



Development of a central Knowledge Transfer Platform in a highly decentralised environment

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Summary

This paper explains the development of the new "Knowledge Information and Sharing System" (KISS) for Swiss polytechnics, research institutions and universities initiated by the ETH-Board (Rat der Eidgenössischen Technischen Hochschulen). The system aims a simple presentation of information about exploitable knowledge on a common electronic user interface for all institutions and, at the same time, quick and user-friendly access to this information by the interested public. Apart from the description of the development process the application is presented. Contrary to conventional research databases it offers not only plain research data but also usage-oriented information such as the benefit of possible applications of the knowledge in products or services, patent data and links to websites containing additional information. KISS is accessible on the Internet via www.knowledgetransfer.ch.

Keywords: Knowledge Management, Knowledge Transfer, Knowledge Database, Research Database, Knowledge Information System

1 Introduction

1.1 Initiation

The ETH-Board is co-ordinating the activities of the six autonomous Swiss research and education institutions affiliated to the ETH-Domain:

- Eidgenössische Technische Hochschule Zürich (ETHZ),
- Ecole Polytechnique Fédérale de Lausanne (EPFL)
- Paul Scherrer Institut (PSI)
- Eidg. Forschungsanstalt für Wald, Schnee und Landschaft (WSL)
- Eidg. Materialprüfungs- und Forschungsanstalt (EMPA)
- Eidg. Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz (EAWAG)

In each of these six institutions new knowledge is constantly developed. Due to new objectives given by the Swiss government, the transfer of this knowledge into industry and society should increase (Schweizerischer Bundesrat, 1999, p.6).

For this reason the ETH-Board has initiated the development of a new interactive platform.

1.2 Project aim

The project was given the working title KISS, which stands for "Knowledge Information and Sharing System". KISS is based on the following intentions:

To establish a platform which allows

- a simple presentation of information about exploitable knowledge on a common electronic user interface for all institutions and, at the same time



- quick and user-friendly access to this information by the interested public.

With respect to the conception of the system a set of basic conditions had to be taken into account:

- a high degree of de-centralisation
- the diversity of research and teaching
- the variety of the IT environments in the different institutions.

2 Project organisation

2.1 Project phases

It was chosen a process organisation according to a six-stage phase concept for the development of application software similar to Becker et al. (see ; Becker et. al., 1997, p. 246).

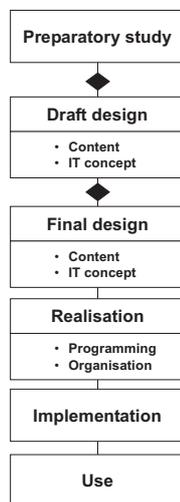


Figure 1: Overview project phases

Even if the project aim was quite clear at the beginning, a preparatory study was made in order to get an even better understanding of the problem. It included an analysis of existing systems or parts of systems already used by the institutions and supposed to contain information about the knowledge available at the respective institution. This analysis made quite clear that there were two main gaps:

1. Existing information media like research databases and websites of research teams qualify only very limited for the advancement of corresponding contacts between the research institutions and the public because of restricted access as well as lack of lucidity of the information.
2. Due to the lack of a common base information comes in different format and quality which makes it nearly impossible to get a concise and comparable overview.

Based on these insights it was possible to give a rough sketch of what elements the future system should consist. This resulted in a decision of the steering committee to go on and to elaborate a draft design.

This draft design was divided into two parts: On the one side there was a content-oriented part containing elements like a more exact definition of the characteristics of the data and an estimation of the number of records. On the other hand there was an IT-oriented part defining the key elements of the system’s architecture. Consequently, both parts were compiled into a specification which made it possible to make a cost-benefit equation of different concepts.

After another ”go”-decision by the steering committee, the final design was worked out. Therefore detailed definitions of data organisation, data editing and processing, search functionalities and information output were set.

In the phase of realisation, the applications were programmed in the development environment of the IT-partners. By choosing one institution as a ”test bed”, it was possible to test it with real data and organisational structures.

The phase of implementation was defined as the process of migrating the applications from the development environment to the equipment of the organisation hosting the productive system.

