Delft Cluster

Title:	**Delft Cluster : Knowledge mapping, Virtual knowledge centre and Special Interest group for DC libraries**

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Abstract

Virtual Knowledge Centres, Knowledge Maps and Communities of Practice are valuable tools in knowledge management. They can be used to elicit, share, learn and create knowledge as well as enable better decision-making, assess an organization's knowledge culture and overcome conflicting or competing issues.

This report accounts of development, implementation and evaluation of two prototypes: a Virtual Knowledge Centre (DCKC) and a Knowledge Map (Tunnel Center) in the area of tunnelling. Also the functioning of the Community of Practice of Delft Cluster librarians (SIG-L) is analyzed and evaluated.

PROJECT NAME:	**DC Corporate Knowledge map** **Hybrid Information Centre** **Knowledge Exchange Facilities**	PROJECT CODE:	**07.03.02** **07.04.03** **07.04.04**
BASEPROJECT NAME:	**Corporate Knowledge Platform (CKP)** **Document and Content Management**	BASEPROJECT CODE:	**07.02** **07.04**
THEME NAME:	**Knowledge management**	THEME CODE:	**07**

Executive Summary

This is the end report of two Delft Cluster Projects in the Knowledge Management area: Knowledge Map and Document & Content Management. It contains the description and results of three subprojects:

Tunnel Center: For the Tunnel Center project a prototype version of the Delft Cluster Tunnel Center was built and implemented: http://www.kmap.ihe.nl/. The idea of this knowledge map is to help facilitate sharing of implicit information on tunnelling in soft soil by putting tunnel experts in touch with each other. The kmap helps to share information about organisations, people, tools, projects and grey literature. All these elements relate to the subject of tunnelling of course. For your understanding: grey literature is about documents that are not officially published. You may think of congress papers, internal reports, lectures etc. In this first phase potential end users will be researchers and advisors. Former Delft Cluster studies have shown that there is a need for a system like the Tunnel Center. There are now informal networks where this implicit information is being shared, but these networks are quite tight. It is difficult for newcomers and for those on the edge of the tunnel world to have access. The idea is that the Delft Cluster Tunnel Center will help to make the networks more open to others, and also to make the information that is shared in the networks more explicit, so that it can be shared more easily with a wider audience. Results of the evaluation of the prototype are positive.
The authors for this part of the report are Carla van den Berg and Ioana Popescu.

Hybrid Information Centre: A virtual knowledge centre on the subject of tunnelling in soft soil was built.. The Delft Cluster Tunnelling Knowledge Centre (DCKC) is a dedicated collection of internet links offering a prototype web guide to tunnel construction information; it has recently been opened for testing and evaluation by all interested parties from the GWW sector at: www.library.tudelft.nl/dckc .
The overall goal of the project was to build and evaluate a prototype virtual knowledge centre based on Delft Cluster interests. To test the KC concept, the prototype has been developed for the subject of Tunnel Construction. Because the built prototype is evaluated positively, the concept can be extended to cover other areas of DC activities.
The author of this part of the report is Charles Citroen.

The SIG-L project was aimed to set up and to facilitate the 'Special Interest Group' for DC libraries , a Community of Practice where librarians can learn from each other and can share their expertise, while maintaining independence within Delft Cluster. BTUD performs a co-ordinating and a facilitating role within this board. Active involvement and participation of all the DC libraries is a critical success factor. Once the principle of working collaboratively has been established, it can be embedded in DC organizations through softer initiatives like culture change programmes or training.
It will allow knowledge sharing between people working in similar topic areas. It will also make it easier for the librarians to get involved in DC Knowledge Management projects and initiatives.
The following goals have been realised:

- Visiting each other's work environment.
- Common training sessions (several lectures with external speakers)
- Sharing expertise / experiences.
- Finding out about relevant online resources / mega licences for DC libraries.
- A common digital workspace (BSCW)
- Preparations for sharing library catalogues (a project to be continued).
- Recently an evaluation has taken place among the SIG-L members. The reactions are positive about continuing SIG-L meetings in the future.

The author for the report for SIG-l is Zofia Brinkman-Dzwig

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Societal Impact

The knowledge economy of the Netherlands is under discussion. Dutch contribution on the world market is said to diminish because of the decline of interest in knowledge.

In the projects described in this report the project members try to find ways to use existing knowledge as efficiently as possible. They seek to do that by making sharing, expressing and retrieval of knowledge more easy. In a society that becomes more and more anonymous, individual and global, the professional worker has less and less insight in the developments that happen elsewhere in their working field. The project members attempt to find ways to improve this situation. Therefore they looked at networks, documents, organisations etc. The end results are promising. Users find sometimes information that is not available in their own networks. It asks from engineers more the use of electronic tools instead of their personal informal networks. This change is of course happening slowly; it demands a different attitude towards knowledge searching and sharing. The project team thinks this change is inevitable in the light of individualization and globalization.

The knowledge developed in the projects can be utilized by professionals on the same subject, communities of practice, organisations etc. who have the aim to share their knowledge.

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1 Introduction

"The mission of Delft Cluster is to generate and disseminate knowledge on the sustainable development of densely populated delta areas. Consequently, the generation and dissemination of knowledge are fundamental activities for Delft Cluster."
(Theme 7 Knowledge Management Research Programme 1999-2000, Dec 1999)

This report is the combined final deliverable of four Delft Cluster projects in the area of Knowledge Management:
1.   Hybrid Information Centre
2.   Knowledge Exchange Facilities
3.   Special Interest Group DC Libraries
4.   Corporate Knowledge Map

An overview of the relationships and responsibilities of these projects is given in the table below:

Project number and title		Principal	Project leader	Documents produced
07.04 *Document and Content Management*	07.04.01 *Review and Strategy*	J. Halmos (BTUD)	C.Citroen (BTUD)	(1)Refer to final report "End Report Review and Strategy (Sept 2001)
	07.04.01.02 *Text Mining*	R. Price (IHE)	S. Velickov (IHE)	(2)Refer to final report ''Text Mining for Document Management'' (Aug 2001)
	07.04.02 *Hybrid Information Centre (HIC)*	J. Halmos (BTUD)	C.Citroen (BTUD)	This report
	07.04.03 *Knowledge Exchange Facilities (KEF)*	J. Halmos (BTUD)	C. van den Berg (BTUD): *DC Grey base* Z. Brinkman (BTUD): *Special Interest Group DC Libraries*	This report
07.02 *Corporate Knowledge Platform*	07.02.03 *Corporate Knowledge Map*	R. Price (IHE)	I. Popescu (IHE)	(1)User requirements report (2)Analysis of tools and methodologies (3) this report

Other important components of the projects are:
- Klankbordgroep - Feedback from the DC participants was organised in the 'Document & Content Management Klankbordgroep', consisting of representatives of all 5 DC organisations. Refer to a list of members in Appendix B3.
- Users Group - The ultimate users of the prototypes are the crucial measure of success. Therefore, a 'Gebruikersgroep' was put together from several projects and partner organisations.

Four projects, one report?

Because the four projects were largely carried out together, the project teams decided to give account of their work in one combined report. To understand why the projects were carried out together, it is necessary to explain a bit of the background and organisation of the two projects.

1.1.1 07.04 Document and Content Management

The *Document and Content Management* project, performed by Delft University of Technology Library (BTUD), started with the subproject *'Review and Strategy'*. This subproject involved some 60 interviews in all five DC partner organisations, which were analysed and used to formulate a strategy for a significant part of the DC knowledge management. Based on the outcome of this study and on the BTUD expertise in the field of information management, concrete form was given to the projects *Hybrid Information Centre (HIC, 07.04.02)* and *Knowledge Exchange Facilities (KEF, 07.04.03)*. This report describes the process and outcomes of these two projects.

These subprojects had to be carried out in parallel with other DC developments, such as the Knowledge Map, the Portal pilot, the e-Publishing initiatives, the Text mining experiments and the database projects in some of the Themes [1]. Amongst so many other knowledge projects, the BTUD projects were focused on content issues. recommended by the *Review and Strategy report* (07.04.01) the following projects were carried out:

- Build a prototype of a hybrid information centre. This was interpreted as the collection and categorisation of references to relevant electronic information on an integrated website. The content can refer to publicly available documents as well as to licensed resources. Content will come from external sources in all available formats (Internet, online bibliographic databases, electronic journals, portals, catalogues, other full text sources etc.) with the aim of making explicit information more easily accessible by end users. (*HIC, DC Virtual Knowledge Centre*)
- Build prototype tool to provide access to grey documents – for example reports and lecture notes - from DC partner organisations and other relevant sources. Grey literature is difficult to obtain, but an important source of information for many engineers. A prototype of an information system was created to facilitate sharing of these grey documents. (*KEF, DC Tunnel Center*)
- Create a Community of Practice of librarians from all Delft Cluster partner institutions. (*KEF, Special Interest Group for DC Libraries (SIG-L)*)

These projects all aim to improve or create simple access by DC researchers, management, and contributors from the GWW sector to relevant knowledge needed for their work.

1.1.2. 07.02 Corporate Knowledge Platform

The *Knowledge Map* project, performed by IHE Delft, is part of the Corporate Knowledge platform project. Knowledge maps are valuable tools in knowledge management. They can be used to elicit, share, learn and create knowledge as well as enable better decision-making, assess an organization's knowledge culture and overcome conflicting or competing issues.

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[1] See Delft Cluster CKP - Facility system borders, P. Van der Weerd, November 2001

Delft Cluster ultimate goal is that of providing immediate access to a range of available (tacit and explicit) knowledge, resources and applications (products of all DC themes and basis projects) and knowledge sharing and collaborative working facilities on a corporate DC level. In order to achieve this goal development and implementation of a Knowledge Map prototype in the area of tunnelling has been done.

Goal of the projects

The project goals are to create prototypes, evaluate them and learn lessons for further developments. . It is important to keep in mind that the results of this project are just the first steps towards the end goal. The prototypes must be seen as the base for ongoing development both vertically (improving on the functionality of the prototypes) and horizontally (building new knowledge centres in other subject areas of interest to DC).

These prototypes could, in a later phase, become links in a comprehensive network of information centres in the major knowledge domains that Delft Cluster covers. Ideally, it is envisaged that the prototypes become an important part of any eventual Corporate Knowledge Platform facility of Delft Cluster.

Domain Focus

One of the common problems encountered in this and other Theme 7 (Knowledge Management) projects, has been the difficulty in getting active user involvement in projects. At the suggestion of the projects' klankbordgroep, the decision was taken to select a sub-domain of Delft Cluster activities on which to focus our energies. In this way, it was hoped that a smaller user group could be more easily identified, motivated and directly involved in the development of prototypes. The choice was made to focus on the sub-domain of 'Tunnel Construction in Soft Soil' as this theme subject was part of the interest of Theme 4, 'Urban infrastructure' who were already active in the area of Knowledge Management and were eager to participate.

2   Tunnel Center:

Project Definition, functional requirements and organisation/planning of the project.

2.1.1   Project Definition

From the Delft Cluster Theme 7 project Document *and Content Management* there is a *Review and Strategy report* that precedes this report:

> *This section outlines a 5-year vision for the management of grey documents in DC.* Grey literature may be briefly defined as that which cannot readily be acquired through normal bookselling channels and which is therefore difficult to identify and obtain. *With the results of the survey, in combination with the knowledge sharing aims of DC, we propose the creation of 'DC Greybase'. The final envisaged DC Greybase contains many different types of grey documents including sound and image files, data sets, modelling software and other material.*
> *In principle, the collection is accessible to the public, DC sector organisations and of course to DC partners. Greybase will assist in overcoming the barrier that came up from the Know ME study: the willingness to share documents, but the actual lack of concrete results of sharing without a proper mechanism.*

In the original proposal of this project the project team promises to make use of new technologies to realize this Greybase prototype.

From the Knowledge Map report:

> In the light of the long-term ambition of Delft Cluster, that is, to become one of the leading knowledge centres on sustainable development of densely populated delta areas, Delft Cluster as a networked organisation needs to establish a common Corporate Knowledge Platform (CKP). The ultimate goal of the DC CKP is that of providing immediate access to a range of available (tacit and explicit) knowledge, resources and applications (products of all DC themes and basis projects) and knowledge sharing and collaborative working facilities on a corporate DC level. In order to achieve this goal it is well recognised that the development and implementation of a Corporate Knowledge Map is of the utmost importance. The main purpose of the Delft Cluster Corporate Knowledge Map is to serve as a navigation aid to explicit (codified) and tacit information and knowledge, showing the importance and relationships between the knowledge objects and dynamics. The Corporate Knowledge Map is designed to meet the needs of all users, external (DC sector) as well as internal (DC organisations). Whereas it is impossible to anticipate all such needs in advance it is important that the Corporate Knowledge Map is evolutionary and can therefore adapt to new identified needs.

> *This main objective of this project was to design, specify and implement a (prototype) Delft Cluster Corporate Knowledge Map.*

> *The long-term objective of the project is to enable further improvement and development of the corporate knowledge platform (2nd phase of the DC programme in 2003-2007) by specifying and designing the parameters for such a platform.*

> *From the knowledge management point of view there is an ongoing quest by each of the DC partner organisations and the Themes to locate or identify*

- *explicit information and knowledge (documents, tools, databases etc including their ownership, value, use)*
- *roles and expertise of people together with the constraints on the flow of knowledge.*

External users are also, if not more importantly for Delft Cluster, interested in accessing such knowledge. The ability to make the knowledge accessible is termed 'knowledge mapping'. Given a map of the available knowledge then the knowledge resources can be made generally available to the benefit of all concerned.

Knowledge mapping as an importance practice aims therefore to track the acquisition and availability of information and knowledge. In this sense knowledge mapping can help to illustrate or "map" how knowledge flows throughout DC as a networked organisation.

