PLEIADES

Smarter Plant Decommissioning

PLEIADES workshop

Introduction

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25 October 2023

This project has received funding from the EURATOM Research & Training Programme 2014-2018 under the Grant Agreement n°899990. The content of this document reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

PLEIADES workshop

→ Many thanks to the DigiDecom organization team that allows us to promote our project and to share our results

→ Workshop objectives:

- →Present the PLEIADES concept, the consortium work done, the different results, …
- →To a large audience
- →More deeply than a classical paper presentation

- →Create opportunity to discuss the concepts with actors of the decommissioning sector
- →Enable feedbacks from a wide audience

PLEIADES workshop agenda

→ Project overview

→ Requirements and expectations

→ Ontology presentation

→ PLEIADES platform presentation

→ Simulation concept and scenarios

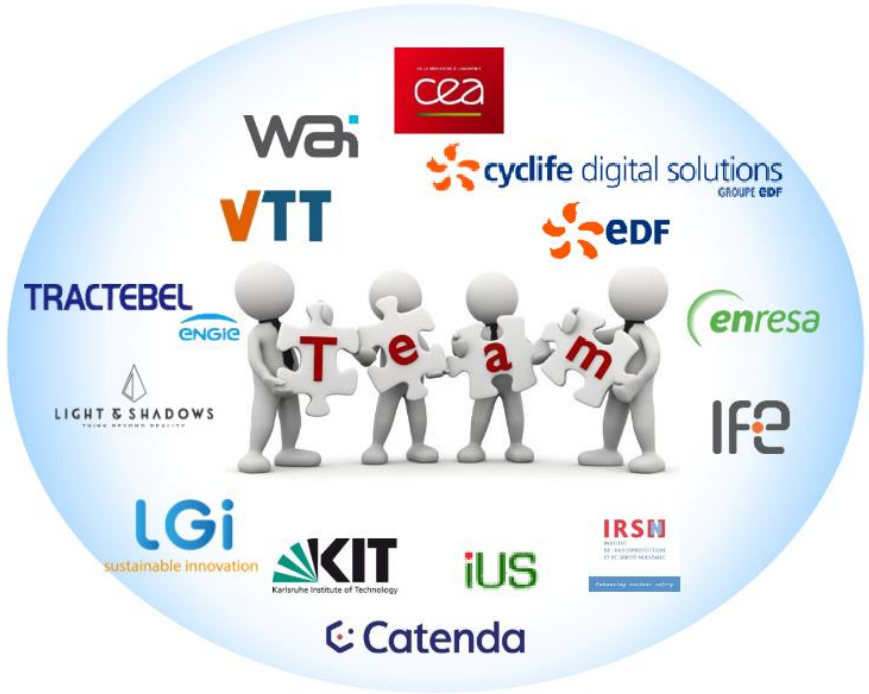
→ Use cases demonstrations

→ Outcomes evaluation process

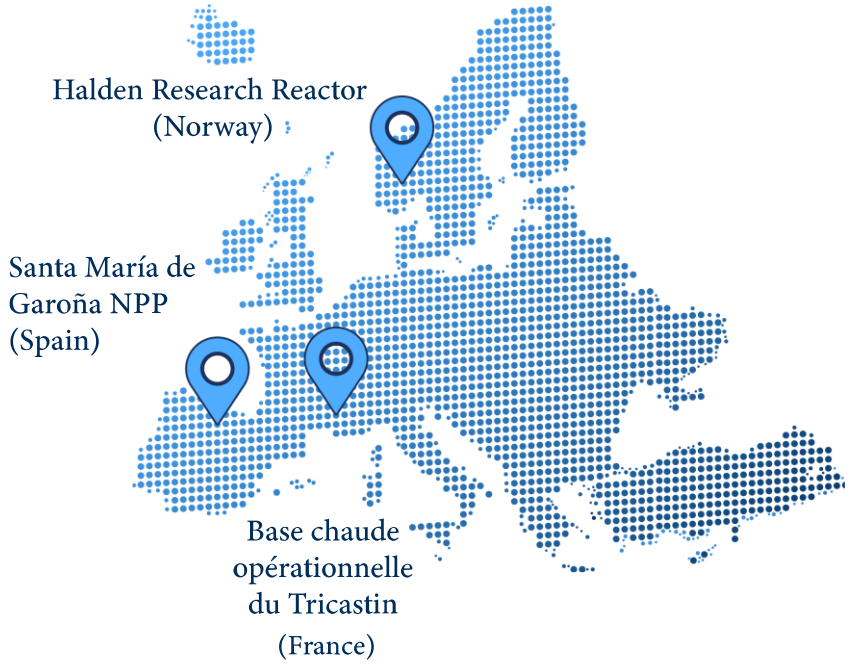
PLEIADES Overview

- PLatform based on Emerging and Interoperable Applications for enhanced Decommissioning processES
- Duration: 3 years (01/10/2020 - 30/11/2023)

