd om het DINO-loket zo gebruiksvriendelijk mogelijk te maken, zodat iedereen die dat wil het loket kan gebruiken. Vind u dat DINO in deze opzet is geslaagd?

- Ja zeker, volgens mij kan iedereen die een computer heeft het DINO-loket gebruiken.
- Ja, maar je dient het DINO-loket wel een aantal keer gebruikt te hebben om te weten hoe alles werkt.
- Niet helemaal, want in minder dan de helft van de gevallen kost het mij moeite om bepaalde informatie op te zoeken of op te vragen.
- Helemaal niet, het kost elke keer dat ik het DINO-loket gebruik veel inspanning om de informatie die ik zoek op te zoeken of op te vragen.

16. In hoeverre nodigt de opmaak van het (huidige) DINO-loket u uit om deze site te gebruiken?

- Het nodigt zeer uit, het is te zien dat er veel aandacht is besteed aan het uiterlijk.
- Het DINO-loket is vooral functioneel en daarvoor zijn de benodigde ingrediënten aanwezig.
- Het opmaak van het DINO-loket is gewoontjes en verschilt niet veel van soortgelijke sites.
- De opmaak kan een goede opknopbeurt gebruiken, want het uiterlijk schrikt eerder af dan dat het gebruikers trekt.

17. Zou u het DINO-loket aanraden bij anderen, zoals familie, vrienden of collega's?

- Ja
- Misschien
- Alleen als ze op zoek zijn naar informatie, waarvan ik weet dat het op het DINO-loket te vinden is.
- Nee

Kunt u dit antwoord motiveren?

Typ hier uw tekst

Gebruik van ondersteuning

18. Om alle mogelijkheden van het DINO-loket goed te kunnen gebruiken, kunt u zich wenden tot de helppagina's, gebruikershandleidingen of de servicedesk. In hoeverre bent u tevreden met de ondersteuning die het DINO-loket u biedt om de door uw gewenste informatie op te vragen?

- Erg tevreden, er is voldoende ondersteuning aanwezig
- Tevreden, hoewel de hulppagina's beter geordend kunnen worden
- Niet zo tevreden, ik maak alleen gebruik van de servicedesk, aangezien ik daarvan weet dat ik op de juiste manier geholpen wordt
- Helemaal niet tevreden, de ondersteuning is erg ongestructureerd en als ik ergens iets van wil weten, weet ik niet waar ik het zoeken moet.

19. Binnen het DINO-loket kunt u vele handleidingen of hulppagina's raadplegen voor ondersteuning, maar een functie dat een overzicht geeft, zoals een pagina 'Veelgestelde vragen' of een zoekfunctie is niet aanwezig. In hoeverre mist u een dergelijke functie binnen het DINO-loket?

- Niet, het huidige aanbod aan ondersteuning is voldoende.
- Een dergelijk functie zou helpen, maar heeft voor mij geen prioriteit.
- Een dergelijke functie is zeer welkom, maar de vorm bepaalt sterk of ik het veel zal gaan gebruiken.
- Een dergelijke functie zou de ondersteuning van het DINO-loket sterk verbeteren en dient absoluut een onderdeel te zijn van het DINO-loket.

20. Welk onderdeel(e)n van het DINO-loket vind u op dit moment onduidelijk en zou beter ondersteund moeten worden?

(er zijn meerdere antwoorden mogelijk.)

- Inloggen
- Selecties maken
- De geleverde data-bestanden
- De kaarten van DINO-map
- De services van DINOservices
- De aangeboden software
- De ondersteuningsmogelijkheden
- Anders, namelijk;

Typ hier uw tekst

Heeft u nog aanvullende opmerkingen?

Typ hier uw tekst

Hartelijk dank voor uw tijd en medewerking. **Sla alstublieft uw ingevulde vragenlijst op en stuur hem terug met als onderwerp 'DINO-loket vragenlijst' naar brunst11533@itc.nl.**

Appendix 20: Cover letter registered user DINO-shop (in Dutch)

Utrecht, .. april 2008

Geachte mevrouw \ meneer,

Hierbij vragen wij u om uw medewerking te verlenen door het beantwoorden van de bijgevoegde vragenlijst van dhr Brunst over het DINO-loket. Dhr. Brunst doet een afstudeeronderzoek voor de masteropleiding Geographical Information Management and Applications (GIMA) naar de gebruikersvriendelijkheid van web-portalen die geo-informatie aanbieden. Met behulp van de door u ingevulde vragenlijst kunnen wij het DINO-loket verbeteren en nog meer toegankelijk maken voor u en alle andere gebruikers van het DINO-loket. Graag verzoeken wij u om de bijgevoegde vragenlijst binnen een week te retourneren naar brunst11533@itc.nl. Bij voorbaat dank voor uw medewerking.

Hoogachtend,

Drs. M. Peersman
Manager afdeling DINO

P.S. Indien u vragen heeft, kunt u contact opnemen met het DINO-loket (dinoloket@tno.nl)

Appendix 21: Cover letter potential users DINO-shop (in Dutch)

Utrecht, .. april 2008

Geachte mevrouw \ meneer,

Bij deze begeleidende brief treft u een vragenlijst aan over het DINO-loket. Het DINO-loket is de centrale toegangspoort tot (geografische) data en informatie over de Nederlandse ondergrond. Deze opslagplaats ontsluit diverse geowetenschappelijke gegevens over de diepe en ondiepe ondergrond, zoals boringen, grondwatergegevens en sonderingen. Om ervoor te zorgen dat het DINO-loket aan blijft sluiten bij de behoeften en wensen van bestaande, maar ook mogelijke nieuwe gebruikers zoals u, willen wij graag weten wat u van het DINO-loket vindt en wat u tegenhoudt om het te gaan gebruiken. Daarom willen wij u vragen of u met behulp van een tijdelijke licentie eens wil rond te kijken in het DINO-loket en uw ervaringen met ons wil delen door middel van het invullen van de bijgevoegde vragenlijst. U kunt een tijdelijke licentie aanvragen door een e-mail te sturen naar dinoloket@tno.nl.

Deze vragenlijst is onderdeel van een afstudeeronderzoek van dhr Brunst. Hij doet onderzoek voor de masteropleiding Geographical Information Management and Applications (GIMA) naar de gebruikersvriendelijkheid van web-portalen die geo-informatie aanbieden. Met behulp van de door u ingevulde vragenlijst kunnen wij het DINO-loket verbeteren en nog meer toegankelijk maken voor u en anderen die het DINO-loket nog niet kennen, maar wel mogelijk de informatie van het DINO-loket goed kunnen gebruiken. Graag verzoeken wij u om de bijgevoegde vragenlijst binnen een week te retourneren naar brunst11533@itc.nl. Bij voorbaat dank voor uw medewerking.

Hoogachtend,

Drs. M. Peersman
Manager afdeling DINO

P.S. Indien u vragen heeft, kunt u ook contact opnemen met het DINO-loket (dinoloket@tno.nl)

Appendix 22: Questionnaire Atlas (in Dutch)

Vragenlijst Atlas van Amsterdam

Beste deelnemer,

Deze vragenlijst is onderdeel van een scriptie onderzoek naar portalen die geo-informatie presenteren en hoe deze kunnen inspelen op de eisen en wensen van zijn gebruikers. Het doel van het onderzoek is om aanbevelingen aan te dragen die het gebruikersgemak van deze zogenaamde geoportalen kunnen verbeteren. In deze vragenlijst wordt u gevraagd uw mening via onderstaande vragen te verwoorden, er zijn geen goede of foute antwoorden. U wordt verzocht bij elke vraag één hokje aan te kruisen, tenzij anders is vermeld. Alle antwoorden zullen *vertrouwelijk* worden behandeld en zullen *anoniem* gepubliceerd worden. Het beantwoorden van de 19 vragen duurt ongeveer 10 minuten en als dank voor uw medewerking maakt u kans op 2 bioscoopkaartjes (1 op de 20 deelnemers na loting).