Why does DC need a corporate knowledge map?
- *To encourage re-use and prevent re-invention, limit redundancy of information*
- *To speed up search time (intelligent search possibilities)*
- *To improve engineering problem-posing, solving and decision making*
- *To enable all DC members and external users (DC Sector) to find critical information/ knowledge/people (experts) quickly*

It was clear that a number of benefits were to be gained by the project teams working together and forming two projects into one. The benefits of this combined approach were identified as:

- For the end users: only one integrated product instead of two
- The two products integrated might trigger each other's use
- More efficient in terms of money, hours, marketing etc
- Easier to get end users involved in the project
- Learning from each other's knowledge

As mentioned before, the subject for this prototype will be '*tunnelling in soft soil'*.

2.1.2 Research questions
Integrating the two projects required both teams to reformulate the objectives a little bit. The compromise is as follows:

The aim of Delft Cluster is to become an important Knowledge centre on the subject of constructions in wet delta areas.

The aim of this project team is to improve access to implicit knowledge on the subject of tunnel construction in soft soil. This is in order to improve the competitive power of The Netherlands as a 'tunnelling country'. One important issue is the sharing of knowledge between researchers, consultants and engineers.

The strategy is then to strengthen the informal networks by improving codification and diffusion of tunnel knowledge. Therefore the project team develops a prototype *Tunnel Center*. In the first phase of the project, the tools produced are intended for use by tunnel construction engineers, consultants and researchers. The end users may be Delft Cluster or non-Delft Cluster employees.

The results presented in the report will give answers to the following questions:
1. Is access to knowledge improved?
2. Are the informal networks more open? (consultants and scientists and contractors)

Of course behind these questions lies another question: is there reason to continue the prototype. If yes, how?

2.1.3 Milestones

The initial project plan was as follows:

	Preliminary investigation
	Literature study, users background research
	Consult klankbordgroep, Consult CoP, CKP projects
End March 2002	Content analysis, design cards
	Develop specification
	Functional design document (including procedures)
	Technical requirements and software recommendations
	Agree developer and development environment
	Develop data model
	Present to klankbordgroep, end users and full project group
Beginning of June 2002	Definitive specification document ready and action plan
	Build prototype
	Design and build software
	Integrate with DC Portal or DC Intranet site
	Load test content
	Build taxonomy
end August 2002	Accept prototype
	User testing of prototype
	Testing by end users
	Load content
	Prototype launched
	Start promotion for evaluation purposes
end September 2002	Present to Klankbordgroep, end users
	Reporting
	Gather use feedback (2.5 months evaluation phase)
end December 2002	Evaluation report

Of course, during the project, lots of changes were made to this plan. The reasons that the project team was three months behind on the original schedule were:
- It took some time before the two project teams really understood each other
- We spent quite a lot of time selecting taxonomy and a software supplier that suited our needs.
- Communication with end users and management was more time consuming than we anticipated
- Testing and debugging of newly developed software took longer than anticipated.

Research & Development

Research initially started separately for the two projects. The knowledge map project was having as its final deliverables, a user requirement report, design of the knowledge map prototype and a survey/analysis of the existing tools in the area of text mining. The Greybase project initial research was based on the results of the Review and Strategy report

While making the user requirement survey and initial concept design of a Knowledge Map system, the two project teams, Knowledge Map and Greybase, come into contact and have seen that there are a lot of advantages, from both user point of view and Delft Cluster resource, if they tried working together and making one single system which will match the needs of both project. From the user point of view only one system needed it to be accessed. Both projects needed it a text mining software tool, therefore one tool was bought and the cost of the tool was shared by the two projects. The new joint project was named by the project teams: Delft Cluster Tunnel Centre.

Initially, the user requirement report and the first design steps were conducted separately. After that phase the projects were joined and refinement of the concept design of the system to be released as the Tunnel Centre took place, together with the functional and technical requirements. According to the defined functional requirements (annex A.1) the purpose of the system is twofold:

- to enable researchers and other sector participants to find and share 'all' relevant 'grey' information about their subject quickly and efficiently. Grey literature is defined as documents that are not formally published and are not available through normal bookselling channels. For example internal reports, congress papers and lectures.
- to give access to –and share- information about DC people, projects, organisations, tools and documents in a simple and complete manner.

From this point on the *key principles* that were followed while building the DC Tunnel Centre prototype included:
- recognising that much of the knowledge generated within the DC Themes is transient and dynamic
- making use of the Know Me indicators to identify knowledge resources and needs, as already identified through ongoing interviews and reviews
- exploring with the member organisations of Delft Cluster their existing and planned knowledge mapping procedures, with the objective of working together with the organisations to develop their knowledge mapping further
- working with the Themes to understand from their external partners the needs and requirements that they have for knowledge mapping
- recognising and locating information and knowledge in a wide variety of forms: tacit and explicit, formal and informal, personal and organisational, internal and external, short-life cycle and permanent
- locating knowledge in people, processes, documents, relationships, policies, conversations, existing and potential customers
- being aware of the different organisational structures, cultural issues, confidentiality of information, copyright, sharing and value and the personal disclosure.
- active participation and consultation with people from the DC Sector and Klankbordgroep.
- knowledge and experience of the people responsible for KM in DC organisations

The projects activities, as they were carried out in time, are described as follows:

2.1.4 Analysis of the user requirements
This phase of the work consisted of collecting the necessary information in order to identify the requirements for the Corporate Knowledge Map in the area of tunnelling. The information was collected through the following means:

- ❑ Conducting interviews and asking targeted questions. These interviews have been combined with the current ongoing and planned interviews and Knowledge Management project activities, specifically:
  - Making the use of the Know Me indicators
  - Document and content management review project
  - DC Intranet and Internet review project with a scan of the DC organisations' intranets
  - Communities of practice project developments and monitoring
  - Formal and informal meetings with the people responsible for KM in DC organisations
  - Formal and informal meetings with the DC users (internal and external, especially those external organisations working as partners with the Themes)
  - Meetings with targeted people from the DC Sector and the Klankbordgroep.
- ❑ Monitoring and observing the work in progress within all Themes.
- ❑ Gathering policy documents, organisational charts, process documents and taxonomies for the particular knowledge area of tunnelling.

❑ Syntegrity session held with an identified group of people from all DC organisations responsible for KM activities and from the sector

The final report of the user requirements analysis is included as Annex A2

2.1.5 Exploring tools and methodologies

One of the main activities for development of a DC Knowledge map in a particular Knowledge domain, was to review the existing methodologies and software tools for knowledge generation, codification and mapping, and to explore currently available (produced) knowledge maps in different application areas both on national (e.g. see www.interwad.nl) and international levels.

The knowledge base of DC is formed from data, which will continually grow. In order to limit the redundancy of information, to encourage re-use and prevent re-invention the following requirements have been imposed on the knowledge map during the selection of tools:

- the system has to be *sustainable* – functionally this means that the system has to be self-organising for growth and adaptation (dynamic generated based on content) and this is translated into practice by a sophisticated means of tagging knowledge and information
- the system has to be *open* – meaning that the system has to be explicit to the users, open within the limit of personal rights to privacy and confidentiality
- the system has to be *accessible* - easy connections, to allow distributive and semantic search; to enable all DC members and external users to find critical information/knowledge people quickly.

The scope of the above-mentioned tools is very wide, ranging from complete document management systems to software libraries for natural language processing (text mining).

The analysis made for the tools is on the following consideration:

- **Composition of Indexes**
  The composition of indexes affects the performance of a search. There are several components that the users need to see: title, author and abstract. In addition, the index engine should be able to import pre-built taxonomies.
- **Search Capability**
  The search engine must include the fundamental search facilities that users are familiar with, which include Boolean logic, phrase searching, truncation, and limiting facilities (e.g., limit by field).
- **Retrieval Performance**
  Retrieval performance is considered for three parameters: response time, time for images to be downloaded and number of documents.
- **Minimal User Effort**
  Intuitive, user friendly and visual graphical user interfaces.

From this point on, the two projects, Corporate Knowledge Map and Greybase, worked together in order to select a final text-mining tool to be used by the system.
Sixty-three software products were evaluated on the basis of these criteria (see annex A3). Seventeen of these products were the subjects of more detailed research. A decision to purchase a certain software tool in order to facilitate the work was made by selecting a short list of six products and having discussions with the producers of these. At the end of the process, the text-mining tool from Smart Haven was selected to be part of the prototype knowledge map.

The software selected for in-depth analysis was Autonomy, Collexis; SemioMap, SmartHaven, SmartLogik and IBM text-mining tool. Autonomy is a very nice system but we choose not to go for it because the database system is embedded into the text mining classifier, which makes the system unusable if we would try to go for another classifier, of if the classifier was not needed. Therefore Autonomy was not selected. An in depth analysis of Collexis turned out that the classifier system is

not based on text mining search, and full text search is not possible. SmartLogic and SemioMap are two companies located in UK and the costs for consultancy to see this software were too high.

At the end by doing a cost analysis of the systems, taking into account the need to integrate the database and the classifier into one system and the performance of the text mining tool, SmartHaven was selected as the software to be used for this prototype.

2.1.6 End users

The intended end users of the Tunnel Center are consultants, scientists and construction engineers in the area of tunnelling in soft soil.

The project team involved potential end users during the development process as much as possible. They were involved in the phases of definition, testing and evaluation.

In the evaluation phase we used the networks of this Tunnel Group to locate other possible end users and organizations that might be interested.

Looking back, the project team realizes that the end users involved may not have been well positioned within the tunnelling world. This became clear when we started marketing the Tunnel Centre product and we discovered that the Centrum voor Ondergronds Bouwen (COB) was developing an information product too. Another interpretation is that the COB has not been able to communicate well enough with the tunnelling community about their project. In any event, ideally this COB initiative would have been identified much earlier in the project. After recent discussion with the COB, they have decided to continue developing their product, and will decide later which product they will promote to their users.

The project team realized that initiatives in this subject area try to direct the reader to a specific piece of text, rather than to a whole document.

Another lesson that we discovered rather too late in the project was that no construction engineers were involved in our first end user group, from which user requirements were derived. During the evaluation phase it became more and more clear that consultants, scientists and construction engineers have information needs that differ enormously. The project team has not investigated these differences enough. The hypothesis is, that the differences are caused by the learning phase they are in. A scientist for example thinks theoretically, a construction engineer more practically. This hypothesis should be worked out in a next phase.

2.1.7 Concept and software development

The development of the prototype of the Tunnel Center has been done in an iterative process. First of all borders with the others Delft Cluster projects were identified. These borders are presented in the table bellow.

Delft Cluster CKP Facility system borders	DC-website	DC-intranet	Virtual Knowledge Centre	Concept Mapping	External DC-Portal	Internal DC-Portal	Collaboration Platforms	Document & Content Management
Information sources								
high-quality official literature	+	-	-	-	(+)	(+)	-	+
grey literature	-	+	+	+	+	+	+	+
project documents	-	+	-	-	-	+	+	-
meta-info of documents	-	+	-	+	+	+	-	+
on-line discussions	-	-	+	-	+	+	+	-
Address info of DC-people	+	+	-	-	(+)	(+)	+	-
Current projects of DC-people	+	+	-	-	(+)	(+)	-	-
Experience & CV of DC-people	+	+	-	+	+	+	+	-
Search facilities								
query on specific meta-attributes	-	+	-	+	+	+	-	+
Boolean combination of words	+	+	+	+	+	+	+	+
query using complete documents	-	-	+	+	-	-	-	-
Concept network navigation	-	-	+	+	-	-	-	-
DC-people network navigation	-	-	-	+	-	-	-	-
file- & ftp-server indexing	-	-	-	-	+	+	-	-
External web site indexing	-	-	-	-	+	+	-	-
Additional options								
list of latest DC-news items	+	+	+	-	+	+	-	-
Calendar & meeting planner	-	+	-	-	-	-	-	-
Document check-out & -in	-	-	-	-	-	+	+	+
Document change alert signals	-	-	-	-	-	+	+	-
Document authorization workflow	-	-	-	-	-	+	-	-
DC-people on-line signal & chat	-	-	-	-	-	+	-	-
(project) task-lists of DC-people	-	+	-	-	-	+	-	-

(+) = seamlessly connected source

Based on these system borders the prototype was built with the assumption that it will be part of a portal system. The portal was not yet finalised when the Tunnel Centre prototype was released; therefore this is functioning as a single stand-alone entity and has as an entry point the following web address:

www.kmap.ihe.nl

Development of the prototype was done based on the following concept:

The knowledge base of DC is formed from a large amount of data, which will continually grow. In order to limit the redundancy of information, to encourage re-use and prevent re-invention the following requirements were imposed on the knowledge map during the design: the Tunnel Center has to
- be dynamically generated based on content;
- be a visual aid for searching and navigation;
- allow distributive and semantic search;
- enable all DC members and external users to find critical Information/knowledge people quickly

All these requirements shows that the knowledge map aimed to be an expert system, which has three levels of organisation (figure 1)
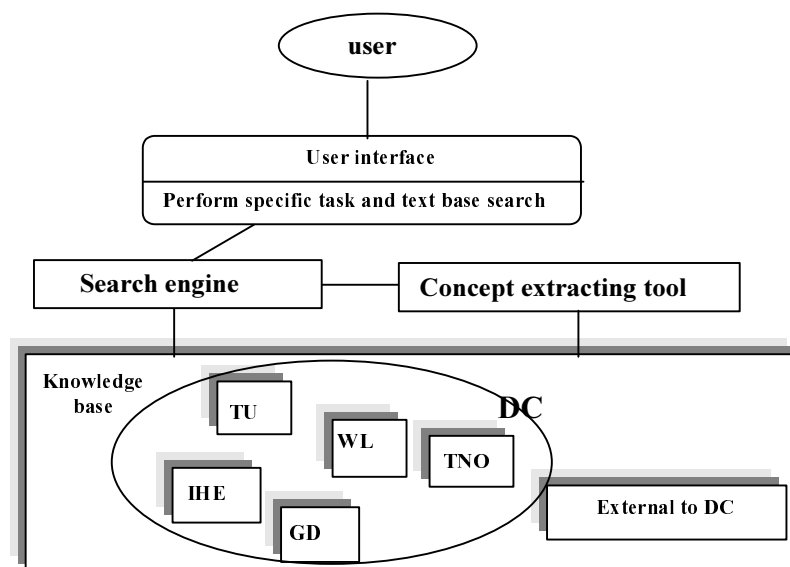
Figure 1. Conceptual design of the DC Tunnel Center

The bottom level is the knowledge base of DC and the top level is the user interface. The connection between the knowledge base and the user Interface was done via a ***search engine*** together with a ***concept-extracting tool***. This tool creates the categorization of the new knowledge acquired by the system. The category system includes all the categories defined by the project team. The categorization tool is based on the Smart Haven categoriser. The Smart Haven categoriser works based on a trained defined taxonomy. After the definition of the taxonomy, each category is trained with a minimum 20 documents. The performance of the classification of a new document added to the system is based on the quality of the training documents. The taxonomy in the tunnelling area contains 25 categories and each category was trained with 20 documents written in English. The task of finding training documents was difficult; however the trained taxonomy gives good results.

