Use of a Knowledge Management System in Waste Management Projects

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ABSTRACT

In Germany the knowledge management system "WasteInfo" about waste management and disposal issues has been developed and implemented. Beneficiaries of "WasteInfo" are official decision makers having access to a large information pool. The information pool is fed by experts, so called authors. This means compiling of information, evaluation and assigning of appropriate properties (metadata) to this information.

The knowledge management system "WasteInfo" has been introduced at the WM04, the operation of "WasteInfo" at the WM05.

The recent contribution describes the additional advantage of the KMS being used as a tool for the dealing with waste management projects. This specific aspect will be demonstrated using a project concerning a *comparative analysis of the implementation of repositories in six countries using nuclear power* as examples:

The information of "WasteInfo" is assigned to categories and structured according to its origin and type of publication. To use "WasteInfo" as a tool for the processing the projects, a suitable set of categories has to be developed for each project.

Apart from technical and scientific aspects, the selected project deals with repository strategies and policies in various countries, with the roles of applicants and authorities in licensing procedures, with safety philosophy and with socio-economic concerns. This new point of view has to be modelled in the categories. Similar to this, new sources of information such as local and regional dailies or particular web-sites have to be taken into consideration. In this way "WasteInfo" represents an open document which reflects the current status of the respective repository policiy in several countries. Information with particular meaning for the German repository planning is marked and by this may influence the German strategy.

INTRODUCTION

In order to compile and provide available information concerning final disposal of radioactive waste and waste management issues, the knowledge management system "WasteInfo" was developed and implemented on behalf of the German Federal Ministry of Environment, Nature Conservation and Reactor safety (BMU) [1, 2]. Core of "WasteInfo" is a pool of documents considering waste management practice, operation of repositories, concepts for final repositories, set up of repositories, licensing procedures, post closure phase, politics and disposal concepts, guidelines, site investigation, site characterisation, closure and other questions.

Main objective of "WasteInfo" for the customer is the provision of information on short notice. This means, that a summary of information for specific topics, background information and an evaluation of the available information is provided. Another essential objective of "WasteInfo" is know-how preservation for future repository projects.

The system was installed in March 2003. Within a period of six months a basic pool of app. 4.000 documents was entered in the system. Following this phase normal operation has been started.

Up to now "WasteInfo" has demonstrated its applicability and benefits by providing concise but comprehensive information. In this contribution the use of "WasteInfo" as project management tool will be described. For this the project *comparative analysis of the implementation of repositories in six countries using nuclear power* is chosen as example:

After a short general description of "WasteInfo", project-oriented adaptations are dealt with. This concerns particularly the aspects of:

- systematic access to "WasteInfo" information pool
- restructuring "WasteInfo"
- use of "WasteInfo" as project repository

DESCRIPTION OF "WASTEINFO"

Technical Solution

"WasteInfo" is based on the *Microsoft SharePoint Portal Server*. *SharePoint* is a server-based platform consisting of three basic elements:

- a configurable portal
- a document management system with a database and
- an indexing and search component

The portal serves as a common entrance for user accessing the knowledge management system by use of an internet browser. The document management system contains the document database with version control and access management. The indexing and search component can index local and external data sources and consists of full-text search, the search for metadata and the search in categories. Any metadata can be defined for specific search purposes. All elements have been adapted to the requirements of "WasteInfo".

The technical infrastructure of "WasteInfo" consists of locally distributed server and clients. The *SharePoint Portal Server* with the document database is installed on a server located at GRS Garching. Authorized experts of GRS at the various GRS-locations enter the system by use of the company network. The main customer (BMU) has access to "WasteInfo" by use of both the internet and a dedicated line. On demand of the BMU other users may get access over internet.

Organization of the Information

Any document stored in "WasteInfo" is characterized in various ways.

I. The document database of "WasteInfo" is organized as web folder. This means, that there is a directory structure as in any other windows folder. Each document must only appear once in the database and is stored in a distinct folder of the "WasteInfo"-directory structure.

II. The stock of information is assigned to a system of categories with respective subcategories. In contrast to the distinct folder that contains the document, several categories may be assigned to one document.

III. In addition to the structuring criteria I and II each document is described by a record of metadata. These metadata differ from the usual metadata used in windows applications as properties for file description. The metadata used in "WasteInfo" are part of the concept of the Knowledge Management System and particularly designed with regard to optimum information retrieval.