Met vriendelijke groeten,

Vincent Brunst

MSc. programma: Geographical Information Management and Applications
Technische Universiteit Delft \ Wageningen Universiteit en Researchcentrum

Kennismaking

1. Hoe bent u met Stadsplattegrond in aanraking gekomen?

- Via collega's
- Via een interne beschrijving van de werkprocessen
- Via de intranet-site van de gemeente Amsterdam
- Anders nl.

Typ hier uw tekst

2. Hoe vaak bezoekt u Atlas van Amsterdam in een werkweek voor het opzoeken van informatie?

- Meer dan 15x per week
- 5 - 15 x per week
- 1 – 5 x per week
- Minder dan 1x per week

3. Vindt u Atlas van Amsterdam (intranet.atlas.amsterdam.nl) makkelijk te vinden op het intranet?

- Ja, het intranet-adres is makkelijk te onthouden en ik zou op elke computer Atlas van Amsterdam kunnen opstarten.
- Het kan beter, maar via het intranet van de gemeente kan ik het altijd opstarten.
- Eigenlijk niet, want ik verwissel Atlas van Amsterdam vaak met Stadsplattegrond.
- Nee, ik heb altijd de favorieten van mijn browser nodig om Atlas van Amsterdam op te starten.

Toepassingen

4. Waarvoor gebruikt u de informatie die u via Atlas van Amsterdam verkregen heeft?

- Maken van rapporten voor afnemers
- Ondersteuning van interne werkzaamheden
- Inventarisatie van een bepaalde woon- of bedrijfslocatie
- Anders nl.

Typ hier uw tekst

5. Bent u tevreden met de wijze waarop Atlas van Amsterdam de informatie aanbiedt?

- Ja, ik kan de informatie goed verwerken voor mijn doel.
- Ja, maar het zou prettiger zijn als ik de informatie kan overhalen naar mijn eigen computer of applicaties.
- Nee, ik heb veel extra werk om de informatie te verwerken voor hetgeen waarvoor ik de informatie wil verbruiken.

6. Welke informatie mist u op dit moment in Atlas van Amsterdam? (er zijn meerdere antwoorden mogelijk.)

- Openbare voorzieningen
- Verkeersinformatie (routes bepalen, wegwerkzaamheden etc.)
- Informatie over straatmeubilair (lantaarnpalen, bomen etc.)
- Informatie over de ondergrond / bodem
- Bestemmingsplannen
- Anders nl.

Typ hier uw tekst

Zoekmethoden

7. In het kaartbeeld kan de ondergrond (topografie met de straatnamen, kadastrale percelen of de luchtfoto's) u helpen om een bepaalde locatie in Amsterdam op te zoeken. In hoeverre biedt u dit voldoende referentie om de gewenste locatie in de kaart op te zoeken?

- In voldoende mate, ik kan vrijwel altijd de locatie vinden die ik zoek in de kaart.
- Het kan beter, want ik heb meerdere pogingen nodig om in de kaart op de locatie uit te komen waar ik naar op zoek ben, maar uiteindelijk kom ik er wel.
- Ik heb te weinig houvast aan de topografie, want het lukt mij niet of zelden om een locatie die ik zoek terug te vinden.

8. Op dit moment kunt u via het invoeren van postcode + huisnummer, straatnaam + huisnummer, kadastraal nummer, bedrijfsnaam of persoonsnaam (met autorisatie) tot op huisniveau een locatie in Amsterdam opzoeken? In hoeverre ondersteunt u dit om een locatie op te zoeken?

- In voldoende mate, want als ik ga zoeken heb ik altijd gegevens om één van de zoekingen te gebruiken.
-> *Ga verder naar vraag 10*
- Ik red me ermee, maar als er meerdere ingangen om te zoeken zou worden aangeboden, zou me dat beter helpen.
-> *Ga verder naar vraag 9*
- Op dit moment zijn de manieren om te zoeken te beperkt en ik zou ervoor pleiten dat er minimaal 2 of 3 zoekmethoden bijkomen.
-> *Ga verder naar vraag 9*

9. Welke zoekmethoden zouden in uw ogen aan Atlas van Amsterdam toegevoegd moeten worden?

(er zijn meerdere antwoorden mogelijk)

- Zoeken op wijk \ buurt
- Zoeken op stadsdeel
- Zoeken op telefoonnummer
- Anders nl.

Typ hier uw tekst

Kwaliteit van de informatie

10. Er wordt veel zorg besteed om de (kaart)gegevens die via Atlas van Amsterdam worden gepresenteerd zo actueel mogelijk te houden. In hoeverre bent u tevreden met de actualiteit van de gepresenteerde informatie?

- Erg tevreden, de informatie op de kaart en in de detailschermen is te allen tijde actueel.
- Tevreden, er zijn echter wel hier en daar wat foutjes te ontdekken, maar deze zijn niet storend.
- Niet tevreden en niet ontevreden, de actualiteit zou hier en daar verbeterd moeten worden.
- Niet tevreden, ik kan zo een aantal locaties aanwijzen waar de situatie al jaren niet klopt met de werkelijkheid.
- Helemaal niet tevreden, ik check de verkregen informatie altijd met andere bronnen om er zeker van te zijn dat de informatie niet achterhaald is.

11. Er is veel verschillende informatie op Atlas van Amsterdam terug te vinden, zowel kaart- als voorzieningsinformatie. Er wordt naar gestreefd om deze zo compleet mogelijk weer te geven. In hoeverre vindt u dat de Atlas hierin geslaagd is?

- Er wordt teveel informatie getoond, waardoor ik geen overzicht meer heb.
- Ik ben erg tevreden over de compleetheid, ik krijg precies de hoeveelheid informatie te zien die ik wens.
- Ik ben tevreden, maar in een gering aantal gevallen is niet alle informatie terug te vinden die ik wens.
- De compleetheid van de informatie op de Atlas laat te wensen over, in een groot deel van de gevallen kan ik de door mij gezochte informatie niet vinden.

Wijze van informatieverstrekking

12. Als u in de kaart op een object, zoals een huis, foto of milieuzone klikt, krijgt u in een apart scherm allerlei informatie over deze voorziening? In hoeverre vindt u deze informatie toereikend?

- Zeer toereikend, deze schermen bevatten precies de informatie die ik zoek.
- Toereikend, de detailinformatie is een welkome aanvulling op de kaartinformatie.
- Niet toereikend, de detailinformatie is in de meeste gevallen te beknopt of niet aanwezig.
- Ik wist niet dat bij het klikken op een object er een scherm met detailinformatie verscheen.

13. Het is mogelijk om de bovengenoemde detailinformatie in een rapport te zetten en deze af te drukken of op te slaan. In hoeverre bent u tevreden met deze functionaliteit?

