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A Global Knowledge Medium as a Virtual Community – The NetAcademy Concept

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Abstract

Taking up the ideas of the ancient Greek concept of Academia, the "NetAcademy" is aiming at providing a knowledge medium to aid in the creation, integration, reviewing and dissemination of domain-specific knowledge in the scientific community. In pursuit of these goals it is taking full advantage of the unique characteristics and potential of the Internet medium. The NetAcademy is an existing web information system (WIS) which was developed in order to support the building of virtual scientific communities for different research fields.

Introduction

Fostered by the rapid dissemination of products and services that are based or heavily rely on information technology in almost every area of daily life and due to the immense increase in data storage capacity, the production of information and knowledge has increased dramatically over the last decades. Whereas in past centuries the phenomenon of universal scholars could be observed, today it is no longer possible within the capacity of one single individual to keep pace with the ever accelerating development of human knowledge [Bleicher 92, p. 32]. These developments pose serious challenges for the management and organization of knowledge bases and aggravate the problem of finding the right information at the right time.

This effect is felt especially in academic research as academic activity requires the search for specific and accurate information in huge knowledge bases on a daily basis. Furthermore, the multiplication of available information sources in a global context exacerbates the problem of being able to judge information on account of its current state of research and the degree to which it has been reviewed and agreed upon by the scientific community. In this context a community approach helps to implement a higher degree of confidence in the system [cf. Iacono/Weisband 97; Hagel/Armstrong 96; Erickson 97]. In this paper the *NetAcademy* community concept [Lincke et al. 97 and 98] will be presented and discussed. The project aims at the design of a system for the structuring, acquisition, mediation and dissemination of domain-specific scientific knowledge on the basis of a generic, internet-based platform, thus adding a contribution to the

solution of the above mentioned problems. As the platform follows a generic, template-driven design approach it can be applied to a vast variety of different research disciplines. As of the time of this writing NetAcademies have been established for the fields of Business Media (<http://www.businessmedia.org>), Knowledge Media (www.knowledgemedia.org) and Media Management (www.mediamanagement.org). The initiating institution is the Institute for Media and Communications Management at the University of St Gallen. The NetAcademy is a non-commercial research project partly funded by the Bertelsmann and Heinz Nixdorf Foundations. The international review board will consist of independent experts for the respective knowledge areas.

Historical Background and Institutional Context

First ideas of how the body of human knowledge could be organized arose with the founding of schools for philosophy in ancient Greece. For some centuries now, a substantial portion of the world's knowledge has been generated and analyzed in universities and academies and has been passed on to succeeding generations through those channels. The first institutionalized academy was founded 387 AD by the Greek philosopher Plato as a place of knowledge disputation. Subsequently the concept of academy evolved into different directions. A development of particular importance was the Berliner Akademie founded in 1700 by Gottfried Wilhelm Leibniz. The NetAcademy concept intends to follow this approach contributing to its realization in a post-modern world and in the new digital medium [Schmid-Isler 98].

In the last few years the notion of a virtual university has gained a lot of popularity [Heilmann 95, p. 3]. In some aspects this concept is closely related to the characteristics of a NetAcademy. Just like a virtual university a NetAcademy also aims at supporting and directing research by enabling and facilitating scientific discourse, dissemination of knowledge and qualification of scientific work through reviewing processes. Unlike a virtual university, however, which like its traditional physical counterpart still represents a private or state-funded corporate entity, a NetAcademy stresses the goal of building a virtual reference knowledge medium for a certain domain of

knowledge to which a large number of researchers contribute. Thus, the entity running the platform should become largely irrelevant.

The NetAcademy as a Knowledge Medium

According to [Schmid 97; Schmid 98] the NetAcademy, viewed as an electronic knowledge medium, constitutes a new, interactive, and globally accessible information storage facility. Taking advantage of the Internet as a telematic infrastructure it:

- Serves as a medium for **data storage**, in the same way as the traditional carriers of information, books or paper, in their organized form in a library.
- supports **knowledge generation** and the **procedural aspects** of information as it becomes visible in academic discussions or, in a more organized form, during conferences or the dissemination of information in academic journals and books.
- supports the **automation of processes** in the field of academic research as it has long been realized for business processes through use of database management systems and method bases.
- facilitates integration and coordination of the **scientific community** in a specific field of knowledge

Another objective strives to design the information processes in such a way that the NetAcademy medium will be gradually adjusted towards a consistent, non-contradictory organization and a completeness of knowledge for a certain domain. In doing so the NetAcademy becomes a finalized machine whose results form a valid handbook of the knowledge within the respective knowledge area (domain) including coverage of ongoing research activities in that domain.