At the user level the interface knowledge was represented in a combined graphical format and concept search.

The entire system formed of the categoriser and the content database has been developed by Smart Haven based on the functional requirements given by the Delft Cluster project team. The development process took 3 months. During these month a continuous refinement and improvement took place. The Delft Cluster project team and SmartHaven as software developers of the system worked out the final design of the prototype by having weekly meetings. After the prototype had been deployed on the internet a period of two months was dedicated for user testing and debugging.

Implementation and marketing

The aim of the project was to build and evaluate a prototype. However, for evaluating the product, the project team was faced with the challenge that end users should be able to use the system. Suspicion that the system might not be sustainable is no motivation for participation of course. End users look at the Tunnel Center as an end product. Because the project team had lots of positive responses before the evaluation was done, it was decided that the Tunnel Center be promoted and opened for use before it contained a critical mass of information. By this method, the project team could approach end users for evaluation and at the same time promote the product.

It was clear from the beginning that it would be difficult to motivate end users to use the product. There are several reasons for this. First, the project team has only communication as a means to motivate end users. There is no intrinsic need for organisations to participate. This means the Tunnel Center depends on the personal interest of potential end users. Second, it was clear that commercial competition between Delft Cluster tunnelling organisations would inhibit participation. We were unable to implement different user access levels into the Tunnel Center in this first phase because of the high costs. The third challenge the project team faces is the fact that continuity of the project is not yet definite. Many potential end users indicated that they would wait until there is more clarity about this aspect before investing time.

The project team undertook the following activities to try to limit the foreseen obstacles:

- Load as much content in the Tunnel Center as possible
- Try to interest potential end user organisations. It is easier for them to promote the product than for the project team. For this reason, COB (Centrum voor Ondergronds Bouwen) is interested to load content and develop the product further; also, GeoDelft has promised to do this.
- Demonstrate the product where possible. So far demonstrations have been done for GeoDelft and Bouwdienst Rijkswaterstaat. Others are planned.

- Publish articles. This was done in several Delft Cluster newsletters and TU Delft newsletters.

- Mail campaign. An email was sent to all members on the mailing list of COB. (annex A4)
- Show the product at the ITA (International Tunnel Association) conference in April 2003.
- Contact project leaders of Dutch Tunnel Projects and asked them to participate in the Tunnel Center by using the evaluation interviews. In this way participation is promised by the project leaders of Westerscheldetunnel.

As a consequence of these activities, the project team received lots of positive reactions. Several third parties showed their interest in the product. Promises were made by GeoDelft, Westerscheldetunnel and COB to add content. Concrete results however, are not yet there.

Evaluation

The last phase of the project was the evaluation of the prototype by potential end users. The methodology used for the evaluation is explained here.
The project team followed three routes to evaluate the end product:

1. In depth face to face interviews with 6 potential end users from different target groups (3 consultants; 2 consultants/scientists; 1 contractor). For a copy of the questionnaire used for these interviews, see Annex A5.
2. A pop-up evaluation form was presented to all visitors to the website. Twelve meaningful responses were gathered in this way. The form is attached as annex A6.
3. Usage statistics are continually being collected by the system. When an administrator logs onto the Tunnel Centre, they can read statistics for any given period.
To re-iterate, the research questions for this project are as follows:

1. Is access to knowledge improved?
2. Are the informal networks more open? (consultants and scientists and contractors)

Of course behind these questions lies also the question: is there reason to continue the prototype. If yes, how?

The **interview** questionnaire (see appendix A5) contained the following questions related to knowledge access and network possibilities:

1. Is this a helpful tool; does it bring you information that is otherwise difficult to find?
2. What do you think of the concept / idea?
3. What do you think of the user friendliness?
4. What do you think of the quality of the content?
5. What do you think of the coverage of the content?
6. What alternatives do you use; how often; replacement?
7. What user type are you: upload, search, promote?
8. Do the tools help you to make your personal networks bigger?

All respondents answered to the first question that the Tunnel Centre is a helpful tool. All were also enthusiastic about the concept. The user friendliness was said to be good by those who had spent time searching the Tunnel Centre. Not all had looked at the Tunnel Centre before the interview.

The quality of the content was seen as alright, although some advisors found it too specific, and not broad enough.

No real alternatives of the Tunnel Center were mentioned, although some had long lists of links to relevant websites. COB and ITA were seen by a few of them as alternatives.

All interviewees said they would use the tool in future. However, when asked about sharing in the sense of uploading content, the project team came across hesitation. Most of the interviewees said they would upload content only after others had done so first. This chicken and egg problem was made worse by shared doubts about the continuity of Delft Cluster projects. Other factors mentioned were: competition and lack of possibilities to secure client information.

Most of the interviewees thought the tool would make their network bigger, although the seniors thought it was more important for the juniors.

Other interesting remarks were as follows:
*   All interviewees made clear that for success of this tool, keeping the content up to date and other maintenance tasks are crucial
*   Also important is administrative control and quality assessment of added content
*   The project team should be aware of commercial interests that end users may have
*   The target groups / content areas / the subject scope are not very clear for the end users. It should be clearer that more practical information that is not really scientific in nature is useful.
*   The project team should be aware of concerns about authors' rights.

Suggested improvements were:
*   Photographs could be added to the CVs (People cards)
*   There is no desire for datasets, software etc. This is too time-sensitive and users would prefer to access this type of content through personal contacts.

- Maps might be an interesting addition.
- Integrated search through all tunnel sources is a common desire.
- Add protocols and 'rules of the game' for the system
- Make it clearer that end users have to register before they can add information in the Tunnel Center
- When searching lists of authors or organisations to choose from could be very handy

The response to the **pop-up evaluation form** on the website was disappointing. There were only twelve respondents. Four were scientists; three identified themselves as consultant & contractors; one contractor; one scientist & contractor and three consultants.

The form is attached in Annex A6.

A summary of the responses is given below:
Helpful tool?

Yes, quite well	1
Somewhat	5
No help	3

User friendliness:

Good	5
Acceptable	3
No response	4

Quality of content (more than one answer possible)

Suits my needs	5
Not my subject	0
Too specific	4
Too much rubbish	2
No response	3

Future use

Yes	5
Perhaps	4
No	0

The statistics collected by the system during the months January-April 2003 have not been of much value in assessing the usage of the system. This is because the numbers are distorted by administration activity in the system, by activity associated with uploading 'critical mass' content by project team members and by promotional activities.

The use of the Tunnel Center in the last 4 months of the project (1 January until the end of April 2003) did not show a significant growth in the use of the Tunnel Center. We can say that in the first two months, the project team made heavy use of the Tunnel Center in adding content.

In the last two months, the Tunnel Center was therefore more used by end users. It is likely that the large email action to promote the Tunnel Center is responsible for that use. The addition of new documents by end users was rare. From the evaluation analysis, this could be because it was not very clear to end users that they needed to register themselves before they could upload content. Also, insecurity about the continuation of the Tunnel Center and the 'chicken and egg' problem described above contributes to this lack of uploads.

Conclusions

In general the reactions on the Tunnel Center prototype have been very positive in terms of both of the project's research questions. The few negative reactions ('not a helpful tool') were made by consultants and contractors. They also mentioned that the tool was too specific and contains too much rubbish.

The number of responses is too small to be able to draw conclusions on different needs of consultants / contractors / scientists. This is something that should be investigated further in the next phase.

During evaluation, several useful suggestions for improvements to the system were made by users. This indicates that they were indeed interested in the prototype and its future.

There are some more complex issues to overcome when the question of end user commitment is discussed. Potential end users have indicated that they are reluctant to contribute content until others have done so. The project team sees three different reasons for this:
- Classic chicken and egg problem, whereby a 'critical mass' of content and users must be in the system before users feel confident to contribute their own content
- Continuity of DC projects is in doubt
- It is unclear that registration is necessary before uploading content
- Competition issues
- Perceived lack of quality control and administration control

Recommendations

Given the successful evaluation of the project, it would be good to continue the project and make it a living, used product. The project team sees the following possibilities:
- Ensure continuation of Delft Cluster projects, so that endusers can be motivated to contribute and share
- Get over the critical mass of content by adding documents to the Tunnel Center by the project team
- Motivate COB, or another tunnelling organisation to become the 'puller' of the implementation
- Improve the end-user group by asking a better mixture of consultants, scientists and constructors to become a member. They might have to be offered some incentives to motivate participation.
- Marketing the tool is important to motivate endusers
- Testing is necessary when the portal is implemented
- Improve information to the endusers by adding FAQ's
- Content quality administrative tasks are necessary for continuation

From research point of view the following items seem important:
- Find out more about the different user needs of consultants, scientists and constructors; also about differences between seniors and juniors
- Find out about automatic procedures to break text into pieces, and label them separately. The aim is then to bring the end-user closer to the information. Instead of reading the whole document, the system will bring he end-user to relevant pieces of text.

Some software improvements are also asked by the endusers:
- when searching it is very handy to choose from lists of authors or organisations
- relevance ranking and refining of search results
- make document input more easy for end-users

Lessons Learned

The project team learned some lessons that might be of interest to others. They have been identified through an evaluation of ourselves as a project team (After Action Review) and an evaluation of the consequences of our actions. This made us think about possible improvements. As a project team we came to the following lessons:

- The information needs of the different user groups (scientist, consultant, construction engineer; but also senior and junior) seem to differ more than we realized in the beginning. An explanation might be that each group is at a different phase of the learning cycle. The learning cycle is about thinking, deciding, action etc. We should have investigated this better at the beginning of our project; probably the functional requirements would have been different.
- Communication with potential end users should have been better. The Theme 4 group we started with did not include people with a big network in the tunnelling area. One important consequence of this is that we ended up in a sort of competition position with COB's information project.
- We did not plan in enough time for consultation of management and end users
- Testing took us a lot of time. This can be improved by preparing a proper test plan and better terms in the contract with the software supplier about bug repair.
- Although the functional requirements were clear, extra work during software development could have been prevented by taking better minutes of discussions with the software supplier during development. Misunderstandings could have been prevented in that way. Certain aspects of the functional requirements should have been more specific (e.g. we should have explained better what we meant by pdf-file, html-file etc.).
- The loading of content should have been organized better. It was disappointing that not much content could be found by the content manager we hired in for the project. This could be due to several reasons: the restricted time available; the selection of quite a specific subject area; insufficient knowledge in the subject area. Also loading it in the database was difficult. Privacy issues played a role when inputting information on people.

3   Delft Cluster Virtual Knowledge Centre

Project Definition.

3.1.1 What is a Hybrid Library?

Proper definitions of the notion of 'hybridity' are quite diverse, somewhere between a conventional library and a virtual library; the hybrid library finds a place with a mixture of paper and electronic information sources.

Oppenheim 1999 states that 'The hybrid library is a term that has entered the parlance of the library and information profession in the past three years. It is viewed as a halfway step towards the fully digital library.'

While a precise definition is not that important, the interesting point is that the word hybrid is disappearing from use, usually replaced by the words 'virtual library' or 'virtual information centre'.

As most of the DC services will be distributed services, the Hybrid Information Centre (HIC) had to conform to that principle and be based on 'access' to information resources rather than 'ownership' of resources. During the development phase and thereafter, care had to be taken that the HIC be functionally compatible with all information storage and dissemination tools that DC partner organisations and the DC central office have in place or are in the process of developing.

When the DC Portal pilot leads to a successful implementation, the HIC could be seen as a section of the portal, together with knowledge maps, collaborative working environment etc.

When beginning our project definition stage, it became clear that the term 'Hybrid Information Centre' was not very informative and what we had in mind was not a full service electronic library but an information service that could be reached online. Our term 'Hybrid' meant that we envisaged a mix of content based on printed materials and electronically recorded information. These ideas reflect the interviews during the previous 'Review and strategy' stage.

In the previous year, the BTUD had defined and implemented a prototype 'Virtual Knowledge Centre'. This was an integrated website which facilitated access to both online information resources as well as more traditional resources such as library collections and expertise. Several studies had been undertaken for and by the library, which indicated a clear demand and readiness for a product such as a web-based virtual knowledge centre. These studies are listed in the literature list. The prototype Knowledge Centres have been implemented in two fields of engineering: Civil Engineering and Maritime Technology. The model had been extensively tested both in terms of usability (user interaction with the site design) and in terms of usefulness (was such a website desirable).

It was clear that the BTUD 'Virtual Knowledge Centre' model fitted well with the expectations of Delft Cluster participants as to what a 'Hybrid Information Centre' could be. Therefore, it was decided to take this model and apply it to the special needs and wishes of the DC research community.

3.1.2 Aims of the prototype Hybrid Information Centre
In the original Proposal, the objectives of the HIC project are stated as:

"To build a working and sustainable prototype Hybrid Information Centre that provides transparent access to all needed public information sources for Delft Cluster and, vice versa, to provide public access to appropriate DC information sources.

This HIC will ensure reliable internal and external information delivery and encompass a well-organised search and order facility via the Delft Cluster network. It will provide access by external partners and stakeholders to the knowledge sources of Delft Cluster.

The HIC will be multi-media compliant and use innovative search tools. It will facilitate access and be a corporate gateway to published information (journal articles, government reports, books, dissertations, news etc) as well as unpublished, but explicit information (technical reports, project end-reports, discussion documents, white papers, internal web (intranet) pages, lessons-learned summaries, best practice, case studies, minutes of meetings, internal communications of the organisation, press releases etc.).

