

## **Recent Improvement Of The Institutional Radioactive Waste Management System In Slovenia - 8091**

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### **ABSTRACT**

The task of managing institutional radioactive waste was assigned to the Slovenian National Agency for Radwaste Management by the Governmental Decree of May 1999. This task ranges from the collection of waste at users' premises to the storage in the Central Storage Facility in (CSF) and afterwards to the planned Low and Intermediate Level Waste (LILW) repository. By this Decree ARAO also became the operator of the CSF. The CSF has been in operation since 1986. Recent improvements of the institutional radioactive waste management system in Slovenia are presented in this paper.

ARAO has been working on the reestablishment of institutional radioactive waste management since 1999. The Agency has managed to prepare the most important documents and carry out the basic activities required by the legislation to assure a safe and environmentally acceptable management of the institutional radioactive waste.

With the aim to achieve a better organized operational system, ARAO took the advantage of the European Union Transition Facility (EU TF) financing support and applied for the project named "Improvement of the management of institutional radioactive waste in Slovenia via the design and implementation of an Information Business System". Through a public invitation for tenders one of the Slovenian largest software company gained the contract. Two international radwaste experts from Belgium were part of their project team.

The optimization of the operational system has been carried out in 2007. The project was executed in ten months and it was divided into two phases. The first phase of the project was related with the detection of weaknesses and implementation of the necessary improvements in the current ARAO operational system. With the evaluation of the existing system, possible improvements were identified. In the second phase of the project the software system Information Business System (IBS) was developed and implemented by the group of IT experts. As a software development life-cycle methodology the Waterfall methodology was used. The reason for choosing this methodology lied in its simple approach: analyze the problem, design the solution, implement the code, test the code, integrate and deploy.

ARAO's institutional radioactive waste management process was improved in the way that it is more efficient, better organized, allowing traceability and availability of all documents and operational procedures within the field of institutional radioactive waste. The tailored made IBS system links all activities of the institutional radioactive waste management process: collection, transportation, takeover,

acceptance, storing, treatment, radiation protection, etc. into one management system. All existing and newly designed evidences, operational procedures and other documents can be searched and viewed via secured Internet access from different locations.

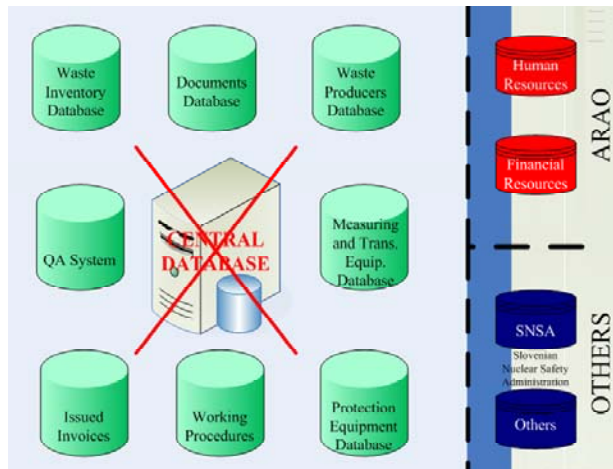
## **INTRODUCTION**

The task of managing institutional radioactive waste in Slovenia was assigned to the National Agency for Radwaste Management (ARAO) by the Governmental Decree of May 1999. This task ranges from the collection of waste at users' premises to the storage in the Central Storage Facility in (CSF) and afterwards to the planned Low and Intermediate Level Waste (LILW) repository. The scope of the managing of institutional radioactive waste also includes waste transport, operation of the CSF, treatment and conditioning of stored waste. The storage has been in operation since 1986, and since 1999 has been managed and operated by ARAO. In 1999 ARAO, as a new operator of the storage facility, has started immediately with planning and implementation of all activities for modernization and refurbishment of the storage facility. One of the initial activities was the new arrangement of the waste inventory stored in the CSF which was not in an enviable state. In parallel the Agency has managed to prepare the most important documents, procedures and instructions and carry out the basic activities required by the legislation to assure a safe and environmentally acceptable management of the institutional radioactive waste.

After six years of successful managing of institutional radwaste together with the positive energy of the additional human resources in the institutional radwaste management department and challenges of new technologies ARAO decided to improve its operational system. With the aim to achieve a better organized operational system, ARAO took the advantage of the European Union Transition Facility (EU TF) financing support and applied for the project named "Improvement of the management of institutional radioactive waste in Slovenia via the design and implementation of an Information Business System". Through a public invitation for tenders one of the Slovenian largest software company gained the contract. Two international radwaste experts from Belgium were part of their project team.