- Erg tevreden, hiermee kan ik gemakkelijker de informatie van de Atlas gebruiken voor mijn doel, dan als ik alleen de detailinformatie tot mijn beschikking heb.
- Tevreden, maar ik had liever een andere toepassing gezien, zoals presenteren in Excel of in een andere rapportvorm.
- Niet tevreden, ik zie hier niet de meerwaarde van en zal deze functionaliteit ook niet snel gebruiken.
- Ik wist niet dat in de Atlas deze mogelijkheid aanwezig was.

14. Zoals u mogelijk kent van sites als bol.com of marktplaats.nl, denkt GVI (aanbieder van Atlas van Amsterdam) erover om functionaliteit in de Atlas te plaatsen waarmee gebruikers een eigen profiel kunnen aanmaken. Met dit profiel kunt u bijvoorbeeld een lijst van veel gezochte adressen aanleggen, een eigen keuze maken van de kaartlagen die in de kaart te zien zijn of zelf kiezen welke functies (zoals zoomen of printen) in het scherm staan. In hoeverre bent u voorstander om deze functionaliteit beschikbaar te stellen in Atlas van Amsterdam?

- Ik ben een groot voorstander, dit maakt de Atlas persoonlijker en hierdoor zal ik het meer gaan gebruiken.
- Ik ben voorstander, maar de vorm waarin dit beschikbaar komt zal erg bepalend zijn of ik er gebruik van ga maken.
- Ik ben geen voorstander, dit maakt het gebruik van de Atlas alleen maar ingewikkelder en ik zie de meerwaarde niet.

Gebruiksvriendelijkheid

15. Er is geprobeerd om Atlas van Amsterdam zo gebruiksvriendelijk mogelijk te maken, zodat iedereen die dat wil de Atlas kan gebruiken. Vind u dat GVI in deze opzet is geslaagd?

- Ja zeker, volgens mij kan iedereen die een computer heeft de Atlas gebruiken.
- Ja, maar je dient de Atlas wel een aantal keer gebruikt te hebben om te weten hoe alles werkt.
- Niet helemaal, want in minder dan de helft van de gevallen kost het mij moeite om bepaalde informatie op het scherm te krijgen.
- Helemaal niet, het kost elke keer dat ik de Atlas gebruik veel inspanning om de informatie die ik zoek op het scherm te krijgen.

16. In hoeverre nodigt het uiterlijk van Atlas van Amsterdam u uit om deze site te gebruiken?

- Het nodigt zeer uit, het is te zien dat er veel aandacht is besteed aan het uiterlijk.
- Atlas van Amsterdam is vooral functioneel en daarvoor zijn alle ingrediënten aanwezig.
- Het uiterlijk is gewoontjes en verschilt niet veel van soortgelijke sites.
- Het uiterlijk kan een goede opknapbeurt gebruiken, want het uiterlijk schrikt eerder af dan dat het gebruikers trekt.

17. Zou u Stadsplattegrond aanraden bij anderen, zoals familie, vrienden of collega's?

- Ja
- Misschien
- Alleen als ze op zoek zijn naar informatie, waarvan ik weet dat het op Atlas van Amsterdam te vinden is.
- Nee

Kunt u dit antwoord motiveren?

Typ hier uw tekst

Gebruik van ondersteuning

18. Om alle mogelijkheden van Atlas van Amsterdam goed te kunnen gebruiken, kunt u zich wenden tot de helppagina's of de gebruikershandleiding. Via de disclaimer, de informatiebalk onder de kaart en de informatie per thema (i) krijgt u meer informatie over de gebruikte kaartlagen. Hoe vaak raadpleegt u deze ondersteuningsopties?

- Bij elk bezoek
- Bij ongeveer de helft van mijn bezoeken
- Alleen in het begin een aantal maal
- Nooit

19. Welk onderdeel(e)l(en) van Atlas van Amsterdam vind u op dit moment onduidelijk en zou beter ondersteund moeten worden?
(er zijn meerdere antwoorden mogelijk.)

- Locatie opzoeken
- Navigeren in de kaart
- Kaartinhoud veranderen
- Opvragen van detailinformatie
- De bij vraag 18 genoemde ondersteuningsopties
- Anders nl.

Typ hier uw tekst

Heeft u nog aanvullende opmerkingen?

Typ hier uw tekst

Hartelijk dank voor uw tijd en medewerking. **Sla alstublieft uw ingevulde vragenlijst op en stuur hem terug met als onderwerp ‘Stadsplattegrond vragenlijst’ naar brunst11533@itc.nl.**

Appendix 23: Questionnaire Stadsplattegrond (in Dutch)

Vragenlijst Stadsplattegrond

Beste deelnemer,

Deze vragenlijst is onderdeel van een scriptie onderzoek naar portalen die geo-informatie presenteren en hoe deze kunnen inspelen op de eisen en wensen van zijn gebruikers. Het doel van het onderzoek is om aanbevelingen aan te dragen die het gebruikersgemak op deze zogenaamde geoportalen kunnen verbeteren. In deze vragenlijst wordt u gevraagd uw mening via onderstaande vragen te verwoorden, er zijn geen goede of foute antwoorden. U wordt verzocht bij elke vraag één hokje aan te kruisen, tenzij anders is vermeld. Alle antwoorden zullen vertrouwelijk worden behandeld en zullen anoniem gepubliceerd worden. Het beantwoorden van de 18 vragen duurt ongeveer 10 minuten en als dank voor uw medewerking maakt u kans op 2 bioscoopkaartjes (1 op de 20 deelnemers na loting).

Met vriendelijke groeten,

Vincent Brunst

MSc. programma: Geographical Information Management and Applications
Technische Universiteit Delft \ Wageningen Universiteit en Researchcentrum

Kennismaking

1. Hoe bent u met Stadsplattegrond in aanraking gekomen?

- Via een familielid / vriend / kennis
- Via het werk
- Via een vlakblad
- Via een verwijzing op een internetsite
- Anders nl.

Typ hier uw tekst.

2. Hoe vaak gebruikt u Stadsplattegrond voor het opzoeken van informatie?

- Meer dan 3x per week
- 1 - 3 x per week
- 1 – 3 x per maand
- Minder dan 1x per maand

3. Vindt u Stadsplattegrond (www.atlas.amsterdam.nl) makkelijk te vinden op het internet?

- Ja, het internetadres is makkelijk te onthouden en ik kan op elke computer Stadsplattegrond opstarten.
- Het kan beter, want de naam ‘Stadsplattegrond’ correspondeert niet met het internetadres en daarom raak ik in de war welke naam ik moet gebruiken.
- Nee, ik heb altijd de favorieten van mijn browser nodig om Stadsplattegrond op te starten.

Toepassingen

4. Waarvoor gebruikt u de informatie die u via Stadsplattegrond verkregen heeft?

- Onderzoeksdoeleinden
- Maken van rapporten voor klanten
- Ondersteuning van interne werkzaamheden
- Zoeken naar een woon- of bedrijfslocatie
- Anders nl.

Typ hier uw tekst

5. Bent u tevreden met de wijze waarop Stadsplattegrond u de informatie aanbiedt?

- Ja, ik kan de informatie goed verwerken voor mijn doel.
- Ja, maar het zou prettiger zijn als ik de informatie kan overhalen naar mijn eigen computer of applicaties.
- Nee, ik heb veel extra werk om de informatie te verwerken voor hetgeen waarvoor ik de informatie wil verbruiken

6. Welke informatie mist u op dit moment in Stadsplattegrond? (er zijn meerdere antwoorden mogelijk)

- Kadastrale informatie
- Verkeersinformatie (routes bepalen, wegwerkzaamheden etc.)
- Informatie over straatmeubilair (lantaarnpalen, bomen etc.)
- Hoogte-informatie
- Bestemmingsplannen
- Anders nl.