The web folder of the "WasteInfo" database is structured as a tree directory. The respective subdirectories give information about type and origin of the documents, see Fig.1. Four main sources of documents are considered, which represent the upmost level of the tree:

- proceedings
- periodicals (journals)
- publications
- reports

Proceedings consist of talks and publications presented at conferences or symposia. The directory *proceedings* is further subdivided into common types of conferences, such as *Waste Management symposia* or *ICEM* etc. Each of these directories contains subdirectories with the year of the conference.

In the main directory *periodicals*, disposal-relevant articles from technical journals are collected. The directory *publications* is meant for publicly available documents, particularly from domestic or international organisations, such as safety series or Tecdocs. *reports* contain results of scientific and technical R&D work. The structure of these main directories is arranged the way as described for proceedings.

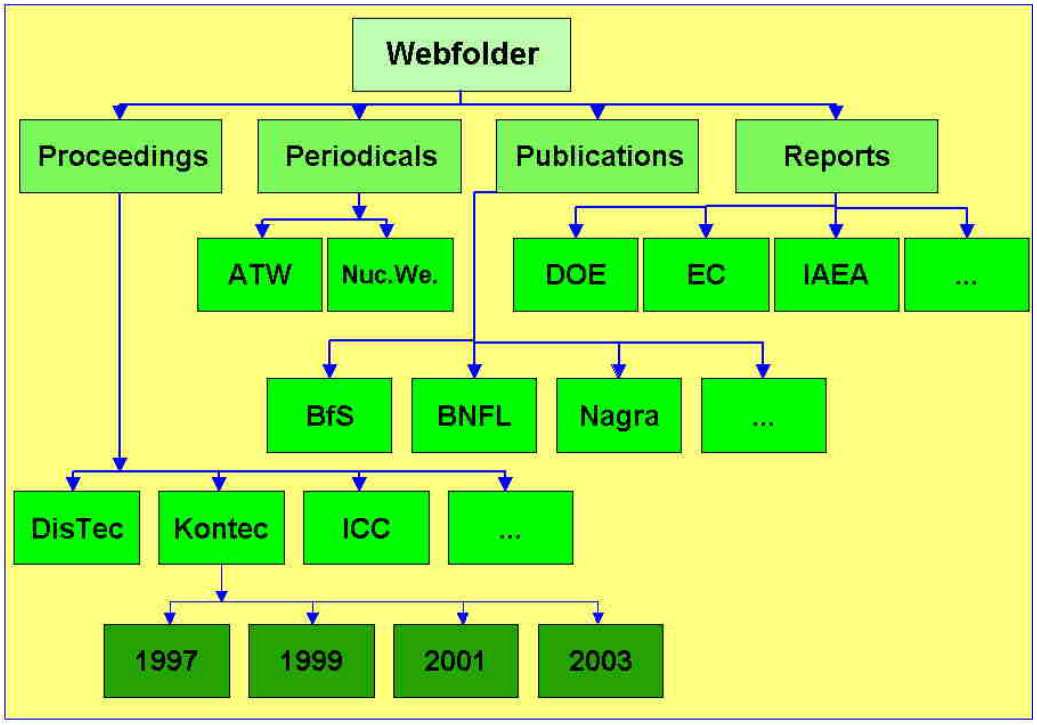

Fig. 1. Directory structure of the database of the final disposal knowledge management system

The second structuring option is the use of categories. Each document stored in "WasteInfo" is assigned to one or more categories. Each category is divided into subcategories. The categories used in "WasteInfo" at the beginning are shown in the screenshot in Fig.2. From the viewpoint of a political decision maker (in Germany) they cover any relevant aspect regarding the development of a sustainable disposal strategy. The documents assigned to a distinct category give an overview and a useful collection of the knowledge of the respective issue.

The number of items in the distinct categories represents an indicator of the available knowledge in the respective process. Only few or even no document in a category is an announcement that further information has to be collected or that there is a necessity for additional work in the considered field.

