WEB-BASED NETWORKING WITHIN THE FRAMEWORK OF ANENT

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Abstract. The Korea Atomic Energy Research Institute (KAERI) is actively participating in the Asian Network for Education in Nuclear Technology (ANENT), which is an IAEA activity to promote nuclear knowledge management. This has led KAERI to conduct a web-based networking for nuclear education and training in Asia. The networking encompasses the establishment of a relevant website and a system for a sustainable operation of the website. The established ANENT website features function as a database providing collected information, a link facilitating a systematic worldwide access to relevant websites, and an activity implementation for supporting the individual tasks of ANENT. The required information is being collected and loaded onto the database, and the website will be improved step by step. Consequently, networking is expected to play an important role, through cooperating with other networks, and thus contributing to a future global network for a sustainable development of nuclear technology.

1. Introduction

The Korean nuclear community, as in many IAEA member states, recognizes the importance of nuclear knowledge management and the essential role of nuclear manpower development for the preservation and succession of the knowledge. The community feels that international cooperation in the field could be an important vehicle for the promotion of attracting the young generation, facilitating the accessibility of nuclear personnel to the international forum, developing the careers of nuclear personnel, upgrading education and training capabilities to an international level, and increasing the mutual benefits.

In this context the Korean nuclear community appreciates the IAEA's initiative for promoting cooperation among the member states for nuclear manpower development, which has resulted in a great achievement. It is hoped that the initiative will continue addressing the needs for developing advanced nuclear technologies combined with other emerging technologies. Along this line, the expected framework of future international cooperation for nuclear education and training may need to focus on the integration and sharing of available resources at national, regional and inter-regional levels. A good example of the IAEA activity set forth echoing the expectation is ANENT (Asian Network for Education in Nuclear Technology). A global networking concept conceived by the Korea Atomic Energy Research Institute (KAERI) is illustrated in Figure 1, where ANENT constitutes an important part [1].

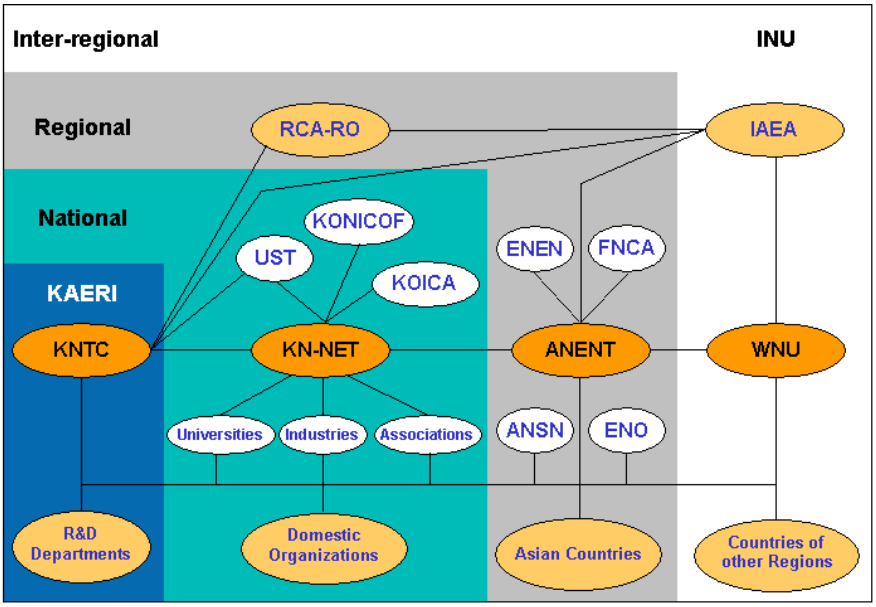

FIG. 1. A concept of global networking for future nuclear education and training

KAERI, on behalf of the Korean government, initiated discussions with the IAEA about the establishment of ANENT when the Agency's Scientific Forum on Knowledge Management was held in September 2002. Subsequently, KAERI hosted an IAEA meeting to prepare the establishment of ANENT in July 2003. The institute actively supported the preparation of the ANENT framework, volunteered to establish a temporary website (www.anent-temp.org), and continued its active involvement in the IAEA's efforts for launching ANENT in February 2004.

