



THE EUROPEAN PROJECT INSIDER

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A circular inset showing the INSIDER project logo and a diagram of the project's structure. The diagram consists of a central circle with eight surrounding boxes, each representing a different work package (WP1 to WP8).

About the INSIDER project

<http://insider-h2020.eu/>

A circular inset showing a photograph of a large, industrial-looking container or vessel, likely part of the INSIDER project's experimental setup.

Highlights and challenges

A circular inset showing the INSIDER project logo and the cover of a document titled 'Guidelines and Pre-Standards on Sampling Strategy, Laboratory Analysis and on Onsite Measurements in Constraint Environments'. The cover includes the project name, the title, and the deliverable number (D7.10).

Short term perspectives and opening

- Improved **N**uclear **S**ite characterisation for waste minimisation in **D**&**D** operations under constrained **E**nvi**R**onment
- A **EU-funded Horizon 2020 project**:
 - “Research and innovation on the **overall management of radioactive waste other than geological disposal**”
 - “Management of **non-standard waste** including D&D waste”
- 17 partners from 10 european countries
 - Launched in June 2017: 4-year project



IAEA
IRSN
ANDRA
ENRESA
SOGIN
NDF
Kraftanlaghen Heidelberg
KAERI
ORANO
IRE
ENGIE

Main Objective

To develop and validate a new and improved **integrated characterization methodology and strategy** during nuclear decommissioning and dismantling operations (D&D) in a waste-led approach: **Coupling sampling and measurements**

Results are being validated through 3 case studies:

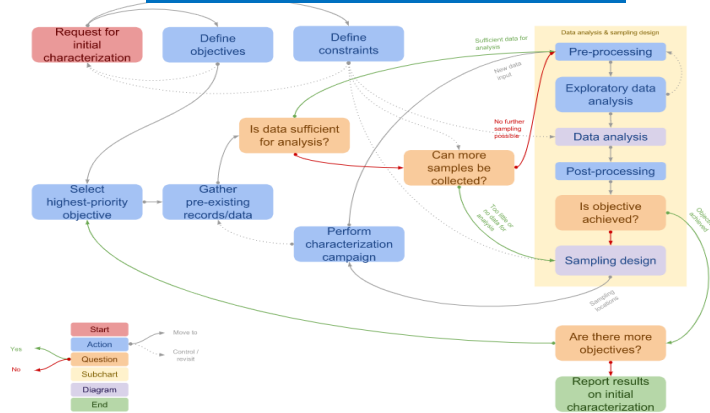
- Liquid waste storage tanks : **Fuel cycle facility**
- Nuclear reactor Biological shield : **NPP**
- Contaminated soil: **Post incidental**



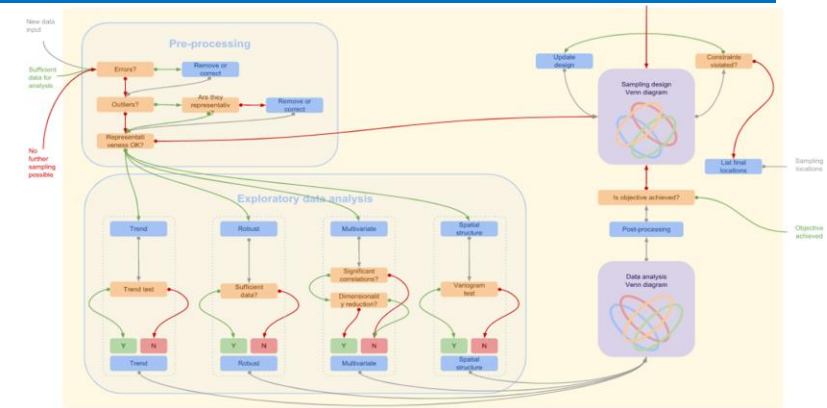
- 1 Decommissioning of a back/end fuel cycle and/or research facility - Ispra (JRC)
- 2 Decommissioning of a nuclear reactor - Mol (SCK/CEN)
- 3 Post accidental land remediation - (CEA)