14 partners from 7 countries



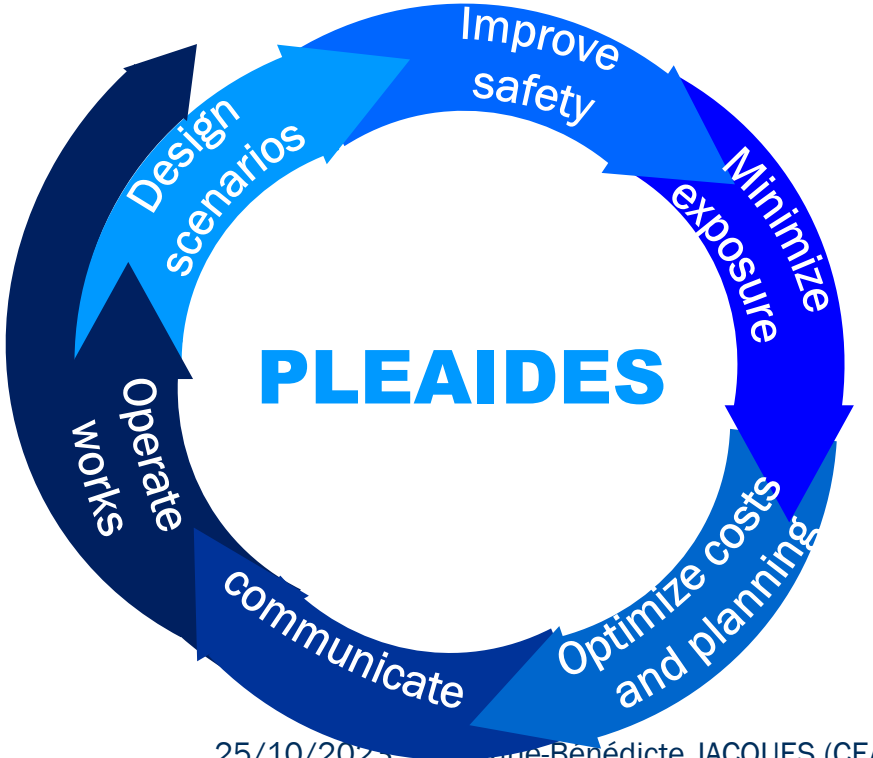
3 Use Cases



PLEIADES: Objectives

✓ Develop an innovative platform based on a BIM approach

→ BIM (*Building Information Modelling*) approach to **design scenario**, **improve safety**, **minimize radiation exposure**, **optimize costs and planning**, **communicate**



PLEIADES Objectives

✓ Develop an innovative platform based on a BIM approach

→ BIM (*Building Information Modelling*) approach to **design scenario**, **improve safety**, **minimize radiation exposure**, **optimize costs and planning**, **communicate**

→ 3D modelling & simulation
→ "multi-dimensional modelling": **3D model**, **time**, **dose**, **feasibility studies**, **waste** and **costs**

→ Software integration and interoperability

1. **3DScanPF (KIT)**: Robotic platform for 3D scans and imaging
2. **DIM (EDF)**: Dismantling Info Modelling system for storing all facility data
3. **Bimsync (CATENDA)**: IFC[1] compatible BIM platform used in construction
4. **iUS IMS (iUS)**: Semantic wiki based nuclear info system
5. **RadPIM (IFE)**: Radiological characterisation tool (part of VRdose family)
6. **VRdose (IFE)**: Detailed job planning tool with a radiological model library
7. **DEMplus (CYCLIFE DS)**: Decision-support tool combined with 3D simulation
8. **Aquila costing (WAI)**: ISDC[2] compatible client-server based costing tool
9. **iDROP (CEA)**: VR dismantling simulation with collision & radiological modelling
10. **LLWAA-DECOM (Tractebel)**: Low Level Waste Activity Assessment tool
11. **ALVAR (VTT)**: AR[3] training platform with advanced tracking capabilities
12. **INTERACT (LS)**: XR[4] platform with physics engine