The first ANENT Coordination Committee meeting was held in February 2004 [2, 3], where the committee identified five group activities and their respective coordinators as shown in Table 1. KAERI became the coordinator for Group Activity (GA) 1 on the "Web-based Exchange of Information and Material for Nuclear Education and Training".

Table 1. Group activities of the ANENT and the responsible coordinators

Activity Number	Scope	Coordinator
GA 1	Exchange of information and materials for nuclear education and training	KAERI/Korea
GA 2	Exchange of student, teachers and researchers	MINT/Malaysia
GA 3	Distance learning	PNRI/The Philippines
GA 4	Establishment of reference curricula and facilitating credit transfer and mutual recognition of degrees	HUT/Vietnam
GA 5	Liaison with other networks and organizations	UC/Sri-Lanka

The specific tasks assigned under Group Activity 1 are 1) the identification of existing information and material, and 2) the establishment of a web-based network, including its operation, amendments and additions. Accordingly, this paper will discuss the main approaches for the establishment of the ANENT website and the future plan for a sustainable operation as well as the improvements of the web.

2. Development of the ANENT Website

2.1 Objectives

The web-based networking is intended to establish an effective and sustainable focal point, which fulfills effectively the following roles of:

- communication among the ANENT members;
- connection to sources (websites) of information/materials and courses for the nuclear education and training which are available worldwide;
- sharing of collected information/materials through a database;
- support for the ANENT activities.

2.2 Review of the typical websites

A number of websites related to networking have been reviewed to establish the available approaches and methodologies for the realization of the roles set for the ANENT website. They include the IAEA websites such as INIS (International Nuclear Information System)[4], ENO (Electronic Networking and Outreach)[5], ENTRAC (Electronic Nuclear Training Catalogue)[6], and ANSN (Asian Nuclear Safety Network)[7]. Some other examples for non-IAEA websites are WNU (World Nuclear University)[8], ENEN (European Nuclear Engineering Network)[9], and UNENE (University Network of Excellence in Nuclear Engineering) of Canada[10].

It is observed firstly that well established diverse solutions are available for a web-based networking with different purposes and a selective application of them to fit the targeted roles of ANENT would be beneficial. Secondly, the number of Asian websites in the Internet Directory of Nuclear Resources of INIS, amounts to only about 1% of the total sites. This would mean that web-based networking may need some encouragement in the Asian region. However, such networking should be designed to have its functions specific enough to avoid any unnecessary overlap with and complementary to other existing websites' functions.

2.3 Functions

The functions of the ANENT website have been identified in terms of the main functions and the web operation functions. These functions will be considered as a whole in the beginning to establish the framework of the ANENT website, while specific functions of a high priority will be built in, primarily, before the others are added step by step.

Main functions in the form of menu items have been set to realize the targeted roles, and they are "About ANENT", "Activities", "NET DB", "Related Events", "Board", "Link", and "Photo Album". The inter-relationship between the roles and the main functions are shown in Table 2. Of the functions, a primary emphasis has been put on "NET DB" (Database for Nuclear Education and Training information in the nuclear field) and "Link" at this stage. These are further discussed under separate topics. "Activities" is also an important function. Since the group activities are at their initial stages, the web function for each group activity provides basic sub-functions, i.e. "about group activity", "board", and link with NET DB.

Table 2. The roles and main functions of the ANENT website

About ANENT	NET IB	Activities	Related Events	Board	Link	Photo Album
•Objectives & Functions •Organization •Members •Activities		•Coordination Committee •GA 1 •GA 2 •GA 3 •GA 4 •GA 5	•Training Courses •Workshops •Meetings	•News •Notice •Publications •BBS/Q&A	•IAEA •Member Institutions •Collaborating Members	• General • GA 1 • GA 2 • GA 3 • GA 4 • GA 5

	• Action Plan			•Inter net Resources
Communication		O	O	
Connection				O
Collected Information	O	(	O	O
Support of Activities		O		

Operational functions include “User Information and Authority Management”, “Search”, “Mailing Notification”, and “Printing”. Users are categorized into six groups along with their different levels of access, i.e. visitor, general member, activity member, data provider/national coordinator, and system administrator. The access system is discussed in the section on “Overall System Structure”, and the search function is discussed in the section on “NET DB”.

