A Status on Development of Information Management System for Radioactive Waste Generated in KAERI

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1. Introduction

Most nuclear facilities and radiation facilities generate large amounts of radioactive waste. Most of radioactive waste is solid and liquid waste generated during operation. The Korea Atomic Energy Research Institute (KAERI) has been managing information related to solid and liquid wastes systematically. In order to innovate the radioactive waste management system for safety, we plan to build a new database and radioactive waste information management system by adding information on decommissioning waste including waste generated from the Korea Research Reactor(KRR), and clearance waste. System construction consists of three stages, and in this paper, 2nd stage has been described.

2. Design of System

This system has been developing to manage small package waste history on the basis of an integrated radioactive waste management system. We organized work procedure and analyzed function and information required in system for performing management in compliance with radioactive waste and small package waste management procedure documents. Finally, we developed the functions to store/manage data of generation and treatment within radioactive waste information system.

2.1 Management Procedure of Radioactive Waste

The system should be developed to be proceeded sequentially according to the work flow chart and to be identified flow of all data. In particular, this system, which deals with data for the life cycle of radioactive waste from generation to disposal transport, has a lot of data and is complicated in function. So it is important to understand the current status of work process to accurately reflect it in the system due to safe management of radioactive waste. Therefore, first, we analyzed the work procedure for each a type of radioactive waste with reference to procedure document and then drew up the work procedure diagram as shown in Fig.1
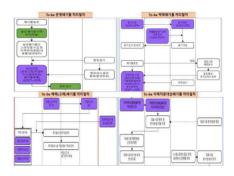

Fig. 1. Diagram of Radioactive Waste Management Procedure in KAERI

Fig.1 shows the location of the data from the generation of radioactive waste to the transfer to the disposal site and the stages in which approval is made according to each work process in the system. This is an important factor in improving the accuracy and understanding of system development by indicating the interface between each component of the system.

2.2 Supplementation of Database

The radioactive waste information management system must integrate and manage the radioactive waste generation information for radioactive waste generating division and the treatment information made during treatment process in management division. It is difficult to efficiently manage radioactive waste information generated from different sources and period and having various properties according to waste classification. In order to solve this, it is necessary to introduce a scalable data schema by objectifying data and classifying data into connection relationships and attributes.
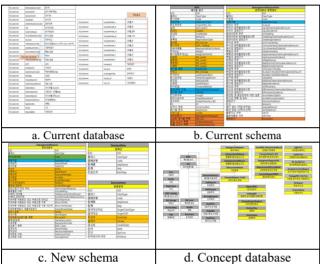
Various types of data that should be managed in the radioactive waste information management system can be managed properties of objects and connection relationships between objects by dividing database tables and relation tables. Through this database design, the scalability and development efficiency of modules to be developed in the future can be guaranteed.
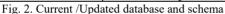
Based on the database that is the result of the first-stage construction, the attribution was modified after analyzing work procedure and function, and new work was added. The supplements are as follows.

- The database (see Figure 2-a) was created based on the management data after the work process was completed.
- In case of including the data generated in work proceedings and to be managed as separate

objects, the corresponding schema is adjusted (see Figure 2-b).

- Database table which was required additionally tables, such as objects and approval modules for system implementation of the work process was created newly by the corresponding schema (see Figure 2-c)

- Through the analysis of the current database and work process, the object that needs to be managed is defined and the concept database is designed as shown in Figure 2-d considering the characteristics between objects.

| a. Current database | b. Current schema |
| c. New schema | d. Concept database |

Fig. 2. Current /Updated database and schema

The table of integrated database was made based on database of the exiting radioactive waste information management system, the waste management work process, and additional data with decommissioning waste and clearance waste (see Table 1).

Table 1. System main table list

No	table_name
1	Management Request
2	Management Request Info
3	Management Request_Cost
4	Transport Request_RW
5	Trans RWC_Measurement Result
6	Measurement of Carry Vehicle
7	RW
8	RWC
9	Decision Flow
10	Decision Item

2.3 Story Board of System

The system screen structure is composed of two areas, menu and work. Through the menu, it is possible to move to the search screen for work processing and management, and all functions of the system are performed in the work area.

The work area was basically composed of the list screen of the selected menu and the detailed view of the list, and the interface for the functions for each menu was configured as similar as possible current system considering the convenience of use. In addition, the screen window is divided so that the user can check various information at the same time.

The data inputs were composed into tabs to improve readability. The application list and detailed view were designed with the same interface, taking into consideration the convenience of using the system.

3. Results

The function and database of the radioactive waste information management system was implemented based on the work procedure updated for small package waste management. The database and screen were materialized according to the work process, and approval module was developed to implement the relevant approval process in the system.

3.1 Layout of System

As shown in Figure 3, the main screen of the system was composed of a menu group area on the left and a work area on the right.

Fig. 3. Layout of RAWINGS

As shown in Figure 4, menus were organized into accordion menus at the lowest menu level, grouping of large menus by management field, and work division. If there is no sub-menu, the large menu itself is a button.

Fig. 4. Screen of Menu in RAWINGS

3.1 Realization of Main Functions

The main functions of each radioactive waste information management system are as follows.

- Request for radioactive waste management
- Management status
- Treatment processing status
- Characterization and disposal status
- Container request status
- Report

4. Conclusions

In the second stage, management procedures for radioactive waste was analyzed for reflecting them in the system. In addition, the data of the existing database was objectified and classified into connection relations and attributes to complement the extensible data schema. Also, considering the convenience of the user, it is similar to the existing system, and the screen of the system is designed so that it can be sequentially performed according to the work procedure.