

Report Literature Research Geo-visualization and Participatory Spatial Planning

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ABSTRACT

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The use of geo-visualization for participatory planning purposes is a challenging field of research. Reason for this is that researchers involved with the subject currently lack a common rationale for the integration of the two complementary domains: participatory planning and geo-visualization. Consequently existing knowledge still needs to be extracted from various relevant sub-domains of research. Therefore a literature research was conducted to make an inventory of aspects that influence the application of visualization and communication tools in (generic) participative planning processes. This report describes the literature search, including a selection of sub-domains and literature sources, a discussion of the search strategy and the search results. Furthermore the report includes a discussion on the set-up and maintenance of an article repository in conjunction with an Endnote database in which the bibliographical information of the retrieved literature is stored. Finally some recommendations are provided.

Keywords: geo-information, geo-visualization, participative planning

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Preface

This report is one of the deliverables of DWK research project 'Scene talk'. The overall goal of this DWK-project is to collect knowledge on the use of innovative geo-visualization techniques for the facilitation of complex, participatory planning processes. The DWK-project is related to (and counter-financed by) the Interreg 3c project called 'PSPE'. In the PSPE-project a theoretical framework is being developed which will serve as a basis for the development of a so-called 'geo-visualization participatory planning infrastructure' (GVCI). This framework will integrate available knowledge on participatory planning methods and techniques on the one hand and on geo-visualization on the other hand.

For the development of this theoretical framework, a literature research was done on the use of geo-visualization for participatory planning purpose. This report describes the work that was performed for this literature research.

The report and the related searches were finished by December 2004. In the last months of 2004 two new search engines were launched (Scopus and Google Scholar) which could not be involved in this research anymore. These search engines promise to perform well regarding peer reviewed articles and citations. Therefore they will be taken into consideration in a next round of the searches.

Summary

In this report a literature research is described on the use of geo-visualization for participatory planning purposes. The goal of the research is to make an inventory of the different aspects that influence the application of visualization and communication tools in participatory planning. The main result of the research is an Endnote database with bibliographical references of relevant literature. In addition a start is made with the production of an article repository with digital copies of the literature. The method described in this report may be used as a source of inspiration to setup similar literature searches for research and publication purposes.

The method for the literature search involves the identification of relevant keywords and sources of literature, the setup of a search strategy and the design of the workflow for the construction of an Endnote database and article repository. In addition a method is described for the assessment of the efficiency of the search strategy and for the application of the database for research and publication purposes.

An important application of the Endnote database is the possibility to generate bibliographies or reference lists which can be imported into word-documents. As such the database can facilitate the efficient preparation of publications made by researchers, PhD and Msc students working on the subject. The classification of the references into sub-domains as well as the production and maintenance of the article repository greatly facilitate the research work on the subject for project or teaching purposes. Specific analyses of the references facilitate the selection of journals and conferences to be targeted for publication on the subject as well as the selection of the most important authors and sources of literature.

1 Introduction

The use of geo-visualization for participatory planning purposes is a challenging field of research. Reason for this is that researchers involved with the subject currently lack a common rationale for the integration of the two complementary domains: participatory planning and geo-visualization. Consequently existing knowledge still needs to be extracted from various relevant sub-domains of research.

The goal of the literature research presented in this report is to make an inventory of aspects that influence the application of visualization and communication tools in participatory planning processes. In addition the literature search is used to get an overview of existing visualization and communication tools for participatory planning purposes.

In chapter 2 and 3 of this report the keywords and literature sources are discussed which were identified as being relevant to this literature study. In chapter 4 the search strategy is discussed which was developed to retrieve relevant literature from the selected literature sources with the selected keywords. In chapter 5 the search results are evaluated and discussed briefly. Chapter 6 includes a brief discussion on the set-up and maintenance of an article repository in conjunction with an Endnote database in which the bibliographical information of the retrieved literature is stored. Chapter 7 concludes the report with some conclusions and recommendations. A literature list and appendices complete the report.

2 Selection of relevant keywords

Literature searches start with the identification of keywords in order to limit the search to what is regarded as relevant to the study. This identification process is an associative and iterative process. Based on experience with the subject, typical keywords are identified, which are used to search specific literature sources. The search results obtained with these keywords are screened for relevance. If most of the results are relevant, the keywords are well identified and if not others need to be identified. For some literature sources, certain keywords are more useful than others. See also chapter 3: Selection of literature sources, chapter 4: Search strategy and chapter 5: Brief discussion of results.

For this literature search, the keywords which were identified as being relevant to this study are clustered in so-called sub-domains. Each sub-domain represents an aspect which is assumed to influence the application of visualization and communication tools in participatory planning processes. Some of these sub-domains are rather traditional, whereas others are still under development. The sub-domains tend to show overlap, with the consequence that the integration of the knowledge which is developed within these sub-domains is a complex process.

A start was made with the classification of the literature according to these sub-domains, in order to facilitate the use of the literature for research and publication purposes (see also chapter 5: Brief discussion of results).

The sub-domains and keywords which were identified are:

1. Geo-referenced data models

This domain includes the (geo-) data sets that can be used for visual representation of reality/landscapes/urban environments, the way 2D, 2.5D and 3D geo-data can be integrated into visualization models and the use of spatio-temporal data.

(keywords: geo data, geo-information, geo data-structure, 2D geometry, 2.5D geometry, 3D geometry, data integration, 3D data management, time series, temporal data).

2. Methodology to visualize multi-dimensional geo-data

This domain includes the methodologies to visualize the 2D, 2.5 D and 3D spatial data and dynamics in time, in relation to theories of visualization (Bertin, cartography) and characteristics of visualizations (3D objects, resolution, level of detail).

(keywords: theory of Bertin, cartography, web mapping, 3D objects, 3D scenes, multi-resolution, level of detail, virtual reality, augmented reality)

3. Perception of visualizations

This domain includes the research areas and aspects that are involved in interpretation and understanding visual representations of reality/landscapes/urban environments.

(keywords: perception, environmental; psychology, readability, understanding of visual information, visual representation of reality/landscapes/urban environments).

4. Connection between spatio-temporal simulation models and 3D visualization interfaces

(keywords: simulation in Virtual reality, link between simulation models and geodata, link between interfaces and simulation models).

5. Dedicated interfaces regarding immersion, navigation, manipulation and feedback, augmented VR

This domain includes functionalities/specifications of interfaces (Graphic User Interface) to visualize, experience, question and manipulate the virtual environment.

(keywords: navigation, movement, interaction, feedback, interaction design, immersion, game interfaces, planning tools, tangible interfaces, drawings in spatial/landscape planning).

6. Levels of participation and the demands related to these levels

This domain includes the role and influence of participants in the process and the demands related to these levels on information exchange, visualizations, interfaces etc.

(keywords: stakeholders, participation, levels of participation, participatory planning, avatars, multi-agents, participation tools).

7. Set up and conditions of Multi-user environments

(keywords: time-space dependencies, discussion threads, communication protocols, mass communication, multi-user environments, collaboration, project tools, multi-user games, collaborative argumentation systems).

8. Concepts of ICT-technology and environments to disseminate geo-visualizations

This domain includes all kinds of applications to use as an interface for geo-visualizations, like mobile caves, interactive digital television, mobile platforms etc.

(keywords: communication technology, cave, interactive television, bill board, ICT walls, location and navigation services).

9. Spatial Planning

This domain includes background literature on spatial planning processes.

(keywords: planning theories, planning systems, politics, government).

10. Specific software/applications to create geo-visualizations

This domain includes specific literature on techniques (software, system architecture, tools) to visualize reality/landscapes/environments.

(*keywords:* Geo-VRML, VRML, JAVA, Open Standards, decision group rooms, decision support systems)

3 Selection of literature sources

In literature research a distinction is made between primary and secondary literature sources. The difference between the two types of literature sources is clarified below, based on information published on this topic by the Berkeley University of California Library¹.

