

PLEIADES

Smarter Plant Decommissioning



PLEIADES: Main outcomes, evaluation and steps forward

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DigiDECOM23– Helsinki
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.

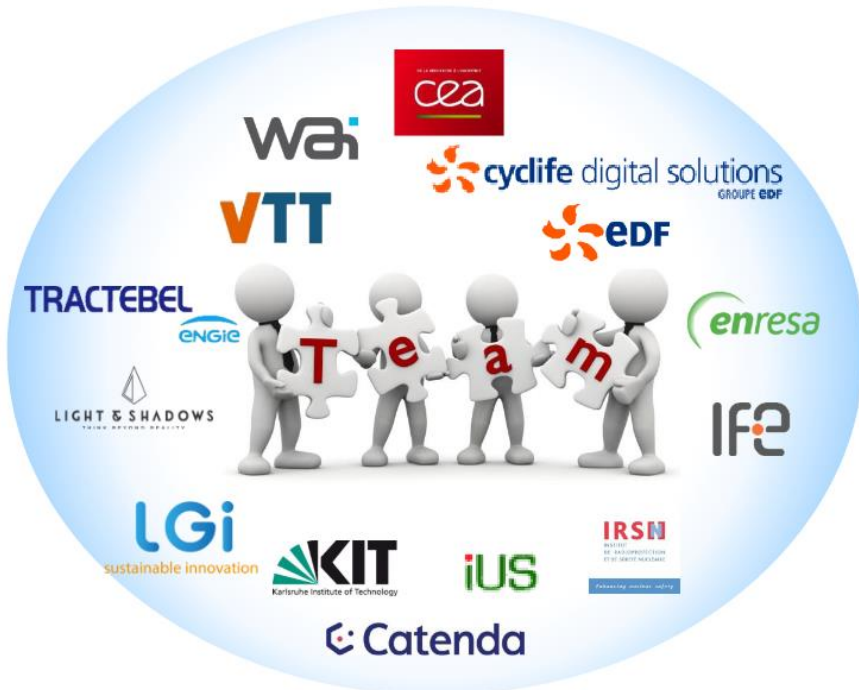
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- Main outcomes
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 - PLEIADES Platform
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- Use of Digital Models & Demonstration on Real Use Cases
- Further Steps

PLEIADES Overview

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

14 partners from 7 countries



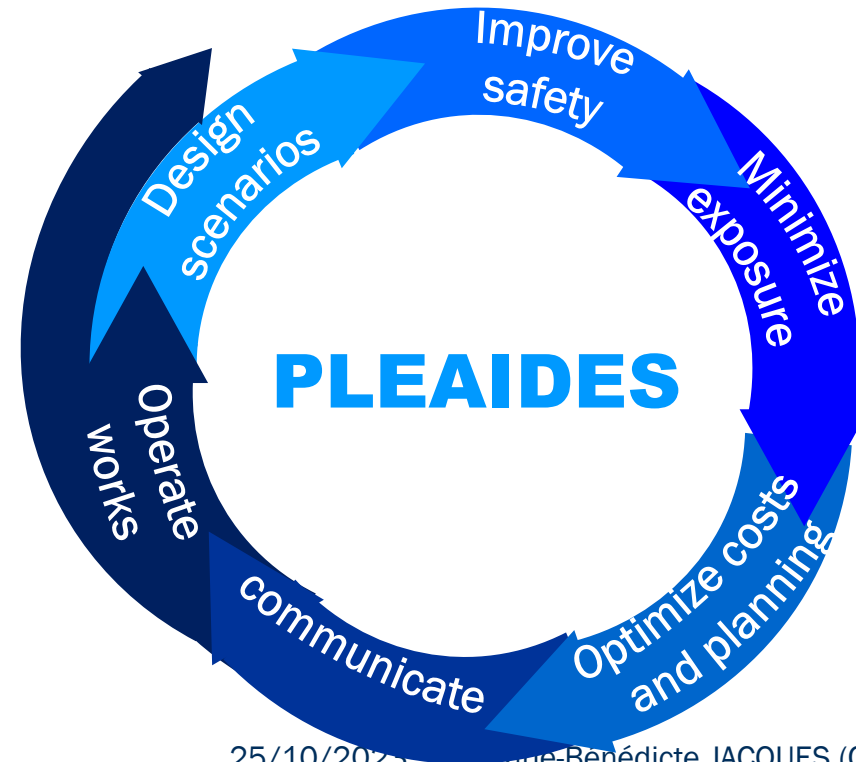
3 Use Cases



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**



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→ 3D modelling & simulation

→ “multi-dimensional modelling”: **3D model**, **time**, **dose**, **feasibility studies**, **waste** and **costs**

