DIGITAL TECHNOLOGIES IN EUROPEAN NUCLEAR DECOMMISSIONING PROJECTS

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Abstract

Many nuclear facilities around the world are reaching the end of their life cycle and are being shut down, so demand in the nuclear Dismantling and Decommissioning (D&D) market will continue to grow. As the complexity of these tasks involves budgetary constraints, long-term frames, and specific logistical requirements among others, research is encouraged to optimize traditional methods with the help of digital technologies.

The Euratom project PLEIADES (PLatform based on Emerging and Interoperable Applications for enhanced Decommissioning processES) was conducted in the years 2020-2023. The project defined a specific nuclear ontology and developed a central server for combining data, ensuring compatibility and demonstrating its utility in three real nuclear sites.

Starting in September 2024, the project DORADO (Digital twins and Ontology for Robot Assisted Decommissioning Operations) is being carried out by some of the previous partners and new ones. DORADO builds on the work done in the PLEIADES project by creating a holistic digital platform based on an ontology-based data-driven approach and a server with a secured RESTful API interface to integrate digital tools into a coherent suite customized for decommissioning applications. Once completed, the DORADO platform can be used for preparing and monitoring decommissioning activities. Applications could include e.g. in-situ waste characterization, remote planning of dismantling, robotic and remote inspection, clearance and surface measurements, cost estimation, risk identification, and knowledge management. During the first stage of the project in 2024-2025, the technical requirements and business value analysis were completed. Further analysis regarding the state-of-the-art, data security, risk and safety among others, are allowing the progress of DORADO towards technical implementation. The project will continue until Autumn 2027. Once the technical implementation is complete, the technologies will be demonstrated in three real use cases using accurate digital models of various facilities in Norway, Finland, and Belgium.

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