Development of a PSA Information Database System

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1. Introduction

The need to develop the PSA information database for performing a PSA has been growing rapidly. For example, performing a PSA requires a lot of data to analyze, to evaluate the risk, to trace the process of results and to verify the results. PSA information database is a system that stores all PSA related information into the database and file system with cross links to jump to the physical documents whenever they are needed. Korea Atomic Energy Research Institute is developing a PSA information database system, AIMS (Advanced Information Management System for PSA). The objective is to integrate and computerize all the distributed information of a PSA into a system and to enhance the accessibility to PSA information for all PSA related activities. This paper describes how we implemented such a database centered application in the view of two areas, database design and data (document) service.

2. System Configuration

It is important to store PSA related information into the data repository efficiently and to retrieve from the data storage whenever it is needed. There are some considerations to developing AIMS. It is difficult to convert the Information into a relational database because it is in an informal style and it is usually stored in the computer as a computerized file format. So it is necessary to build an information management system for a PSA that has a similar style with the conventional document management system.
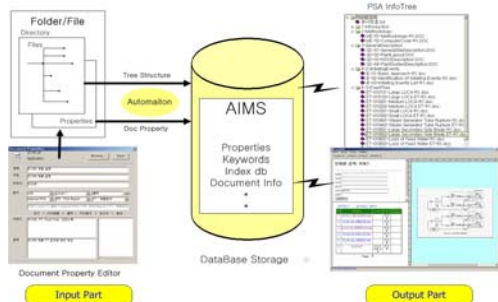

Figure1. AIMS system configuration

Figure.1 is a system configuration of the AIMS. The left side of the figure is the data input part and the right side of the figure shows the data output part. The data input part converts folders and file structure into a AIMS logical tree structure called a PSA InfoTree. It also converts the extended property of the documents into an AIMS database table automatically. In the output part, several information data browsing modules are developed to find the proper documents that the user wants.

3. Data collection and classification

3.1 Data collection

In order to perform a PSA, various PSA related information is necessary. All the data for a PSA is obtained and computerized by storing them in an integrated database. We collected the following data to build the AIMS database. They are PSA related documents, final safety analysis procedures and guidelines as the followings:

- System documents: design document, drawings
- Plant manuals: Operation and Maintenance procedures.
- PSA Reports.
- PSA Supporting Documents: essential information which is not included in the PSA Report. (ex. Calculation sheets)

3.2 Data classification

We classified all the data by several categories. That is a PSA report, FSAR, plant data, reliability data, and etc. The table1 shows the classified and inserted data in the AIMS database. All data are stored in the database and they can be retrieved by a user's request.

Category	Contents
PSA Report	Introduction, Methodology, Initiating Event , Event Tree (classified by Initiating Event) , System Analysis(Classified by System) and etc
PSA Related report	PSA analysis guideline, Methodology
FSAR	Final Safety Analysis Report
Plant Data	Procedures , P&ID, C&ID, C&LD
Reliability Data	Analysis Result (PSA reports, Reliability data), Raw Data
Etc	PSA Thermo-Hydraulic Analysis data

4. Development of PSA Information database Browser

As an output part of the AIMS, We have developed two component modules and information browsers. That is the PSA InfoTree, document property editor and AIMS PSA information browser.

4.1 PSA InfoTree

The PSA InfoTree is a hierarchy tree viewer for PSA information such as a table of contents for the whole PSA. All PSA documents are stored in the system using the file system structure. The AIMS generates the

information tree structure from the file system and builds the PSA InfoTree automatically. Thus, the user can find a document from the PSA InfoTree by handling (expanding or collapsing) the tree control of the window.

4.2 Document Property Editor

Since we use the file based document management system as a default data repository, it is difficult to add additional information to the documents. It is necessary to manage the additional information (extended property) of the PSA documents. In order to add an additional property into the document, we have developed the document property editor. With the document property editor, the user can add extended property into the documents.
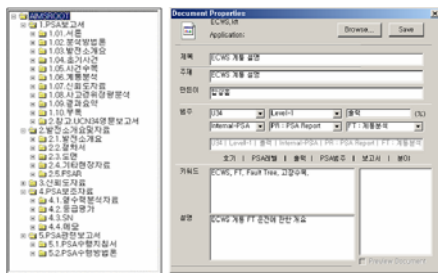

Figure 2 PsaInfoTree and Document Property Editor

4.3 Information Browser

The AIMS was developed for the UCN Units 3 & 4 PSA information management. It supports the document management and document search so that it can be used as a PSA analysis supporting tool. The AIMS consists of two main modules; AIMS-MINI Browser and AIMS-PLUS Browser.

4.3.1 AIMS-Mini

AIMS-MINI browser is a small and simple document searching tool to finds a proper document from the AIMS DB with user input search string. Document Title, any keywords, any drawing number or any text string can be used as a search string to find the proper document for PSA analysis.

4.3.2 AIMS-Plus

Usually the user can find the PSA data with AIMS-MINI but an advanced search is necessary during a PSA analysis. AIMS-Plus consists of 3 main modules by the difference of a document finding scheme.

- **PSA InfoTree Browser**

The PSA InfoTree is a logical hierarchy tree of PSA information. We developed the PSA InfoTree browser to explore logical structure of the PSA information.

- **Keyword Search Tool**

The AIMS Database has a document property table which contains additional information for each document. The additional information consists of the document title, subject, author, category, keywords and a description of each document. The user can find a

document from the property database using a keyword search tool.

- **Text Search Engine**

The PSA InfoTree and property database stores only essential data for a PSA document. So we developed the text search engine to find the proper documents with any text string. When a user inputs a search string, the text search engine returns the search results and the user can select the proper document and open it from the search results list.
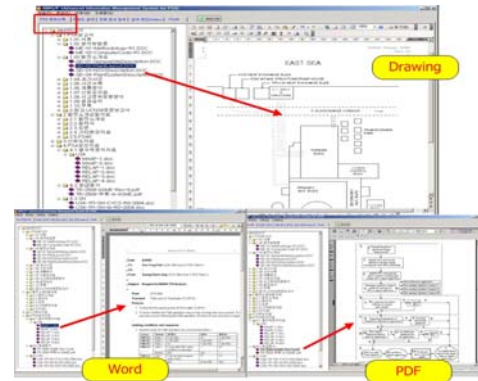

Figure3. AIMS Information Browser

5. Conclusion

Korea Atomic Energy Research Institute (KAERI) is developing the PSA Information Database System (AIMS: Advanced Information Management System for PSA) which enhances the accessibility to PSA information for all PSA related activities. The key technology implemented in AIMS is a database that stores all the references and links to information used by the PSA. All hyper links can be clicked to open the related documents, drawings, sheets and models. We expect AIMS will be a good supporting tool for the all PSA activities.

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