→ Software **integration** and **interoperability**

Data/info
acquisition and
management

Characterization
and Job planning

Decisions, Costing,
Waste management

Demonstration
and Training

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)**: IFC¹ 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)**: ISDC² compatible client-server based costing tool
9. **iDROP (CEA)**: VR dismantling simulation with collision & radiological modelling
10. **WASTREAM : (Tractebel)**: Low Level Waste Activity Assessment tool
11. **ALVAR (VTT)**: AR³ training platform with advanced tracking capabilities
12. **INTERACT (LS)**: XR⁴ platform with physics engine

PLEIADES Objectives

- ✓ Develop an innovative platform based on a BIM approach
- ✓ Implement on real cases

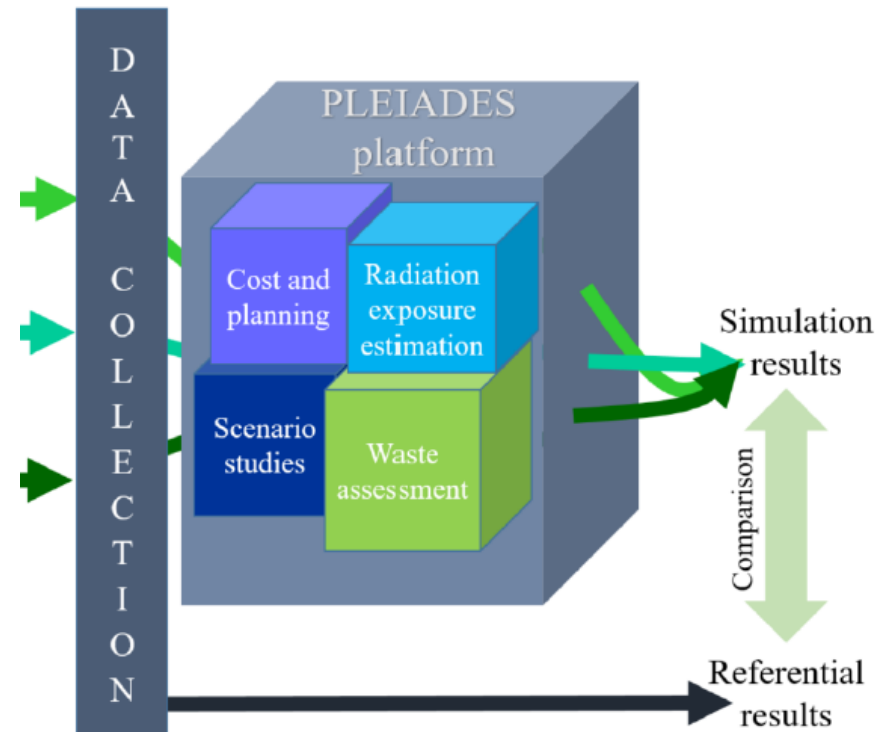
Santa María de
Garona (SMG)



Halden Research
Reactor (HRR)