Typ hier uw tekst

Zoekmethoden

7. In het kaartbeeld kan de topografie (de gekleurde vlakken of de luchtfoto's) en de straatnamen u helpen om een bepaalde locatie in Amsterdam op te zoeken. In hoeverre biedt u dit voldoende referentie om de gewenste locatie in de kaart op te zoeken?

- In voldoende mate, ik kan vrijwel altijd de locatie vinden die ik zoek in de kaart.
- Het kan beter, want ik heb meerdere pogingen nodig om in de kaart op de locatie uit te komen waar ik naar op zoek ben, maar uiteindelijk kom ik er wel.
- Ik heb te weinig houvast aan de topografie, want het lukt mij niet of zelden om een locatie die ik zoek terug te vinden.

8. Op dit moment kunt u via het invoeren van een postcode en huisnummer of een straatnaam en huisnummer tot op huisniveau een locatie in Amsterdam opzoeken? In hoeverre ondersteunt u dit om een locatie op te zoeken?

- In voldoende mate, want als ik ga zoeken heb ik altijd een adres of postcode beschikbaar.
-> Ga verder naar vraag 10
- Ik red me ermee, maar als er meerdere ingangen om te zoeken zou worden aangeboden, zou me dat beter helpen.
-> Ga verder naar vraag 9
- Op dit moment zijn de manieren om te zoeken te beperkt en ik zou ervoor pleiten dat er minimaal 2 of 3 zoekmethoden bijkomen.
-> Ga verder naar vraag 9

9. Welke zoekmethoden zouden in uw ogen aan Stadsplattegrond toegevoegd moeten worden?

(er zijn meerdere antwoorden mogelijk)

- Zoeken op wijk \ buurt
- Zoeken op kadastraal nummer
- Zoeken op bedrijfsnaam
- Zoeken op persoonsnaam
- Zoeken op telefoonnummer
- Anders nl.

Typ hier uw tekst

Kwaliteit van de informatie

10. Er wordt veel zorg besteed om de (kaart)gegevens die via Stadsplattegrond worden gepresenteerd zo actueel mogelijk te houden. In hoeverre bent u tevreden met de actualiteit van de gepresenteerde informatie?

- Erg tevreden, de informatie op de kaart en in de detailschermen is te allen tijde actueel.
- Tevreden, er zijn echter wel hier en daar wat foutjes te ontdekken, maar deze zijn niet storend.
- Niet tevreden en niet ontevreden, de actualiteit zou hier en daar verbeterd moeten worden.
- Niet tevreden, ik kan zo een aantal locaties aanwijzen waar de situatie al jaren niet klopt met de werkelijkheid.
- Helemaal niet tevreden, ik check de verkregen informatie altijd met andere bronnen om er zeker van te zijn dat de informatie niet achterhaald is.

11. Er is veel verschillende informatie op Stadsplattegrond terug te vinden, zowel kaart- als voorzieningsinformatie. Er wordt naar gestreefd om deze zo compleet mogelijk weer te geven. In hoeverre vindt u dat Stadsplattegrond hierin geslaagd is?

- Er wordt teveel informatie getoond, waardoor ik geen overzicht meer heb
- Ik ben erg tevreden over de compleetheid, ik krijg precies de hoeveelheid informatie te zien die ik wens.
- Ik ben tevreden, maar in een gering aantal gevallen is niet alle informatie terug te vinden die ik wens.
- De compleetheid van de informatie op de Stadsplattegrond laat te wensen over, in een groot deel van de gevallen kan ik de door mij gezochte informatie niet vinden.

Wijze van informatieverstrekking

12. Als u in de kaart op een openbare voorziening klikt, krijgt u in een apart scherm allerlei informatie over deze voorziening? In hoeverre vindt u deze informatie toereikend?

- Zeer toereikend, deze schermen bevatten precies de informatie die ik zoek.
- Toereikend, de detailinformatie is een welkome aanvulling op de kaartinformatie.
- Niet toereikend, de detailinformatie is in de meeste gevallen te beknopt of niet aanwezig.
- Ik wist niet dat bij het klikken op een openbare voorziening er een scherm met detailinformatie verscheen.

13. Zoals u mogelijk kent van sites als bol.com of marktplaats.nl, denkt Stadsplattegrond erover om functionaliteit in Stadsplattegrond te plaatsen waarmee gebruikers een eigen profiel kunnen aanmaken. Met dit profiel kunt u bijvoorbeeld een lijst van veel gezochte adressen aanleggen, een eigen keuze maken van de kaartlagen die in de kaart te zien zijn of zelf kiezen welke functies (zoals zoomen of printen) in het scherm staan. In hoeverre bent u voorstander om deze functionaliteit beschikbaar te stellen in de Stadsplattegrond?

- Ik ben een groot voorstander, dit maakt Stadsplattegrond persoonlijker en hierdoor zal ik het meer gaan gebruiken.
- Ik ben voorstander, maar de vorm waarin dit beschikbaar komt zal erg bepalend zijn of ik er gebruik van ga maken.
- Ik ben geen voorstander, dit maakt het gebruik van Stadsplattegrond alleen maar ingewikkelder en ik zie de meerwaarde niet.

Gebruiksvriendelijkheid

14. Er is geprobeerd om Stadsplattegrond zo gebruiksvriendelijk mogelijk te maken, zodat iedereen die dat wil Stadsplattegrond kan gebruiken. Vindt u dat de Stadsplattegrond in deze opzet is geslaagd?

- Ja zeker, volgens mij kan iedereen die een computer heeft Stadsplattegrond gebruiken.
- Ja, maar je dient Stadsplattegrond wel een aantal keer gebruikt te hebben om te weten hoe alles werkt.
- Niet helemaal, want in minder dan de helft van de gevallen kost het mij moeite om bepaalde informatie op het scherm te krijgen.
- Helemaal niet, het kost elke keer dat ik Stadsplattegrond gebruik veel inspanning om de informatie die ik zoek op het scherm te krijgen.

15. In hoeverre nodigt het uiterlijk van de Stadsplattegrond u uit om deze site te gebruiken?

- Het nodigt zeer uit, het is te zien dat er veel aandacht is besteed aan het uiterlijk.
- Stadsplattegrond is vooral functioneel en daarvoor zijn alle ingrediënten aanwezig.
- Het uiterlijk is gewoontjes en verschilt niet veel van soortgelijke sites.
- Het uiterlijk kan een goede opknopbeurt gebruiken, want het uiterlijk schrikt eerder af dan dat het gebruikers trekt.

16. Zou u Stadsplattegrond aanraden bij anderen, zoals familie, vrienden of collega's?

- Ja.
- Misschien.
- Alleen als ze op zoek zijn naar informatie, waarvan ik weet dat het op Stadsplattegrond te vinden is.
- Nee

Kunt u dit antwoord motiveren?

Typ hier uw tekst

Gebruik van ondersteuning

17. Om alle mogelijkheden van Stadsplattegrond goed te kunnen gebruiken, kunt u zich wenden tot de helppagina's. Via de disclaimer en de informatie per thema (i) krijgt u meer informatie over de gebruikte kaartlagen. Hoe vaak raadpleegt u deze ondersteuningsopties?

