

Thoughts on Documentation of Atomic Power Technology

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1. Introduction

Korean Atomic Energy Research Institute (KAERI) has accumulated a number of technology development and research outcomes, including its representative achievements such as atomic energy technology independence and the first export of atomic energy system, since it was established in 1959.

With its long history of over 50 years, KAERI has produced a large amount of information and explicit knowledge such as experiment data, database, design data, report, instructions, and operation data at each stage of its research and development process as it has performed various researches since its establishment. Also, a lot of tacit knowledge has been produced both knowingly and not unknowingly based on the experience of researchers who have participated in many projects. However, in the research environment in Korea where they focus overly on the output, tacit knowledge has not been managed properly compared to explicit knowledge. This tacit knowledge is as an important asset as explicit knowledge for an effective research and development. Moreover, as the first generation of atomic energy independence and research manpower retire, their accumulated experience and knowledge are in danger of disappearing.

Therefore, in this study, we sought how to take a whole view and to document atomic energy technology researched and developed by KAERI, from the background to achievement of each field of the technology. Comprehensive and systematic documentation of atomic energy technology will establish a comprehensive management system of national atomic energy technology record to make a foundation of technical advancement and development of atomic energy technology. Also, it is expected to be used as an important knowledge and information resource of atomic energy knowledge management system.

2. Methods and Results

To prepare an effective documentation on atomic energy technology, it is important to document every single process without omission not only research and development process of the relevant field but also every step from its background to achievement. Therefore, to make overall summary from background to achievement, it should be prepared systemically without omission through a well-made TOC (Table of Contents),

and the content of each section of TOC should be well summarized and documented. Also, every data related to documented content should be attached to support the record.

2.1 Selection of Pilot Field

To select a field to be the subject of documentation, we organized research projects that have been performed or is being performed in the institute from main fields to detailed fields and considered technical and historical value. A field that has rich data to document was also selected considering the level of utilization after the documentation. Because the documentation of a technology that has been transferred or that is not being performed is difficult, and the level of utilization is relatively low. Therefore, we selected a representative technology field each of software and hardware. SFR (Sodium-cooled Fast Reactor) and ATLAS (Advanced Thermal hydraulic test Loop for Accident Simulation) were selected to represent software and hardware, respectively.

Since SFR has sufficient historical and technological value and the project is being performed now, it was considered to be appropriate for documentation project and selected as the pilot program in software field. Also, it was considered as a good example of pilot program since that field has relatively rich objects of documentation, it is easy to secure material, as well as it has sufficient manpower related to the participation and preparation in the field. In the case of ATLAS, it was considered to be appropriate to make technical documentation and selected as the representative case of hardware field, since its equipment is already established and currently the experiment is being performed.

2.2 TOC Preparation and Technical Documentation

The draft of TOC was prepared through discussion with core researchers of each selected field, and TOC was finally completed with several adjustments. With the completed TOC, we selected specialists who were able to prepare overview of each item and technical summary and commissioned the writing. Completed copy was reviewed by knowledgeable expert to be corrected and supplemented. The final copy was completed through preparation, review and continuous correction and supplement by participants. After completing preparation and review of the copy, copies prepared for each item and copies completed with

review were compiled by the participating researchers for a report.

Especially, in the case of SFR field of which study was started in the late 70's, we invited retired veteran experts in 2011 to hear from them about the background and process of technical development in the early years, in a discussion session which was recorded in a video clip. Besides, every available relevant research report, pictures, plans, and document was collected to compare the list and the original source. Figure 1 shows the process of TOC preparation and technical documentation.

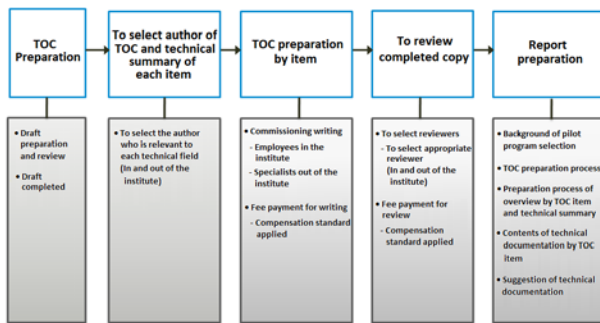


Figure 1. Process of TOC preparation and technical documentation

3. Conclusions

All sorts of records produced during the process of research and development are important information resource of benefit and advancement of the institute, helping preventing duplication of research projects, and realization of research projects, not to mention contributing to the validity of the project and the establishment of research ethic. Also, these records are a comprehensive knowledge resource that can secure evidence based copyright, a steppingstone to the creation of new information value. Therefore, a systematic management of various records produced and collected throughout the whole cycle of research and development project is to manage knowledge resource and to equip with a sustainable technique inheritance system.

As pilot fields of atomic energy technology documentation, SFR and ATLAS were selected as the representative fields of software and hardware, respectively, considering technological and historical value as mentioned above and technical documentation of those fields were initiated. However, we found a few problems to consider during the process of initiation. First, it is the problem of recording the experience of failure case. While successful experiences and research achievements are documented in detail in reports and papers, experience of inevitable failure during research projects has not been recorded, but hidden. But, if these failure cases are not recorded, it would be harder to remember them later, and moreover, it is technically

impossible to find their support data. Therefore, a way to preserve a failure of current researchers should be found for later generation researchers, and the related record is required to be systematically collected and managed. Then, researchers in later generation don't have to repeat the same failure when they perform researches, and ultimately, the economic effectiveness of the research can be improved in a large part. Second, it is the problem of setting up the range and level of technical record. Some parts can be missed out during technical documentation leading a limitation of its utilization in the future. The range and level of technical documentation should be accurately set up considering this fact. Third, it is the need of establishment the data management system. Besides data possessed by a project, data preserved deep in a cabinet in a laboratory and privately owned data should be also documented. Therefore, a management system of these data is needed to be established.

A comprehensive management system of national atomic energy technology record will be established through this atomic energy technology documentation project, and it will make foundation of technical data preservation, and of advancement and development of atomic energy technology. Record accumulated by atomic energy technology documentation project will be a measure of effective inheritance of experience and knowledge between generations of atomic energy researchers, as an important resource of atomic energy knowledge management. Also, the knowledge and information resource like this can be utilized as a key information resource in promotion and achievement diffusion.

REFERENCES

- [1] Korea Atomic Energy Research Institute, Final report of atomic technology documentation pilot project, 2011.