The HIC will support the working of the Communities of Practice model and will form a fundamental part of the Corporate Knowledge Platform."

The HIC project was described in a work plan (Mijlpalenplan) that specified the discreet steps to be taken, the timeframe, the contributors and the responsibilities for each step. The following is an outline of the milestones/targets as formulated at the start of the project.
These steps have been summarised in a milestone format to enable effective project management:

3.1.3 Milestones for the HIC project
For planning purposes, the project was broken down into the following milestones:

1. Literature studied into theory and practical implementations of hybrid/electronic/virtual libraries, world-wide
2. Information analysis – developed a detailed list of realistic user requirements
3. Definition study: functionality based on input from the previous DC review of document management and use in the themes, describing required functionality of the Hybrid Information Centre and e.g. that needed for communities of practice and corporate knowledge platform, theme projects etc.
4. Contracted most co-operative/interesting Theme(s) or project(s) to act as a 'guinea pig'
5. Designed desired information architecture of the prototype information centre
6. Software selection made: reviewed software requirements and commercially available options as to functionality, cost, stability etc, co-ordinated with other DC requirements -and implementations
7. Designed technical structure of the Hybrid Information Centre
8. Software development –software tailored as required
9. Formulated content policy (editorial policy, what material is included and where is it best stored etc), added structured (meta) information; assist in implementation of this policy at partner organisations
10. Designed knowledge sharing agreement by which all users must abide (includes those utilising the materials and those contributing to the database
11. Presentation of workshops to Delft Cluster collaborators in order to elicit commentaries
12. Organised input to system, scanning, OCR, indexing, search methods
13. Implemented the prototype with a basis set of documents, based on web technologies, populated with documents submitted by Theme(s) or project(s)
14. Training – focused on training of end users and those responsible for maintenance

15. Application testing / prototyping – does the solution work?
16. Carried out user testing against stated requirements
17. Established evaluation criteria and set up techniques for monitoring use and evaluating value of the prototype
18. Procedures development – with end users, developed a basic set of maintenance procedures
19. Final report to Delft Cluster.

During the project phases, several times some of the milestones had to be adjusted. An example is the software selection process and tailoring (Phases 6 & 8); in view of the revised definition of the prototype the need for acquiring specific software was no longer felt. NetObjects' TeamFusion Client 2000 was found to be a suitable tool for construction of the web pages.

Research and Development

3.1.4 Objectives and End Users

Strategic Objectives
The strategic aim of this project derives from the Delft Cluster objectives to increase co-operation between partners through sharing of knowledge.

Thus the aim of the *knowledge centres* will be to integrate the supply of scientific knowledge, per discipline, to fulfil both the Delft Cluster and sector roles. The BTUD's key competencies can be exploited through this prototype *knowledge centre*, namely by providing scientific knowledge that is easy, integrated and quick to access and process.

User Objectives
To unite users of scientific knowledge around a single information source and to provide a collaborative environment for the exchange of knowledge for the mutual benefit of all users. The quality of scientific solutions to research problems will be enhanced, and efficiencies will be made, through use of the *knowledge centre* because of easier access to a greater amount and a wider range of scientific knowledge.

Content Objectives
To meet the above strategic and user objectives, the knowledge contained in the *knowledge centre* must be comprehensive (completeness, depth, breadth) reliable (quality, accuracy, authority) current (timeliness, time sensitivity) easily accessed and available in the best format.

Design Objectives
Two points are considered crucial to the success of a *knowledge centre:* it must be simple to use and it must be simple to maintain.

Therefore, the design objectives are to build the *knowledge centre* with a simple site structure, which is quick to download, regardless of the users' technology platform. Navigation through the site must be 'obvious' and the information must be accessible by the 'least clicks'. The site is designed so that the processes for updating and otherwise maintaining content are as simple as possible.

Target User Groups
The main target user groups for the *knowledge centres* will be, according to Delft Cluster's dual responsibility the DC partner institutes and the GWW sector:

1. Management, staff and researchers of Delft Cluster
2. Sectorial GWW organisations related to DC, (*but with specific restrictions where required*)

Included in the BTUD prototype Knowledge Centre project is a test on providing access to licensed information resources to users who are outside of the university network. It is hoped that the technological and contractual issues can be resolved in a test case, with at least one supplier (possibly more) and one source, so that eventually, non-university-based users will have access to all the same resources as university-based users.

However, it should be noted, that in the present prototype, unfortunately, users from outside the university computer network will not have access to all the same resources as users inside the university network.

3.1.5 Development

A model for the knowledge centre was developed based on the following inputs:

- Needs and wishes as expressed by DC researchers during interviews in the 'Review and Strategy' project
- Experience and expertise of the BTUD in developing their prototype Knowledge Centre.

The diagram below shows the model and gives an overview of the content within each 'section'.
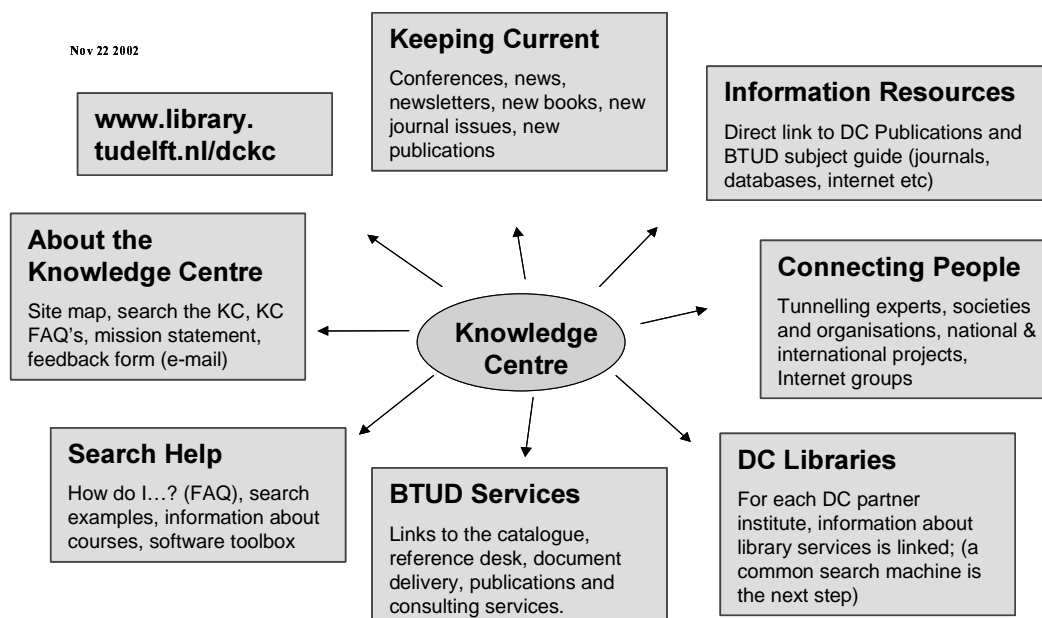
Figure 2. Hybrid Information Centre model

The following is a more detailed look at each section: the objectives defined and the content to be found. To view the actual site, click on the section headings.

Section: Keeping Current

Objective: to provide a single location for users to get a quick update on news and information resources in their area of interest. This section also acts as a hook to regularly draw users back and therefore must be updated regularly.

User Objective: to be able to get a quick update of news, research, new info resources etc in a 'quick scan' format.

How the user objective is met: provide all update material on a single quick-download page.

Supplementary info is given on linked pages.

Links to:
Engineering events, News, newsletters & Magazines, News headlines, 'How to keep up to date' Journal issues (links to Table of Content' sites), New articles (links to document services), New books (links to book alerts), New books acquired by the BTUD on earth Sciences during the last month.

Section: **Information Resources**

Objective: To help users make the best use of the documentary information available to them per subject area first by drawing the resources to their attention and secondly, by providing good 'help' in how to use them.

User Objective: To quickly and easily access the best information, which fits my information, need.

How the user objective is met: Provide a comprehensive collection of relevant information resources, presented in a clear way, with supporting 'help' resources.

Links to:
Delft Cluster publications with a link to the DC Reports site, report sites of the 5 partner organisations, Resource guides (data bases, journals and e-journals, web sites) specifically in the field of geotechnics and underground construction and related fields, dictionaries and handbooks and also to the DC Tunnel Centre

Section: **Connecting People**

Objective: to help make accessible the implicit and tacit knowledge of the scientific community by helping knowledge centre users find and contact experts and/or peers.

User Objective: to discover and contact experts or peers who can answer questions.

How the user objective is met: bringing together various sources of expertise and contact information from within and outside the university environment. Highlighting opportunities for communication between peers (listservs, conferences etc).

Links to:
Professional societies, communities and expertise search sites, over 20 tunnelling associations and organisations in as many countries. Projects' links to a large number of tunnel ventures worldwide, including tunnel safety; often names of contact persons are cited. Links to Internet groups that are dedicated specifically to civil engineering and geomechanics and a general introduction on discussion groups of many sorts.

Section: **DC Libraries**

Objective: To raise awareness of library services offered at each institute. Provide space for institute libraries to promote their services.

User Objective: to get easy access to all relevant web-based information from the DC partner libraries.

How the user objective is met: a structured collection of links acts as a web-guide to

information about the 6 existing web-based DC libraries giving contact details, opening hours, staff names.

Section: <u>Search Help</u>

Objective: to provide a comprehensive range of user-friendly, self-paced and free training materials about how to use the library and its resources and covering general information literacy topics, both generic and subject specific.

User Objective: to easily access understandable and relevant, on-demand (just-in-time) training material which can help in all areas of scientific communication.

How the user objective is met: a range of free self-paced training materials, in different styles (short tips, longer tutorials etc) is made available over a range of topics (general and subject specific).

Links to:
How do I…?, a search example for a data base search on 'Safety issues in rail tunnel construction', elaborated in 6 steps to be taken for an optimal result; other training sites identified for the most part for web searching; a Software toolbox with links to viewers, readers and browsers.

Section: <u>Library Services</u>

Objective: to provide, in user-friendly language, information about BTUD library services which are available to the public.

User Objective: to find out about services offered to the pubic by the BTUD library.

How the user objective is met: provide short descriptions of each library service and direct links to individual service pages.

Section: __About the KC__

Objective: the aim of this section is to provide supporting help functions and background information so that the knowledge centre can be used as it was designed to be used.

User Objective: to find appropriate 'help' details and general navigation aids as and when required.

How the user objective is met: provide several different forms of 'help' information and provide prominent links to this section from throughout the knowledge centre.

Links to:
DCKC Site Map, a site search section, a FAQ section, a feedback form and the DCKC mission statement (see Appendix).

3.1.6 Software

Originally (October 2000) it was envisaged that to construct a real electronic library service, a special library automation software package would be required. There are several such packages on the market, but they are rather costly and all need adjustment to specific wishes, and thus technical support. When it became clear from the first Review & Strategy study that the requirements of Delft Cluster were more aimed at access to published and unpublished sources rather than search instruments, we decided to adjust the planning and thus the tools to be used.

For construction of the web pages, NetObjects' TeamFusion Client 2000 was found to be a suitable tool with sufficient capabilities for the rather straightforward task of building a specific website.

The result is a standard web site with easy links to a range of local, national and international Internet sites. It can be considered a subject gateway (or portal) with some functional quality control. (Koch, 2000; Gietz 2002).

The site is available from each user's desktop, on the internet, and is fully accessible for the public. The only, and serious restriction is that where the links lead to a licensed resource (e.g. bibliographic database, electronic journal) for which the University Library has licence only for the University campus, access cannot be given to users outside campus. This is still a matter for consideration that forms part of a separate project (mega licences).

3.1.7 Knowledge Sharing

The DC Tunnelling Knowledge Centre promotes knowledge sharing in several ways - through its links to many local, national and international Internet sites and by highlighting opportunities for networking. The main objective of the section 'Connecting People' is to encourage engineers to join organisations, visit conferences and get in touch with experts online.

Many of the sites listed in the knowledge centre contain contact names and email addresses, which makes contacting experts very simple and quick. In the section 'Connecting People' a number of sites have been collected under the heading 'Tunnelling people' listing links to professional societies, communities and expertise search sites. The sub-heading 'Organisations' links to over 20 tunnelling associations and organisations in many countries. The sub-heading 'Projects' links to a large number of tunnel ventures worldwide with often names of contact persons cited. The listing of conference agendas makes users aware of upcoming face-to-face networking and learning opportunities.
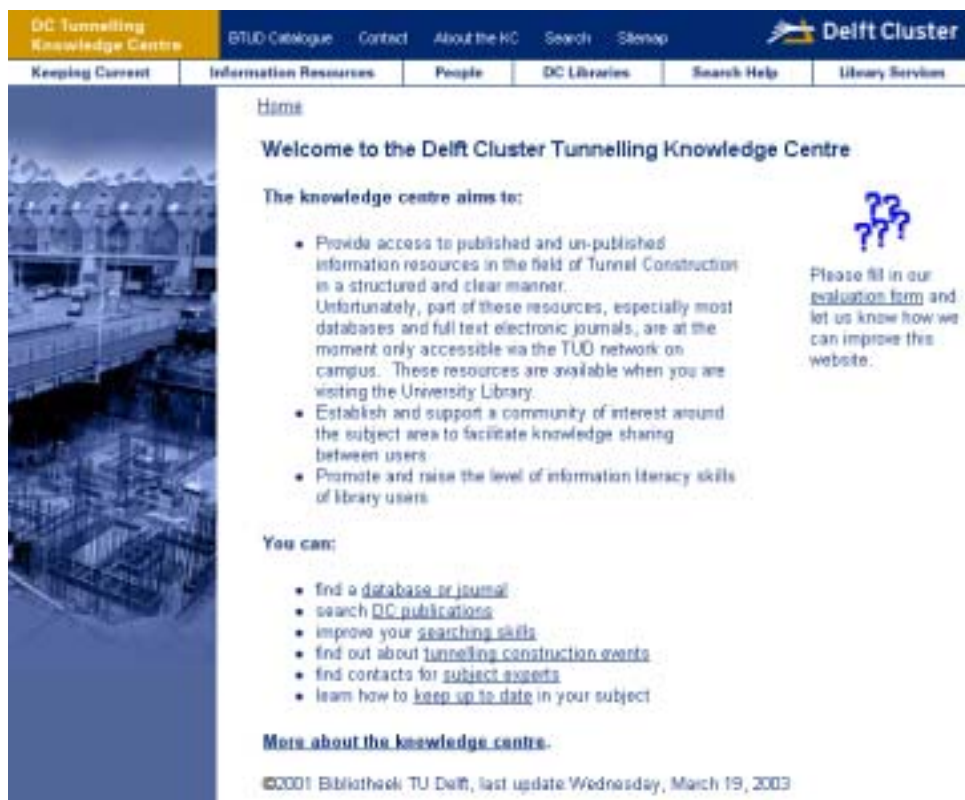
Further, engineers, as other knowledge professionals, are becoming more and more comfortable with online communication methods. By listing existing internet groups (email lists, bulletin boards etc) the knowledge centre attempts to encourage engineers to network with experts around the world. The last heading in the 'Connecting People' section links to Internet groups that are dedicated specifically to civil engineering and geomechanics and a general introduction is given on the different types of online groups.