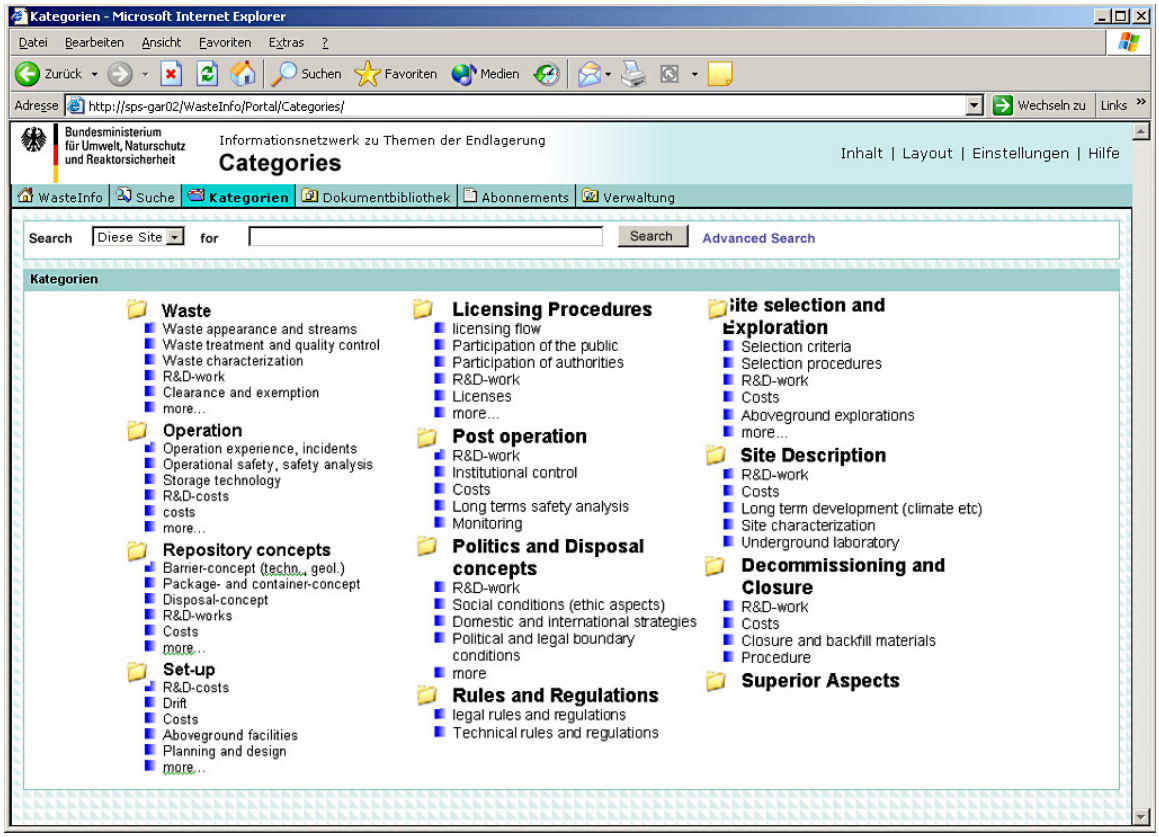

Fig. 2. Categories used in the final disposal knowledge management system

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The third characterization option for documents in "WasteInfo" are the metadata of the document, which have to be entered manually. In addition to common metadata such as title and author a set of enhanced metadata is provided regarding the evaluation of the respective documents. I. a. this affects information about users of the documents, their (subjective) evaluation of and comments about the document and last not least about the usefulness.

The metadata used in "WasteInfo" are shown in table I. Column 1 gives the field names, column 2 exemplary entries.

Table I. Metadata for Documents of "WasteInfo"

Status	checked in
Modified	2005-09-23
Version	n. r.
Folder	/documents/proceedings/Distec/2000/1
URL	http://sps-gar02/wasteinfo/documents/proceedings/Distec/2000/1
Profile	SR 2435
Title	Site selection procedure and criteria - interim results of the German expert group
Author	Nies, Alexander
Description	pursuing the development of a site selection procedure attempts to get host formations as the result of a selection process which is based on general criteria describing an integral geological setting
Institution	BMU
License	unrestricted
Keywords	site selection, host formation
Read	yes
Benefit	useful
Comment	official statement
Form of publication	proceeding
Country	Germany
Categories	:06 Site Selection and Exploration :03 Selection Criteria
Date of publication	2003-04-08
Date of origin	
Size	

Information Retrieval

Microsoft *SharePoint* Portal Server provides a powerful full-text-search engine. However, to gain optimum benefit of the information of "WasteInfo", particularly considering all characterization options, the search engine and the search form have to be adapted adequately. Considering user-friendliness an advanced Google-look-and-feel search engine was chosen, see Fig. 3.