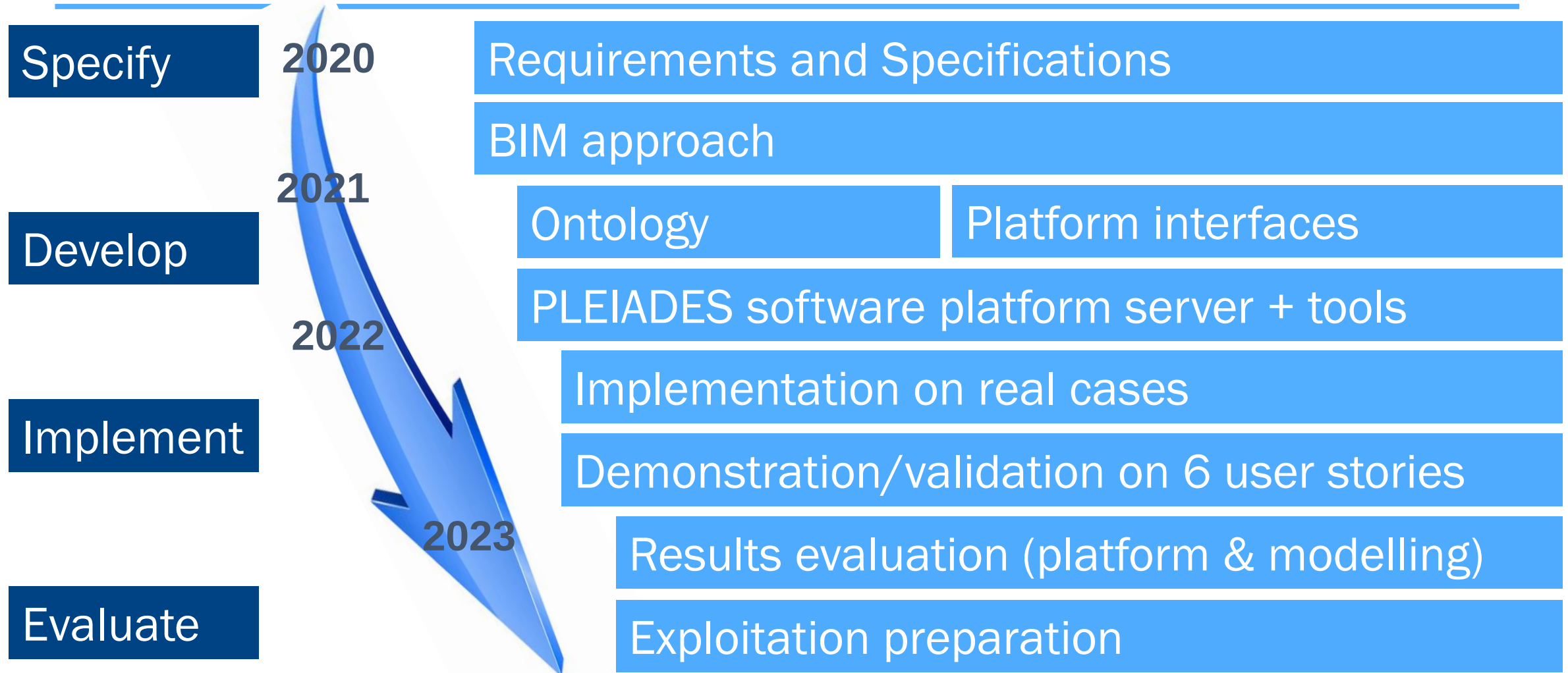
Base Chaude O.
du Tricastin (BCOT)