Lastly, the knowledge centre makes available the expert knowledge of librarians via the section 'Search Help'. In this section, example searches are given which reflect the expertise of information professionals. Online training materials provided by the BTUD and other institutions are another way to transfer information literacy expertise from librarian to knowledge centre visitor.

Implementation

The following screen shots show examples of the implemented Delft Cluster Knowledge Centre. The site is publicly accessible at the following web address (URL): http://www.library.tudelft.nl/dckc .

Example page - Homepage

Example of 2nd level page – Home > Keeping Current

Example of 3rd level page – Home > Information Resources > Resource Guides

Example of 3rd level page – Home > Connecting People > Projects

Example page – Search page

Example page – Site Map

DC Tunnelling Knowledge Centre | BTUD Catalogue Contact About the KC Search Sitemap | **Delft Cluster**

Keeping Current | **Information Resources** | **People** | **DC Libraries** | **Search Help** | **Library Services**

Home > About the KC > Site Map

Knowledge Centre Site Map

The main sections of the Tunnel Construction Knowledge Centre are:

- Keeping Current
- Information Resources
- DC Libraries
- About the Knowledge Centre

- Connecting People
- Search Help
- BTUD Library Services

Keeping Current

Information and links to help you keep up to date with what's new in tunnel construction

- Tunnel Construction events
- Information about how to keep up-to-date in your subject
- Tunnel Construction news and newsletters links

Connecting People

Links to put you in touch with tunnel construction experts and peers.

- Links to Tunnel Construction experts inside and outside Delft Cluster
- Links to websites of large tunnelling projects
- Professional organisations
- Links to Tunnel Construction mailing lists, forums and newsgroups

Information Resources

Books, journals, reports, conference proceedings, databases, dictionaries.... access to the library's large collection of resources

- Tunnel Construction resource guides
- (Delft Cluster Library Catalogues LATER!)
- Delft Cluster publications
- DC Tunnel Center
- Reference resources

Search Help

Training materials to help you find information and to use the library.

- How do I find...?
- Real search examples
- Other training sites on the internet
- Software toolbox

Delft Cluster Libraries

Information about visiting and services of the libraries of Delft Cluster partners.

- TU Delft
- IHE
- GeoDelft
- KIWA
- TNO-Bouw
- WL| Delft Hydraulics
- (In a next phase: common search engine for DC libraries catalogues)

BTUD Library Services

Information about all the various services that the Delft University library offers.

About the Knowledge Centre

All you need to know about the knowledge centre.

- Search the Knowledge Centre
- Site map
- Mission statement
- FAQ
- Feedback form

Evaluation

The model of a Virtual Knowledge Centre had previously been tested extensively by the BTUD both in terms of usability (user interaction with the site design) and in terms of usefulness (is such a website desirable). A professional web site testing centre was used to evaluate the way the site is constructed, the way users find their way in such a site and the whether users could find what they are looking for in an efficient manner. Adjustments were made where these were indicated by these tests.

Specifically the new DCKC has been evaluated in three ways:
- a pop-up evaluation form, (See annex)
- interviews with users
- study of site usage statistics.

Conclusions

1. Maintenance
   While the aim of this project was to set up a *prototype* HIC, consideration has to be made as to the sustainability of the website.

   From the evaluations conducted, it is clear that many respondents place emphasis on the need for maintenance of the site as it is of extreme importance to keep it of continued interest to the user community.

   The site has been designed to keep maintenance to a minimum; however, to keep the site useful, the following tasks must be undertaken:
   - Check for broken links and fix/replace (once per month)
   - Search for and add any appropriate new links (once per month)
   - Answer feedback emails (once per week)

   Ongoing tasks are:
   - Actively seek contributions of links from practising professionals
   - Prepare new training materials and/or ask for contributions from DC libraries

2. 'Look and feel' (colours, navigation methods etc) of the Virtual Knowledge Centre and the Tunnelling Centre.

   Several users commented they did not understand why the 'look and feel' (styles) of the DCKC and the Knowledge map/Greybase were so different. Originally it was thought that both would be part of the Delft Cluster portal, thus taking on the style of that portal and solving this issue. Consideration should be given on restyling these two centres to more closely resemble each other.

3. The evaluation form (see Appendix B5) unfortunately has only been used by a few users. Comments are that the user friendliness is good to acceptable and that the quality of the contents for a specialist 'suits the needs'. The website could help solve information needs in some cases.

4. From one-to-one interviews with potential users of the site, results can be summarised as follows:
   a. The knowledge centre is a useful tool, brings information otherwise not so easy to find, could save time
   b. Good concept, but some links hard to find, too 'jumpy'
   c. User friendly and well designed
   d. Important to keep up-to-date and monitor quality of data
   e. Add more relevant links and links to standard documents
   f. Support was shown for extending the concept site to other DC subject areas.

5. Site statistics are collected each month using software called 'Analog'. Statistics for the month of March 2003 show that there were 1125 page requests. It is important to note that, for several reasons, site usage statistics are of only limited value in assessing numbers of visitors to a site (for a good explanation of the issues, refer to http://www.goldmark.org/netrants/webstats/). However, statistics have been collected and analysed and some important insights can be found.

    About 350 of these 1125 page requests are traced to bot's and crawlers showing that the site has been indexed by internet search engines such as Google. Of the remaining 750 'real' page requests, 56% come from the domain 'NL', 25% from 'COM' addresses with no country indication. About 5% can be traced to other specific countries, mostly UK and Australia. Almost 9% of users come from the Netherlands' Ministry of Traffic and Water Management (V&W).

    The statistics are useful in giving insight in the popularity distribution of pages accessed:

Connecting People	24%
Keeping Current	18%
Information Resources	19%
About the KC	15%
DC Libraries	15%
Search Help	6%
Library Services	3%

Recommendations

In the ICES III funding application, a proposal has been made to continue maintaining and updating this prototype site, and continue to gather feedback from users to be able to improve its value.

Furthermore, it should be remembered that this project has resulted in a prototype information service on only one small field from the many areas that are covered by Delft Cluster. In view of the generally positive response, development of further sites on other subjects in civil engineering could be considered under ICES III.

4 Special interest group for DC Libraries (SIG-L)

The objective of this project is to work out the basic ideas and recommendations concerning Delft Cluster Library Strategy as described in the Review and Strategy Report (DC 07.04.01).

Objectives of the SIG-L project:

- Short term: improving communication and co-operation between libraries of Delft Cluster partner-organisations, building up the identity of the group in the eyes of Delft Cluster
- Mid term: align library policy for Delft Cluster Libraries (collection, lending)
- Long term: sharing library resources and services (Delft Cluster mega licences for journals and databases, access to library collections)
- Installing the Special Interest Group for Libraries (a community of practice), working on collaborative projects (like producing information literacy materials for users)

This project aims to set up and to facilitate the 'Special Interest Group' for DC libraries, a co-operation board where librarians can learn from each other and can share their expertise, while maintaining independence within Delft Cluster. BTUD acts as a co-ordinator and a facilitator of this board. Active involvement and participation of all the DC libraries is a critical success factor.

Once the principle of working collaboratively has been established, it can be embedded in DC organizations through softer initiatives like culture change programmes or training.
This initiative will hopefully lay the groundwork for establishing new cross-functional communities of practice with yesterday's hierarchies replaced by flat structures. It will allow knowledge sharing between people working in similar topic areas. It will also make it easier for the librarians to get involved in DC Knowledge Management projects and initiatives.
One of the primary aims of the SIG-L project is to improve services offered by DC libraries to their customers by co-operation. A better service leads to a better client satisfaction and to a stronger knowledge infrastructure within DC partner organisations.

Proposed effective means to realize the aims of the project:

- Visiting all the DC libraries
- Common training sessions
- Sharing past experiences (lessons learnt)
- Sharing expertise (lectures during the meetings)
- Common promoting material (about library collections and services)
- Finding out which online resources can be of interest for every library
- Preparing ground for common DC licenses for databases and journals
- Presenting the SIG-L on the local Intranets / DC Intranet
- Exploring possibilities of sharing library catalogues and / or collections

Members of the SIG-L group:

Hélène Tuit :	TNO BOUW
Annemarie Buitelaar (followed by Paula Franken) :	IHE
Jan Mul :	GeoDelft
René Hagman (followed by Wim Owel) :	WL|Delft Hydraulics
Addie Ritter:	TUD CiTG
Pim Bogaerds:	KIWA
Zofia Brinkman :	BTUD (if necessary assisted or replaced by members of the BTUD Advisering Cluster)

The group meets once a month. The meetings are organized, prepared and evaluated by BTUD. The DC libraries are free and welcome to propose and to work out subjects for each meeting as long as they contribute to the general aims of the project as described above.

Activities

1. *Visiting all DC libraries.*
   The group has visited all the DC libraries (except KIWA, who joined SIG-L only recently). All SIG-L members organized a guided library tour and a lecture about their own library. Lively discussions followed.

2. *Common training sessions.*
   Several lectures, given by guest speakers, have been organized (Metalib, TIC, Knowledge Management and E-Journals). All lectures were well received by the group. Subjects were proposed by members of the group.

3. *Sharing expertise / experiences.*
   Every meeting is an opportunity for the group members to share current issues with the group. Several interesting experiences from daily library practice have been exchanged.

4. *Finding out about relevant online resources / mega licences for DC libraries.*
   Inventarization has been made of electronic resources that are relevant for each library. A proposition for a megalicence for Compendex has been taken into account and negotiated. The contract with Compendex has not been finalized yet because of lack of support from some libraries. The project has been postponed.

5. *Presenting SIG-L on the local Intranets / DC Intranet.*
   Information about libraries has been placed on the website of DCKC.
   The SIG-L group has also its own digital working space on BSCW, where actual information is being placed and discussion can be set up.

6. *Sharing library catalogues.*
   Realisation of this <u>long-term objective</u> has been initiated in ICES II by creating support from Delft Cluster partner organisations for "<u>The Metalib project".</u> The aim of this project is to give access to the catalogues and resources of all Delft Cluster Libraries through one common user interface. This project will be an important library-wise contribution in the process of transferring Delft Cluster into a high quality Knowledge Centre. On the long term the GWW sector will profit as well. The concrete steps for project will be defined and worked out in ICES III.
   Not all DC partners library systems are technically suited to join "the Metalib project". Institutes like IHE, GeoDelft and KIWA need to first upgrade their catalogue systems in order to meet basic technical system requirements for Metalib. The Adlib system of TNO Bouw is going to be upgraded soon into a web-base version. There already have been negotiations between Delft University Library and GeoDelft concerning a possible new project: implementing the Aleph catalogue system within GeoDelft library. This project could be partly seen as a Delft Cluster ICES III project. After a positive evaluation similar projects will be carried out for other Delft Cluster organisations.

Evaluation

SIG-L is an informal Community of Practice that depends strongly on a voluntary active contribution from every member of the group. It is difficult for the members to combine their daily tasks with the SIG-L goals. The group is still in development and we hope for more own initiative from the members in the future.

The group is interested in the Knowledge Sharing aspect; the lectures have been quite a success so far. We hope to be able to continue to realize this educational program.

Also "The Metalib Project" has made some substantial progress. Almost all the institutes gave a positive response and some of them are negotiating how the next steps are to be realized.

The SIG-L members have been kindly asked to fill in a survey where they could express their opinion on the project so far. Here briefly the main points:

o   Communication between DC librarians: has been improved
o   Aligned library policy: is not seen as a realistic goal
o   Sharing resources: realistic only if it will lead to cost reduction
o   Visiting Libraries: interesting and useful
o   Lectures   informative, helpful, useful
o   BSCW   is not enough used / appreciated
o   Sharing experiences   one of the most important benefits
o   Continuing SIG-L   YES !!!

Conclusions

The SIG-L group has been established and has been operational for over a year now. After positive evaluation, the SIG-L project will hopefully be continued in **ICES III** provided the DC Business Plan is going to be approved.