PLEIADES Objectives

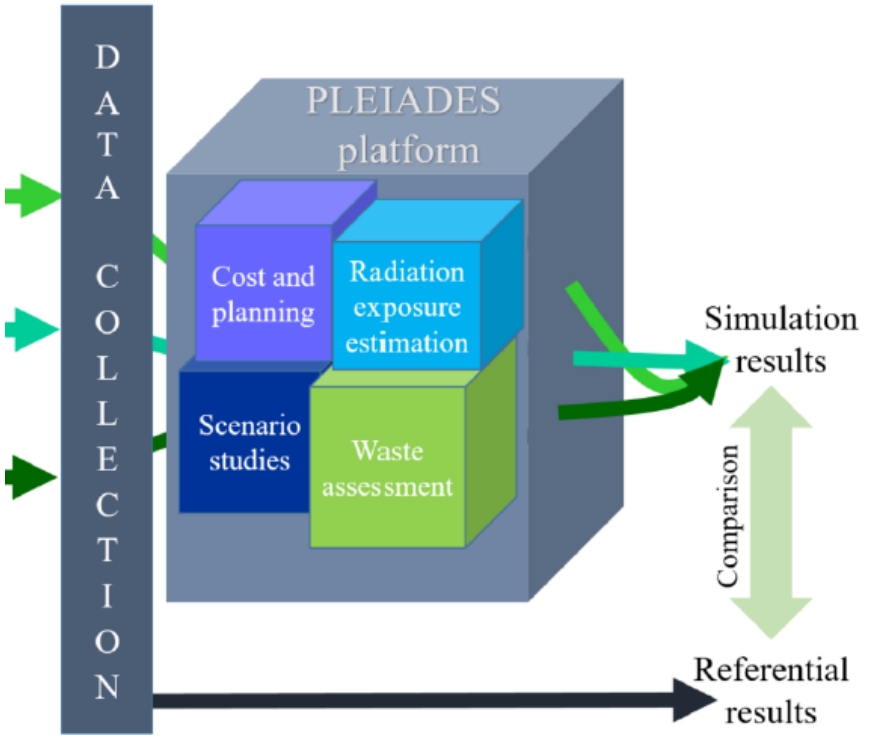
✓ Develop an innovative platform based on a BIM approach

✓ Implement on real cases

Santa María de Garona (**SMG**)

Halden Research Reactor (**HRR**)

Base Chaude O. du Tricastin (**BCOT**)



PLEIADES Objectives

✓ Develop an innovative platform based on a BIM approach

✓ Implement on real cases

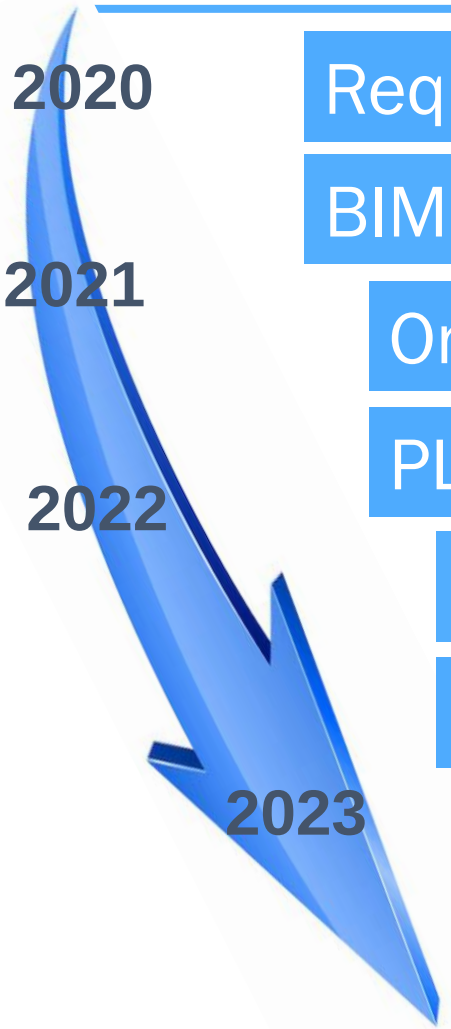
✓ Develop an associated methodology and prepare it as a standard

→ Establish a standardized process to organize the data collected consistent with BIM approach

→ Propose an ontology for an international standard:

- decommissioning specific terminology / vocabulary definition
- concepts relationships identification
  - ➢ common understanding
  - ➢ common knowledge modeling