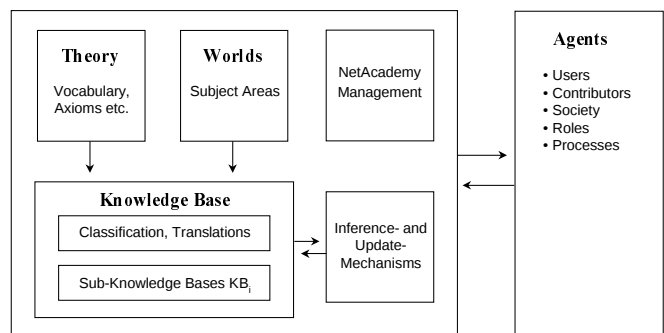
Digital Documents in the NetAcademy

Digital documents form the basic unit of information within a knowledge medium. According to [Palmer 97] "Digital documents and digital libraries provide new opportunities for defining and delivering information to students and researchers". However, the NetAcademy goes beyond providing efficient and effective means of representing knowledge. One added value lies in its interactive components which foster the collaborative community processes within the system. Other added value lies in an explicit representation of semantic aspects of information. By way of embedded collaboration processes and interfaces it also serves as a tool for the interactive generation of knowledge among different globally distributed participants. This means that the NetAcademy platform makes full use of the special characteristics of electronic documents and combines them with the interaction facilities offered by the Internet thereby going beyond traditional concepts of digital libraries. The NetAcademy is a new form of knowledge medium which makes it possible to

overcome the deficiencies of electronic documents as discussed in recent literature, e.g.[Palmer 97], especially the absence of contextual cues and markers to the origins of social meaning. Besides this, there are defined processes for the quality assurance of the contents generated within the NetAcademy.

Logical Architecture

At its core an instance of a NetAcademy contains a knowledge base [Fig. 1]. The knowledge base stores facts and procedural knowledge, discussions, research papers, and other information relevant to the domain. This body of knowledge can be subdivided into contents of a theoretical or practical nature (worlds). In the theory component the vocabulary employed by the scientific community, the accepted methods of scientific proof and axioms are made explicit. Thus, taking advantage of the collaboration mechanisms and infrastructure provided by NetAcademy a common living and widely accepted electronic handbook for a field of knowledge can be established and is easily extended and kept up to date by a globally dis-



tributed group of contributing researchers.

Fig. 1: Logical architecture of the NA-knowledge medium

The integration of vocabularies of different knowledge sources requires standardization of vocabulary terms, which can be carried out on a global or a local level. The notion of a global data schema envisions some central repository that, in terms of the knowledge medium, translates between the local vocabularies of the individual knowledge bases to a global vocabulary (schema) which is again translated to the inquirer's query vocabularies (external schemata). The drawback to this approach, as pointed out by [Boman 93] lies in the management of the global schema which seems to be unfeasible due to the tremendous size it may achieve over time. Therefore, the NetAcademy pursues a bottom-up approach by importing expressions from other vocabularies and implicitly incorporating standardization of terms into the integration process thereby avoiding the disadvantages of a global approach [Geyer et al. 96; Stanoevska/Hombrecher 98].

Another essential component represents the agents (as defined and described in [Lechner/Schmid 98]), which consist of the scientific community for that particular domain, and provides them with an organized communica-

tions platform. Agents are separable into different classes which are assigned roles granting them certain rights and obligations within the NetAcademy. Furthermore processes can be defined laying out and enforcing procedures to be followed for certain actions, e.g. procedural details of reviewing processes that are triggered by a document submission or the enforcement of certain guidelines to be followed in discussions. Ideally, these processes should be structured in a way that development towards gradual completion of the knowledge in the domain is supported.