For the use of the systems by the institutions was chosen a ”one-after-the-other-system” in order to guarantee a proper education of the staff

2.2 Organisation structure

Within the evaluation of a suitable organisation structure it had to be considered that the interests of the single institutions were duly accommodated during the development of the common platform. A dynamic project structure depending on phases was chosen. The preparatory study and the first draft were elaborated by an external project team, whereas the interests of the institutions were taken care of by representatives in the steering committee. Beginning with the phase of the final design a completely new project organisation structure was established (see):

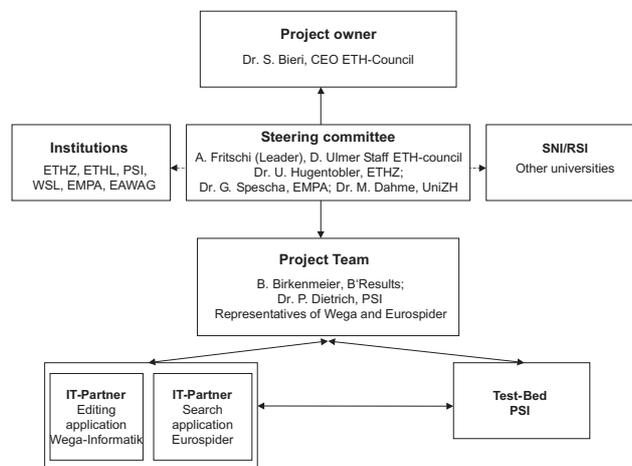


Figure 2: Project organisation structure

It was built up a core project team consisting of an external project manager, a principal’s representative as well as a delegate of the institutions and of particular representatives of the companies charged with the development of the application during the different stages of processing. One of the six institutions served as a sample environment in terms of a prototype. During each stage of development all other institutions were constantly informed about the work’s progress and consulted before important decisions.

3 Characteristics of the system

Within the conception of the solution the high level of organisational decentralisation, the different contents of research and education as well as the peripheral responsibilities and the involved heterogeneity of the existing IT infrastructure had to be taken into account.

3.1 Applications

Based on that a concept was elaborated intending that the data model and the application as well as the preparation of resources would be realised and run centrally. The inputs into the system will be made directly by the peripheral research groups whereby, with regard to the connection of the contents, it is possible to assign different user rights. In the overview, the solution consists of the following applications and interfaces (see):

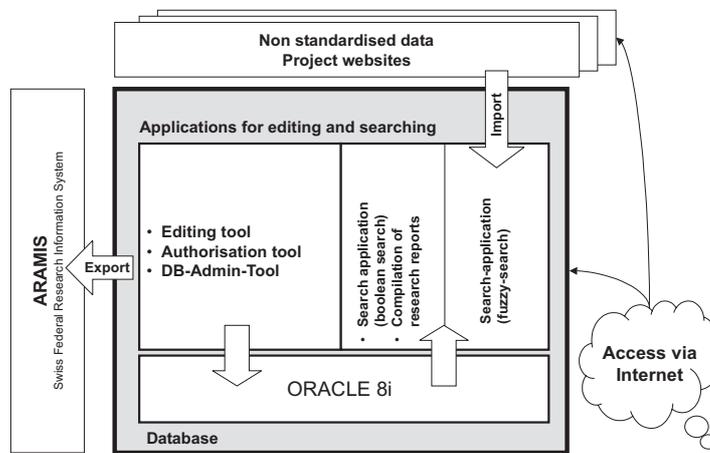


Figure 3: Application overview

Only the meta-data about the projects will be stored in the central database, whereas for complete information there will be links to the more detailed full-text documentations on websites of institutes and research groups. Information about existing knowledge is based on data to research projects such as: Project title, -number

- Date of project start/project end
- Abstract
- Keywords
- Research field
- Scientific target
- Benefit of possible applications
- Patent data/Product data
- Links to URLs
- Personal data of researchers involved in the project
- Possibilities for participation

Contrary to conventional research databases there are also relevant data such as information about the benefit of knowledge in possible applications or patent/product information.

The core of the search application is a full-text search system which checks both the content of the input fields and the linked websites. Besides there is a Boolean standard search available.

As federal institutions are obliged to enter research data to the Swiss Research Information System ARAMIS an interface was created, which allows it to easily export relevant data from KISS to ARAMIS.

3.2 Architecture

The system is based on a so called Three-Tier-Architecture:

- A relational database (ORACLE 8i) with the structured meta-data and links to unstructured data as the first tier.
- An application server which provides the Java based application and represents the intermediate layer.
- The user's standard browser as the last tier.

In order to communicate with other programs and data management systems there are PDF and XML interfaces available. Both the data recording and the search for information take place on the internet using a standard web browser so that no further installation on the user's terminal will have to be taken up. There are neither restrictions regarding the type or the settings of the client.