‘Primary sources enable the researcher to get as close as possible to what actually happened during a historical event or time period. A primary source reflects the individual viewpoint of a participant or observer.’...‘Examples of primary sources are memos and other papers in which individuals describe events in which they were participants or observers,’... research data such as the results of scientific experiments or published materials such as books, magazine and journal articles.’

‘A secondary source is a work that interprets or analyzes an event or phenomenon. It is generally at least one step removed from the event itself.’ A secondary source is based both on primary sources as well as on other secondary sources. Typically secondary sources present background information and summarize results of scientific work so that you can read the full range of thinking on a particular topic. Secondary literature does not present the most current scientific information, which is found in primary literature. Examples of secondary literature sources are reference materials like encyclopaedia, reference journals, reviews, library catalogues and bibliographies.

Note that reference materials such as bibliographic databases and catalogues disclose meta-information (e.g. bibliographical records) about primary literature. The Internet however discloses primary literature directly (e.g. full digital text of article placed on a website). Therefore the Internet is considered as a primary literature source.

To obtain an overview of the literature which is published on a particular subject, both primary and secondary sources of literature need to be studied. For each subject the sources which are relevant can be different and depend on the publication strategy of the researchers who publish on the subject. Some publish in books, others in particular peer-reviewed articles or on the Internet. Just like with the identification of keywords, the identification of relevant sources of literature is an iterative process; An assumption on the relevance of sources for a particular subject needs to be made and by studying the search results, the relevance of the individual sources can be assessed. See also chapter 5: Brief discussion of results.

For a literature search on the use of geo-visualization for participatory planning purposes a distinction needs to be made between literature on planning, participation

¹ <http://www.lib.berkeley.edu/TeachingLib/Guides/PrimarySources.html>

and GIS on the one hand, and literature on the hard boiled technical side of the use of visualization tools and GIS applications on the other hand.

The first type of literature is mainly available through traditional bibliographic databases such as Geobase and the Science Citation Index. Searching these sources is relatively easy. But the second type of literature is often to be found by searching less traditional literature sources such as the Internet and (proceedings of) conferences & symposia. In the following paragraphs the primary and secondary literature sources which were identified as relevant to this study are discussed in more detail.

3.1 Secondary sources: Bibliographic databases

The following bibliographic databases and article- or periodical indexes were identified as the most important secondary sources of literature for this study:

3.1.1 Cab Abstracts of CAB International

Cab Abstracts is a bibliographical database which has long been recognized as a leading scientific information source in agriculture and related sciences. Sections in the database cover literature in the fields of physical planning and GIS. Over 14,000 serial *journals* in over 50 languages are scanned, as well as *books, reports, and other publications*. Over 95 percent of the literature is abstracted. About 150,000 items per year are selected for inclusion. However, input of new references, mostly those from journals of minor importance, sometimes lags behind more than six months.

3.1.2 Geobase of Elsevier Publishers

Geobase is a bibliographical database covering worldwide research literature in physical and human geography, earth and environmental sciences, ecology, and related disciplines. The material covered includes *refereed scientific papers*, trade journal and *magazine articles, product reviews, directories and any other relevant material*, with 85,000 records added annually. The database provides current coverage of over 1,700 journals and archival coverage of several thousand additional titles. Each GEOBASE record contains full bibliographic citation, indexing terms and codes and 99.5% of records contain abstracts. As well as providing comprehensive coverage of the core scientific and technical periodicals, GEOBASE offers unique coverage of non-English language and *less readily available publications plus books, conference proceedings and reports*.

3.1.3 ISI Science Citation Index and Web of Science of the Thomson Corporation

The ISI Science Citation Index is a multidisciplinary index to the *journal literature* of the sciences. It fully indexes 5,900 major journals across 150 scientific disciplines. The Science Citation Index Expanded includes all cited references captured from indexed articles. It also provides access to current information and retrospective data from 1945 forward. It averages 19,000 new records per week. An extension of the database is the Web of Science. The information stored about each article includes the article's cited reference list, you may also search the databases for articles that cite a known author or work. This so-called *Cited Reference Searching* lets you use a given work as if it were a subject term to identify more recent articles on the same topic. Once you have found a relevant record, you can click a link to a list of related records that share common references with the article you are viewing. These two types of searching often locate relevant articles that cannot be retrieved through traditional subject-author searching.²

3.1.4 Citeseer

Citeseer is a database that intends to complement commercial citation indices such as the ISI Science Citation Index. The main subject is computer science. It includes information from *conferences, monographs, technical reports, and preprints*. Citeseer uses Web search engines (like AltaVista, HotBot, and Excite) and heuristics to locate good starting points for crawling the Web. Citeseer checks to verify that the document is a research document by testing for the existence of a reference or bibliography section. Citeseer autonomously creates a citation index that can be used for literature search and evaluation. All records have a link to the full text.

3.2 Secondary sources: Catalogues

Books, theses & reports are considered to be very relevant secondary sources of literature for this study. They were retrieved by means of the Wageningen Union Catalogue and Bookfind Online.

² <http://library.wur.nl/desktop/direct/index.html>

3.2.1 Wageningen Union Catalogue

‘This catalogue, formerly known as the AGRALIN Catalogue, contains bibliographic data on *books and periodicals* held by the libraries of Wageningen University, Dutch agricultural research institutes and agricultural experiment stations. Holding data are added to each description. The joint collections of the participating libraries cover a substantial part of the internationally available scientific literature in the field of agriculture and related disciplines, including a large collection of records on GIS and spatial planning. All titles are entered in their original language. The database is updated every day and now contains over 600.000 records.’³

3.2.2 Bookfind Online of Nielsen Bookdata/VNU

This is a subscription web service for library professionals and the book trade. Global coverage with comprehensive information on *books (no theses or reports) published in the UK and US as well as English language titles* from Australia, New-Zealand and South Africa. The World International edition was searched.

3.3 Primary sources: via the Internet

Many conferences & symposia are organized on the subject of GIS, visualization and virtual reality and a large amount of papers are published on the Internet. However, there seems to be less attention to the bibliographic disclosure of these papers by the traditional database providers. Citeseer is an example of an interesting new bibliographic source on the Internet that tries to resolve this problem (supra). But for the moment the literature searcher is still obliged to also do more thorough searches on the Internet using several search engines. Cause for concern gives the scientific reliability of material found in these non-traditional sources.

3.3.1 Internet Search engines

According Searchenginewatch.com Google, Yahoo and Ask Jeeves are currently the three best search engines. The results from these engines show little overlap. In addition Scirus (www.scirus.com), the search engine of the publisher Elsevier was selected for this study, because it specifically targets scientific publications. Finally the Copernic Agent is regarded as useful to this study.

- *Google*: has a well-deserved reputation as the top choice for those searching the web. The crawler-based service provides both comprehensive coverage of the web along with great relevancy.
- *Yahoo*: started in 1994, as the first web ‘directory,’ a place where human editors organize web sites into categories. From October 2002, Yahoo made a shift to crawler-based listings for its main results. For less common or non-popular queries, Yahoo results look quite different from Google results.

³ <http://library.wur.nl/desktop/direct/index.html>

- *kJeeves*: is an innovative search engine with invisible tabs and with what it calls Smart Search.
- *Scirus*: is a search engine which combines a targeted crawler that focuses only on web sites with scientific content, with Elsevier's massive scientific information resources drawn from thousands of journals and books.
- *Copernic Agent*: is a meta search engine, capable of sending your query to multiple engines simultaneously. It is also an invisible web explorer, online research assistant and extensive tool box, combined into a easy to use program.

In the last months of 2004 two new search engines were launched (Scopus and Google Scholar) which could not be involved in this research anymore. These search engines promise to perform well regarding peer reviewed articles and citations. Therefore they will be taken into consideration in a next round of the searches.