## **OPERATIONAL SYSTEM OF THE INSTITUTIONAL RADIOACTIVE WASTE MANAGEMENT BEFORE THE IMPLEMENTATION OF THE IBS**

In the year 1999, ARAO started its work on the preparation of all the necessary preconditions, which were needed for a successful start of institutional radioactive waste management. The status of activities of ARAO's work in this field is given in figure 1. In this phase, due to the lack of experience in this specific domain, the optimization of the internal operational procedures had not been carried out. Also ARAO was well aware that the existing QA system, which covers this field of work, was necessary to be enhanced. This was the starting point for the needed improvements.



**Fig.1: Status of record keeping in management of institutional radioactive waste in Slovenia before the implementation of the IBS**

From the figure 1 it is obvious that the former operational system was not supported by any information technology (IT). There were no links between databases and nothing was accessible through a secure Internet access. The databases were physically located on different computers. At this stage all analysis and reports were prepared manually.

## **DESIRED IMPROVEMENTS IN THE OPERATIONAL SYSTEM OF THE INSTITUTIONAL RADIOACTIVE WASTE MANAGEMENT**

In order to accomplish the project's objectives, ARAO's needs were the following [1]:

- Enable the transfer of the Best Available Technologies (BAT) in the field of institutional radioactive waste management from EU countries to Slovenia.
- Link all the activities related to institutional radioactive waste in one management system (collection, transport, acceptance, operation of the facility, treatment, storage, radiation protection, physical and technical protection).
- Improve traceability and availability of all data and documents regarding the institutional radwaste management.
- Improve the efficiency of the operational system of the institutional radioactive waste management.
- Optimize the existing operational procedures and definition of the missing ones.
- Develop all missing operational procedures.
- Develop the new IBS system:
  - Re-designing the existing databases,
  - Designing new ones,
  - Enabling different categories of users to have controlled separated and secured Internet access to the relevant information from institutional radioactive management field of ARAO's work from different locations,
  - Connection of existing and new databases with central database,
  - Implementation of the searching tool, which will enable advanced searching within databases by different attributes,

- Train the ARAO personnel to be completely capable to work with the newly developed IBS system.

These desired improvements were part of the Terms of References and starting point for the future work.

## **PROJECT IMPLEMENTATION AND METHODOLOGY**

The duration of the project was agreed for 10 months, starting with the 1<sup>st</sup> of December 2006. Project was divided in two main phases with five tasks in total.

The first phase of the project concerned the detection of weaknesses, the planning of the necessary improvements and implementation of the proposed improvements into the current ARAO operational system. This phase consisted out of three main tasks (as listed bellow) and was performed by the two Belgian experts for radioactive waste management, in close collaboration with the ARAO's project team:

- Task 1: Analysis of the deficiencies of existing ARAO operational system.
- Task 2: After the evaluation of the ARAO's existing operational system the possible improvements were identified in order to improve and optimize the process.
- Task 3: Implementation of proposed improvements.

Within the third task, based on the guidance and support of radwaste key experts from Belgium, ARAO was implementing the proposed improvements into the existing operational system for the management of the institutional radioactive waste and developing the missing operational procedures and manuals.

The second phase consisted in two tasks and was performed by the group of IT experts:

- Task 4: Informatization of the improved operational system with development of the new IBS system that supports the process of institutional radioactive waste management.
- Task 5: Training of ARAO personnel to be completely capable to work with the newly developed IBS system.

In the second phase of the project, the software system Information Business System (IBS) was developed and implemented by the group of IT experts.

The most complex part of whole project was the task 4 during which the IBS system was developed. Due to the very short project executing time, tasks three and four were performed in parallel.

In spite of the fact that the project work plan was extremely intensive, all project tasks were successfully closed and performed as planned.

In order to accomplish the above-mentioned objectives it was necessary to analyze and reengineer the existing operational system. To ensure the highest safety standards for radioactive waste management, the best practices known in the European Union (EU) as well as the International Atomic Energy Agency (IAEA) recommendations were taken into account.