- Bij elk bezoek
- Bij ongeveer de helft van mijn bezoeken
- Alleen in het begin een aantal maal
- Nooit

18. Welk onderdeel(e)l(en) van Stadsplattegrond vindt u op dit moment onduidelijk en zou beter ondersteund moeten worden?
(er zijn meerdere antwoorden mogelijk.)

- Locatie opzoeken
- Navigeren in de kaart
- Kaartinhoud veranderen
- Opvragen van detailinformatie
- De bij vraag 17 genoemde ondersteuningsopties
- Anders nl.

Typ hier uw tekst

Heeft u nog aanvullende opmerkingen?

Typ hier uw tekst

Hartelijk dank voor uw tijd en medewerking. **Sla alstublieft uw ingevulde vragenlijst op en stuur hem terug met als onderwerp ‘Stadsplattegrond vragenlijst’ naar brunst11533@itc.nl.**

Appendix 24: Output Correlation Analysis

		How did you get in touch with Stadsplattegrond?	How often do you use Stadsplattegrond for information searching?	Do you think Stadsplattegrond (www.atlas.amsterdam.nl) is easy to find on the internet?	Wherefore do you use the information you find on Stadsplattegrond?	Are you satisfied with the way the Stadsplattegrond provides you the information?	Which information do you miss at the Stadsplattegrond?	In which level do you think there is enough reference in the map to find a certain location?	In which level the searching methodes supports you to find a location?	Which searching methodes should in your eyes need to be added to the Stadsplattegrond?	In which level are you satisfied with the actuality of the presented information?	In which level do you think that the information offered by the Stadsplattegrond is complete?	In which level do you think that the offered detail information is adequate?	In which level are u a supporter to provide such a functionality on the Stadsplattegrond?	Do you think that the Stadsplattegrond is user-friendly?	In which level invites the appearance of the site you to use the Stadsplattegrond?	Would you recommend Stadsplattegrond to others, like family, friends or colleagues?	How often do you use the supporting options?	Which part(s) of Stadsplattegrond are not clear to you and should be better supported?	Do you have any complementary remarks?
How did you get in touch with Stadsplattegrond?	Correlation Coefficient	1	-0.018	0.218	-0.239	0.187	-0.034	0.235	0.081	0.024	-0.024	0.114	-0.083	0.024	0.182	0.109	0.269	-0.286(*)	-0.102	-0.012
	Sig. (2-tailed)		0.904	0.141	0.102	0.202	0.829	0.112	0.586	0.899	0.874	0.456	0.579	0.873	0.216	0.462	0.064	0.049	0.516	0.934
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
How often do you use Stadsplattegrond for information searching?	Correlation Coefficient	-0.018	1	-0.149	-0.004	0.061	-0.173	-0.049	-0.025	0.045	-0.12	-0.161	-0.239	0.164	0.111	0.092	0.151	-0.18	-0.187	0.054
	Sig. (2-tailed)	0.904		0.319	0.977	0.681	0.263	0.744	0.867	0.815	0.421	0.29	0.105	0.271	0.454	0.532	0.304	0.221	0.231	0.716
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
Do you think Stadsplattegrond (www.atlas.amsterdam.nl) is easy to find on the internet?	Correlation Coefficient	0.218	-0.149	1	-0.194	0.113	0.084	0.28	0.018	0.014	0.031	0.066	0.21	0.152	0.182	.378(**)	.323(*)	-0.033	-0.028	-0.031
	Sig. (2-tailed)	0.141	0.319		0.191	0.448	0.591	0.059	0.904	0.944	0.838	0.671	0.162	0.306	0.222	0.009	0.027	0.824	0.86	0.835
	N	47	47	47	47	43	46	47	29	46	47	44	46	47	47	47	47	47	43	47
Wherefore do you use the information you find on Stadsplattegrond?	Correlation Coefficient	-0.239	-0.004	-0.194	1	-0.233	0.181	-0.171	-0.182	0.165	-.350(*)	-0.223	-0.128	0.074	-0.188	-0.264	-0.168	0.204	-0.009	0.139
	Sig. (2-tailed)	0.102	0.977	0.191		0.11	0.24	0.25	0.216	0.384	0.016	0.142	0.391	0.619	0.2	0.069	0.254	0.164	0.953	0.346
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
Are you satisfied with the way the Stadsplattegrond provides you the information?	Correlation Coefficient	0.187	0.061	0.113	-0.233	1	0.257	0.281	-.294(*)	-0.03	0.057	.446(**)	-0.275	-.461(**)	.382(**)	.466(**)	.407(**)	-.498(**)	0.181	-0.094
	Sig. (2-tailed)	0.202	0.681	0.448	0.11		0.092	0.056	0.043	0.873	0.703	0.002	0.061	0.001	0.007	0.001	0.004	0	0.246	0.527
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
Which information do u miss at the Stadsplattegrond?	Correlation Coefficient	-0.034	-0.173	0.084	0.181	0.257	1	-0.072	-0.1	.415(*)	-0.063	0.227	0.005	-0.25	-.305(*)	-0.159	0.08	-0.139	-0.098	-0.1
	Sig. (2-tailed)	0.829	0.263	0.591	0.24	0.092		0.648	0.516	0.023	0.686	0.143	0.972	0.106	0.044	0.304	0.606	0.367	0.548	0.518
	N	44	44	43	44	44	44	43	44	30	43	43	44	44	44	44	44	44	40	44
In which level do you think there is enough reference in the map to find a certain location?	Correlation Coefficient	0.235	-0.049	0.28	-0.171	0.281	-0.072	1	.475(**)	-0.278	-.357(*)	0.007	0.059	-0.074	.426(**)	.352(*)	0.073	-0.061	0.218	0.002
	Sig. (2-tailed)	0.112	0.744	0.059	0.25	0.056	0.648		0.001	0.137	0.015	0.963	0.697	0.626	0.003	0.015	0.624	0.684	0.166	0.99
	N	47	47	46	47	47	47	47	47	30	46	44	46	46	47	47	47	47	42	47
In which level the searching methodes supports you to find a location?	Correlation Coefficient	0.081	-0.025	0.018	-0.182	.294(*)	-0.1	.475(**)	1	0.037	.311(*)	0.127	-0.23	-0.205	.457(**)	.365(*)	-0.108	-0.219	-.398(**)	-0.13
	Sig. (2-tailed)	0.586	0.867	0.904	0.216	0.043	0.516	0.001		0.847	0.033	0.406	0.12	0.167	0.001	0.011	0.466	0.135	0.008	0.38
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
Which searching methodes should in your eyes need to be added to the Stadsplattegrond?	Correlation Coefficient	0.024	0.045	0.014	0.165	-0.03	.415(*)	-0.278	0.037	1	0.032	0.042	-0.218	0.22	0.016	-0.045	0.083	-0.102	-0.046	0.011
	Sig. (2-tailed)	0.899	0.815	0.944	0.384	0.873	0.023	0.137	0.847		0.868	0.827	0.248	0.252	0.934	0.814	0.663	0.591	0.817	0.956
	N	30	30	29	30	30	30	30	30	30	29	30	30	29	30	30	30	30	28	30
In which level are you satisfied with the actuality of the presented information?	Correlation Coefficient	-0.024	-0.12	0.031	-.350(*)	0.057	-0.063	.357(*)	-.311(*)	0.032	1	0.207	0.081	-0.025	.333(*)	0.136	0.061	0.03	0.045	0.103
	Sig. (2-tailed)	0.874	0.421	0.838	0.016	0.703	0.686	0.015	0.033	0.868		0.179	0.593	0.868	0.022	0.361	0.685	0.842	0.776	0.492
	N	47	47	46	47	47	43	46	47	29	47	44	46	46	47	47	47	47	42	47
In which level do you think that the information offered by the Stadsplattegrond is complete?	Correlation Coefficient	0.114	-0.161	0.066	-0.223	.446(**)	0.227	0.007	0.127	0.042	0.207	1	-0.104	-.346(*)	0.127	0.21	.307(*)	-.324(*)	0.269	-0.06
	Sig. (2-tailed)	0.456	0.29	0.671	0.142	0.002	0.143	0.963	0.406	0.827	0.179		0.495	0.406	0.021	0.407	0.167	0.04	0.089	0.695
	N	45	45	44	45	45	43	44	45	30	44	45	45	45	45	45	45	45	41	45
In which level do you think that the offered detail information is adequate?	Correlation Coefficient	-0.083	-0.239	0.21	-0.128	-0.275	0.005	0.059	-0.23	-0.218	0.081	-0.104	1	0.174	-0.021	-0.206	-0.161	.383(**)	-0.275	0.097
	Sig. (2-tailed)	0.579	0.105	0.162	0.391	0.061	0.972	0.697	0.12	0.248	0.593	0.495		0.246	0.89	0.165	0.28	0.008	0.074	0.518
	N	47	47	46	47	47	44	46	47	30	46	45	45	47	46	47	47	47	43	47
In which level are u a supporter to provide such a functionality on the Stadsplattegrond?	Correlation Coefficient	0.024	0.164	0.152	0.074	-.461(**)	-0.25	-0.074	-0.205	0.22	-0.025	-.346(*)	0.174	1	-0.06	-0.006	-0.075	.289(*)	-0.065	-0.042
	Sig. (2-tailed)	0.873	0.271	0.306	0.619	0.001	0.106	0.626	0.167	0.252	0.868	0.021	0.246		0.687	0.966	0.616	0.049	0.677	0.779
	N	47	47	47	47	43	46	47	46	47	46	44	46	46	47	47	47	47	43	47
Do you think that the Stadsplattegrond is user-friendly?	Correlation Coefficient	0.182	0.111	0.182	-0.188	.382(**)	-.305(*)	.426(**)	.457(**)	0.016	.333(*)	0.127	-0.021	-0.06	1	.369(**)	-.347(*)	-0.229	0.132	-0.238
	Sig. (2-tailed)	0.216	0.454	0.222	0.2	0.007	0.044	0.003	0.001	0.934	0.022	0.407	0.89	0.687		0.01	0.016	0.118	0.4	0.103
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
In which level invites the appearance of the site you to use the Stadsplattegrond?	Correlation Coefficient	0.109	0.092	.378(**)	-0.264	.466(**)	-0.159	.352(*)	-.365(*)	-0.045	0.136	0.21	-0.206	-0.006	.369(**)	1	.435(**)	0.005	-.314(*)	-0.089
	Sig. (2-tailed)	0.462	0.532	0.009	0.069	0.001	0.304	0.015	0.011	0.814	0.361	0.167	0.165	0.966	0.01		0.002	0.972	0.04	0.547
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
Would you recommend Stadsplattegrond to others, like family, friends or colleagues?	Correlation Coefficient	0.269	0.151	.323(*)	-0.168	.407(**)	0.08	0.073	-0.108	0.083	0.061	.307(*)	-0.161	-0.075	.347(*)	.435(**)	1	-0.194	-0.002	-0.094
	Sig. (2-tailed)	0.064	0.304	0.027	0.254	0.004	0.606	0.624	0.466	0.663	0.685	0.04	0.28	0.616	0.016	0.002		0.187	0.988	0.526
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
How often do you use the supporting options?	Correlation Coefficient	-.286(*)	-0.18	-0.033	0.204	-.498(**)	-0.139	-0.061	-0.219	-0.102	0.03	-.324(*)	.383(**)	.289(*)	-0.229	0.005	-0.194	1	-0.058	0.233
	Sig. (2-tailed)	0.049	0.221	0.824	0.164	0	0.367	0.684	0.135	0.591	0.842	0.03	0.008	0.049	0.118	0.972	0.187		0.713	0.111
	N	48	48	47	48	48	44	47	48	30	47	45	47	47	48	48	48	48	43	48
Which part(s) of Stadsplattegrond are not clear to you and should be better supported?	Correlation Coefficient	-0.102	-0.187	-0.028	-0.009	0.181	-0.098	0.218	.398(**)	-0.046	0.045	0.269	-0.275	-0.065	0.132	.314(*)	-0.002	-0.058	1	-0.245
	Sig. (2-tailed)	0.516	0.231	0.86	0.953	0.246	0.548	0.231	0.166	0.817	0.776	0.089	0.074	0.677	0.4	0.04	0.988	0.713		0.113
	N	43	43	43	43	43	40	42	43	28	42	41	43	43	43	43	43	43	43	43
Do you have any complementary remarks?	Correlation Coefficient	-0.012	0.054	-0.031	0.139	-0.094	-0.1	0.002	-0.13	0.011	0.103	-0.06	0.097	-0.042	-0.238	-0.089	-0.094	0.233	-0.245	1
	Sig. (2-tailed)	0.934	0.716	0.835	0.346	0.527	0.518	0.99	0.38	0.956	0.492	0.695	0.518	0.779	0.103	0.547	0.526	0.111	0.113	
	N	48	48	47	48	48	44	47	48	30	47	45	47							