PLEIADES work plan



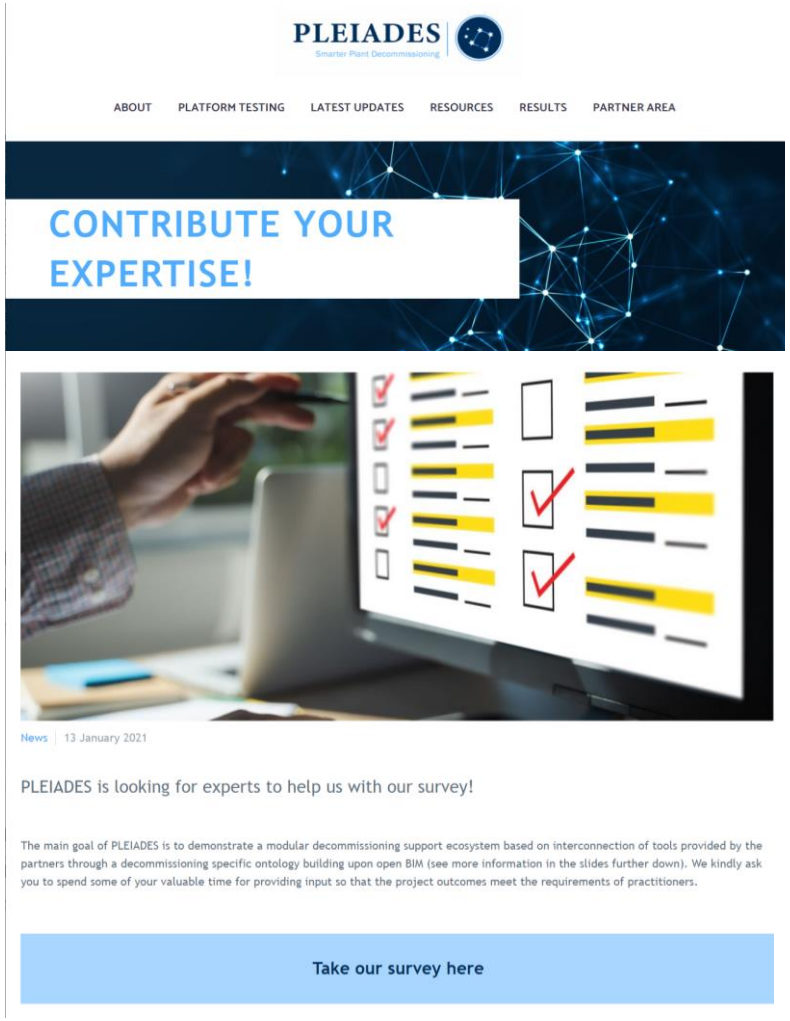
Specify	2020	Requirements and Specifications
		BIM approach
	2021	Ontology
Develop		Platform interfaces
		PLEIADES software platform server + tools
	2022	Implementation on real cases
Implement		Demonstration/validation on 6 user stories
	2023	Results evaluation (platform & modelling)
Evaluate		Exploitation preparation

➢ End of project : November 2023

Specify

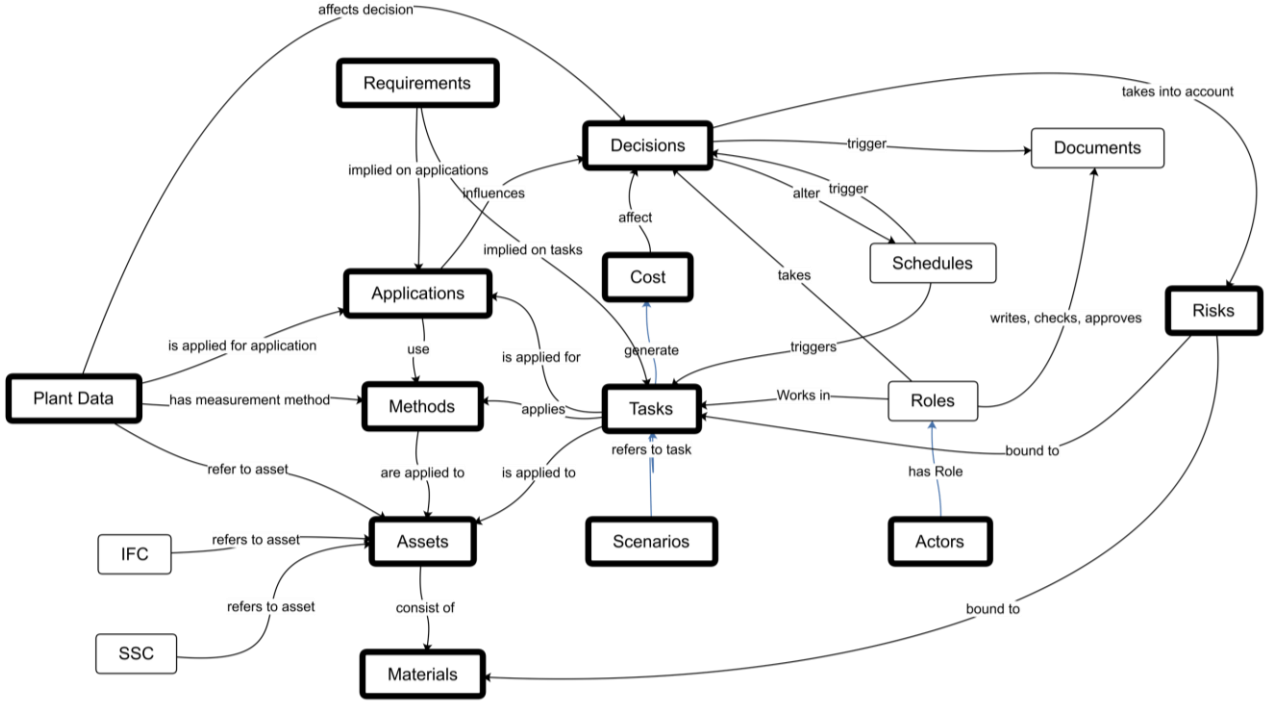
- Analysing requirements and eliciting specifications
- Inputs for:
  - Designing the PLEAIDES software architecture
  - Defining valuable demonstration tests