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What is the hybrid library? C. Oppenheim, D. Smithson, Journal of Information Science, **25** (2) 1999, pp. 97–112

Several studies undertaken for and by the Delft University Library:

Een Supermarkt voor Informatiediensten (an extensive market research report undertaken by the library where users were asked whether they would support a knowledge centre, May 1998)
Towards a Library of Bits and Bytes (report of a Visiting Committee to the Library which reviewed the current strategic situation of the library and it's future vision, December 1999)
Kenniscentrum Energie (a market research report, by Van Winkelen Marketing Services, describing the market opportunity for a virtual knowledge centre in the field of energy, January 2000)

Science Portals on the Internet, *Wendy A. Warr,* http://www.warr.com/wzarc01.html; (2001)

Several publications from the Digital Library Federation: (http://www.diglib.org/dlfhomepage.htm)
The Digital Library Federation (DLF) is a consortium of libraries and related agencies that are pioneering in the use of electronic-information technologies to extend their collections and services. Through its members, the DLF provides leadership for libraries broadly by -
identifying standards and "best practices" for digital collections and network access
coordinating leading-edge research-and-development in libraries' use of electronic-information technology

Some examples of recent statements by experts in the field;

'The hybrid library is firmly in the 'existing library augmented by digital services' camp. It should provide the human support we have come to rely on, but should use digital means to improve the service provided, whether through digital information directly, or using technology to provide better access to paper or other non-digital forms.' (Chris Rusbridge Director of Information Services, University of Glasgow)

'We need software development that supports common elements between different research Communities of Practice which includes digital library content. We now have the ability to provide the type of system that was first articulated by Vannevar Bush in 1945, with caveats. The library information portals that are becoming popular, are a step in the right direction from a library perspective, but we need to be sure that as information systems develop supporting communities of practice, that digital library services are included as core structure.' (John L. Isenhour, Director of Information Technology Research and Development North Carolina State University Libraries)

'For Delft Cluster it is important that internal and external users have access to an up-to-date, informative working environment for
- Document storage (and other DIS items)
- Document retrieval: all repositories should be easily connected, indexed and retrievable
- Digital co-operative environment for groups: virtual project management
- Simple login/authorisation procedures

- A basis facility, connecting to the tools partners have available. ' (C. Keuls, DC Knowledge Management).

ANNEXES

ANNEXES A : Tunnel Center
Annex A1: Tunnel Center Functional requirements

Greybase and K-Map ('the system') combined functional requirements
July, 2002

Introduction
The system is made up of two distinct content types:
- full text, subject-relevant grey documents produced by DC and non-DC authors (this component was originally called Greybase).
- knowledge cards, which contain meta data about DC documents, DC people, sector organisations, DC projects and tools. The cards also contain links to full text documents where applicable (this component was originally called K-Map).

The content subject focus for the system is tunnelling.

The system is web based and in the prototype phase, all content is open to search and view for all DC members. All DC members are able to contribute content.

This functional requirements document describes the functions of the *working prototype* system. The intention is to implement a full '*production*' system later in 2003, following evaluation and subsequent improvements during the prototype stage.

Purpose of the system
The purpose of the system is twofold:

- to enable researchers and other sector participants to find and share 'all' relevant 'grey' information about their subject quickly and efficiently.
- to give access to –and share- information about DC people, projects, organisations, tools and documents in a simple and complete manner.

Target user group
The user group of the *prototype* will be only DC participants – those who have access to the DC Intranet. This will be a group of mainly researchers (senior and junior), DC librarians and managers with some consultants and other sector participants.

All content in the prototype system will be able to be searched and viewed by all users.

For the prototype, access will be controlled as per the DC Intranet, that is, only those who have accessed the Intranet, will be able to access this system.

The user group of the *production* system will be these DC users as well as the sector in general (public access). Some documents will have restricted access, but as much as possible will be publicly available.

Content

The subject area for the system is 'tunnelling'. This subject was chosen after consultation with potential users. The fact that Theme 4 Underground Construction has an active KM programme with interested users and a defined information need made this subject a logical focus for the prototype. Further refinement of the subject area is possible as the project progresses.

The *production* system will cover all subjects of Delft Cluster participants.

The content of the system will be one of two distinct forms:
*   Full text 'grey' documents – Word, PowerPoint, Excel sheets or other MS Office file formats are expected to form the bulk of documents in the system. Documents such as project reports, interim reports, CVs, training presentations, pre-print articles, conference papers, definition studies etc are expected to be added to the full text content store. Further input from users will determine what content is input at the beginning of the prototype evaluation period (founding material).
*   Knowledge cards – these are documents that contain pieces of meta data about a person, an organisation, a full text document or another entity. One piece of meta data may be the active URL of a related full text document (e.g. to a CV of a person).

    People card:
    Organization card:
    Project card:
    Document card:
    Tool card:

    The metadata contained in each type of card are described in the accompanying data model.

Foundation material will be added to the system, but during the prototype evaluation period, and in the production system, contributions of content will be made by system users. Selection and input of foundation material will be done by IHE and BTUD.

Functions

In general:
*   All user interfaces will be in English
*   Web interfaces will be viewable using NetScape and Internet Explorer 4.0+
*   Expected number of users is about 300 (concurrent users about 30)
*   Expected number of new documents each month is about 30

There are 8 areas of functionality of the system:

*   Browsing
*   Searching
*   Retrieving
*   Adding content
*   Editing/deleting content
*   Alerting
*   User administration
*   Content administration

Browsing
There will be two methods for browsing to content:

- Via a multi-layered structure based on the stages of a 'typical' tunneling project (contracting phase, feasibility study, site monitoring, preliminary design, detail design etc).
- Via a yahoo-like hierarchical subject category structure (see note on the last page about the use of an intelligent categorizing tool)

The user will click through each layer until a list of relevant knowledge cards is shown.

The browsing interface must be simple and intuitive to use.

Searching

Another content access method is searching. A simple search screen and an advanced search screen will be available. Here, users can search through the whole content or through sections of content (e.g. only through people cards), using keyword(s) or phrases.

Functional requirements are:

Simple Search

Search by terms
Select type of document(s) to search (tick boxes)

Advanced Search

Search by terms
Radio buttons for Boolean options (and, or, not)
Select type of document(s) to search through (tick boxes)
Limit search by author name, date, organisation, project phase and keywords

Retrieval

When the user browses to the lowest level, or when a keyword search is done, a list of relevant cards will be presented. This results list must show:

Clickable card title, sorted by card type
20 words description / keywords
Relevancy ranking

Also on the results screen:

Button to 'Refine my search' (search within these documents)
Button to 'Start a new search'

When the user clicks on a card title in the results list, the card itself will be presented as follows:

Full meta data (meta data shown varies depending on the type of card)
Link to related relevant full text documents (e.g. full text of document, CV, training presentation etc)

When the user clicks on a link to a full text document, a new window opens showing the text and a 'Print' button.

Adding Content

Input of metadata and documents (cv's, grey literature) can be done by any end-user, so user friendliness and simplicity is important. The person who submits a document becomes the document 'owner'. This person could be different from the document author.

Batch upload of documents from other publicly accessible 'grey document databases' must be possible.

When the user submits a document, it is immediately available in the system. A notice is sent to the content administrator so that the document can be checked. If changes need to be made to the document, the owner will be contacted by email and asked to make necessary amendments.

The addition of a new document will be a simple stepwise process, via a web browser. At each step, it must be possible to return to the previous step.

Step 1:
After clicking on a button 'Add new document', the user selects which type of card is to be added.

Step 2:
Depending on which card is to be filled, the appropriate data fields will appear. For each field, data will be required, optional, free text, selected from a drop down menu etc according to the data model, which accompanies this Functional Requirements document.

If a full text document or other accompanying file (e.g. a photo) can be uploaded, an 'Upload' ftp button appears. When the 'Continue' button is clicked, fields are validated. If there is a problem, the form is displayed and errors are listed at the top of the screen.

Step 3:
A preview of the card is given so that the user can see how the information will appear.

Step 4:
The user enters contact details (name and email address) and clicks on 'Save'. A confirmation message then appears.

Editing or deleting content

This will also be a step-wise process and at each step, it must be possible to return to the previous step. Only the person who submitted the original document (the document 'owner') or the content administrator can edit or delete documents. If a document is deleted, it is entered into a holding pen for one week so that if the owner changes their mind, it can be recovered. In this case, the owner must contact the content administrator.

Step 1:
After clicking on either 'Edit or delete existing document', the user identifies themselves with their email address.

Step 2:
The user is shown a list of documents of which they are the owner. The user selects the document to be edited or deleted.

Step 3:
The existing card is shown as a form with editable fields. A 'Delete entire document' button is shown at the top of the screen. If this button is clicked, a confirmation message appears telling the user that the document has been removed from the database and that it can be retrieved by contacting the

content administrator within one week. When the 'Continue' button is clicked, fields are validated. If there is a problem, the form is displayed and errors are listed at the top of the screen.

Step 4:
A preview of the card is given so that the user can see how the information will appear. A button 'Confirm changes' appears at the bottom of the screen. When this is clicked, a confirmation message appears. The original (un-edited) document is deleted immediately.

User administration and access control

During the prototype phase, the system will only be available to DC members. Access to the system will be via the existing DC Intranet and therefore users are identified before accessing the system. To enter the Intranet, a password and username are required. Users must contact the intranet system administrator to get a username and password. New users will actually be added by DC Intranet administrators. Agreements will be made with these people to administer the addition of new users.

User statistics are important for evaluating the prototype and in the long run, for monitoring of the production system use. The system must provide user statistics such as:
- Number of users from each organization, number of authors, number of documents submitted per author or per organization
- Number of users viewing types of documents
- Number of users per time period

Alerting

Users of the system and create (and edit) their own interest profile by saving a search as an alert. This alert will create an email showing any new relevant additions to the system. The frequency of alerting can be selected by the user.

Content administration

During the prototype, the BTUD will provide all content administration services. In the production system, it is envisaged that one content administrator from each partner organization will contribute to the system. Therefore, it must be possible for several content administrators to be identified by the system.

Content administration must be done via a browser and must be simple and user friendly. Tasks of the content administrator are:
- Initial bulk upload of documents
- Input of content on behalf of authors
- Checking and correcting submitted documents
- Communication with the authors

The content administrator may also ask for assistance from a subject specialist.

Content statistics are important for evaluating the prototype and for ongoing monitoring of the production system. The system must provide content statistics such as:
- Number of documents added per time period
- Number of documents read/edited/deleted
- Average size of documents

The content store

Oracle corporation and the academic ISP (SURF) have negotiated a SURF-license for all Oracle products. This gives free use of Oracle products for SURF member institutions, including IHE and the TU Delft. Therefore, if suitable, the use of an Oracle database would be preferable for storing content. There are significant differences between the types of content stored (meta-data cards and full text documents) and database design will have to take this into consideration.

Integration with Categorization tool

The use of an intelligent 'text mining' tool for automatic generation of keywords and for automatic categorization of a full text document is being investigated. Several products are available on the market and some include alerting functionality.

Any tool selected must be integrated with the system described above. A critical selection criterion will be openness and ease of integration (e.g. API available, open programming language, configurable vs. programmable customization etc.)

Annex A2: Tunnel Centre: User requirement report for the knowledge map Abstract

Contents of User requirement report

Corporate Knowledge Platform (CKP) User requirements analysis ………………………

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Introduction

Delft Cluster (DC) has as a long-term ambition to become one of the leading knowledge centres on sustainable development of densely populated delta areas. Knowledge is being constantly produced and it is assumed that even more will result in the future. Therefore, there is the need to provide all DC researchers and sector workers access to the (tacit and explicit) knowledge, resources and applications (products of all DC themes and basis projects). To achieve this goal the development and implementation of a Corporate Knowledge Map has been designed within the framework of this project. Knowledge mapping aims to track the acquisition and availability of information and knowledge.

The relationship of the objective and programme of DC

End-users of relevant information (documentation, people, organization, projects, and tools) on a particular topic use bibliographic sources. The end-user has to establish the availability of retrieved information. Every search is time-consuming and difficult for non-skilled end-users. The main purpose of the Delft Cluster Corporate Knowledge Map is to serve as a navigational aid to explicit (codified) and tacit information and knowledge, showing the importance, relationships and dynamics between the knowledge objects.

The Corporate Knowledge Map is designed to meet the needs of all users, external (DC sector) as well as internal (DC organizations). The main result of such an integrated environment will be the prototype of a general system for combining search results of different elements (people, projects, organizations). Knowledge mapping can, in this way, help to illustrate or "map" how knowledge flows throughout DC as a networked organization.

The system, designed according to separations of interfaces, applications and data, will be continually updated and extended.

Purpose

To achieve the goal of the Corporate Knowledge Map, the final specification for the design is based on three reports: Tools and Methodology overview report, Functional requirements and User requirements report (this document).

A user requirements analysis has been conducted as part of the Corporate Knowledge Map project. The main interests are:
- To give users the opportunity to express their needs
- To collect opinions about their use of a knowledge map
- To gather information which would enable decisions on the design of the Knowledge Map prototype
- To collect suggestions on possible future developments

Background

Definition of the user target group

The knowledge Map prototype will be done in the field of tunnelling. The target group users are from different areas like construction companies, research organizations, government, education and from the public sector. Users in all these fields have been identified during a literature search.

Literature search

The field of tunnelling has been selected in Delft Cluster as the subject to be mapped for the prototype. A preliminary literature search has been conducted by the Library UT Delft in order to find articles related to the field of tunnelling within Delft Cluster. The search was limited to the period 1999-2001/5. The search was done in a number of databases (Compendex, Web of Science, Transport). The Compendex database yielded the most interesting results. The following search was performed in Compendex:

Search History
    #7 #4 and #6 (8 records)
    #6 #1 or #2 or #3 or #5 (592 records)
    #5 caisson and tunnelling (1 record)
    #4 Netherlands* or delft or Holland or Nederland* (10710 records)
    #3 immersed tunnelling (3 records)
    #2 (tunnelling-excavation) in DE,SU (497 records)
    #1 (tunnels and tunnelling) in DE,SU (351 records)

A URL to the full text of the articles was provided for the majority of the articles .

Methodology

Timing

The survey was conducted from 1 January to 15 July 2002. Twenty-five target users were identified and ten were personally interviewed. Also, brainstorming sessions have been held with experts from the field of tunnelling and representatives from the sector in order to determine the user requirements and content of the Knowledge Map.

Gathering of data

The data were collected using a questionnaire (annex 1). The Library UT Delft and IHE Delft collaborated closely in its preparation. The questionnaire was studied and discussed during the first two weeks of the work package. This resulted in the questionnaire being divided into five parts to improve its understanding.
The first part was dedicated to the habits of working with information. The aim of this part was to focus on the general characteristics of using information. The second part dealt in general with sharing of information in the user's organization and the user's opinion on effective sharing of information. In the third part the users were asked to answer some questions regarding the content of the Knowledge Map and to find information there. In the fourth part the users were asked to provide basic information about their domain of expertise. The last part of the questionnaire was related to knowledge map usage and access level.

