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Digital tools for cemented waste package and facility monitoring and prediction

To provide better means for a safe and effective monitoring of cemented waste packages including prediction tools to assess the future integrity development during pre-disposal activities, several digital tools are evaluated and improved in the frame of the EC funded project PREDIS. Safety enhancement (e. g. less exposure of testing personnel) and cost effectiveness are part of the intended impact.

The work includes but is not limited to inspection methods such as muon imaging, wireless sensors integrated into waste packages as well as external package and facility monitoring such as remote fiber optical sensors. The sensors applied will go beyond radiation monitoring and include proxy parameters important for long term integrity assessment (e.g. internal pressure). Sensors will also be made cost effective to allow the installation of much more sensors compared to current practice.

The measured data will be used in digital twins of the packages for specific simulations (geochemical, integrity) providing a prediction of future behavior. Machine Learning techniques trained by the characterization of older packages will help to connect the models to the actual data.

All data (measured and simulated) will be collected in a joint data base and connected to a decision framework to be used at actual facilities.

The presentation includes detailed information about the various tools under consideration, their connection and first results of our research.

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