In the preliminary stages of the project it was checked if there should be utilised standard or individual application software for the platform being developed. As possible standard solutions the groupware "Lotus Notes" as well as the knowledge database "Community of Science" were taken into account. However, the evaluation made it clear that these solutions would result in technical, organisational or financial disadvantages compared with the development of an individual solution.

4 Operation

The operation is based on the so-called "KISS community" concept (see):

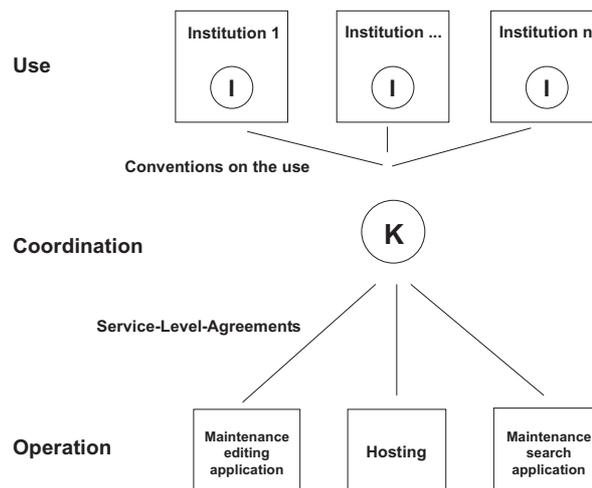


Figure : The KISS-Community

The members of the KISS-Community are located on three different levels: the level of Co-ordination, the level of Operation and the Level of Use. The assignment of duties and the relations between each other can be described as follows:

4.1 The level of co-ordination

The level of Co-ordination consists of the KISS co-ordinator. It is the virtual lynchpin of the KISS-Community as all information is bundled and spread here. The job of the Co-ordinator is done by a staff-member of the ETH-Board. Furthermore the KISS-Co-ordinator has the following duties:

- Preparation and Conclusion of Service-Level-Agreements for Hosting and Maintenance of the applications.
- Evaluation of needs for the further development of the applications.
- Contact point for external institutions out of academia and industry seeking information on possibilities to participate or use the system.

4.2 The level of operation

On the level of Operation the accurate function of all applications is provided. Hence the organisations responsible for the hosting as well as for the development and maintenance of the applications are located on this level.

As a hosting partner the IT-services department of the ETH Zurich was chosen, where the applications can be run on an existing server using Solaris system software. The companies which developed the applications keep the responsibility for the maintenance of their respective part of the system.

The compliance of distinct operational requirements is regulated in a support-concept comprising three levels of support and additionally in bi-lateral Service-Level-Agreements between the ETH-Council and the three organisations.

4.3 The level of use

The level of use is composed of the institutions which make use of KISS by entering their data. Every university and research institution can join the KISS community. For the use of the service the institutions sign a "convention of use" with the ETH-Board and commit therewith particularly observing the code of conduct included in the so called "KISS-Charta" in terms of a quality assurance:

- They encourage the researchers to aliment the platform actively. This concerns not only the initial launch but also regular updates of the data.
- They establish the organisational preconditions to assure that no data are published that are not related to the research done at the institution or data that may be offending to the public.

The further development of the common core application is also co-ordinated by the ETH-Board. It is based on the KISS community member's common needs. Furthermore, the members of the KISS community are allowed to develop supplementary applications individually provided that the function of the common core application is not affected. Contrary to the operation of the application the full responsibility for the data is allocated to the institutions.

5 Conclusions

5.1 Perspectives

The first institutions start with the entry of data in May 2002. The data search will be available from June 2002 on www.knowledgetransfer.ch.

Apart from the institutions of the ETH-Domain several cantonal universities and polytechnics have in the meantime expressed their interests in www.knowledgetransfer.ch. They will be integrated in the near or intermediate future so that KISS middle-term is expected to contain data about around 15'000 research projects.

5.2 Perceptions

Different perceptions can be derived from the experiences in the development and the operation of this central knowledge platform in a very distributed environment:

- The Operation of a web based three-tier-architecture and the concentration on content instead of workflow has proven itself in a peripherally organised environment without a homogeneous IT-infrastructure.
- The concept of entering only a few meta-data with links to further information increases the user acceptance and therewith the chances of success of the system.
- Practically all institutions intend to use the collected data not only within the scope of the publication on www.knowledgetransfer.ch but also simultaneously:
 - in order to support internal organisational processes (such as applications, statistical evaluations, reporting)
 - to serve superior positions with research information (e.g. feed of the database ARAMIS which contains data on research projects financed by the Swiss government)

The realisation of the corresponding technical interfaces will occasionally decide about the employment of KISS in the individual institutions.

6 References

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