Scopus integrates the Science Citation Index (<http://www.scopus.com/scopus/home.url>) and Google Scholar the Citeseer database (<http://www.scholar.google.com/>).

3.3.2 Internet websites of conferences & symposia

Websites from relevant congresses, symposia provide valuable (often otherwise unpublished) relevant and up-to-date literature. In Appendix 4: Relevant Congresses and Symposia the congresses are listed which are considered to be relevant to this study.

3.4 Other sources

Last but not least, relevant literature can -on an ad hoc basis- be provided for by colleagues (professors, researchers, PhD-and Msc students) working on a relevant field of research. For this, it is necessary to set up a network of researchers working on relevant subjects. See also 6.3 Maintenance, Viscom group.

4 Search strategy

For each literature search, a tailor-made search strategy needs to be developed to search the identified literature sources with the relevant keywords.

Searches for relevant primary and secondary literature can be performed both automatically and/or manually. Figure 1: Representation of the Literature Sources represents the literature sources which are considered relevant for this study. In the two upper boxes an overview is provided of the primary and secondary literature sources (in bold) which were searched automatically by means of tools (in italic). The sources of literature which had to be searched manually are summarized in the third lower box. The snowball method is an exception, as it uses the automated databases but much of the work consists of manually selecting individual records. (See also Chapter 3: Selection of literature sources.)

The strategy which was developed for this study consists of two consecutive phases. In the first phase an initial search was performed and the search results were analyzed. The bibliographical information of the search results was downloaded to an Endnote database and the readily available articles were stored in an article repository (see also chapter 6: Endnote database and article repository and Appendix 1: Export file Endnote database on cdrom).

In the second phase, the search is continuously updated, taking into account the analyses results of the first phase. See also Figure 2: Workflow Endnote Database & Article Repository.

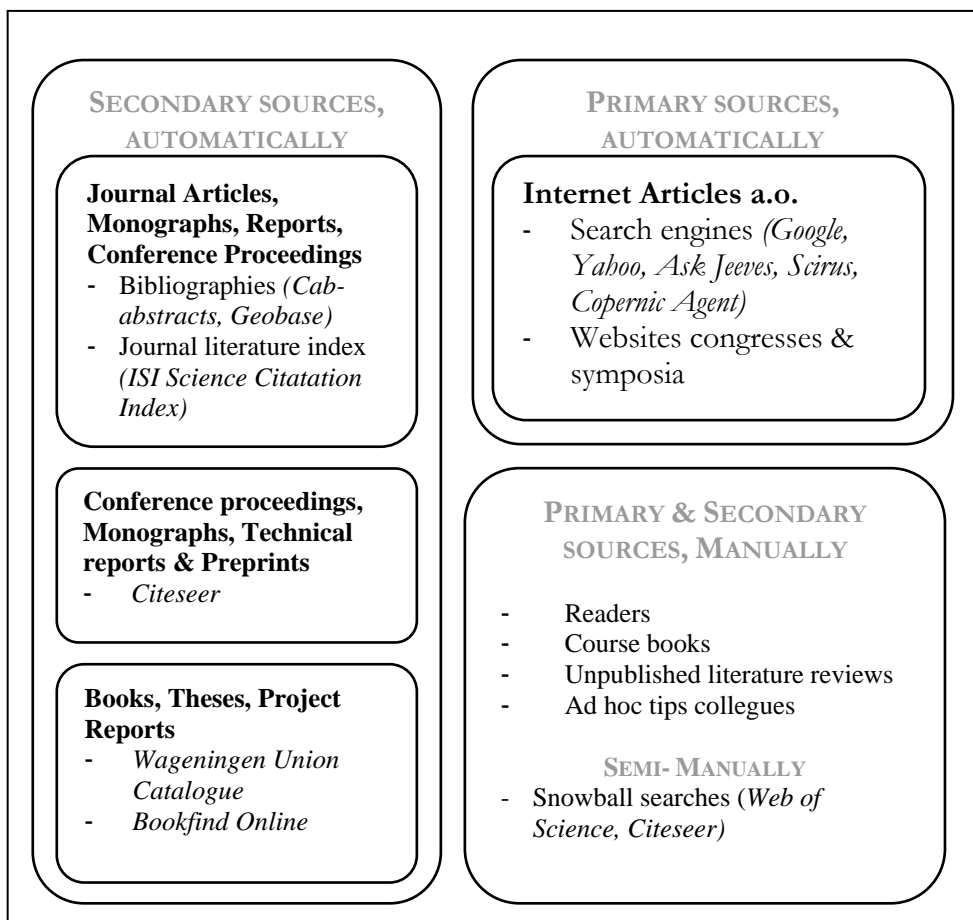


Figure 1: Representation of the Literature Sources

In the following paragraphs, the various searches which were performed during phase 1 are documented.

Searches in CAB Abstracts, Geobase and Science Citation Index

Two queries were used for searches in CAB Abstracts (1990-2004), Geobase (1990-2004) and the Science Citation Index (1990-2004). See Query-Databases 1 and Query-Databases 2. The first query is basically an extended search for geo-visualization and spatial planning without the aspect of participation. The second query is a simplified version of the first query, including the participation aspect and leaving out the spatial planning aspect.

Query-Databases 1: ((virtual reality or vr) and ((spatial or physical or urban or landscape) near plan*)) or ((geo* near visuali*) and ((spatial or physical or urban or landscape) near plan*)) or (((gis or geographic?? information system?) and (virtual reality or vr)) or (geo* near visuali*)) and ((spatial or physical or urban or landscape) near plan*))

Query-Databases 2: (participat* or communicati*) and (geo* near visuali*)

Searches in Web of Science

The Web of Science was searched for the work of the key authors of an existing reader 'Capita Selecta on Geo-visualization' (Lammeren 2003). In addition it was searched for related records and citing records for these authors (snowball search). Also a keyword search was done.

Searches in Citeseer

The Citeseer database was automatically searched for literature which contains specific keywords in the document or in the citations (see Query-Citeseer). In addition some records were selected manually using a snowball search. With this method for each selected record, additional literature can be searched by means of options such as: active bibliography (related documents), similar documents based on text and citations.

Query-Citeseer: ((geographic information systems or geographical information systems or gis) and (visualization or virtual reality)) or (gis and visualization and 3d) or geovisualization or ppgif.

Searches in Wageningen Union Catalogue

The search in the Wageningen Union Catalogue was based on an overview of relevant research reports, selected students thesis and the names of key authors derived from an existing reader 'Capita Selecta on Geo-visualization' (Lammeren 2003). Also a search was carried out using the thesaurus term 'geographical information systems' and the basic index terms particip* and visualization:
KW geographical information systems and (visualization OR particip*)

Searches in Bookfind online

A search in Bookfind online was based on the authors mentioned in an existing reader 'Capita Selecta on Geo-visualization' (Lammeren 2003) and on the keywords geographic* information system*, GIS, visualiz*, particip*, and planning.

'Snowball method'

An interesting, though time consuming, method to find literature is to search for (references to) related literature in already known relevant literature. This literature can manually be looked-up in relevant readers, course books, unpublished literature reviews, articles etc. But it can also be traced automatically using the Web of Science or Citeseer and search for and browse through citations.

Searches with Internet Search Engines

Via search engines there was searched for recent publications (2000 and later) and if possible, the search was limited to files in pdf-format. Depending on the date on which the following queries were submitted to search engines, various numbers of hits were obtained. None of these search results were imported into the Endnote database, because the screening was too time consuming, but they can be retrieved via the respective URLs. There was no search performed with the Copernic Agent.