Respondents to the questionnaire

The potential users of the Knowledge Map were identified to be engineers and stake–holders. Only engineers working in the area of tunnelling were selected as respondents to the questionnaire. These engineers have been selected from research, consultancy, education and the tunnelling field. Nine out of twenty-five selected respondents kindly gave their time for a 2 hours interview. The summary of their responses is given in appendix 2.

Brainstorming session

One brainstorming session has been held as a kick-off for the user requirements survey. The brainstorming session was a one-day interactive group process, which had an objective to make explicit the knowledge requirements of the users and to shape the appropriate prototype knowledge map for Delft Cluster. Twelve people were invited to the session, six of which attended the group process.

Analysis

The questionnaire has been analysed based on nine answers from which decisions were made for the final report and its content.

Background information on the respondents

As stated in the introduction the results are based on the answers from 90% of the respondents that were actually working in the field of tunnelling. One user, who was not an expert in the field of tunnelling, was interested in the knowledge map concept.

The respondent's base organizations encompass the areas of research, engineering, consultancy and education. The respondents' status range from PH.D students to professors, researchers, managers, consultants and knowledge officers.

Results analysis

The interviews were split into three main topics: personal information working habits, sharing information concepts and required content for the knowledge map. The present analysis has been done based on comparative matching between the three topics.

The results indicate the user requirements for such a system. One user commented that the DC Knowledge Map is a Replica of the COB data base system, while COB sees the DC Knowledge Map as an expert system and a tool needed for every day work. It became clear that most users are looking for people with expertise in the field and relevant articles and books. They prefer all relevant records, not just the latest record in a database.

Research done outside the Netherlands is viewed by one user as being much more important than the national focus, as this is covered through personal networking.

Another result of the survey revealed that (digital) shared platforms are not used extensively, especially in consultant companies. The only areas where these platforms are known and used are in research and education organizations. The fact that engineering consultants do not have such tools in place shows the need for a knowledge map tool for the sector.

Co-operation between organizations is widespread, not only with fellow institutes but also between engineering organizations working with sector and specialized organizations.

The documents to be used are not limited to scientific literature, although they contribute significantly, but also news, project information, minutes of meetings, and concepts (the so called Greybase) are considered important sources of information and knowledge sharing.

Although tools are not regarded as one of the most important components of the knowledge map, as the usage increases, content will increase bringing more and more information on the availability of tools and their use in daily work. Tools are also limited by technological capacity.

General conclusions

A general conclusion resulting from the interviews is that such a tool, although regarded as very useful, will take time to be included in everyday working habits of the tunnelling industry. The main form of communication is currently the standard e-mail, which is not used as a basis for decisions but as a very important method of sharing information.

The main path followed to collect information for use in solving problems is the same for all the interviewed persons, i.e. first at personal contact level, then by e-mail followed by publications and books. This approach indicates:
- that *people* and *people expertise* are an important component of the knowledge map; and
- that the order of the use of these components is diverse, but all three components play an equally
- important role in solving problems.

The four components of the Knowledge Map (people, organization, documents and tools), identified during the concept definition, each proved to be a relevant aspect for the tunnelling industry. However, comments were made on the level of inclusion or exclusion of specific components, for

instance, people's CV's should not to be in the public domain. Remarks on documents were "careful with spreading on an in-depth level, not every expert is pleased with an easy access level".
The added value of the Knowledge Map is found to be in providing grey literature information at the document level, which is usually hard to come by.

To allow co-operation between organizations and their search for information, these are required to have as much information as possible on their expertise and organizational structure, etc, made publicly available (i.e. via the URL of the organization).

During interviews the respondents showed preference for mixed presentations, both text and diagram, while processing information.

The sharing knowledge concept provided by the respondents matches their habits of working with information. On the personal level: personal contact, both through face-to-face and phone or e-mail, and for documents: the role of "scientific" information to be used in daily work, are all-important knowledge sharing elements.

All the respondents considered that, as a general sharing rule, sharing knowledge is best done during face-to-face meetings and workshops. A document awareness system would be helpful. Differentiation between internal and external procedures for sharing knowledge has proven to be non-relevant for the content development of the Knowledge Map.
A knowledge map does not exclude face-to-face knowledge exchanges but the two forms used together optimise the effectiveness of information provision.

Recommendation

The Corporate Knowledge Map project is linked with other Delft Cluster projects, such as Document Content Management and Grey base, both of which have had user requirement surveys. The recommendations from these two projects were instrumental in defining the final functional requirements of the Corporate Knowledge Map Project because of its limited survey response (nine people). The Knowledge Map should be:

1. User friendly – During the interviews it was agreed that the Knowledge Map should be designed to be as friendly as possible for the end-user The word that most occurred in the discussion was "simple" meaning no complicated access. The interface should be developed with tools or products that provide this desired result. Displayed results of retrieved elements from the Knowledge Map should contain both graphical and text formats.

2. On-line facilitator - the system should have the possibility to have an on-line facilitator, which can guide and do search in the Knowledge Map database for those users who are less experienced in making searches.
3. Document request - the speed of delivery of the retrieved document is very important.
4. Content development- Appendix 1, parts III, IV and V, provide information on what should be the focus for the content development of the Corporate Knowledge Map.

Annex A3. List of available text mining tools

?	: Unknown													
+	: Yes													
0	: Mwa				**f** : Fixed taxonomy, not customizable									
-	: No				**nf** : Non Fixed taxonomy, customizable									
							Features:							
	Tool:	*Searching*	*Parsing*	*keyword extraction*	*Taxonomy*	*Document Structure*	*Multilanguage*	*API interface*	*Complete source*	*Database interface*	*Price range*	*comment*		*interessant*
1	TNO, Quetzal	+	-	-	-	-	+	+	-	-	free	TNO's search engine		
2	netowl extractor	+	-	+	0	+	+	+	-	+	$70,000	Extracts names and phrases		
3	textanalyst	+	?	+	nf	-	0	+	-	-	$1782	Toolkit for textmining		
4	megasearch	+	-	-	-	-	+	?	?	-	$77.7	Searching in Natural language		
5	intelligent miner for text	+	?	+	nf	-	+	+	-	-	$30.000	Toolkit for textmining		
6	icrossreader	+	0	0	f	-	+	0	-	+	$149	Text Mining & Intelligent Search Engine		
7	yahoo planet	+	?	+	f	?	?	?	?	?	?	Ready in the fall. Classifies documents to Yahoo hierachy		
8	dataset	+	?	?	?	?	?	?	?	+	$49	Database with text search and retrieval tools		
9	concept map user interface	?	?	?	?	?	?	?	?	?	?	site down?		
10	themescape	+	-	+	-	-	0	0	-	-	>$20,000	Graphical ConceptMap creator		
11	readware, ipserver, SDK	+	-	+	nf	+	+	+	-	+	> € 42.304,29	intelligent text analysis server		
12	twurl	+	-	-	+	+	+	0	-	0	?	Internet searcher.		
13	taxonomy engine	+	-	+	nf	0	+	+	-	+	>Dfl. 10.000	Text classifier		
14	smisc	-	-	?	?	?	+	?	?	?	?	Ready in the fall. Discourse mapping.		
15	textcenter, textfinder	+	+	-	-	-	+	+	-	-	$120.000	Hardware implementation with textmining software		
16	zyimage	+	-	-	-	-	+	+	-	+	Dfl. 10.000	index, fast (fuzzy and proximity) searching of many documents		
17	knowledge server	+	-	+	nf	+	+	+	-	+	£10.000-£3.000.000	pattern-matching, contextual analysis and concept extraction		
18	ie studio, administrator, text-o-scope	+	0	+	nf	+	-	+	-	+	?	Information Extraction Studio		
19	verity developer kit	+			nf	+	+	+		+		Provides unparalleled high-speed search precision		x
20	inquery	+	0	+	nf	+	-	+	-	+	> £17,688	probabilistic text retrieval system		x
21	excalibur retrievalware	+	-	0	nf	+	+	+	-	+	> € 25,000	Advanced Search and Retrieval		x

No.	Name										Price	Description	
22	basis	+	-	+	nf	+	+	+	-	+	>Dfl 76.000,-	search and retrieval solution	
23	concordance	+	-	-	nf	-	-	+	-	+	$995 - $5000	full text database management package	
24	dtsearch	+	-	-	f	+	+	+	-	+	$999	fast indexing and searching	
25	proindex	+	-	-	-	-	+	+	-	+	$3000 - $12,000	toolkit for full-text searching	
26	multi-site search software	+	-	-	-	-	-	-	-	-	$750 - $3,850	Internet indexing and searching	
27	callable personal librarian	+			nf	+	+	+	+	+	free	tools for searching and multimedia applications	x
28	texis	+	-	+	nf	+	+	+	-	+	> $ 10,000	Text Retrieval RDBMS	
29	texcovery	-	-	+	nf	-	-	-	-	-	?	Prototype text categorization tool with 3D visualization	
30	vantagepoint	+	0	+	+	+	-	-	-	+	$6,500	extract knowledge from text databases	
31	fulcrum searchserver	+	0	+	nf	+	+	+	-	+	$ 7,800	advanced information retrieval solution	
32	searchkey	+	-	-	-	+	+	+	+	+	$10,000	Enterprise wide indexing and searching	
33	seekit developer	+	-	-	-	+	+	+	+	-	> $9,999	programming library for use in developing text search software.	
34	searchopia	+	-	-	-	-	+	-	-	-	$10	Library for text searching in files	
35	t·find, t·store, t·mining,t-repository	+	-	+	nf	+	+	+	-	-	Dfl.100.000/ year	advanced text mining and automatic classification system	
36	thoughttreasure	-	+	+	nf	-	0	+	+	-	free	Database of 25,000 concepts with NLP tools	x
37	bow library	+	-	-	-	-	+	+	+	-	free	Lib for stat text analysis, language modeling, information retrieval	
38	childes	+	+	-	-	-	+	+	+	-	free	tools for studying conversational interactions	
39	Xerox, askonce	+	-						+			web-based meta-search application	
40	linguistx, categorizier	+	+	+	nf	+	+	+	-	+	> $150K	fast, comprehensive suite of multilingual text services	
41	ht://dig	+	-	-	-	0	+	+	+	+	free	www indexing and searching system for intranet	
42	isearch	+	-	-	-	+	-	+	+	-	free	indexing and searching text documents	
43	amberfish	+	-	-	-	+	-	+	-	-	free	indexing and searching text documents	
44	textpress	+	-	-	-	-	+	+	-	+	> $4,000	database of relational data, free text and multimedia objects	
45	zebra	+	-	-	-	+	0	+	+	0	free	fielded free-text indexing and retrieval engine	
46	z'mbol	+	-	-	-	+	0	0	-	0	£ 32.000	high performance, information indexing and retrieval tool.	
47	searchexpress	+	-	-	-	+	-	+	-	+	$995	powerful full-text searching	
48	isis	+	-	-	-	-	+	+	-	+	free	set of textual database softwares	
49	boolean search 2	-	-	-	-	-	-	-	-	-	$247	Only on the Macintosh	
50	dioweb search	+	+	+	f	+	+	-	-	+	>$495	true natural language search tool	
51	onix text	+	-	-	-	+	+	+	0	0	$2,000	C++ code library for indexing and

		Searching	Parsing	keyword extraction	Taxonomy	Document Structure	Multi-language	API interface	Complete source	Database interface	Price range	comment	interessant
	toolkit											searching	
52	harvest	+	?	?	?	?	?	+	+	?	free	tools for information retrieval	
53	Oracle, intermedia	+	-	+	nf	+	+	+	-	+	?	extends Oracle8i by indexing any text or documents	
54	protan	+	0	0	nf	-	+	-	+	-	free	content-analytic engine	
55	visualtext	+	+	+	nf	+	+	+	-	-	$50K to $100K	IDE for developing text analyzers	x
56	folio integrator	+					+	+				devkit for using and managing electronic reference information	
57	Text Analysis Computing Tools	+	-	+	-	+	+	0	-	-	free	text-retrieval and analysis on literary works	
58	textpack	+	-	+	-	-	+	-	-	-	>DM 200	computer-assisted content analysis	
59	wordsmith tools	+	-	-	-	+	+	-	-	-	£ 50	tools for looking at how words behave in texts	
60	asksam	+								+	$385.00	flexible database for textual information	
61	agfl system	-	+	-	-	+	+	+	+	-	free	software systems for Natural Language Processing	
62	alembic	+		+		+				0	free	natural language engineering environment	x
63	cslu toolkit										free	tools to build, investigate and use interactive language systems	
64	quicktag and quickparse	-	+	+	-	-	-	+	+	-	>$1500	tools for tagging and parsing	
65	interbasis	+	-	0	nf	+	+	+	-	+	> $1000	multi-platform, multi-protocol, information management products	
66	alise	+	-	-	-	-	+	+	-	0	$1,999	one of the fastest index keyword search engines	
67	ae1	+	+	+	nf	-	0	+	-	-	$250K - $400K	interpret contents of documents as the questions that users ask.	
68	LexiQuest	+										accurate information retrieval using CL and NLP	
69	Tides	-	-	-	-	-	-	-	-	-	-	This is a basic research project, no product.	

Annex A4: Tunnel Center promotion material

Light at the beginning of your tunnel: Delft Cluster Tunnel Center

You are now looking to the test / prototype version of the Delft Cluster Tunnel Center. The idea of the kmap is to help facilitate sharing of implicit information on tunnelling in soft soil by putting tunnel experts in touch with each other. In the first phase potential endusers will be researchers and advisors. In a later phase students may also take part. The kmap helps to share information about organisations, people, tools, projects and grey literature. All these elements relate to the subject of tunnelling of course. For your understanding: grey literature is about documents that are not officially published. You may think of congress papers, internal reports, lectures etc.