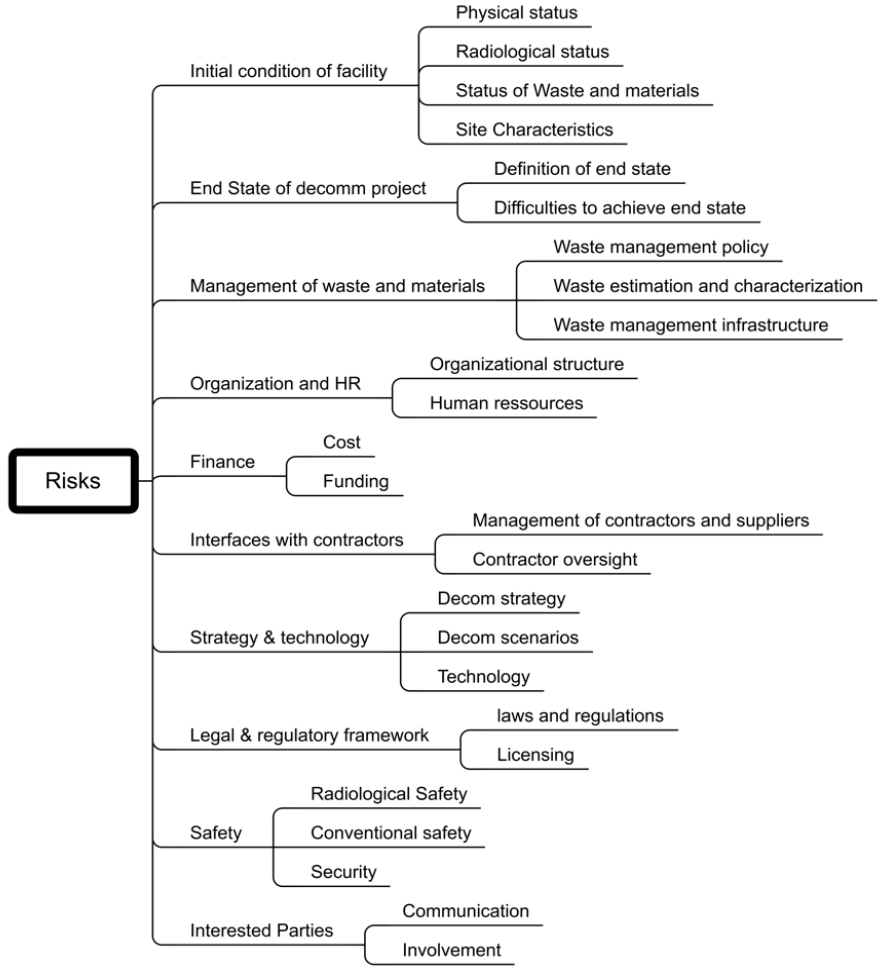
- Started during a dedicated work session at DigiDecom 2021