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



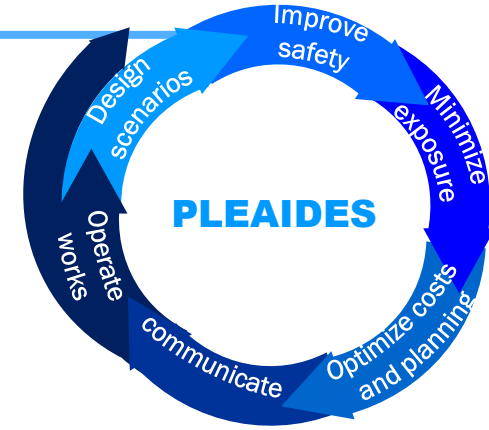
➤ End of project : November 2023



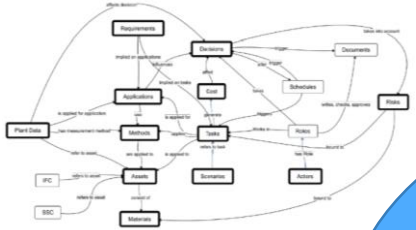
PLEIADES Outcomes overview

PLEIADES BIM-based concept

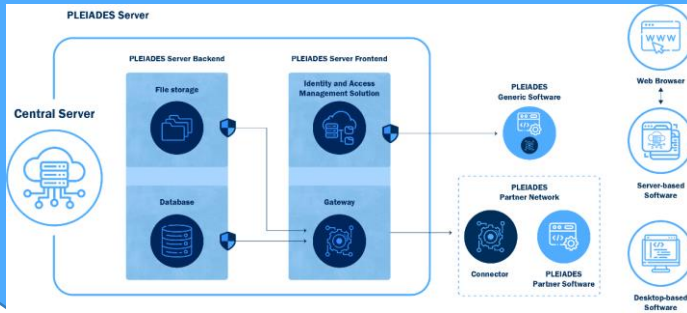
BIM (*Building Information Modelling*) approach to **design scenario**, **improve safety**, **minimize radiation exposure**, **optimize costs and planning**, **communicate**



Data collection based on decommissioning ontology



Platform + tools



Scenario simulation

SMG



HRR



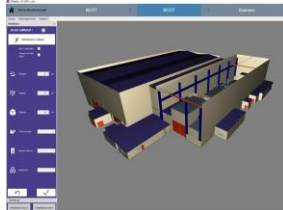
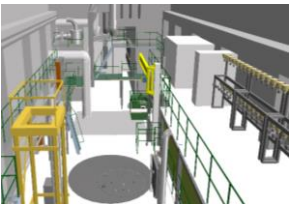
BCOT