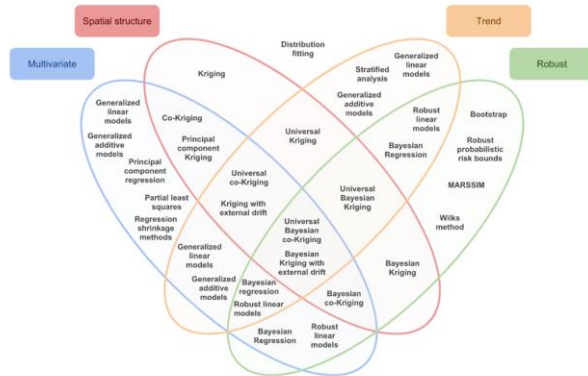
Overall strategy



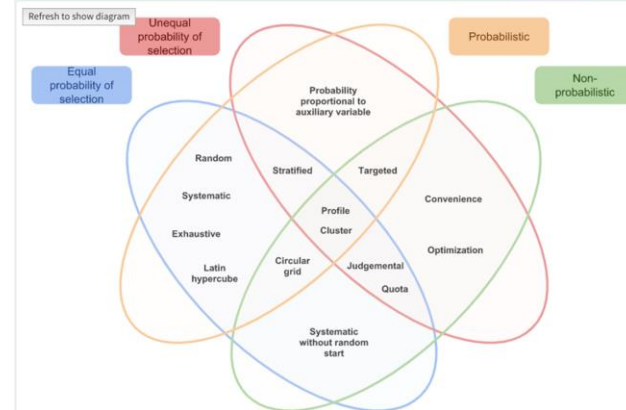
Data analysis & sampling design



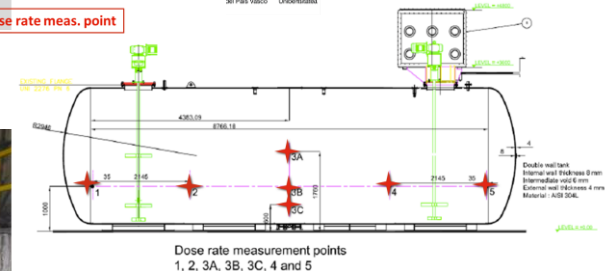
Methods for data analysis



Methods for sampling design



Dose rate meas. point



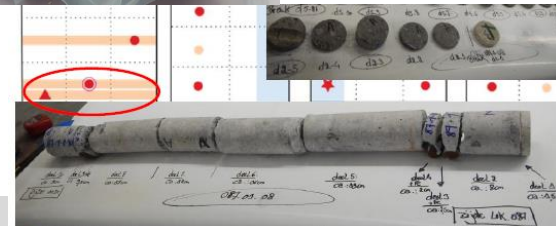
Onsite benchmarking and interteam comparisons

- Preexisting data
- Sampling design
- Dose rate
- Total γ and γ spectrometry
- Each team:
 - 25 meas. at 5 or 8 specific loc.

Paper submitted to JRNC, M. Crozet et al.

Interlaboratory comparisons

- **2 certified reference materials**, characterized for radionuclide content to an accuracy better than 10 % at 95 % confidence level
 - Matrix representative: real concrete spiked (^{133}Ba , ^{152}Eu , ^{154}Eu , ^{60}Co) and effluent solution (^{63}Ni , ^{55}Fe , ^{137}Cs , ^{90}Sr , Pu ,...)
- **2 reference materials** based on homogenized sample collection



• ILC processing

- In lab ILC on CRM
 - 9 measurands for CRM1
 - 4 measurands for CRM2
- In lab ILC on RM
- Proficiency tests and uncertainty meas. estimation