Develop

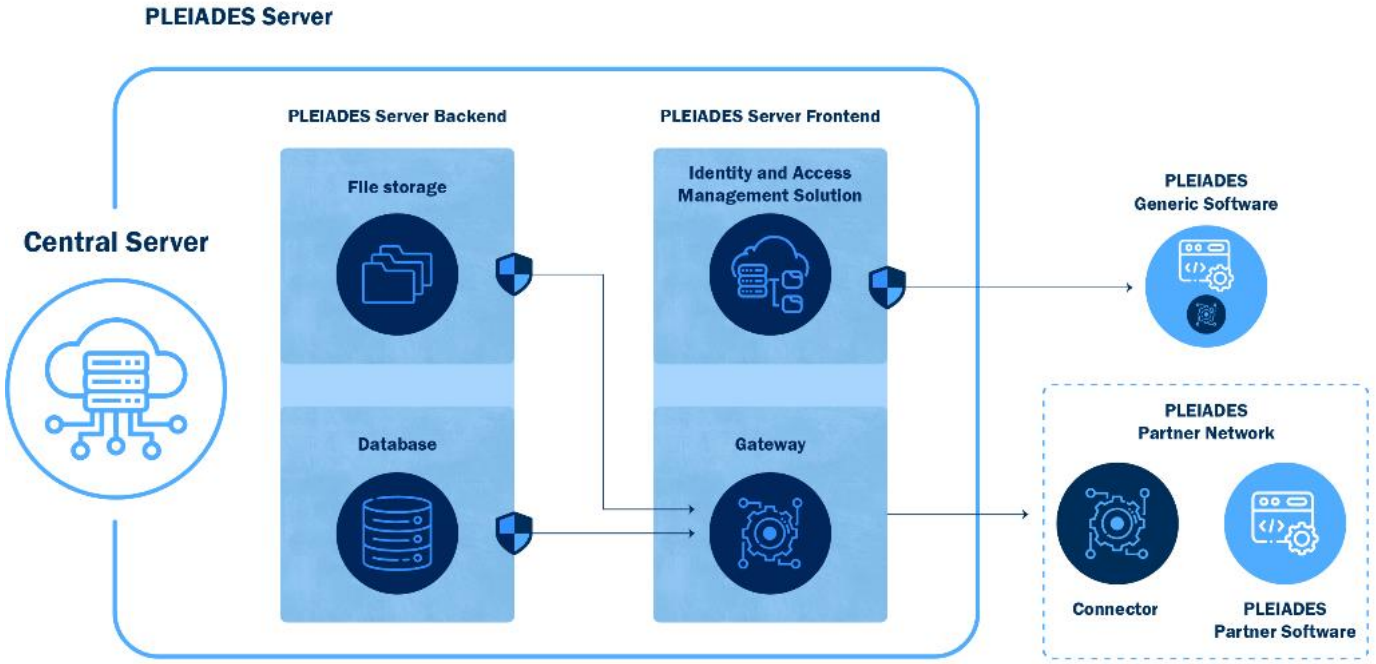
Ontology





Develop

Platform (server + tools) & API



WASTREAM

idrop

VRdose®

DEMplus FOR NUCLEAR
Démantèlement Exploitation Maintenance

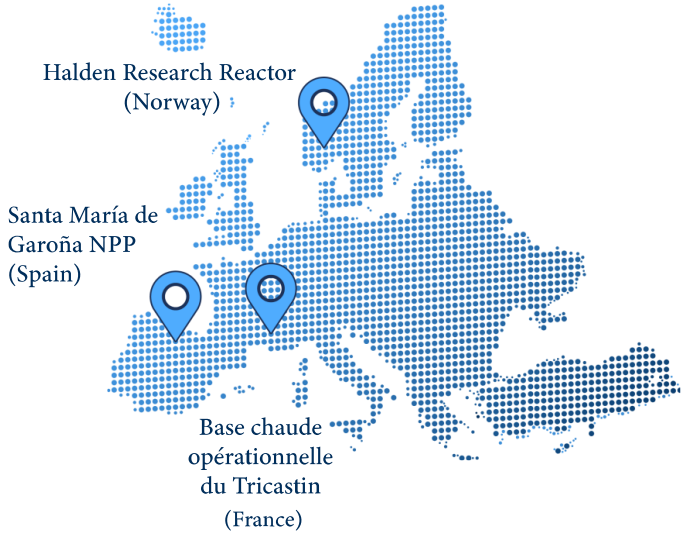
AquilaCosting
Decommissioning & Waste Management Costing Software

INTERACT

ALVAR

Implement

Use Cases 3D models & data



Halden Research Reactor (HRR)