This search engine consists of 4 parts. The first part is a simple full-text search option. The second part represents an advanced full-text search with the common Google full-text search option. Thus users familiar with internet services can easily use this advanced search option. The third part is a search for properties, one of which is the property "category". In a query any choice of categories can be selected. In the fourth part a time slot regarding the publishing or editing date of a document can be set.

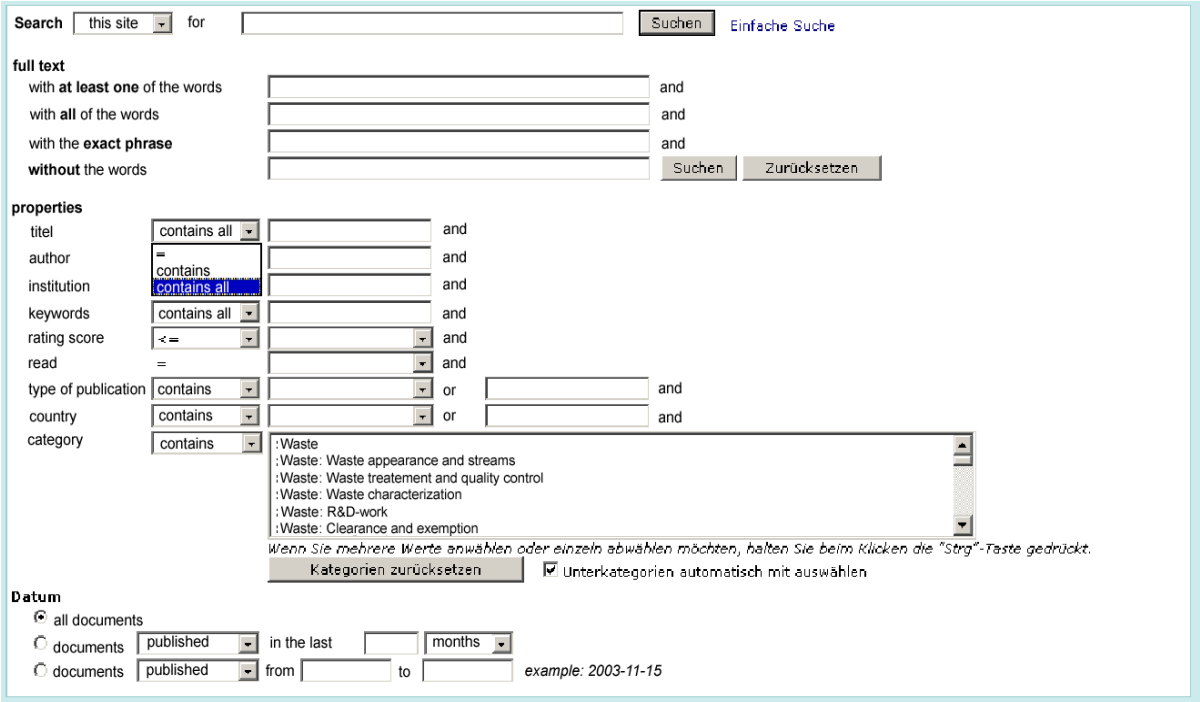

Fig. 3. User interface of the search module for the final disposal knowledge management system

The last three parts can be used in combination. With this, any requirement for queries is covered.

The result set of a query is a list of documents matching the query. Apart from the title the list contains additional properties such as dates, author, rating score etc. By clicking on the respective document, it is completely downloaded and available for the user.

USE OF "WASTEINFO" FOR WASTE MANAGEMENT PROJECTS

In addition to its role as a efficient source of information "WasteInfo" has increasingly been used as a project management tool. A typical project dealing with international aspects of waste management is used to show this application of "WasteInfo". This exemplary project is a comparative analysis of the implementation of repositories in six countries using nuclear power.

Objectiv of the project is the evaluation of schedules of international disposal projects and the comparison with the German approach. In many countries there are plannings for repositories in deep geological formations for high active waste. Each planning consists of numerous subtasks, such as waste management, site selection, exploration, operational issues and research work.

In order to benefit from the experiences in other countries the current plannings for repositories in six selected countries shall be analyzed and evaluated. The analysis shall deal with the following issues:

- final disposal processes
- application issues
- role of the licensing authority
- safety philosophy
- public participation
- information strategy
- research

Countries taken into consideration are Switzerland, France, Sweden, Finland, UK and the USA.