Query-Google 1: (467 hits)

Search string: (geovisualization OR 'geo visualization' OR 'geographic visualization') filetype:pdf (participation OR participatory OR involvement OR collaborative) (last year, English)

URL: <http://digbig.com/4cmyd>

Query-Google 2: (370 hits)

Search string: (geovisualization OR 'geographic visualization') filetype:pdf (participation OR participatory OR collaborative) (tool OR tools) (last year, English)

URL: <http://digbig.com/4cmkq>

Query-Yahoo: (630 hits)

Search string: (geovisualization OR 'geographic visualization') (participation OR participatory OR collaborative) (tool OR tools)

URL: <http://digbig.com/4cmye>

Query-AskJeeves: (177 hits)

Search string: (ppgis AND visualization AND tools) (after 2000)

URL: <http://digbig.com/4cmyf>

Query-Scirus 1: (85 hits):

Search string: (geovisualization OR 'geo visualization' OR 'geographic visualization') AND ((participation OR participatory OR collaborative) AND (tool OR tools)) (after 2000) (All journal sources and all web sources)

URL: <http://digbig.com/4cmyg>

Query-Scirus 2: (54 hits)

Search string: ppgis (tool OR tools) (3D OR 2.5D)

URL: <http://digbig.com/4cmyh>

Searches on Websites of Congresses & Symposia

Only two conferences (Agile and Eurographics) that took place in 2004 were screened for relevant articles. Congress articles are often available (as full text) on the Internet, but are usually not disclosed bibliographically which makes the searches time-consuming. Other relevant congresses & symposia yet to be screened are mentioned in Appendix 4 : Relevant Congresses and Symposia.

Searches based on readers

The literature mentioned in the existing reader 'Capita Selecta on Geo-visualization' (Lammeren 2003) was added to the Endnote database.

Searches based on course books

The literature from the following selected relevant course books, still has to be added to the Endnote database:

- PHLO course 'Participatory planning'
- PHLO course 'Tools for participatory planning'
- WING course 'Process facilitation'

Searches based on unpublished literature reviews

The literature to which is referred to in some existing reviews ((Câmara 2004), (Lammeren and Hoogerwerf 2003)) still has to be added to the Endnote database.

Ad hoc tips for literature

Various partners involved in the PSPE-project were asked to provide relevant literature which they collected recently for their personal research activities.

5 Brief discussion of results

In this chapter the search results of phase 1 of the search strategy are analyzed and discussed briefly. For the analyses, Endnote database version 1.6 was used. An overview of the search results is provided in Appendix 1: Export file Endnote database on cdrom.

The searches have been performed according to the search strategy as described in chapter 4: Search strategy. In addition to the postponed actions which are described in chapter 4, it should be mentioned that the assessment of the search strategy is restricted by the fact that the screening and classification of the references which are already imported into the Endnote database was not completed. Both activities proved to be too time consuming and were therefore postponed.

5.1 Analyses of literature sources

In Table 1: Overview screening of search results, the screening results are summarized per literature source. In this table data which can not be obtained because the references were not screened yet, is marked with ‘-’.

The first column in the table states the various literature sources. The following columns respectively state the number of search results per source, the percentage of the total amount of original search results –including and excluding the search engine results-, the amount of bibliographical records that were imported into the Endnote database after the search results were screened on relevance and the percentage of the total amount of relevant search results. In the last column the amount of relevant search results is compared to the amount of original search results and can therefore be regarded as an indication of the ‘success rate’ of each literature source.

Table 1: Overview screening of search results

Literature Source	number of original hits	% of total original hits	% of total original hits (excl. search engines)	number of relevant hits	% of total relevant hits	% relevant of original hits
Internet (search engines)	1783	76	-	-	-	-
Citeseer	96	4	17	37	11	5
CAB Abstracts + Geobase + Science Citation Index	186	8	33	66	19	35
ad hoc (other)	71	3	12	71	21	100
Web of Science	70	3	12	55	16	79
ad hoc (participation)	43	2	8	40	12	93
ad hoc (visualization)	37	2	6	36	10	97
Bookfind	37	2	6	3	1	8
Wageningen Union Catalogue	32	1	6	14	4	44
Internet (congresses & symposia)	-	-	-	23	7	-
readers	-	-	-	-	-	-
course books	-	-	-	-	-	-
unpublished literature reviews	-	-	-	-	-	-
Total	2355	100	-	345	100	15
Total (excl. search engines)	572	-	100	345	100	60

Based on the amount of original search results (2355) it looks like the Internet search engines constitute the most important sources of literature (76%). But as these search results were not screened, it is unclear how important this source actually is.

Limiting the search engine results (to 572) by excluding the search engine results, the order of importance of the ‘automated’ literature sources (74% in total) based on the original amount of search results is: the CAB Abstracts-Geobase-Science Citation Index (33%), Citeseer (17%), Web of Science (12%), Bookfind (6%) and Wageningen Union Catalogue (6%). The ‘manual’ ad hoc sources seem less important in this overview (26% in total).

However, in the overview of screened search results, the ‘manually’ ad hoc sources have the highest success rates (100%, 97% and 93%). After screening almost all these ‘tips’ proved to be relevant. From the ‘automated’ searches, the Web of Science is the one which yields the most relevant literature (79%). The success order of the remaining ‘automated’ sources is: Wageningen Union Catalogue (44%), the CAB Abstracts-Geobase-Science Citation Index (35%), Bookfind (8%) and Citeseer (5%).

The various search results were initially stored in different Endnote databases. As the databases were integrated, it became apparent that *little overlap* exists between these collections of literature, which suggests that the selected sources are *complementary*. If the overlap with the search results obtained via search engines would also prove to be small (after screening of the search results) this would suggest that a lot of relevant literature can not be found in more traditional sources of literature such as the bibliographical databases & indexes.

From all the originally yielded literature (excluding the search engine results) currently 60% proved to be relevant after screening which suggests that the search strategy is relatively efficient. But because the references from the Internet, readers, course books and unpublished literature reviews are not screened yet, it is currently not possible to assess to what degree these sources are important for the study.

5.2 Analyses of reference types per literature source

In Table 2: Overview Reference Types per Literature Source the search results are summarized according reference type and literature source. In this table data which can not be obtained because the references were not screened yet, is marked with ‘-’ and data which is incomplete for the same reason is underlined.

Currently, the most important type of references for this study seem to be journal articles (62%), articles from conference proceedings (14%), book sections (10%) and books (9%). Less important in the overview are electronical sources (2%). Finally, manuscripts, reports and thesis seem to be of minor importance (each 1%). However, it should be repeated here that the importance of reference types such as electronical sources and articles from conference proceedings could change dramatically, once the screening of the literature from sources such as Internet (both search engines and websites of conferences and symposia), readers, course books and unpublished literature reviews will be completed.

As currently journal articles and articles from conference proceedings seem to be the most important reference types, these are discussed more in detail in the following paragraphs.

Table 2: Overview Reference Types per Literature Source

literature source / reference type	books	book section	conference	edited book	elec. Source	journal articles	magazine article	manuscript	report	thesis	total per source	% of total references
CAB Abstracts + Geobase + Science Citation Index		1	1			64					66	19
Web of Science		2				53					55	16
Citeseer			7			27			2		36	10
Internet (congresses & symposia)			23								23	7
Bookfind Online	3										3	1
Wageningen Union Catalogue	5	9									14	4
Internet (search engines)	-	-	-	-	-	-	-	-	-	-	-	-
ad hoc (visualization)	3	4	6		8	9	1	4	1		36	3
ad hoc (participation)	14	1				23			1	1	40	12
ad hoc (other)	6	17	10	1		35				1	70	20
Internet (congresses & symposia)	-	-	-	-	-	-	-	-	-	-	-	-
readers	-	-	-	-	-	-	-	-	-	-	-	-
course books	-	-	-	-	-	-	-	-	-	-	-	-
unpublished literature reviews	-	-	-	-	-	-	-	-	-	-	-	-
total per reference type	31	34	47	1	8	211	1	4	4	2		
% of total references	9	10	14	0	2	62	0	1	1	1		

5.3 Analyses journal articles

Currently 211 references (61% of all records in the database) are journal articles. The traditional sources of literature such as CAB Abstracts, Geobase, Science Citation Index and Web of Science seem to be of particular importance to trace relevant journal articles. As there is little overlap between the references found with these sources and the ad hoc sources, it should be checked which important journals are covered by which type of source. The latter is required to be able to update the database efficiently by means of so-called alerting service. Landscape and Urban Planning is by far the most important journal which is currently referred in the references, followed by the four other journals mentioned in table 3.

