

3D Digital Simulation Applied to Support Nuclear Facilities Decommissioning Knowledge Management, Training and Education

Luc ARDELIER, Vincent TESTARD and Paola ONTIVEROS

OREKA Solutions - 615, avenue de la roquette, 30200 Bagnols-sur-Cèze, FRANCE

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Abstract

Lifecycle of a NPP goes to about 100 years (including decommissioning and site remediation), therefore the participation of three or four generations of nuclear workers is engaged, so is the data produced during this period. Indeed, several questions need to be answered, being the most important the following:

- how to manage this knowledge along time?
- how to use and share this information among stakeholders?
- how to train/educate operators and develop efficient/safe interventions?

Today, decommissioning projects are still being prepared using endless spreadsheets, no longer adapted to these long-term challenges, neither to the large number of stakeholders who need to share the information. Thus, the key is the use of dedicated digital solutions.

This paper presents the application of one of these solutions in knowledge management, decommissioning projects studies and training.

DEMplus® *for nuclear* is a 3D digital software (based on BIM) dedicated to nuclear projects (from preliminary to front-end design). It includes two calculation engines (dose rate in real time and anti-collision) and integrates the 3-D model of the facility with its multidisciplinary data. Thus, this digital technical repository provides multi-criteria results of scenarios (costs, planning, dose intake and waste management). Moreover, the software can be connected to VR lens allowing to train operators. This solution provides an approach that gives a higher visual content, greater interactivity and instant access to information to the multidisciplinary users.

Combining the experience of nuclear workers with their knowledge transfer is an important feature powered by DEMplus® *for nuclear*. Its client-server architecture allows to share the information through all stakeholders (each member has a defined user rights and feeds the software with data belonging to his field when appropriate), to be later used for inquiring or/and for its application in the simulation (under the given rights). As a result, the digital technical repository is enhanced.

The data is managed by the software mainly to help the user as a decision-making tool to build scenarios. Some other important features are the application of ALARA/ALARP approach, the verification of the feasibility of an operation by its simulation, the multicriteria results, the dose intake assessment (high accuracy thanks to the step by step environment evolution), risk assessment through sensitivity studies. Currently, the communication to other complementary software are being explored (iDrop for execution studies using VR lens, and FlexSim for flow studies).

The VR experience using the software can be applied to train operators and engineers, through the immersion into a defined scenario, as well as the simulation of incidental/accidental events (ex. sirens to see the apprentice's reaction).

Furthermore, the software can be used for education, to teach how to apply the ALARA/ALARP approach and to let students discover nuclear facilities, just to mention two examples. Nowadays, all of this is being shared to students from the most important French nuclear education institutions (CEA, IRSN and INSTN).