Appendix 25: Results questionnaire DINO-shop per separate question

How did you get in touch with DINO-shop?		
Answer	Frequency	Percent
Via my work place	5	83%
Via my education institute	0	0%
Via a magazine	0	0%
Via an internet-site	0	0%
Via this inquiry	1	17%
Other answers	0	0%
Total	6	100%

Table 1: Results question 1

How often do you use DINO-shop for information searching?		
Answer	Frequency	Percent
More than 3 times a week	1	17%
Between 1 - 3 times a week	3	50%
Between 1 - 3 times a month	0	0%
Less than 1 time a month	1	17%
Total	5	83%
No answer	1	17%

Table 2: Results question 2

What kind of user do you consider yourself?		
Answer	Frequency	Percent
Information analyst	4	67%
Advisor	2	33%
Ad hoc user	0	0%
Other	0	0%
Total	6	100%

Table 3: Results question 3

Do you think that DINO-loket (www.dinoloket.nl) is easy to find on the internet?		
Answer	Frequency	Percent
Yes, the address is easy to remember	5	83%
Could be better	0	0%
No, I should simply forget the address	1	17%
Total	6	100%

Table 4: Results question 4

With which purpose do you use the information gathered from the DINO-shop?		
Answer	Frequency	Percent
Investigation purposes	4	40%
Search for appropriate location	2	20%
analyse reports for customers	4	40%
Others	0	0%
Total	10	100%

Table 5: Results question 5

Which information do you miss at the DINO-shop?		
Answer	Frequency	Percent
Soil map	3	27%
Topographical information	3	27%
Height information	1	9%
Meteorological information	1	9%
Other answers	3	27%
Total	11	100%

Table 6: Results question 6

At which level do you think the chosen division of categories (maps, data and services) of DINO-shop is logical?		
Answers	Frequency	Percent
Very logical	2	33%
Logical	4	67%
Not logical	0	0%
Total	6	100%