Estimations/Comparison/Decisions

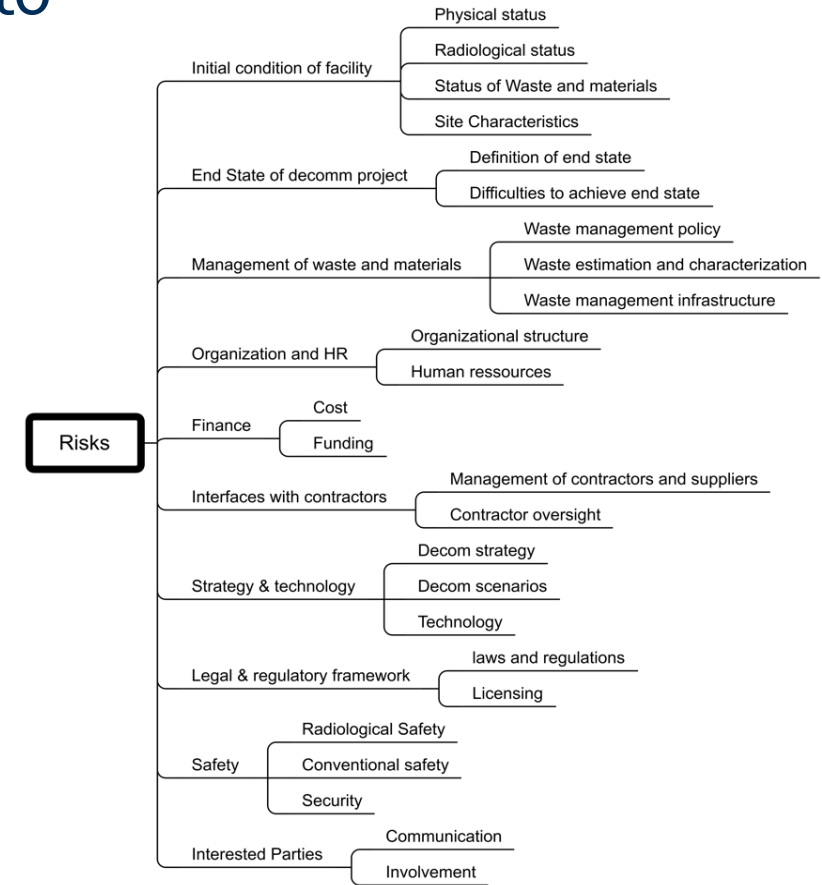
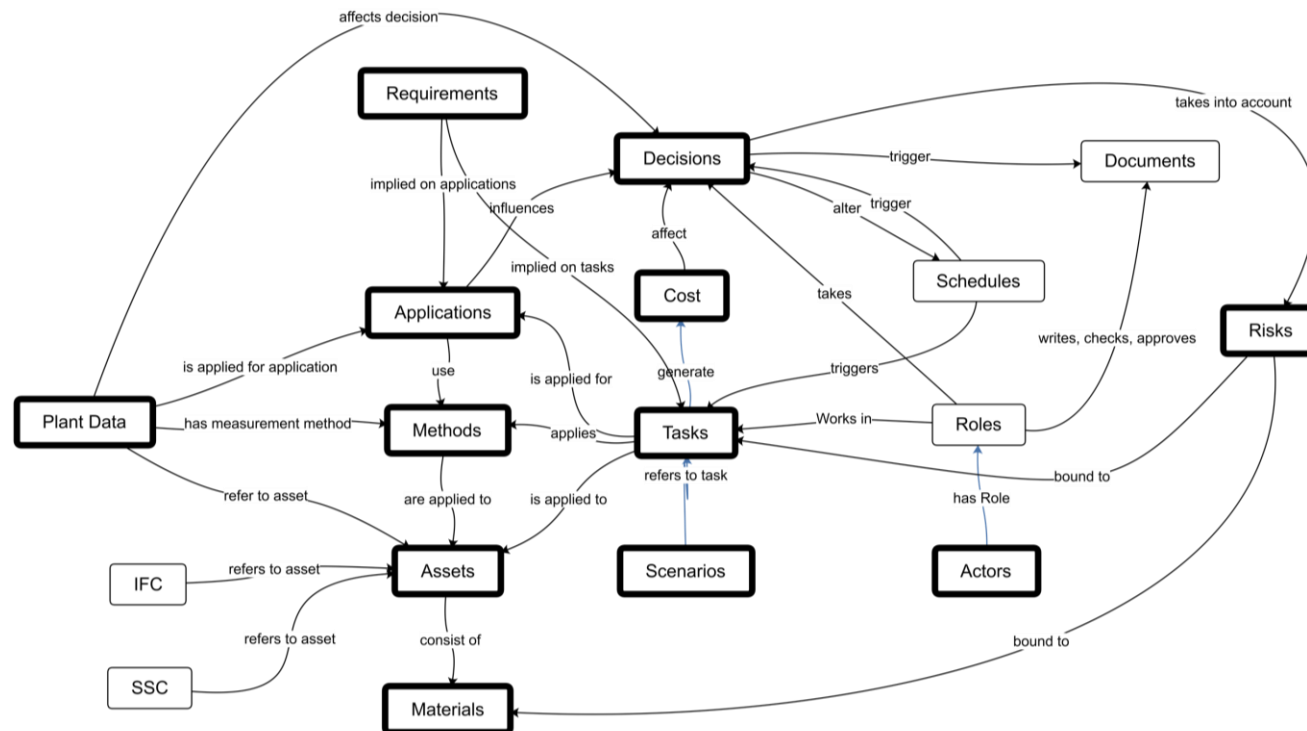
- Waste management
- Dose exposure
- Cost
- Planning
- ...