2.4 NET DB

The hierarchy of the NET DB is structured in five levels namely “Country”, “Institution”, “Field”, “Course (or Subject)”, and “Course Material”. Sub-items coming under “Institution” consist of name, postal address, website, number of professors or researchers, field of specialization, equipment, and contact person. “Field” is categorized tentatively into nuclear power, non-nuclear power, and medical applications. The classification of the fields for nuclear education and training is an area that should be examined carefully in the next step. “Course (Subject)” contains sub-items such as title, contents, level, duration, credits, language, material (list of title), prerequisite, accrediting organization, and domestic/foreign linkage. “Course Material” stores available files (in the form of text, cyber, or multi-media), which are attached to the respective title of the material listed in “Course Material”. Figure 2 depicts the overall scheme of the NET DB.

The NET DB has an important interface with “Activities” in particular group activities. Obviously the database has a direct connection with “Group Activity 1” which deals with the exchange of information/material and forms a main part of the activity. Meanwhile, other group activities will also store collected data in the database. Data input is conducted by the data providers who are designated by the national coordinators or the group activity leaders and authorized by the ANENT web administrator. The use of NET DB can be done by a search function which is available on the front page of the database. The search function is operated along with the database hierarchy or key words.

KAERI established a format corresponding to the designed NET DB items, which was then circulated to the member country coordinators. Completed formats are being collected and their data is being loaded onto the database. Also other group activity coordinators are providing the database with data obtained from their activities.

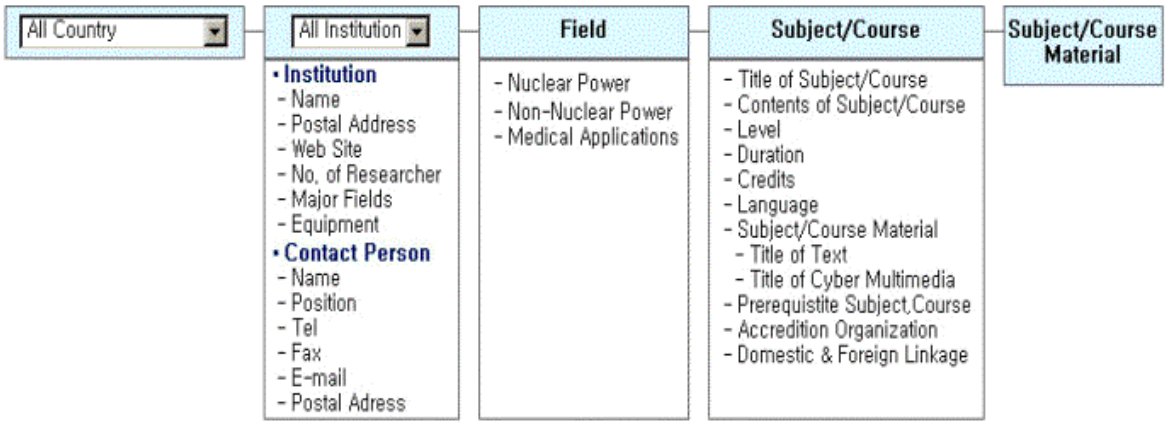

FIG. 2. The structural hierarchy of the NET DB

2.5 Link System

The link of the ANENT website with other relevant websites or hyper-linked web-pages is considered as an important means of information exchange and networking as well as complementary to the functions of "NET DB" and "Activities". The link system is designed with two access modes, i.e. access by an institutional hierarchy and by a subject-wise hierarchy, as shown in Figure 3. For the institutional hierarchy, the top level is grouped as IAEA, ANENT members, collaborating members, and internet resources. Again each group is specified along with different levels until specific websites are reached. For the case of the subject-wise hierarchy, websites or web-pages which are available worldwide for nuclear education and training, are grouped and again sub-divided as necessary into a number of subject areas so that specific information, materials and learning systems of interest can be reached by the users in an effective way. For further information other than nuclear education and training, the link system will guide users to other websites like the Internet Directory of Nuclear Resources of INIS.