The evaluation of the existing system formed the basis for the preparation of the report named *Plan of improvements in the ARAO internal organizational system for the management of institutional radioactive waste [5]*. The improvements were divided into three groups:

- The improvements that change the process,

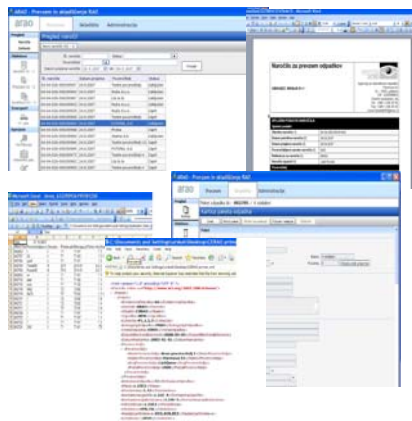
- The improvements that change the procedures,
- The improvements that require development of new procedures regarding the institutional radioactive waste management.

The improvements were also ranked by their importance on: critical, important and administrative or so called *cosmetic improvements*.

To insure success in this task of the project, an action plan was made. In this Action plan, special attention was given to the method for monitoring the progress during the implementation of the changes in order to meet the deadline defined in the Terms of References.

For the development of the IBS, the best available practices from the software engineering process were used. As a software development life-cycle methodology the Waterfall methodology was used. The main reason for choosing this methodology was the simplicity of its approach (analyze the problem, design the solution, implement the code, test the code, integrate and deploy) [2].

The 2007 Microsoft Office System introduces a new file format that is based on XML. It is called Microsoft Office System Open XML Formats and applies to Microsoft Office Word 2007, Microsoft Office Excel 2007, and Microsoft Office PowerPoint 2007. Among other benefits, an important benefit of using this technology was automated generation of Microsoft Office System documents, which enabled use of all Microsoft Office Word 2003 or 2007 functionalities on the documents, produced by the application [3].



**Fig. 2: A few IBS screenshots: the data inserting masks, documents and reports generating from the IBS (Takeover and storing of radioactive waste packages)**

## **RESULTS OF THE PROJECT**

It is clear that the effectiveness of the project can be fully identified and analyzed after a certain period of time during which users would become completely familiar with the new technology. Based on the current experience, the results of this project allowed ARAO to improve the efficiency of the functioning of the institutional radioactive waste management. In particular it means that there is no doubt that the following results of the project are achieved [3]:

- There is no confusion about the process definition any more. The ARAO operational system for institutional radioactive waste management is uniformed and optimized. The transparency of the whole process is achieved by clear definition of all activities.
- The directives for further development of the operational system are already known. The experts in the field of radioactive waste management in the task 2 also proposed some long-term developments.
- The transfer of BAT in the field of institutional radioactive waste management from EU countries to Slovenia was enabled by the support of skilled experts with the radioactive waste management experience in EU countries.
- Due to the optimization of the administrative activities (consequence of IBS system), the operative costs of work are expected to be lower.
- The use of one single 'tailor made' database (IBS system) and possibility to access to the waste management data from different locations will allow all users to access to the data easily and faster.
  - One-time data entering, possibility to search, export or prepare reports about data will enable users to economize their working time.
  - Storing documents in one place (Share Point portal) will prevent documentation losses or confusions.
- Due to traceability of the waste management data, users will have insight into the whole management process; from takeover and acceptance until handling the package in the storage facility and eventual removing package from the facility.
- Due to the fact that project was well planned and managed by all involved parties, there were no additional indispensable costs, arising from project handling or performing, that would lower the efficiency of the project.

Therefore the implementation of the project enables the ARAO to meet the requirements for performing effective, updated and technological adequate management system of the institutional radioactive waste in Slovenia.

## **CONCLUSION**

It is clear that the information technology is one of the most important factors of business process reengineering. The main factors of the success of this project were:

- Detailed analysis of the existing process and potential changes,
- Active support and involvement of the ARAO staff in the project,

- Good and open communication between the ARAO and software company during the IBS system development and process changing,
- Support of ARAO management,
- Usage of proper methodologies,
- Clear instruction and good cooperation with radwaste experts,
- Decision for the tailor made IBS system.

Within this project ARAO and software company have done everything that was needed to optimize the process of institutional radwaste management in Slovenia. Reengineering of business process is a continuous activity and it has to be clear that the real efficiency of the IBS will be fully identified and analyzed after a defined time period, but even now can we state that significant improvements in the organization of institutional radwaste management in Slovenia has been made.

In the future ARAO will reserve a certain amount of financial resources for upgrading and updating the IBS system. With this approach, ARAO will assure a continuous process optimization and will prevent it to become out-of-date.

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