An existing list of journals which was decided to be regarded as key-journals for publications in the field of visualization and communication, was completed with the journals that emerged from this analyses. The journal 'Landscape and Urban Planning' was lacking in this list. See Appendix 2: List of Journals.

Table 3: Analyses of Journals

Journal title	Number of journal articles	% of 211 records
Landscape and Urban Planning	29	14
Environment and Planning B : Planning and Design	16	8
Computers and Geosciences	15	7
International Journal of Geographical Information Science	14	7
Computers, Environment and Urban Systems	8	4

5.4 Analyses articles from conference proceedings

Currently 47 references (14% of all records in the database) are articles from conference proceedings. Most of these articles (49%) were found on the respective websites of the conferences. However ad hoc sources (34% in total) also proved to be very useful to find this type of literature.

For the articles from conference proceedings, neither Geobase nor Citeseer yield much relevant literature, although this was assumed in chapter 2. It should therefore be checked which important conferences and symposia are not covered by these traditional sources and should therefore be screened directly (via the Internet or ad hoc). The screening of the websites of relevant congresses should be completed based on a list of most important conferences & symposia (see Relevant Congresses and Symposia). This list should still be completed with conferences on participatory planning issues, as these currently lack in the list.

Table 4: Analyses of Articles from Conference Proceedings

Literature source	Number of articles from conference proceedings	% of 47 records
Geobase, Cab Abstracts & Current Contents	1	2
Citeseer	7	15
Websites of Congresses & symposia	23	49
ad hoc tips	6	13
ad hoc (other)	10	21

5.5 Analyses preliminary classification of literature

A start was made with the classification of the references into the sub-domains which are discussed in chapter 2: Selection of relevant. Currently only 40% of the references are classified. In Table 5: Overview of Preliminary Classification of Literature the results are summarized. Most of the classifications are based on the available abstracts in the Endnote database, because currently only for 160 records

the full copy of the literature is available in the article repository (see also Appendix 3: Screen dumps Workplace Viscom group and VPO PSPE project) and because time lacked to study all these articles. The classification of the references proved to be a difficult and time-consuming task, and much of the literature seems to covers multiple sub-domains.

Currently most of the literature is classified in the sub-domain on the methodology to visualize multi-dimensional geo-data (61% of all classified literature in the database). There is also a lot of information on the geo-referencing of data models (35%), levels of participation (24%), interfaces (22%), software (18%) and perception (17%). The database currently contains less classified information on multi-user environments (10%), concepts of ICT-technology (7%), simulation models (6%) and spatial planning in general (4%).

With regard to the overlap between the various sub-domains, the sub-domains that are most linked to other sub-domains include spatial planning in general (100%), use of models (38%), software (36%), perception (25%), levels of participation (24%) and methodologies to visualize geo-data (21%). The literature about interfaces (16%), multi-user environments (14%), concepts of ICT-technology (11%) and data models (6%) seems to be least related to other sub-domains, based on the current preliminary classification. There was no analyses made of the exact overlap between the various sub-domains, as the current classification (of 40% of the references) is too preliminary.

Table 5: Overview of Preliminary Classification of Literature

Name of sub-domain	Code of sub-domain	Number of records labelled with this sub domain (and others as well)	% of total amount of labelled records	Number of records labelled with this sub domain only	% of records labelled with this sub domain
Methodology to visualize multi-dimensional geo-data	2	84	61	18	21
Geo-referenced data models	1	48	35	3	6
Levels of participation and the demands related to these levels	6	33	24	8	24
Dedicated interfaces regarding immersion, navigation, manipulation and feedback, augmented VR	5	31	22	5	16
Specific software/applications to create geo-visualizations	10	25	18	9	36
Perception of visualizations	3	24	17	6	25
Set up and conditions of Multi-user environments	7	14	10	2	14
Concepts of ICT-technology to disseminate geo-visualizations	8	9	7	1	11
Connection between spatio-temporal simulation models and 3D visualization interfaces	4	8	6	3	38
Spatial Planning	9	5	4	5	100

6 Endnote database and article repository

6.1 Documentation

The bibliographical information of the search results was copied to one single Endnote database. Readily available articles were stored in an article repository (see also following paragraphs).

Three custom fields of the Endnote database are used to complete the bibliographical information with information on the literature source (custom field 1), copy write information (custom field 2) and classification (custom field 3).

Custom field 1

The purpose of this field is to keep track of the history of the compilation of the Endnote database and to be able to contact the person who provided the literature in case of doubt. The codes correspond with various literature sources.

Table 6: Key to codes in custom field 1

Code in custom field 1	Corresponding Literature Source
1a	Geobase, Cab Abstracts & Current Contents
1b	Web of Science
2	Citeseer
3	Websites of congresses & symposia
4a	Bookfind Online
4b	Wageningen Union Catalogue
5	Internet Search Engines
6a	ad hoc tips on visualization from: Irene Pleizier (Vrije Universiteit)
6b	ad hoc tips on visualization from: Antonio Camara (New University Lisbon)
6c	ad hoc tips on visualization from: Arend Ligtenberg (WUR)
6d	ad hoc tips on visualization from: Eduardo Diaz (Vrije Universiteit)
6e	ad hoc tips on visualization from: Ron van Lammeren (WUR)
7	ad hoc tips on participation from: Arend Ligtenberg (WUR)
8	ad hoc tips on various topics from: Tessa Hoogerwerf, Hilbert Davelaar, Ron van Lammeren (WUR)

Custom field 2

The purpose of this field is to be able to quickly select all literature that WUR is allowed to share with partners outside WUR. This field is not yet completed for all records, because this was too time consuming.

The default value for this field is 0. When adding a new record to the database, the code should be either 1 or 0. The code '1' is used to indicate the literature is public and may be distributed freely. E.g. articles published on Internet.

The code '0' is used for literature which may NOT be distributed freely. E.g. articles from electronical journals. The code '0' is default and should be used is it is uncertain whether the literature may be distributed freely. Hans Fransen (Haaff library WUR) is to be contacted in case of doubt.

Custom field 3

The purpose of this field is to classify the literature in the database into relevant sub-domains. See also Chapter 2: Selection of relevant. The default value for this field is 'algemeen'. Records that show the default value have not been classified yet. See also Table 5: Overview of Preliminary Classification of Literature.

Table 7: Key to codes in custom field 3

Code in custom field 3	Corresponding Sub-domain
1	Geo-referenced data models
2	Methodology to visualize multi-dimensional geo-data
3	Perception of visualizations
4	Connection between spatio-temporal simulation models and 3D visualization interfaces
5	Dedicated interfaces regarding immersion, navigation, manipulation and feedback, augmented VR
6	Levels of participation and the demands related to these levels
7	Set up and conditions of Multi-user environments
8	Concepts of ICT-technology and environments to disseminate geo-visualizations
9	Spatial Planning
10	Specific software/applications to create geo-visualizations

URL field

It would be favourable that hyperlinks are added to the URL field in the Endnote database, which direct to the pdf-files in the repository. This has not been done yet, because of a lack of available time.