Table 7: Results question 7

At which level do you think the classification of categories of the DINO-shop supports you in finding information?		
Answer	Frequency	Percent
Sufficient	1	17%
It could improve	3	50%
I am often searching	2	33%
Total	6	100%

Table 8: Results question 8

In which level do you think a similar search screen needs to become available at DINO-shop?		
Answer	Frequency	Percent
I am satisfied with the current lay-out	1	17%
The shape of the search form is providing	3	50%
A similar search form increases the findability	1	17%
A similar search form is useful for planning purposes	1	17%
Total	6	100%

Table 9: Results question 9

At which level are you a supporter to use meta-information in DINO-shop?			
Answer	Frequency	Percent	
Big supporter	3	50%	
Supporter, for searching purposes	1	17%	
Supporter, for delivering meta-data	0	0%	
Not a supporter	0	0%	
Total	4	67%	
No answer	2	33%	

Table 10: Results question 10

At which level are you satisfied with the actuality of the presented information?			
Answer	Frequency	Percent	
Very satisfied	0	0%	
Satisfied	3	50%	
Not satisfied, not dissatisfied	2	33%	
Dissatisfied	1	17%	
Very dissatisfied	0	0%	
Total	6	100%	

Table 11: Results question 11

The ambition of DINO is present as complete data as possible. In which level do you think DINO is succeeding this ambition?			
Answer	Frequency	Percent	
Very satisfied	0	0%	
Satisfied, but datasets lacks geographical density	1	17%	
Satisfied, but some datasets lacks time series	3	50%	
Dissatisfied about the geographical density of the datasets	0	0%	
Dissatisfied about the completeness of the time series	2	33%	
Total	6	100%	

Table 12: Results question 12

At which level are you satisfied with this way the information can be obtained?			
Answer	Frequency	Percent	
Very satisfied	3	50%	
Satisfied	0	0%	
Not satisfied, datasets not available in my desired format	1	17%	
Not satisfied, I only want to consult the data sets	2	33%	
Total	6	100%	

Table 13: Results question 13

At which level are you satisfied with this way of registration?			
Answer	Frequency	Percent	
Very satisfied	2	33%	
Satisfied	1	17%	
Not satisfied, the registration system is not efficient	0	0%	
Not satisfied, the data sets should be freely available	3	50%	
Total	6	100%	

Table 14: Results question 14

At which level are you supporter to personalize your profile in DINO-shop?		
Answer	Frequency	Percent
Big supporter	0	0%
Supporter	1	17%
Not a supporter	4	67%
Total	5	83%
No answer	1	17%

Table 15: Results question 15

There is tried to make DINO-shop as user-friendly as possible. Do you think DINO is succeed in this intention?		
Answer	Frequency	Percent
Yes, absolutely	0	0%
Yes, but not at first	3	50%
Not totally	2	33%
Not at all	1	17%
Total	6	100%

Table 16: Results question 16

At which level does the appearance of the site invites the user?		
Answer	Frequency	Percent
The portal invites users to make use of it	1	17%
The portal is functional	4	67%
The lay-out is not special	1	17%
The lay-out needs to be improved	0	0%
Total	6	100%

Table 17: Results question 17

Would you recommend DINO-shop to others, like family, friends or colleagues?		
Answer	Frequency	Percent
Yes	1	17%
Maybe	0	0%
Only if they are looking for information	5	83%
No	0	0%
Total	6	100%

Table 18: Results question 18

At which level are you satisfied with the support the DINO-shop offers so you can retrieve the desired information?		
Answer	Frequency	Percent
Very satisfied	1	17%
Satisfied	2	33%
Not totally satisfied	3	50%
Totally not satisfied	0	0%
Total	6	100%

Table 19: Results question 19

At which level do you miss an overview page with support options within DINO-shop?		
Answer	Frequency	Percent
No , the offer of support is adequate	1	17%
A similar function will help	4	67%
A similar function is very welcome	1	17%
A similar function needs to be part of DINO-shop	0	0%
Total	6	100%

Table 20: Results question 20

Which part(s) of DINO-shop are not clear to you and should be better supported?		
Answer	Frequency	Percent
Access procedure	1	11%
Making selections	2	22%
The delivered data-files	1	11%
The maps of DINO-map	3	33%
The services of DINO-services	1	11%
The offered software	1	11%
The supporting options	0	0%
Other of multiple answers	0	0%
Total	9	100%

Table 21: Results question 21

Appendix 26: Results questionnaire Atlas of Amsterdam per separate question

How did you get in touch with the Atlas?		
Answer	Frequency	Percent
Via colleagues	9	82%
Via an internal description of work processes	0	0%
Via the intranet-site of the municipality of Amsterdam	2	18%
Other answers	0	0%
Total	11	100%

Table 1: Results question 1

How often do you visit in a workweek the Atlas of Amsterdam for information searching?		
Answer	Frequency	Percent
More than 3 times a week	3	27%
1 - 3 times a week	5	45%
1 - 3 times a month	3	27%
Less than 1 time a month	0	0%
Total	11	100%

Table 2: Results question 2

Do you think Atlas van Amsterdam (intranet.atlas.amsterdam.nl) is easy to find on the intranet?		
Answer	Frequency	Percent
Yes, easy to remember	3	27%
It could be improved	7	64%
I get confused with Stadsplattegrond	0	0%
No	1	9%
Total	11	100%

Table 3: Results question 3

With which purpose do u use the information you find on the Atlas of Amsterdam?		
Answer	Frequency	Percent
Making of reports for clients	0	0%
Support of internal workings	10	91%
Investigation of a particular living or business location	0	0%
Other answers	1	9%
Total	11	100%

Table 4: Results question 4

Are you satisfied with the way Atlas offers you the information?		
Answer	Frequency	Percent
Yes, I can process the information well	8	73%
Yes, it would be better if I can transfer the information	1	9%
No, it is a lot of extra work to make the information usable	1	9%
Total	10	91%
No answer	1	9%

Table 5: Results question 5

Which information do u miss at the moment in Atlas of Amsterdam?		
Answer	Frequency	Percent
Public provisions	3	11%
Traffic information	7	26%
Information about street furniture	5	19%
Urban zone plans	6	22%
Other answers	6	22%
Total	27	100%

Table 6: Results question 6

At which level does the map offers you enough reference to find the desired location?		
Answer	Frequency	Percent
In appropriate level	10	91%
It could be approved	1	9%
Not enough reference	0	0%
Total	11	100%

Table 7: Results question 7

At which level does these methods support you to find a location?		
Answer	Frequency	Percent
In appropriate level	8	73%
More searching entries would help	3	27%
The numbers of search entries are too limited	0	0%
Total	11	100%

Table 8: Results question 8

Which search methods should in your eyes need to be added to Atlas of Amsterdam?		
Answer	Frequency	Percent
Search for district / neighborhood	1	9%
Search for urban quarter	0	0%
Search for telephone number	0	0%
Other or multiple answers	4	36%
Total	5	45%
No answer	6	55%

Table 9: Results question 9

At which level are you satisfied with the actuality of the presented information?		
Answer	Frequency	Percent
Very satisfied	3	27%
Satisfied	4	36%
Not satisfied, not dissatisfied	3	27%
Dissatisfied	1	9%
Very dissatisfied	0	0%
Total	11	100%

Table 10: Results question 10

At which level do you think the offered information at the Atlas is complete?		
Answer	Frequency	Percent
There is too much information	1	9%
Very satisfied	5	45%
Satisfied	5	45%
The completeness of the information lacks	0	0%
Total	11	100%