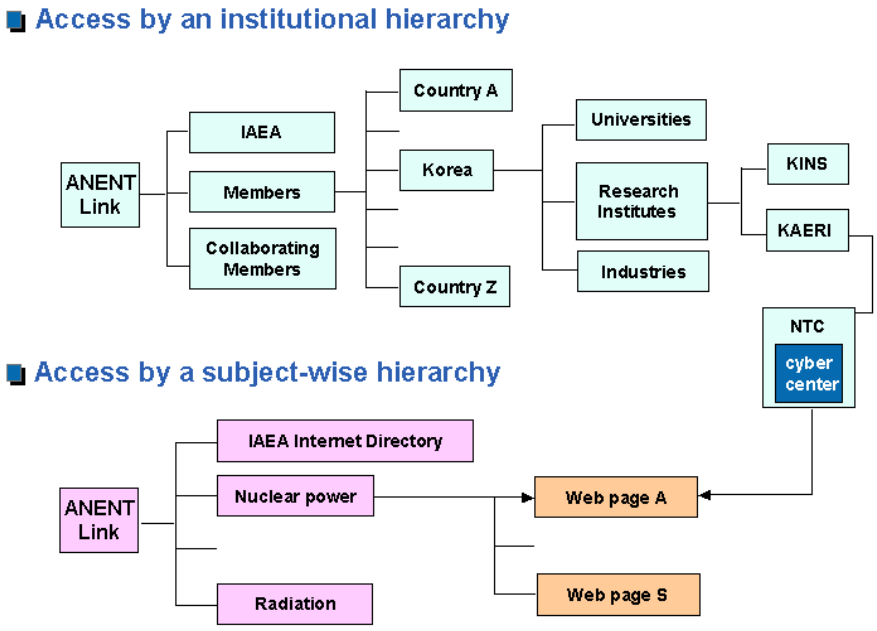

FIG. 3. Design concept of the "Link" system

The “Link” has become operational, providing a systematic access to web sites of the current member institutions and other relevant institutions/networks. The subject-wise access has been attempted on a trial basis. An important feature of the link function is an interconnection between the ANENT website and INIS2.com which is a host site of IAEA INIS for the Asian region. Also substantial effort has been made, on the part of KAERI, for the establishment of a cyber training system on its own website [11].

2.6 Overall System Structure

As shown in Figure 4, the ANENT website is divided into two domains, one for users and the other one for administrators. The user domain provides seven main functions in three access levels. “NET DB” can be accessed by the activity members and general members, while “Activities” can be accessed only by the activity members. However, the other main menu items are open to visitors as well as general members and activity members. The administrator domain with the functions of access control, log list, user access accounting, and input to NET DB is managed as a whole by the web-system administrator, while the input to NET DB can also be accessed country-wise by the data providers who are designated by the ANENT national coordinators.

3. Future Plan

The outcome of the ANENT website establishment has to be reported to the second ANENT Coordination Committee meeting which is planned for 2005. Until that time additional data for the NET DB and information for other menu items will be added, website functions will be improved, and an operation process established through the coordination of KAERI with the ANENT member country coordinators.