6.2 Application and distribution

An important advantage of the use of Endnote is the possibility to generate bibliographies or reference lists in any desired formatting style, which can be automatically incorporated in word documents. As such the database and the article repository facilitate the work:

- on the development of the theoretical framework in Interrreg 3c PSPE project
- on publications made by the WUR viscom group⁴
- of PhD & Msc students working on the subject of geo-visualization and/or participatory planning at WUR
- on other related projects conducted at WUR
- process consultancy by partners within WUR such as WING (participatory planning)
- the development of a WUR PHLO course ‘Gebruik van planvorming ICT-tools’

The Endnote database is currently distributed via the WUR viscom workplace and the virtual project office of the PSPE project (see Appendix 3: Screen dumps Workplace Viscom group and VPO PSPE project). The database can only be used in combination with a license for the Endnote software, which can easily be obtained via the website of the producer <http://www.Endnote.com/>. However, the software allows to export a selection of the bibliographical information to various formats such as .txt or .html.

The articles are currently only distributed (in pdf-format) via the WUR viscom workplace. The literature from electronical journals are subject to copy-write restrictions and sub-scripters are not allowed to distribute these articles. As it is unclear whether or not PSPE partners have subscriptions to these electronical journals, and as it is not yet determined yet for all articles referred to in the Endnote database whether or not they are subject to copy-write restrictions, it was decided not to actively distribute the articles outside WUR.

6.3 Maintenance

Figure 2 illustrates the workflow related to the construction and maintenance of the Endnote database and the article repository. For records from the traditional bibliographic databases the import of bibliographic information into Endnote works perfectly. However, for the generation of an Endnote database from other literature sources, the bibliographical record (if available at all) can only partly be automatically converted. This part is called the *BibTeX entry*. Abstracts and all other bibliographical information have to be transferred to Endnote by hand, which is a time-consuming activity.

It is clear that the maintenance of the database and article repository is an important, but time consuming activity. Currently the updates are produced by researchers working on the DWK and the PSPE project. But after completion of these two projects, updates will depend entirely on the discipline of individual viscom-members.

⁴ In the ‘viscom’ group researchers as well as Msc- and Phd-students who are working on visualisation and communication issues at WUR, meet for exchange of experiences and ideas.

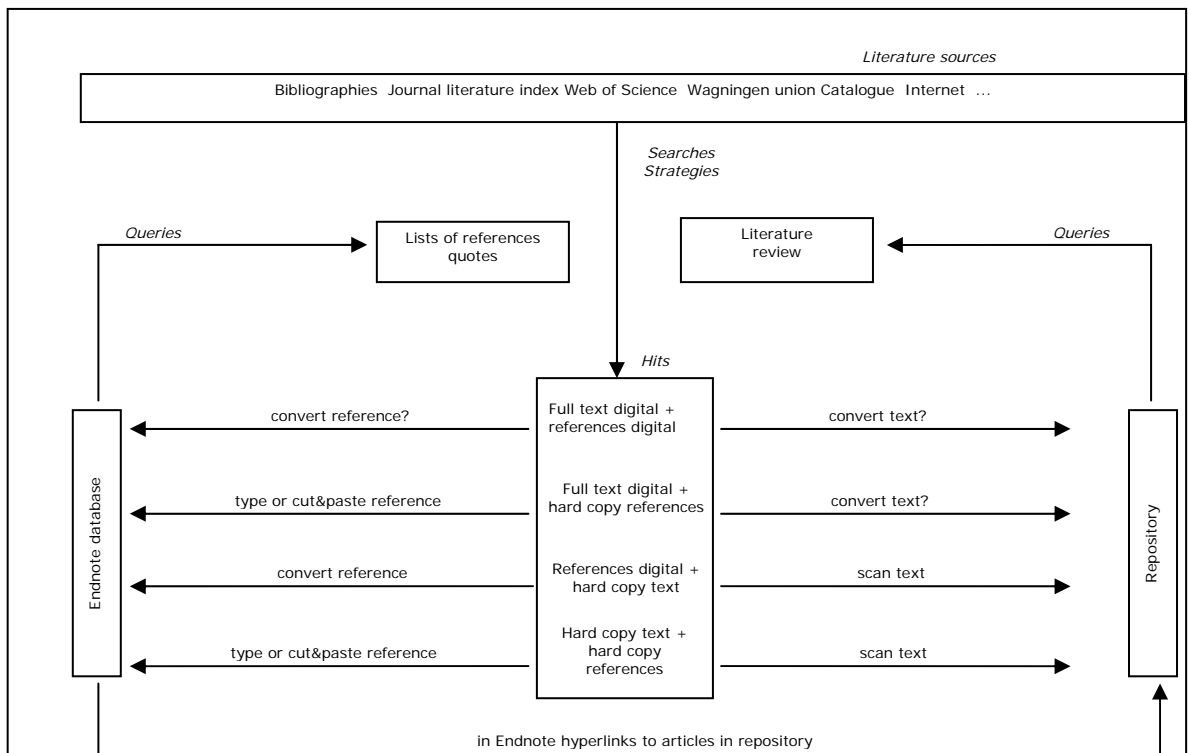


Figure 2: Workflow Endnote Database & Article Repository

7 Conclusions & recommendations

Search strategy

In order to be able to fully assess the search strategy, the screening of literature sources such as search engines, websites of conferences and symposia, readers, course books and unpublished literature reviews as well as the screening and classification of a remaining 60% of the references should be completed. However, based on the available information it is concluded that the search strategy which was developed for this study is partly successful in terms of retrieving literature which is relevant to the various targeted sub-domains.

With regard to the identification of relevant *keywords*, the fact that 60% of the search results appear to be relevant for the subject in its whole, is significant. It means that for the literature sources with the highest success rates, the respective keyword queries (listed in chapter 4) were rather appropriate. However, based on the classification of 40% of the references, currently a number of targeted sub-domains still seem to be underrepresented in the database. These sub-domains are multi-user environments, concepts of ICT-technology, simulation models and spatial planning in general. It is therefore recommended that at least for these sub-domains new queries are constructed and applied with the literature sources with high success rates (see later). It is also recommended that per literature source the most ideal search strategy is developed. For the sources with the lowest success rates -Bookfind and Citeseer-, it is possible that the keyword queries were not appropriate or that the source is simply not relevant for the subject of the study.

With regard to the identification of relevant *sources of literature*, the ad hoc sources, the CAB Abstracts-Geobase-Science Citation Index, the Web of Science and to a lesser degree Citeseer are the sources of literature with the highest success rate for this study. It is assumed however that the literature sources which yet have to be screened will also prove to be very important. These sources are: Internet search engines, websites from congresses and symposia readers, course books and unpublished literature reviews. In this context it is suggested that the list of important conferences should still be completed with conferences on participatory planning issues, as these currently lack in the list. In addition it is also recommended that additional literature sources are be searched, such as newly available search engines Scopus and Google Scholar.

Because the search results obtained from the different literature sources show little overlap, it is concluded that the various literature sources are complementary to each other. If the overlap between the search results obtained via Internet search engines and the more traditional sources of literature will prove to be small, this would suggest that a lot of relevant literature can not be found in the traditional sources.

The most important reference types for this study seem to be journal articles and articles from conference proceedings. Most likely the electronical sources and

manuscripts will prove to be important as well after screening of the remaining sources (*supra*). Assuming a journal or conference is not covered by a secondary literature source like CAB Abstracts or Citeseer, the articles will need to be searched for directly in publications of publishers, such as websites from journals or conferences. Therefore it is recommended that for the most important sources of literature it is analyzed which journals and conferences are covered.