In a first preparatory step the existing categories are extended to the new problem. An obvious option is the arrangement of six new country-related main categories, each for a country dealt with in the considered project and another main category used as project repository. For each of the new country-related main categories an identical set of subcategories is added. Taking the experience with the existing structure of categories and the available information into consideration the following subcategories seem to be suitable:

- repository technology
- planning issues of operator
- domestic disposal policies
  (this subcategory summarizes *role of the licensing authority, safety philosophy* and partly *information strategy*)
- communication issues
  (this subcategory summarizes *public participation* and *information strategy*)
- schedules
- research and development

Subcategories to the project repository will be added during processing the project.

The application of "WasteInfo" in the further project work is schematically shown in Fig. 4.

At the beginning of the work "WasteInfo" serves as source for information. The most convenient way is to use the *country* option of the query form. However, because up to now not for all documents the enhanced metadata set has been cared for yet, there may be documents without an entry in the country field. For these documents the full-text search has to be used. In any case "WasteInfo" provides a useful stock of information for starting up the project.

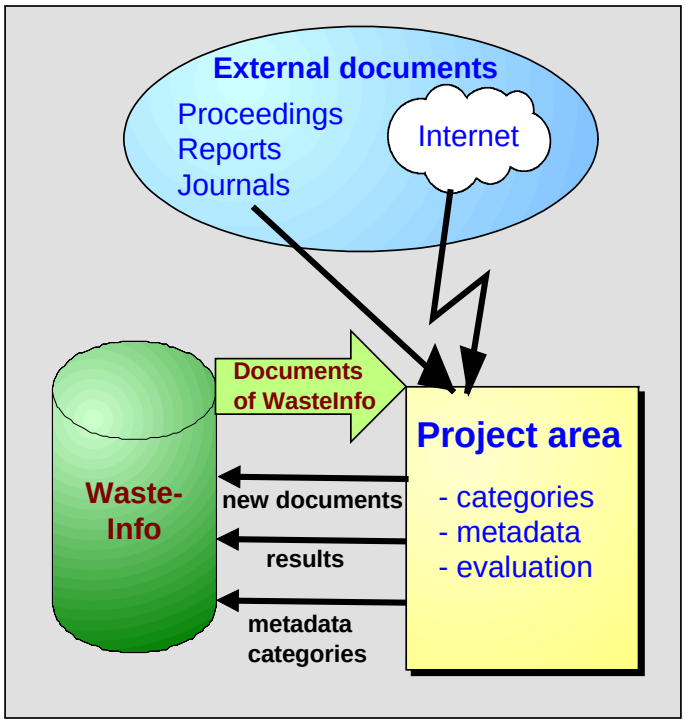

Fig. 4. Application of "WasteInfo" in project work

In order to attach the documents to the project, they are assigned to the new project-related categories. Within this process, further metadata are added, too. It shall be emphasized that the former assignment of documents to categories is kept. By this, one document can be attached to several projects.

Of course there are other sources for information, e. g. recent conferences and publications, the internet or project-related inquiries. All these new data have to be entered into "WasteInfo" adding adequate metadata. Primarily these documents are assigned to the project area (the six country-related and the project related main categories), however the new documents should be assigned also to the original "WasteInfo"-categories. Thus, the availability of the documents for other projects is increased.

All documents prepared within the framework of the project (such as progress, interim and final reports, calculations, presentations) have to be entered in "WasteInfo", too and have to be categorized in the main project category. With this "WasteInfo" serves as a convenient and effective project repository, to which all members of the project team have access and which provides at any time comprehensive information concerning the current project status.

CONCLUSION

After two years and six months operation the knowledge management system "WasteInfo" has proved as a useful tool for document- and information-management in the field of repositories and waste management for radioactive wastes. The use as project management tool arose from the normal operation of "WasteInfo". The more "WasteInfo" has dealt with, e. g. for categorization purposes, the more "WasteInfo" was used in project work.

The first time "WasteInfo" was used this way, only the original standard categories were used. Today the set of categories is adapted to the respective project and with that represents a customized project repository.

The advantage for the experts involved in the project is the prompt availability of all information relevant for the project. From the customers point of view the benefit consists of the direct access not only to the project status but also to a comprehensive stock of documents related to the project and to the evaluation of all available information by experts.

REFERENCES

1. D. Gründler, et. al, “ Knowledge Management for Final Disposal“, WM'04, Tucson, March 2004
2. D. Gründler, et. al, "Operation of a knowledge management system for final disposal", WM'05, Tucson, March 2005