3D models

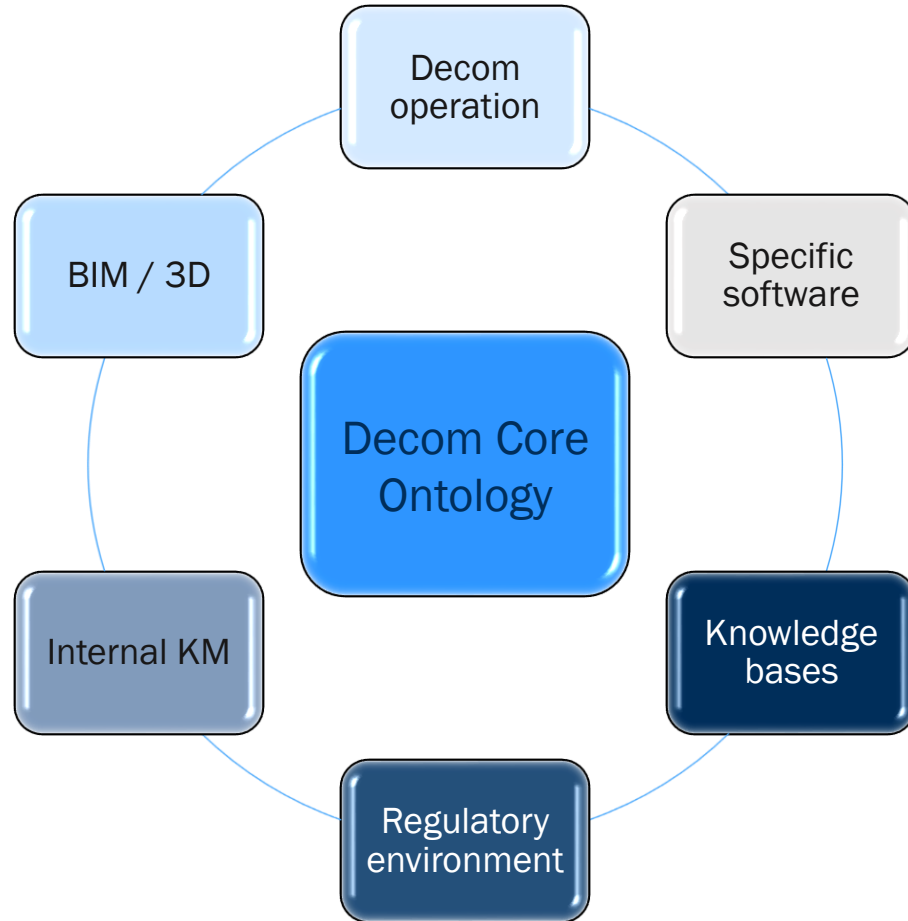


Ontology

- Achieve: common understanding + data compatibility
- Reuse ontology/taxonomy concept; extended to decommissioning process data