Maintenance of database and article repository

The literature sources with the highest success rates should be re-searched regularly in order to keep the collection of literature up-to-date. Suggestions per reference type are stated below:

- *Journal articles*: The publication of new journal articles can directly be monitored via alerting services of the Wageningen Library (see Appendix 2: List of journals) or via repeated searches in updates of the bibliographies & indices. Furthermore the Web of Science is important for this type of reference and could be re-searched with an updated list of authors (namely those currently presented in the database). In addition Citeseer (and/or Google Scholar) could be used to update the database, especially making use of the snowball method. Also the available electronical journals which are not covered by the traditional secondary sources should be systematically searched for relevant articles. Finally the ad hoc methods proved to be successful for the collection of relevant literature. Therefore it is recommended that this network with fellow researchers is maintained pro-actively and that it is regularly inquired about additional literature.
- *Articles from conference proceedings*: Websites of conferences & symposia, as well as Citeseer and ad hoc methods should regularly be screened for relevant articles from conferences and symposia. For this purpose the list of important conferences should be kept up-to-date.
- *Book section and books*: Once the Wageningen Union Catalogue is searched for relevant titles, it is probably sufficient to use the ad hoc method (*supra*) to keep the collection up-to-date for this type of literature. However, alerting services (both of Wageningen Union Catalogue and Bookfind Online) might prove to be useful in this context.
- *Electronical sources*: If the search results obtained with the queries which were developed for the various Internet search engines largely prove to be relevant, it would be favourable to re-submit the queries to the engines regularly. However, the problem which will remain is the fact that the screening and import into Endnote of bibliographical information for this e-literature is very time consuming. Some search engines, such as Scopus, provide alerting services.

Classification & Application

The database and article repository have already proved -even in their current state- to be very useful instruments for the *initiation and consolidation of the research work* which is conducted at WUR. Amongst other applications are: Msc-projects, the writing of a PhD-proposal, the completion of an article on the level of detail in geo-visualization, the production of a database of geo-visualization tools, the development of a

theoretical framework on the use of geo-visualization in participatory planning and the work a DWK-deliverable on geo-visualization.

In this context it is recommended that -once the screening and classification of the references is completed- the relations between references that link one or more sub-domains is studied in depth. By doing so, assumptions with regard to the relations between sub-domains could be verified in the PSPE-project (and other related future projects). For this purpose specialized tools could be used which are currently developed to visualize relations between various field of research. An example of such a tool is Touchgraph (<http://www.touchgraph.com>), which facilitates the Citeseer and Amazon browser.

For distribution purposes, it is recommended that the inventory is completed of articles of e-journals which may not be distributed outside WUR (and even not without the university). It would also be favourable to complete the URL-field of the references with hyperlinks to the full texts in the article repository once these are available. A last recommendation concerns the use of the Endnote software. Version 8 has become available with which there are no longer limitation to the size of the database. Therefore it may be favourable to convert the current version of the Endnote database (version 7) to version 8.

Literature

Câmara, A. S. (2004). Review: Virtual reality and the simulation of Europe's land use in the xxi century. In Press.

Lammeren, R. v., Ed. (2003). Capita Selecta Geo-Visualization GRS-50302, reader part 1. Capita Selecta Geo-Visualization. Wageningen, Wageningen University.

Lammeren, R. v. and T. Hoogerwerf (2003). Geo-virtual reality and participatory planning: Virtual Landscape Position paper version 2.0. CGI-rapport2003-07. Wageningen, Wageningen University and Research: 61 p.

Appendix 1 Export file Endnote database on cdrom

Cdroms available with the authors.

Appendix 2 List of Journals

This is a list of the most important journals which publish on geo-visualization & (participatory) spatial planning. Originally composed by M. Wachowic, R. van Lammeren and completed by M. Bloemmen, based on a search in de Wageningen Union Catalogue and on an analyses of the current Endnote database.

1. **Computer and Visualization in Science** (4 issues per year, Springer): Aims to provide a platform for scientists from mathematics, computer science, physics, chemistry, environmental sciences, biosciences, and engineering willing to cooperate in solving challenging scientific and technological problems.
2. **Journal of Visualization** (4 issues per year, IOS Press): focuses on the techniques of experimental visualization and computer-aided visualization for providing information on a wide range of applications in engineering, physics, medical science, agriculture, oceanography, meteorology, and sports science for both researchers and technicians.
3. **IEEE Transactions on Visualization and Computer Graphics** (4 issues per year, IEEE): designed to inform readers on the state of the art in a number of specialized fields related to computers and computing. These include subjects related to visualization and computer graphics techniques, systems, software, hardware and user interface issues. Specific topics include, but are not limited to: a) visualization techniques and methodologies; b) visualization systems and software; c) volume visualization; d) flow visualization; e) information visualization; f) multivariate visualization; g) modelling and surfaces; h) rendering techniques and methodologies; i) graphics systems and software; j) animation and simulation; k) user interfaces; l) virtual reality; m) visual programming and program visualization; and n) applications
4. **Information Visualization** (4 issues per year, Palgrave MacMillian): A new academic journal aiming to act as a dedicated forum for the theories, methodologies, techniques and evaluations of information visualization methods and their applications in engineering, geography, and psychology.
5. **Computer Animation and Virtual Worlds** -Formerly known as The Journal of Visualization and Computer Animation (5 issues per year, John Wiley@ Sons): aims to publish research papers on the technological developments (both hardware and software) that will make animation tools more accessible to end-users. It will also publish on new application areas for animation films and will commission and encourage submissions of case studies to demonstrate to film makers what techniques have previously been drawn on and their results.
6. **Journal of Visual Languages and Computing**: a forum for researchers, practitioners, and developers to exchange ideas and results for the advancement of visual languages, and its implication to the art of computing.
7. **Geoinformatica** (4 issues per year, Kluwer): forum for disseminating original and fundamental research and experience in the use of computer science for spatial studies. The topics that are addressed include, but are not limited to: Spatial Modeling, Spatial-Temporal Databases: Human-Computer Interfaces for