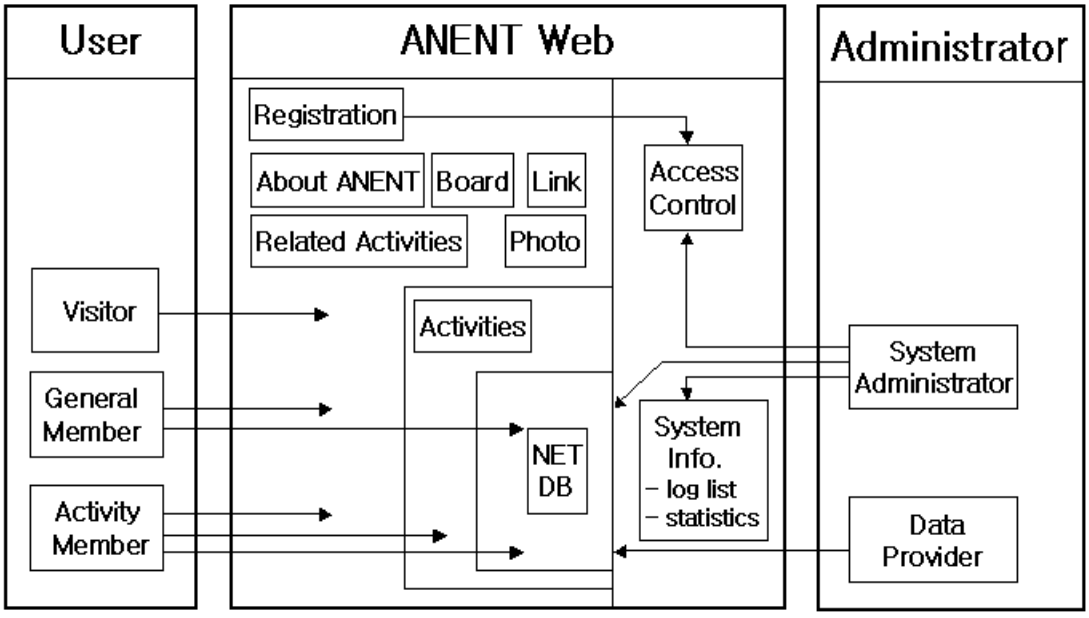

FIG. 4. Overall structure of the ANENT website

Much more long term improvements will be required to accomplish the intended objective of the web-based networking for the ANENT. For this, the upgrading of the web functions, maintaining the required quality of the contents, and the assurance of a sustainable operation seem to be important issues. First, the web functions need to be further improved to have the link system more specific and effective in accessing and providing the required tools to

support the ANENT group activities along with their progress. Second, the quality of the contents should reach a level that the users feel attractive and useful. For this relevant data and information should be added and updated in particular onto NET DB, and useful websites or hyper-linked web pages should be created. This will require a great effort which could be shared by the ANENT members. Then there should be a mechanism by which the quality is evaluated. Third, essential factors for its sustainability would be the co-sharing of the responsibility in its operation, thus maintaining a common interest among the members within the framework of ANENT, and taking measures to ensure that there is a periodic monitoring of the performance and feedback with regards to the web operation.

4. Conclusion

As part of the group activities of the IAEA's program on ANENT (Asian Network of Education in Nuclear Technology), KAERI has established a website (www.anent-iaea.org) as shown in Figure 5, where the image of front web-page highlights "NET DB" and the group activities which are inter-connected. The required information and material for nuclear education and training is being collected and loaded onto the database. Also, being given great attention is the link of the ANENT website with relevant sources. The website is to be improved step-by-step, while its effective and sustainable operational system will be secured so that the intended web-based networking within the ANENT framework can be accomplished.

FIG. 5. The front menu page of the ANENT website

2.0. The web-based networking is expected to promote communication, and the sharing of information and materials including multi-media and cyber material related to nuclear education and training that are available from ANENT members. It will also promote a joint creation of the required information and material. These will also facilitate greatly ANENT members in their self-learning as well as their implementation of and participation in the specific ANENT activities, e.g. regional and bilateral education and training programs including distance learning. Also members in need of introducing new nuclear programs or expanding their on-going programs will benefit from establishing the required human resource development infrastructure. Further, young generations in the Asian region will be encouraged by the network which intends to facilitate a regional level mutual recognition of educational credits and thereby provide more meaningful opportunities for region-wide master and doctoral courses. Finally, the web-based network for ANENT is expected to play an important role within the framework of a global network, cooperating with other networks like the WNU (World Nuclear University) network. Thus this will lead to the establishment of internationally qualified curricula to deal with advanced nuclear technology combined with the other emerging technologies including bio, nano, information, and space technologies.

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