Implementation and Technology

The functionality supporting the community aspects of the NetAcademy are embedded into three main applications: Publications, Participants/Registration and Discussions. Fig. 2 illustrates the links and integration between the three modules, and the technologies employed.

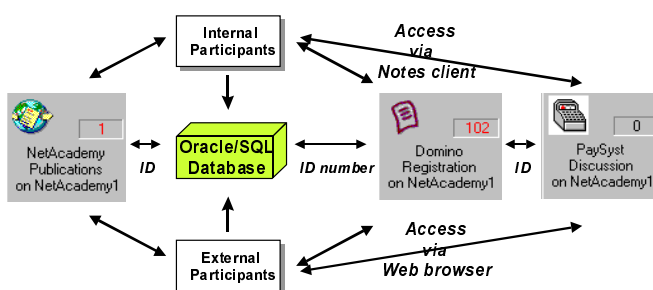


Fig. 2: The NetAcademy community modules and their interrelations

• Publications

In order to provide powerful browsing, submission, and search interfaces and to be able to optimally manage structured meta-information as well as unstructured documents (abstracts and full text of publications) and handle workflow processes (submission and review of new publications) the publications database application was implemented as a hybrid system combining a Lotus Notes/Domino object store and application with a relational Oracle database backend. External participants enter their submissions into a web-entry form which initiates a review process. In order to maintain a good level of quality, submissions to the publications section are subject to a strict reviewing process as is the case for articles submitted to scholarly journals and academic conferences.

The publications database is fully integrated with the participants and discussion databases. Thus, from every publication links are offered to other publications and discussion posts by the same author as well as to her home page in the participants database if available, which provides contact and further personal information.

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Registered NetAcademy participants have the option of maintaining a personal homepages in the NetAcademy. These pages serve multiple purposes. They provide information on authors and offer links to the respective

publications and discussion contributions. Furthermore, they inform discussion participants about their "virtual" counterparts.

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Conclusions and First Experiences

One of the foremost goals of the NetAcademy is to enable collaborative authoring leading to the generation of new knowledge [cf. Yates et al. 97]. The NetAcademy editorial staff continuously updates and adds new information considered to be relevant. Online discussions and well-defined processes for the submission of publications extend the collaborative authoring to a global community of participants. The vision is that many different researchers contribute a number of small pieces of information and research findings which - when combined - will eventually amount to a significant addition to the established body of knowledge.

The NetAcademy was opened in April 1997. So far more than 120 participants have registered themselves in at least one of the different NetAcademies (different research fields). Over 500 publications have been submitted to the publications database. Activity in the discussion section, however, is still rather slow possibly indicating that a critical mass of participants has not been reached yet.

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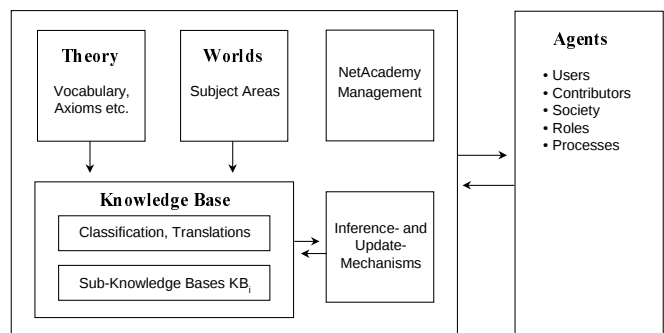
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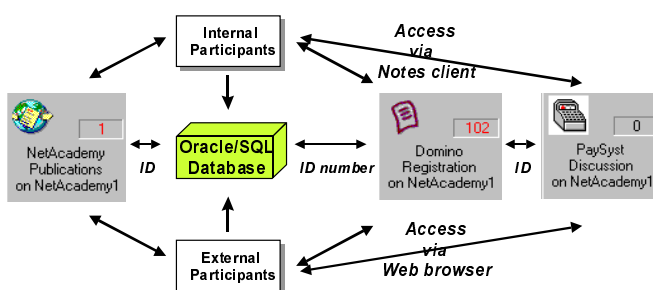


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