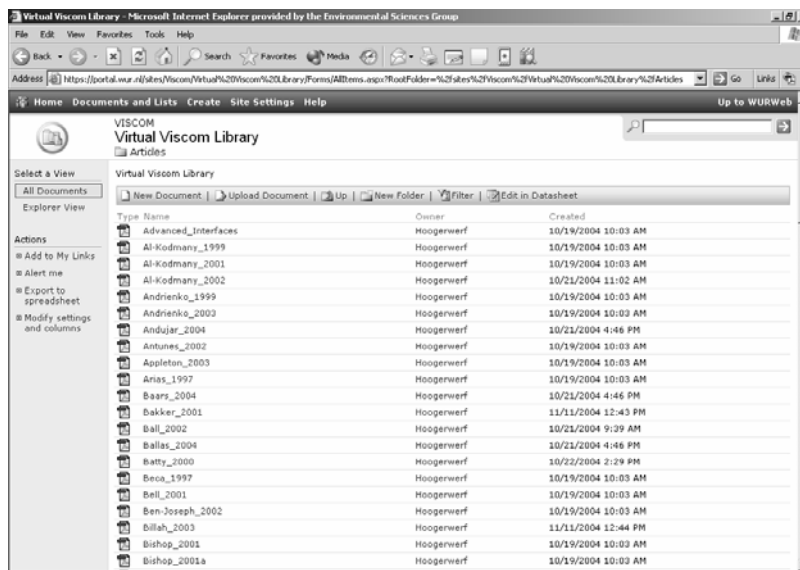
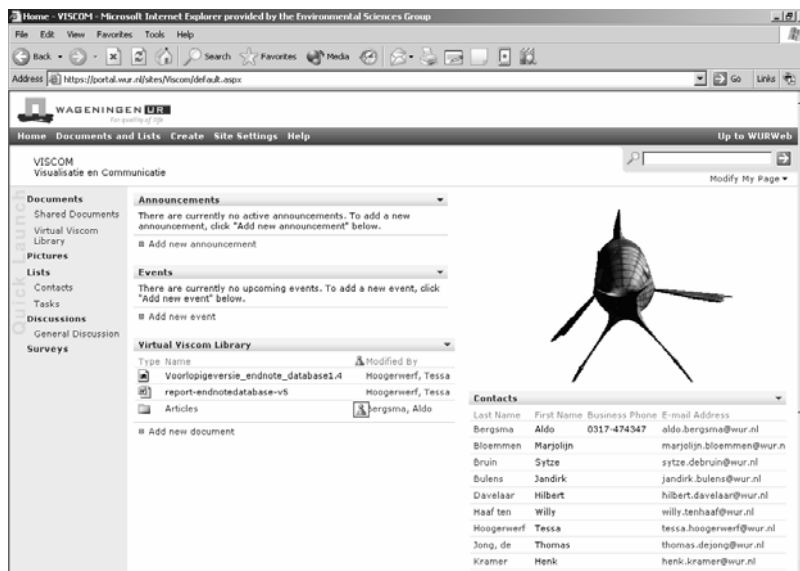
- GIS, Digital Cartography at the Core of GIS, Space Imagery in GIS, Parallelism, Distribution and Communication through GIS: and Spatio-Temporal Reasoning.
8. **International Journal of Geographical Information Science** (8 issues per year, Taylor and Francis): forum to exchange original ideas, techniques and approaches and experiences in the rapidly growing field of geographical information sciences.
 9. **Computers and GeoSciences** (10 issues per year, Elsevier): devoted to all aspects of computing in the geosciences. It brings to its readers information about databases, data structures, computer graphics, numerical methods, simulation models, statistical and expert system methods, image analysis, spatial analysis and other topics of interest to geoscientists working with computers. The term Geoscience is used in its broadest sense, encompassing geology, geophysics, geochemistry, geomathematics, oceanography, environmental science, hydrology, geography, remote sensing and geographic information systems.
 10. **Cartography and Geographic Information Science** (4 issues per year), is a peer-reviewed publication of the Cartography and Geographic Information Society on the role of surveying and cartography in land management, the national economy, and the national infrastructure through the provision of reliable geo-information.
 11. **Journal of Geographical Systems** (4 issues per year, Springer-Verlag): dedicated to geographical information, analysis, theory, and decision, aims to encourage and promote high quality scholarship on important theoretical and practical issues in regional science, geography, the environmental sciences, and planning. One of the distinctive features of the journal is its concern for the interface between mathematical modelling, the geographical information sciences, and regional issues. An important goal of the journal is to encourage interdisciplinary communication and research, especially when spatial analysis, spatial theory and spatial decision systems are the themes. In particular, the journal seeks to promote interaction between the theorists and users of the geographical information sciences and practitioners in the fields of regional science, geography, and planning.
 12. **The Cartographic Journal** (2 issues per year, The British Cartographic Society) publishes material covering all aspects of cartography, the science and technology of presenting, communicating and analysing, spatial relationships by means of maps, and other graphical representations of the Earth's surface. This includes some coverage of the related technologies of for example; Remote Sensing and Geographical Information Systems, where it is deemed to be appropriate. Papers are published in two categories; Refereed Papers, and Shorter Papers. The latter comprises a variety of subject matter, from conference reports, technical matters and historical notes, to reminiscences, interviews, personal opinions and innovations.
 13. **Cartography – The Journal** (2 issues per year, Mapping Sciences Institute, Australia): theory and development of the mapping sciences.
 14. **Environment and Planning B** (4 issues per year, PION): leading edge research in the application of formal methods, methods models, and theories to spatial

problems which involve the building of the environment and spatial structure of cities and regions. The journal also specializes in new approaches to planning and design methods which explore ways of generating and evaluating optimal plans and policies.

15. **Computers, Environment and Urban Systems** (6 issues per year, Elsevier): multidisciplinary forum focused on the development, enhancement, and use of computer-based methodologies for understanding and improving environmental and urban systems.
16. **URISA Journal** (up to 4 issues per year): is a peer-reviewed publication of the Urban and Regional Information Systems Association. Articles are accepted for publication in the following areas: Urban and Regional Information Science, Applications, Social, Organizational, Legal and Economic Sciences, Geographic Information Science, Information and Media Sciences (e.g. web GIS), Spatial Data Acquisition and Integration, Geography, Cartography and Cognitive Science as well as Education
17. **GeoJournal** (4 issues per year, Kluwer): focused on the links between the transformation of modern society, technological development and environmental change, as interpreted by human geography and related sciences. The sphere of interest of the journal encompasses all relevant processes reshaping human activity patterns in different parts of the world, the methods of their analysis and the forms of application of geographical knowledge in planning and forecasting.
18. **Landscape and Urban planning:** (min 12 issues per year, Elsevier): A journal concerned with conceptual, scientific, and design approaches to land use. By emphasising ecological understanding and a multi-disciplinary approach to analysis and planning and design, it attempts to draw attention to the interrelated nature of problems posed by nature and human use of land. In addition, papers dealing with ecological processes and interactions within urban areas, and between these areas and the surrounding natural systems which support them, will be considered. Papers in which specific problems are examined are welcome. Topics might include but are not limited to landscape ecology, landscape planning and landscape design. Landscape ecology examines how heterogeneous combinations of ecosystems are structured, how they function and how they change. Landscape planning examines the various ways humans structure their land use changes. Landscape design involves the physical strategies and forms by which land use change is actually directed. Landscape and Urban Planning is based on the premise that research linked to practice will ultimately improve the human made landscape.

Appendix 3 Screen dumps Workplace Viscom group and VPO PSPE project

The following screen dumps give an impression of the distribution of the results of the literature search. The first two image are drawn from the Viscom workplace. The last image is from the Virtual Project Office of the PSPE project.



Document Library View - Microsoft Internet Explorer provided by the Environmental Sciences Group

Home | Documents | Discussion Boards | Lists | Create | Site Settings | Help

Participatory spatial planning in Europe Component 2

Approaches for Doing
Responsible partner: Wageningen University

New Document | Upload Document | Filter | Subscribe Modify settings and columns

Title	Edit	File Size	File Name	Last Modified	Modified By
report literature review v2		195 KB	report-literature-review-v2	12/9/2004 1:52 PM	Marjolijn Bloemmen
endnote database		663 KB	Voorlopigeversie_endnote_database1.4	12/9/2004 1:40 PM	Marjolijn Bloemmen
framework-v1.mdb		2,016 KB	framework-v1	0/27/2004 5:28 PM	Marjolijn Bloemmen
framework-v6.doc		709 KB	framework-v6	8/27/2004 5:28 PM	Marjolijn Bloemmen
guidelines position papers		162 KB	Guidelines	7/29/2004 8:39 PM	Marjolijn Bloemmen
hyperlinks to websites about tools in access database		6 KB	tools	9/29/2004 1:51 PM	Marjolijn Bloemmen
mintzberg.PH9		60 KB	mintzberg	8/27/2004 5:29 PM	Marjolijn Bloemmen
minutes 090804		46 KB	Minutes-090804	8/27/2004 5:27 PM	Marjolijn Bloemmen
minutes 160804		44 KB	Minutes-160804	8/27/2004 5:27 PM	Marjolijn Bloemmen
minutes 260804		44 KB	Minutes-260804	8/27/2004 5:38 PM	Marjolijn Bloemmen
position paper r. van lammeren		1,634 KB	PositionPaper21	6/24/2004 12:51 PM	Marjolijn Bloemmen
report endnote database		104 KB	report-endnotedatabase-v5	12/9/2004 1:47 PM	Marjolijn Bloemmen
report marketing research		77 KB	report-marketing-research-v2	12/9/2004 1:46 PM	Marjolijn Bloemmen
review a. camara		2,157 KB	viaASC-antonio	6/24/2004 12:51 PM	Marjolijn Bloemmen

Internet

Appendix 4 Relevant Congresses and Symposia

The current list of relevant congresses was compiled by M. Wachowicz, and is currently completed by T. Hoogerwerf. Special attention will be given to congresses on participatory planning issues.

- Digital Creativity Symposium 2000
- GIScience: International Conference on Geographic Information Science
- Annual International Conference on GeoInformatics
- GIN Nederland
- Annual International Conference On Visualization, Imaging and Image Processing
- VIS
- IEEE ViS
- Information Visualization
- Agile
- Eurographics