Table 10: Results question 11

At which level do you think the screens with detail information is adequate?		
Answer	Frequency	Percent
Very sufficient	1	9%
Sufficient	8	72%
Not sufficient	0	0%
I didn't know there was this function	2	18%
Total	11	100%

Table 12: Results question 12

At which level are you satisfied with the functions to print?		
Answer	Frequency	Percent
Very sufficient	1	9%
Sufficient	2	18%
Not sufficient	1	9%
I didn't know there was this function	7	63%
Total	11	100%

Table 13: Results question 13

At which level are you a supporter to personalize your user profile at the Atlas?		
Answer	Frequency	Percent
Big supporter	3	27%
Supporter	2	18%
Not a supporter	6	55%
Total	11	100%

Table 14: Results question 14

Do you think that GVI made the Atlas user-friendly?		
Answer	Frequency	Percent
Yes, absolutely	4	36%
Yes, but you need to know how the portal works	6	55%
Not totally	1	9%
Totally not	0	0%
Total	11	100%

Table 15: Results question 15

At which level are you invited by the appearance to use the site?		
Answer	Frequency	Percent
The appearance invites the user	2	18%
The portal is especially functional	7	64%
The appearance does not differ from other portals	1	9%
The appearance need to be smarten up	0	0%
Total	10	100%
No answer	1	9%

Table 16: Results question 16

Would you recommend the Atlas to others, like family, friends or colleagues?		
Answer	Frequency	Percent
Yes	7	0.64
Maybe	2	0.18
Only if people are looking for information	2	0.18
No	0	0
Total	11	1

Table 17: Results question 17

How often do you consult the support options?		
Answer	Frequency	Percent
With every visit	0	0%
Around half of all my visits	1	9%
Only at the first few visits	4	36%
Never	5	45%
Total	10	91%
No answer	1	9%

Table 18: Results question 18

Which part(s) of the Atlas are not clear to you and should be better supported?		
Answer	Frequency	Percent
Finding a location	1	7%
Navigation in the map	3	21%
Change map information	0	0%
Consulting detail information	2	14%
Support options	2	14%
Other answers	3	21%
Total	11	79%
No answer	3	21%

Table 19: Results question 19

Appendix 27: Results questionnaire Stadsplattegrond per separate question

How did you get in touch with Stadsplattegrond?		
Answer	Frequency	Percent
Via family member \ friend \ acquaintance	2	4%
Via the workplace	14	29%
Via an industry magazine	0	0%
Via a link from a website	29	60%
Other answers	3	6%
Total	48	100%

Table 1: Results question 1

How often do you use Stadsplattegrond for information searching ?		
Answer	Frequency	Percent
More than 3 times a week	10	21%
1 - 3 times a week	14	29%
1 - 3 times a month	16	33%
Less than 1 time a month	8	17%
Total	48	100%

Table 2: Results question 2

Do you think Stadsplattegrond (www.atlas.amsterdam.nl) is easy to find on the internet?			
Answer	Frequency	Percent	
Yes, the internet address is easy to remember	23	48%	
It could be better	7	15%	
No, I always need my browser favorites	17	35%	
Total	47	98%	
No answer	1	2%	

Table 3: Results question 3

Wherefore do you use the information you find on Stadsplattegrond?		
Answer	Frequency	Percent
Investigation purposes	10	16%
Making reports for clients	4	6%
Support for internal workings	12	19%
Looking for living or business location	32	51%
Different or multiple answers	5	8%
Total	63	100%

Table 4: Results question 4

Are you satisfied with the way the Stadsplattegrond provides you the information?		
Answer	Frequency	Percent
Yes, I can process the information well	24	50%
Yes, it would be better if I can transfer the information	16	33%
No, it is a lot of extra work to make the information usable	8	17%
Total	48	100%

Table 5: Results question 5

Which information do u miss at the Stadsplattegrond?		
Answer	Frequency	Percent
Traffic information	16	23%
Information about street furniture	11	15%
Height information	9	13%
Urban zone plans	17	24%
Other or multiple answers	14	20%
Total	67	94%
No answer	4	6%

Table 6: Results question 6

In which level do you think there is enough reference in the map to find a certain location?		
Answer	Frequency	Percent
In appropriate level	28	58%
It could be approved	17	35%
Not enough reference	2	4%
Total	47	98%
No answer	1	2%

Table 7: Results question 7

In which level the searching methods supports you to find a location?		
Answer	Frequency	Percent
In appropriate level	21	44%
More searching entries would help	20	42%
The numbers of search entries are too limited	7	15%
Total	48	100%

Table 8: Results question 8

Which searching methods should in your eyes need to be added to the Stadsplattegrond?		
Answer	Frequency	Percent
Search for district \ neighborhood	17	26%
Search for business name	12	18%
Search for telephone number	5	8%
Other answers	14	21%
Total	48	73%
No answer	18	27%

Table 9: Results question 9

In which level are you satisfied with the actuality of the presented information?		
Answer	Frequency	Percent
Very satisfied	9	19%
Satisfied	28	58%
Not satisfied, not dissatisfied	9	19%
Dissatisfied	1	2%
Very dissatisfied	0	0%
Total	47	98%
No answer	1	2%

Table 10: Results question 10

In which level do you think that the information offered by the Stadsplattegrond is complete?		
Answer	Frequency	Percent
There is too much information	1	2%
Very satisfied	15	31%
Satisfied	20	42%
The completeness of the information lacks	9	19%
Total	45	94%
No answer	3	6%

Table 11: Results question 11

In which level do you think that the offered detail information is adequate?		
Answer	Frequency	Percent
Very sufficient	0	0%
Sufficient	18	38%
Not sufficient	6	13%
I didn't know there was this function	23	48%
Total	47	98%
No answer	1	2%

Table 12: Results question 12

In which level are you a supporter to personalize your user profile on the Stadsplattegrond?		
Answer	Frequency	Percent
Big supporter	5	10%
Supporter	22	46%
Not a supporter	20	42%
Total	47	98%
No answer	1	2%

Table 12: Results question 13

Do you think that the Stadsplattegrond is user-friendly?		
Answer	Frequency	Percent
Yes, absolutely	24	50%
Yes, but you need to know how the portal works	13	27%
Not totally	9	19%
Not at all	2	4%
Total	48	100%

Table 14: Results question 14

In which level invites the appearance of the site you to use the Stadsplattegrond?		
Answer	Frequency	Percent
The appearance invites the user	7	15%
The portal is especially functional	28	58%
The appearance does not differ from other portals	8	17%
The appearance need to be smarten up	5	10%
Total	48	100%

Table 15: Results question 15

Would you recommend Stadsplattegrond to others, like family, friends or colleagues?			
Answer	Frequency	Percent	
Yes	31	65%	
Maybe	4	8%	
Only if people are looking for information	12	25%	
No	1	2%	
Total	48	100%	

Table 16: Results question 16

How often do you use the supporting options?		
Answer	Frequency	Percent
With every visit	1	2%
Around half of all my visits	1	2%
Only at the first few visits	14	29%
Never	32	67%
Total	48	100%

Table 17: Results question 17

Which part(s) of Stadsplattegrond are not clear to you and should be better supported?			
Answer	Frequency	Percent	
Finding a location	13	19%	
Navigation in the map	30	43%	
Change map information	7	10%	
Consulting detail information	12	17%	
Support options	3	4%	
Other answers	0	0%	
Total	65	93%	
No answer	5	7%	

Table 18: Results question 18