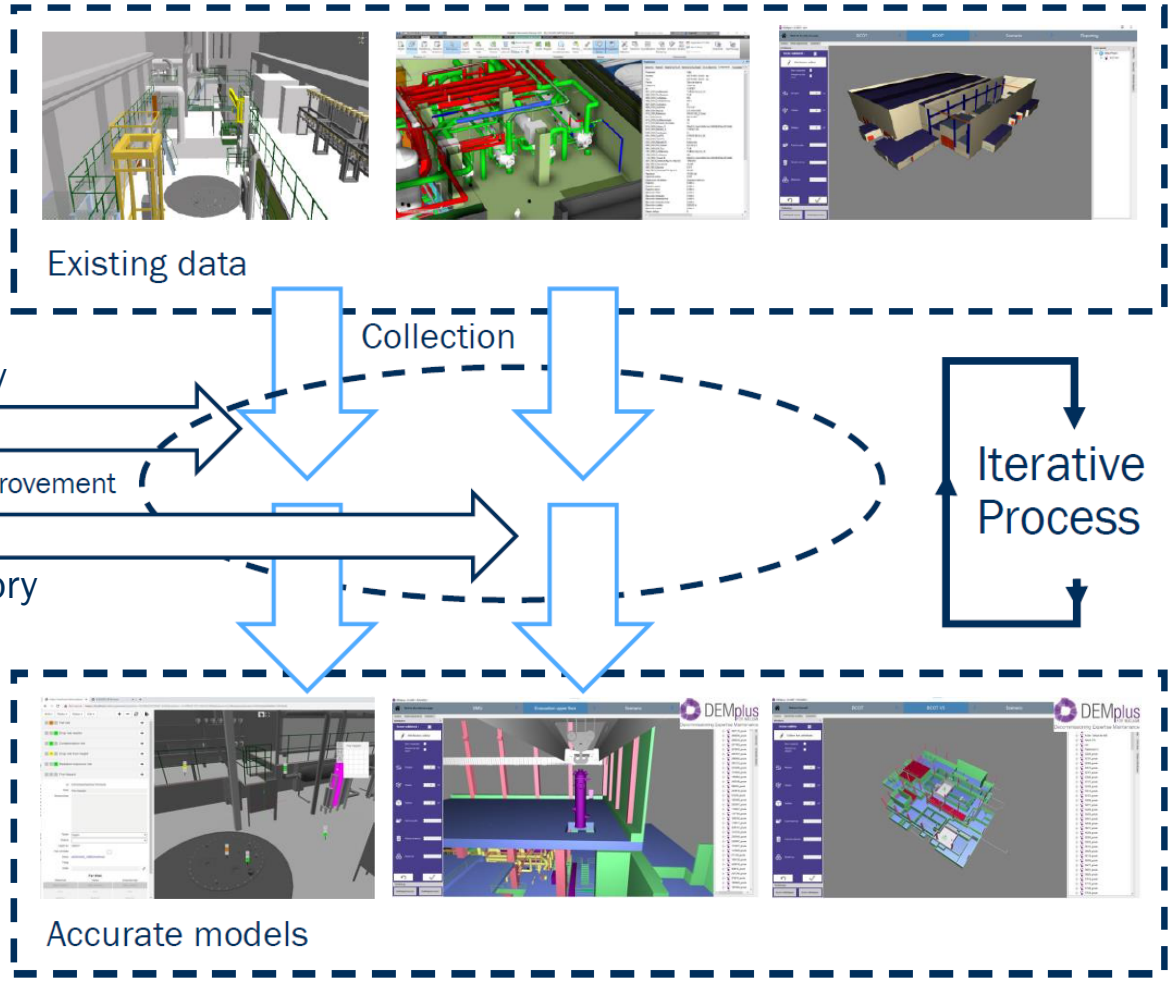
IFE Institute for Energy Technology

Santa María de Garona (SMG)

enresa

Base chaude O. du Tricastin (BCOT)

EDF



Implement

Scenarios simulation

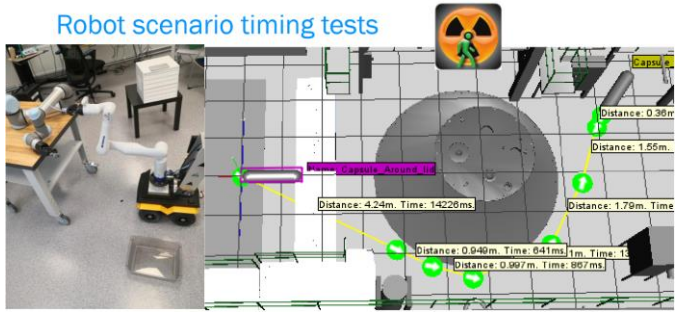
Halden Research Reactor (HRR)

IFE Institute for Energy Technology

US#1:

Manual vs. remote radiological characterization

Robot scenario timing tests



HVRC VRdose® Results

Actor	Dose-uptake
Radiation Protection (manual scenario)	0.027 mSv
Radiation Protection (robot scenario)	0.018 mSv
Worker (manual scenario)	0.021 mSv
Worker (robot scenario)	0.021mSv
Supervisor (manual scenario)	0.023 mSv
Supervisor (robot scenario)	0.023mSv

Scenario	Duration (hours)
Manual scenario	0.3
Remote / robot scenario	0.338

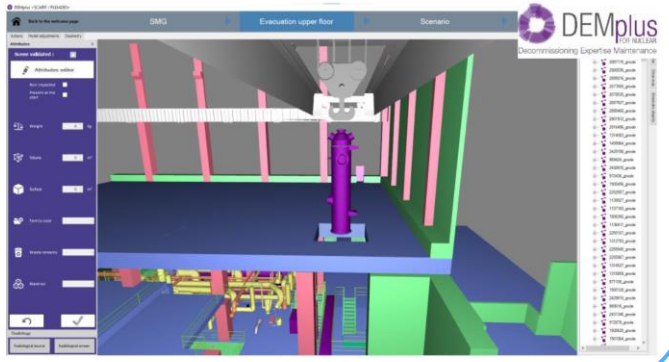
Santa María de Garona (SMG)

enresa

US#2:

3D supported vs. digitally enhanced dismantling

SMG 3D model visualization on DEMplus®



Base Chaude O. du Tricastin (**BCOT**)

EDF

US#3:

Manual vs. automated decontamination of surfaces

Test and results from DEMplus® scenario simulations

US#4:

Strategic risk management planning

US#5:

Regulatory/TSO review capabilities

US#6:

Strategic waste management planning

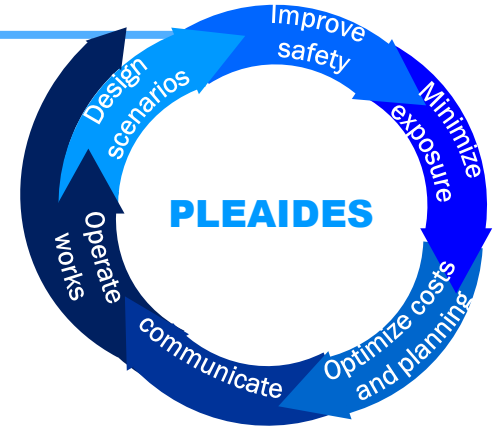
Evaluate

- Evaluate the modelling process
  - Data collection :
    - Acquisition
    - Cleaning
    - Completing “holes”
    - Formatting
  - Simulation process:
    - Modules/tools use
    - Work steps and process
    - Produced data management
- Assess the data structuration evolutions (Decom ontology standardization process)
- Provide PLEIADES platform guidelines

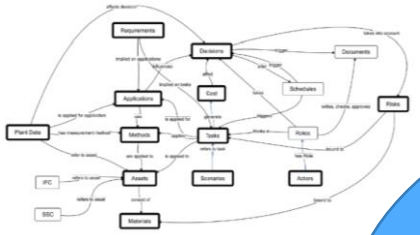
Overview

PLEIADES BIM-based concept

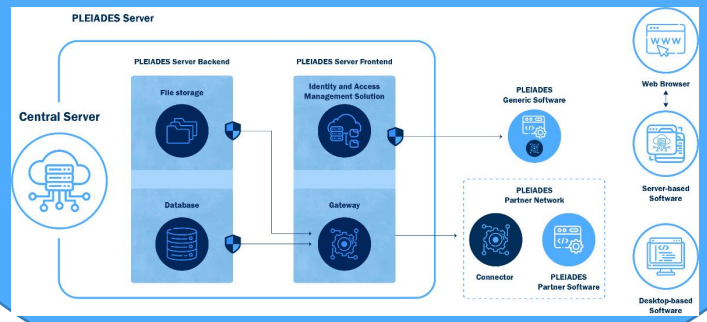
BIM (*Building Information Modelling*) approach to **design scenario**, **improve safety**, **minimize radiation exposure**, **optimize costs and planning**, **communicate**



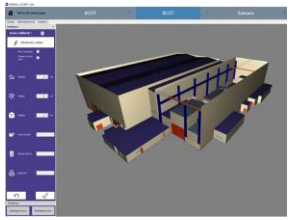
Data collection based on decommissioning ontology



Platform + tools



3D models



Scenario simulation

Estimations/Comparison/Decisions

- Waste management
- Dose exposure
- Cost
- Planning
- …

SMG

HRR

BCOT

Thank you for your attention

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http://pleiades-platform.eu

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