RN	Mass activity range (Bq/g)
⁶³ Ni	1-10
⁹⁰ Sr	1-100
²³⁸ Pu	0.1-10
^{239,240} Pu	0.1-10
²⁴¹ Am	1-10
⁶⁰ Co	0.1-10
¹³⁷ Cs	1-200
⁵⁵ Fe	0.1-5
²³⁸ U	0.1-10

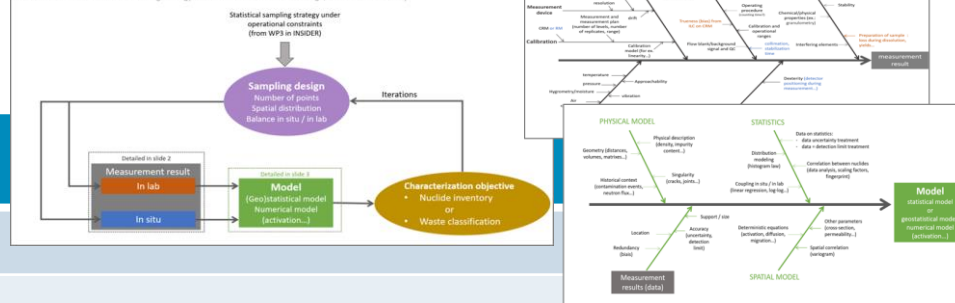
RN	Mass activity range (Bq/g)
¹³³ Ba	15-20
¹⁵² Eu	1-2
¹⁵⁴ Eu	0.05-0.1
⁶⁰ Co	0.1-0.2

• Guidelines

WP	Title
WP2	Result summary of the benchmarking exercise
WP3	Statistical approach guideline
WP4	Reference material certification report
WP5	Guideline on the requirements for method implementation & Guideline for method validation
WP6	Establishment of uncertainty budget
WP7	State of knowledge for sampling strategy, in lab and on site measurements. Links with ISO

Uncertainty sources identification

Item: upstream knowledge of the history of the workpiece is essential; it is not a source of uncertainty but it guides upstream the choice of measurands and the overall dismantling strategy. The better the historical knowledge, the lower uncertainty



Innovative metrological study based on a multidisciplinary network and D&D key activities

- ▶ New D&D matrix reference materials development
- ▶ Intercomparisons on real samples and Inter-team comparison
- ▶ Analytical innovation needs identification, development and implementation
- ▶ Advanced integrated approach for site radiological characterization and automation of characterization process...
- ▶ Decommissioning initial characterization experience

Potential further opening of the project in the future Horizon Europe Euratom work program

- ▶ Extension/application of the methodology and approaches : historic wastes, graphite reactors, NORM...
- ▶ Nuclear reference material production(CRM)
- ▶ Support to D&D Standards (sampling, measurements and validated methods,...)
- ▶ Management of other waste (legacy waste, NORM, future waste...)
- ▶ Decommissioning standardized practices, remediation issues
- ▶ Characterisation process contribution to circular economy

INSIDER

www.insider-h2020.eu
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Planning for tomorrow
By 2050, more than half of today's 400 UK nuclear reactors are expected to be replaced by the next generation of reactors.

Improved nuclear site characterisation for waste minimisation in Decommissioning & Dismantling operations under constrained Environment
Smart applications and waste models developed to improve the control of nuclear site water and waste pollution issues.

A wide diversity
Nuclear industry represents a wide variety of expertise and competences.

Accurate geological and technical characterisation of facilities and sites is a prerequisite for characterisation and classification of contaminated materials. This knowledge is essential for the development of decommissioning and dismantling plans.

The project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 755554.

18 partners

INSIDER will develop and validate the reference integrated decommissioning approach that jointly integrates and addresses the multiple challenges of nuclear site water and waste pollution issues.

What INSIDER will achieve

- Improve the safety during site dismantling operations by better tools
- Reduce the greenhouse gas emissions by optimising the use of resources and energy
- Improve the performance of available measurement techniques (chemical and toxic) for characterisation of contaminated materials and a variety of waste management
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THANK YOU for your attention

Any questions?



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