

Session 2: Characterisation of rooms and buildings

## Data Analysis for Radiological Characterisation: Geostatistical and Statistical Complementarity

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### Summary

Radiological characterisation may cover a large range of evaluation objectives during a decommissioning and dismantling (D&D) project: removal of doubt, delineation of contaminated materials, monitoring of the decontamination work and final survey. At each stage, collecting relevant data to be able to draw the conclusions needed is quite a big challenge.

In particular two radiological characterisation stages require an advanced sampling process and data analysis, namely the initial categorization and optimisation of the materials to be removed and the final survey to demonstrate compliance with clearance levels. On the one hand the latter is widely used and well developed in national guides and norms, using random sampling designs and statistical data analysis. On the other hand a more complex evaluation methodology has to be implemented for the initial radiological characterisation, both for sampling design and for data analysis.

The geostatistical framework is an efficient way to satisfy the radiological characterisation requirements providing a sound decision-making approach for the decommissioning and dismantling of nuclear premises. The relevance of the geostatistical methodology relies on the presence of a spatial continuity for radiological contamination. Thus geostatistics provides reliable methods for activity estimation, uncertainty quantification and risk analysis, leading to a sound classification of radiological waste (surfaces and volumes).

This way, the radiological characterization of contaminated premises can be divided into three steps. First, the most exhaustive facility analysis provides historical and qualitative information. Then, a systematic (exhaustive or not) surface survey of the contamination is implemented on a regular grid. Finally, in order to assess activity levels and contamination depths, destructives samples are collected at several locations within the premises (based on the surface survey results) and analysed. Combined with historical information and radiation maps, such data improve and reinforce the preliminary waste zoning.

The paper discuss the strategic aspects of the implementation of the statistical and geostatistical methodologies on real application cases (in French nuclear premises) and why these two data processing are complementary rather than in opposition because they are not used at the same radiological characterisation stage of a D&D project.