Former Delft Cluster studies have shown that there is a need for a system like the Tunnel Center. There are now informal networks where this implicit information is being shared, but these networks are quite tight. It is difficult for newcomers and for those on the edge of the tunnelworld to have access. We hope that the Delft Cluster Tunnel Center will help to make the networks more open to others, and also to make the information that is shared in the networks more explicit, so that it can be shared more easily with a wider audience.

This Tunnel Center project is a Delft Cluster research project. It is financed by Delft Cluster funds, IHE and the TU Delft Library. The project is managed by IHE and TU Delft Library together. After investigation of the user needs, a document with all functional requirements was produced. Then the project team spent quite a long time in searching for a software supplier who could provide us with taxonomy software together with a tailor-made database application. Of course it all had to fit in the budget. In SmartHaven we found a partner that we wanted to work with. They delivered the test version that is now running. Until the beginning of January bugs can be reported and will be fixed. Afterwards the project team will evaluate the project. Formally the end date of the project is at the end of March; the prototype software will run until August 2003 but we hope that end users are so enthusiastic about the Tunnel Center that we can find ways to continue.

Now that the technical side of the project is more or less under control, the project team faces the real challenge of this project: how to get tunnel experts involved in the Tunnel Center. Of course we have come up with some ideas: we input as much data as we can find, especially grey literature, in the Center.

We are aiming to input a critical mass of documents to trigger interest in the system. We also organised test sessions for groups and one-to-one visits to those who show interest. We have to try now to get in touch with Communities of Professionals on tunnelling, or organisations that might be interested. This is all in the hope of attracting more potential endusers. Also, we continue to work closely together with the project team of the Delft Cluster Tunnelling Knowledge Centre. This is a website which brings together a large variety of links to all sorts of information in tunnelling (www.library.tudelft.nl/dckc). We think this combination of implicit and explicit information on tunnelling in soft soil has great potential.

But of course, it is the endusers who decides if the Tunnel Center shows some light in their own tunnel.

Are you interested? Do you have any suggestions?
Please let the project leaders know; we would be very grateful.

Annex A5 : Tunnel Center Interview questionnaire

Are you a: scientists, advisors and engineers?

The tools
9. *Is this a helpful tool; does it bring you information that is otherwise difficult to find?*
10. What do/could you use it for?
11. *What do you think of the concept / idea?*
12. What do you think of the user friendliness?
13. What do you think of the quality of the content?
14. *What do you think of the quantity/coverage of the content?*
15. *What alternatives do you use; how often; replacement?*
16. *Do the tools help you to make your personal networks bigger?*

The use
17. *What user type are you: upload, search, promote?*
   a. Tunnel Center: fill in own personal and organisation card?
   b. Do you think you will promote these tools to other potential users?
18. Are you planning to use this tool in future?

Improvement
19. *What would make you a (more) happy user*
20. What do we need to do to improve usefulness, get a critical mass, get this functioning?
21. *Is confidentiality / competition a real barrier for sharing?*
22. What other parties could be interested; how to interest them?
23. Do you see possibilities for sponsorship, finances?
24. *Ask for content*
   a. Ask for grey documents (esp. taxonomy) Tunnel Center
   b. Ask for additional links, sources, headings etc.

ANNEXES B: Virtual Knowledge Centre
Annex B1: Promotional material

Delft Cluster Tunnelling Knowledge Centre

URL: http://www.library.tudelft.nl/dckc
Email: dckc.editor@library.tudelft.nl
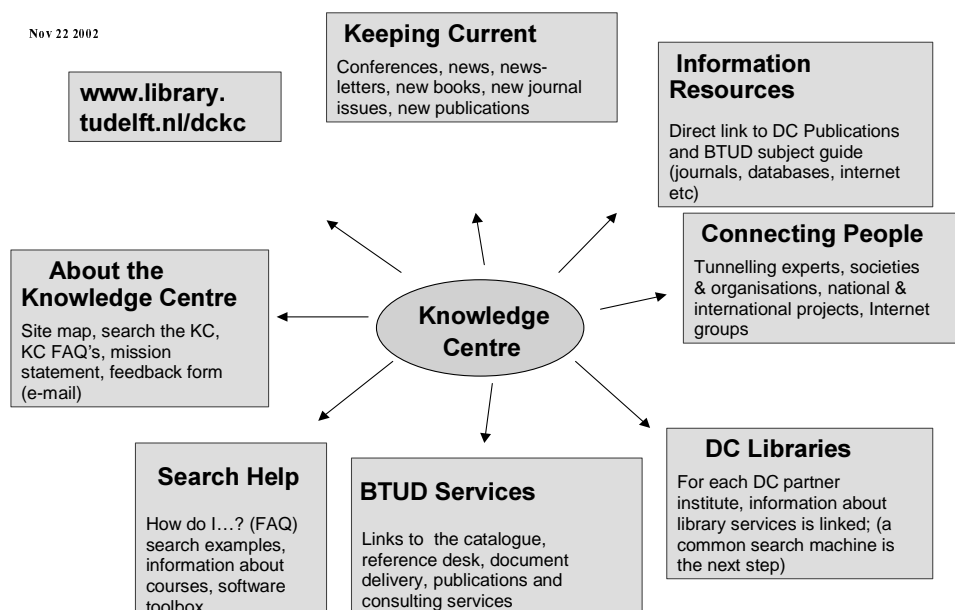
Charles Citroen
Briget Lander

TU Delft Library

The Delft Cluster Tunnelling Knowledge Centre (DCKC) is a dedicated collection of internet links offering a prototype web guide to tunnel construction information; it has recently been opened for testing and evaluation by all interested parties from the GWW sector at: www.library.tudelft.nl/dckc.

Project Goal
The overall goal of the project was to build and evaluate a prototype virtual knowledge centre based on Delft Cluster interests. To test the KC concept, the prototype has been developed for the subject of Tunnel Construction. If the prototype is seen to be of value, then the concept can be extended to cover other areas of DC activities.

The format of the DCKC is based on a similar knowledge centre developed by the BTUD for Civil Engineering in general. (www.library.tudelft.nl/ctkc)

The tunnelling KC prototype, in conjunction with the DC Tunnel Center (www.kmap.ihe.nl) could in a later phase become a link in a comprehensive network of knowledge centres in the major knowledge domains that Delft Cluster covers.

Nov 22 2002

www.library. tudelft.nl/dckc

Keeping Current
Conferences, news, news-letters, new books, new journal issues, new publications

Information Resources
Direct link to DC Publications and BTUD subject guide (journals, databases, internet etc)

About the Knowledge Centre
Site map, search the KC, KC FAQ's, mission statement, feedback form (e-mail)

Knowledge Centre

Connecting People
Tunnelling experts, societies & organisations, national & international projects, Internet groups

Search Help
How do I…? (FAQ) search examples, information about courses, software toolbox

BTUD Services
Links to the catalogue, reference desk, document delivery, publications and consulting services

DC Libraries
For each DC partner institute, information about library services is linked; (a common search machine is the next step)

Contents
An overview of the contents of the DCKC is given in the diagram on the first page. Each block represents a web page on the theme around this tunnelling issue, and within each block further web links are given. Some of these links refer to pages especially developed for this Delft Cluster KC, while most links point to existing web sites that are relevant for tunnel construction engineers.

Testing and evaluation
The proof of the pudding is in the eating, so all engineers, planners and managers involved in tunnelling issues are invited to test and use the DCKC and see if it provides useful information to them. Naturally, any comments and additions are invited at dckc.editor@library.tudelft.nl or at citroen@library.tudelft.nl.

Annex B2: Excerpt from 'Review and Strategy' report

Recommendations

According to results of the review, the aims of this project, and our expertise in documentary information as a university library, the following recommendations are made:

In order to make any kind of knowledge management feasible and successful, facilitation of co-operation will be needed. However, sharing explicit knowledge is always easier than sharing tacit/implicit knowledge. In subsequent chapters of this report, recommendations are made for increasing awareness of knowledge management and increasing interaction between partners in sharing grey documents and in library services and collections.

In order to create some order out of the currently widely differing document systems, it will be useful to try to synchronise essential grey literature creation procedures.
The next activity in Theme 7.4.1 projects will be to select and implement tools for virtual knowledge stores and access mechanisms.

The prototype Hybrid Information Centre, the second phase in this BTUD basis project, will give the possibility to test methodologies that are available on the market now and that will be adapted to specific Delft Cluster requirements. In the short term, these are likely to be implemented in the existing DC Intranet and/or Internet environments.

Ensuring sufficient interaction with the other Theme 7 projects is essential; this refers to the Communities of Practice (tacit knowledge), Learning Organisations (sharing culture), Know ME (assessing the current knowledge management situation of each organisation) and integration with the Corporate Knowledge Platform in the long term. Content will have to be linked to specific Theme groups.

Annex B3: Klankbord- and end user group members:

Klankbordgroep	Ir. J.J. Olie	GeoDelft
	Prof. Dr. R.K. Price/S. Velickov	IHE
	Ir. H.J. Verheij	WL
	Prof. Ir. H.J. Verhagen	TU Delft

End user group (active members)	J.J. Olie	Geodelft
	F.H.M.Mischgofsky	Geodelft
	R.Stoevelaar	Geodelft
	M.Kiers	Geodelft
	G. Hannink	Geodelft
	P.Waarts	TNO Bouw
	C.W.H.Keuls	Delft Cluster
	M.Hutteman	Geodelft
	L. Pennings	TNO STB
	B.R.Hemmen	Geodelft
	J.J. van Meerten	Geodelft
	P. Meijers	Geodelft

Annex B 4: Mission Statement of the Delft Cluster Tunnelling Knowledge Centre

The knowledge centre exists to provide user focused integrated access to information resources from libraries and Internet sources and to facilitate sharing of the knowledge contained within the tunnel construction user group.

Specifically the knowledge centre will:
- Provide access to library and Internet information resources in a structured and clear manner
- Establish and support a community of interest around the subject area of tunnel construction to facilitate knowledge sharing between users
- Promote and raise the level of information literacy skills of library users

The knowledge centre at this moment is targeted at a user group of engineers, staff and management of the Delft Cluster partner organisations. The focus is on meeting the information needs of engineers and researchers and not on the specific needs of other potential users (consultants, manufacturers, construction firms etc). Therefore you will find technical research-related information and quality scientific and technical references and documents, but you will not find product information or legal or economic data.

Feedback
At any stage, but particularly in this early prototype stage, feedback is sought from knowledge centre users. If you have comments about what or how information is presented, if you have ideas about what could be added or changed, if you have problems using the knowledge centre - or if you have any other input - please contact the knowledge centre editor (dckc.editor@library.tudelft.nl). You may also use the feedback form.

Knowledge Management and Delft Cluster
The Delft Cluster project team recognises that is has a role to play in more than just research management and has embraced the goal of knowledge management as a central part of its strategy for the future. Under the umbrella of Theme 7 Knowledge Management, an attempt is made to offer an integrated source of information linked to available knowledge in the form of a prototype web based Knowledge Centre. Input from users is essential to make this resource more than just another source of nice-to-know web links.

If this prototype is judged to be useful by its users, further knowledge centres directed at other DC user categories could be developed.

History
The Civil Engineering Knowledge Centre was the first prototype version of the BTUD Virtual Kenniscentrum and was launched in Sept 2001. The concept was developed by the TU Delft Library and the look and feel was designed by an external web design company.

Annex B 5: Evaluation form

Delft Cluster Tunnelling Knowledge Centre 2003 Web Site Survey
Your Feedback Is Important To Us
Help us improve our Web site by taking a short survey about your online experience.
Please click on the "Submit" button below

I am a :

☐   Scientist

☐   Consultant

☐   Construction Engineer

Other: [_____]

The user friendliness is:

☐   Good

☐   Acceptable

Not Ok: [_____]

The quality of the content:

☐   Suits my needs

☐   Not my subject

☐   Too specific

☐   Too much rubbish

Other: [_____]

The tool helps to make my personal professional network larger:

☐   Yes, quite well

☐   Somewhat/perhaps

☐   Not

I will use this tool in future:

☐   Yes

☐   Perhaps

☐   No

I think this tool ...

[text area]

GENERAL APPENDIX: Delft Cluster Research Programme Information

This publication is a result of the Delft Cluster research-program 1999-2002 (ICES-KIS-II), that consists of 7 research themes:
►Soil and structures, ►Risks due to flooding, ►Coast and river, ►Urban infrastructure,
►Subsurface management, ►Integrated water resources management, ►Knowledge management.

This publication is part of:

Research Theme	:	Knowledge Management
Baseproject name	:	**Corporate Knowledge Platform (CKP)** **Document and Content Management**
Project name	:	**DC Corporate Knowledge map** **Hybrid Information Centre** **Knowledge Exchange Facilities**
Projectleader/Institute		Dr.Ir. I. Popescu Drs. J.J. Halmos	IHE BTUD Library
Project number	:	07.02.03 07.04.02 07.04.03
Projectduration	:	01-01-2001 - 30-06-2003
Financial sponsor(s)	:	Delft Cluster
Projectparticipants	:	GeoDelft
		WL|Delft Hydraulics
		IHE - Delft
		TNO
		BTUD Library
Total Project-budget	:	€ 580.000 (HIC & KEF & e-publishing & Kmap)

Delft Cluster is an open knowledge network of five Delft-based institutes for long-term fundamental strategic research focussed on the sustainable development of densely populated delta areas.

Theme Management team: Knowledge Management

Name	Organisation
Prof. Dr.R.K. Price	IHE-Delft
Prof. Dr. A. Mynett	WL|Delft Hydraulics

Projectgroup

During the execution of the project the researchteam included:

Name	Organisation
1C.C van der Berg	TU-Delft
2C.C. Citroen	TU-Delft
3.J.J. Halmos	TU-Delft
4.Z.Brinkman-Dzwig	TU-Delft
5.I.Popescu	IHE-Delft

Other Involved personnel

The realisation of this report involved:

Name	Organisation
1. B.Lander	TU-Delft
2. S. Deniszenka	IHE-Delft
3. S. Velickov	IHE-Delft
4. M. Meulblok	TU-Delft
5. C.G.M. Kassels	TU-Delft