

# Development of Waste Characterization System for the Life-Cycle of Decommissioning Nuclear Facilities

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## 1. Introduction

Since a large quantity of radioactive and nonradioactive waste is generated during the decommissioning of nuclear facilities, waste management is one of the crucial parts of effective planning and cost estimation. Therefore, in countries with decommissioning experience, decision making methodology and related technologies have been developed. However, existing systems, which are usually designed from the costing point of view, have limitations in terms of waste management.

To overcome these shortcomings, in the present study, waste management system including efficient waste tracking module from point of waste generation to final disposal were designed.

## 2. Technical status

The existing waste management function implement just simple activities like transferring waste drums to disposal from its generation or cost calculation at final disposal stage. On the other hand, decommissioning wastes typically handles various processes such as segmentation, repackaging, and decontamination for volume and radioactivity reduction. Also the physical, chemical and radiological characteristics change continuously. Therefore, to optimize waste management, it is essential to develop a technology to trace waste history at final stage. Below is an introduction to the software that implements some of the related functionality.

### 2.1 eOMEGA

The eOMEGA code is a decommissioning costing software with fully implemented International Structure for Decommissioning Costing (ISDC) structure, methodology and ISDC costing approach [1].

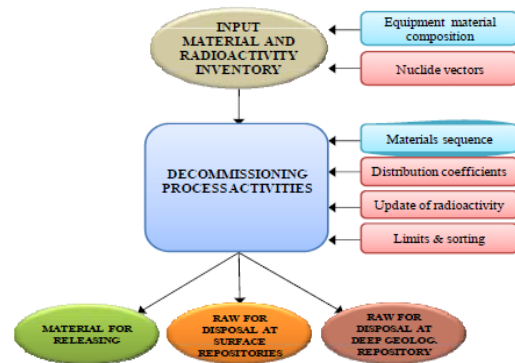


Fig. 1. Principle scheme of waste management in the eOMEGA code.

Because waste management costs have a large impact on cost estimates, eOMEGA has system for simulating material and radioactive flow where physical and nuclide resolved radiological charactersitics of each material item are linked together [2].

### 2.2 DEXUS

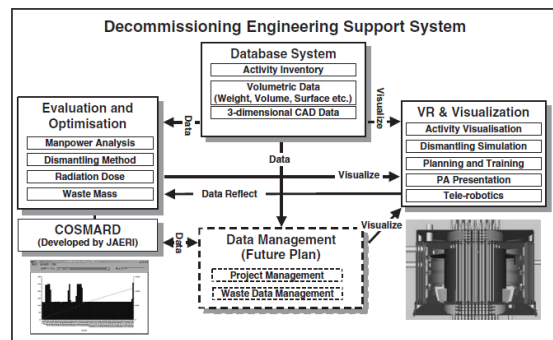


Fig. 2. Conceptual Design of DEXUS [3].

DEXUS, an engineering support system for decommissioning, has been developed to make an efficient decommissioning plan by adopting new information technologies such as 3-dimensional computer aided design systems and virtual reality systems. Although DEXUS only provides functions such as calculation of the exposure dose at present, it is planning to build effective waste management system based on these 3D functions.

### 3. System design requirements

Waste characterization system is designed to improve decommissioning safety and reduce waste. Waste is managed based on the waste packages as a basic unit in the system. Waste packages and waste containers are managed separately. Waste containers provide general information for waste management such as the facility, date of occurrence, type of waste and serial number.

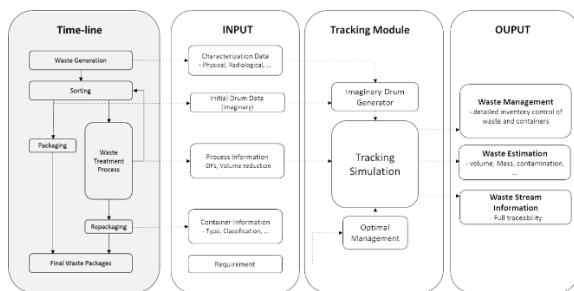


Fig. 3. Schematic of waste management module.

Information of decommissioning waste packages changes continuously during the process such as segmentation, repackaging, and decontamination. Therefore a key part of the system design is to track the history of physical, chemical and radiological information and ultimately to provide the information required for the disposal. In addition, the tracking process does not need to continuously input/output all the information related to the packages, but only inputs/outputs changed data.

When the system user outputs information related waste generation, processing and disposal, system provides all the integrated packages information and tracks waste stream in the container.

### 4. Conclusions

The waste characterization system for the life-cycle of decommissioning nuclear facilities is designed for

the integrated management and evaluation of the radiological characteristics of the various types of waste generated during decommissioning process.

### REFERENCES

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- [3] Yukihiro Iguchi, et al., "Development of Decommissioning Engineering Support System (DEXUS of the Fugen Nuclear Power Station), Journal of Nuclear Science and Technology. (2012).