Ontology

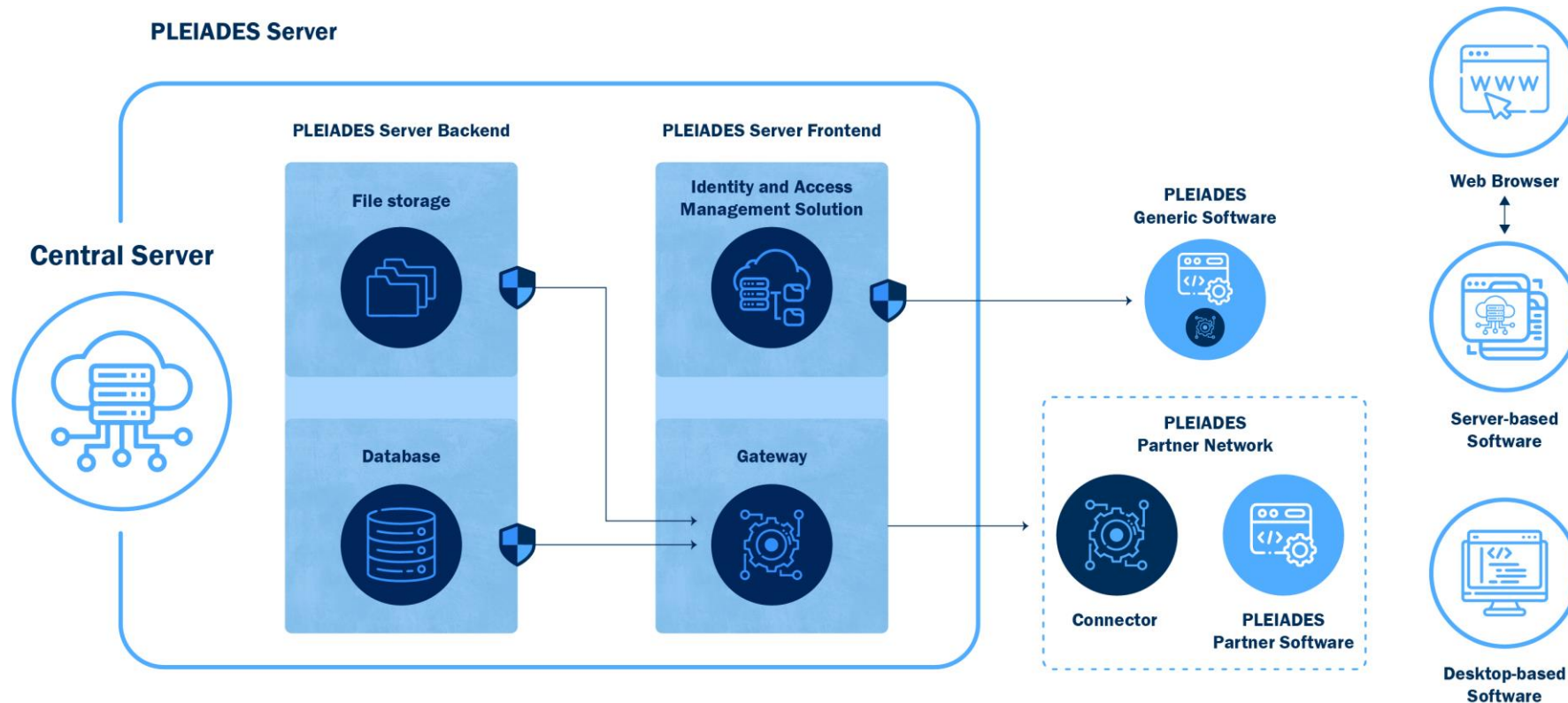


Results:

- Common understanding + data compatibility
- Easier to connect different applications and knowledge base
- Enabling to reuse the vast decommissioning knowledge
- Basis for PLEIADES platform interfaces

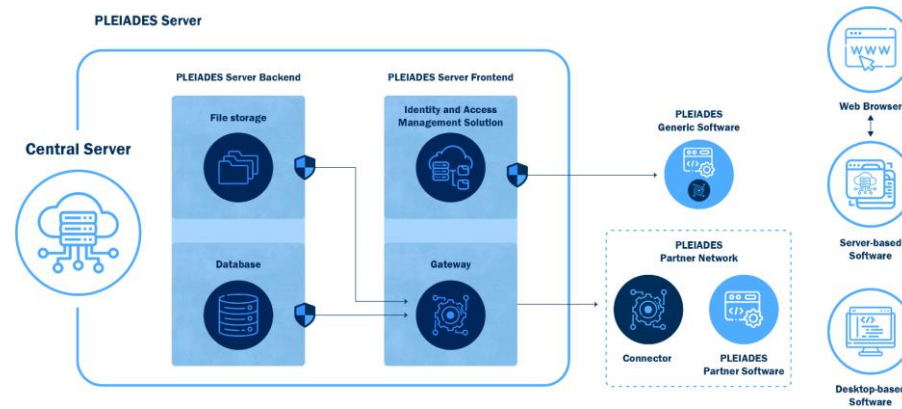
PLEIADES Platform

- PLEIADES innovative platform has been specified, developed and tested
- Platform is operational



PLEIADES Platform

→ Platform is **flexible** : SW connection and benefit from common data

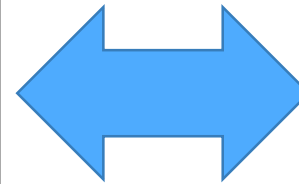


PLEIADES DB browser
Version 0.1beta

[Add new record](#)

All records
Show 10 entries

_id	Class	Content	RecordInfo	
6229e16c181997e78131790f	ActorsTeams	{ "headlines": "super team", "members": [{ "memberType": "Actors.Persons", "memberID": "jake" , }, { "memberType": "Actors.Persons", "memberID": "fame" , }], "effectivenessOptions": 99, "workExposure": 80 }	{ "client": "aquilacosting", "validator": "2022-09-09T11:31:31.790Z" }	Edit Delete



 **WASTREAM**

 **AquilaCosting**
Decommissioning & Waste Management Costing Software



 **INTERACT**

 **DEMplus**
FOR NUCLEAR
Démantèlement Exploitation Maintenance

 **ALVAR**

 **VRdose®**



Digital models



Halden Research Reactor (HRR)

IFE Institute for Energy Technology



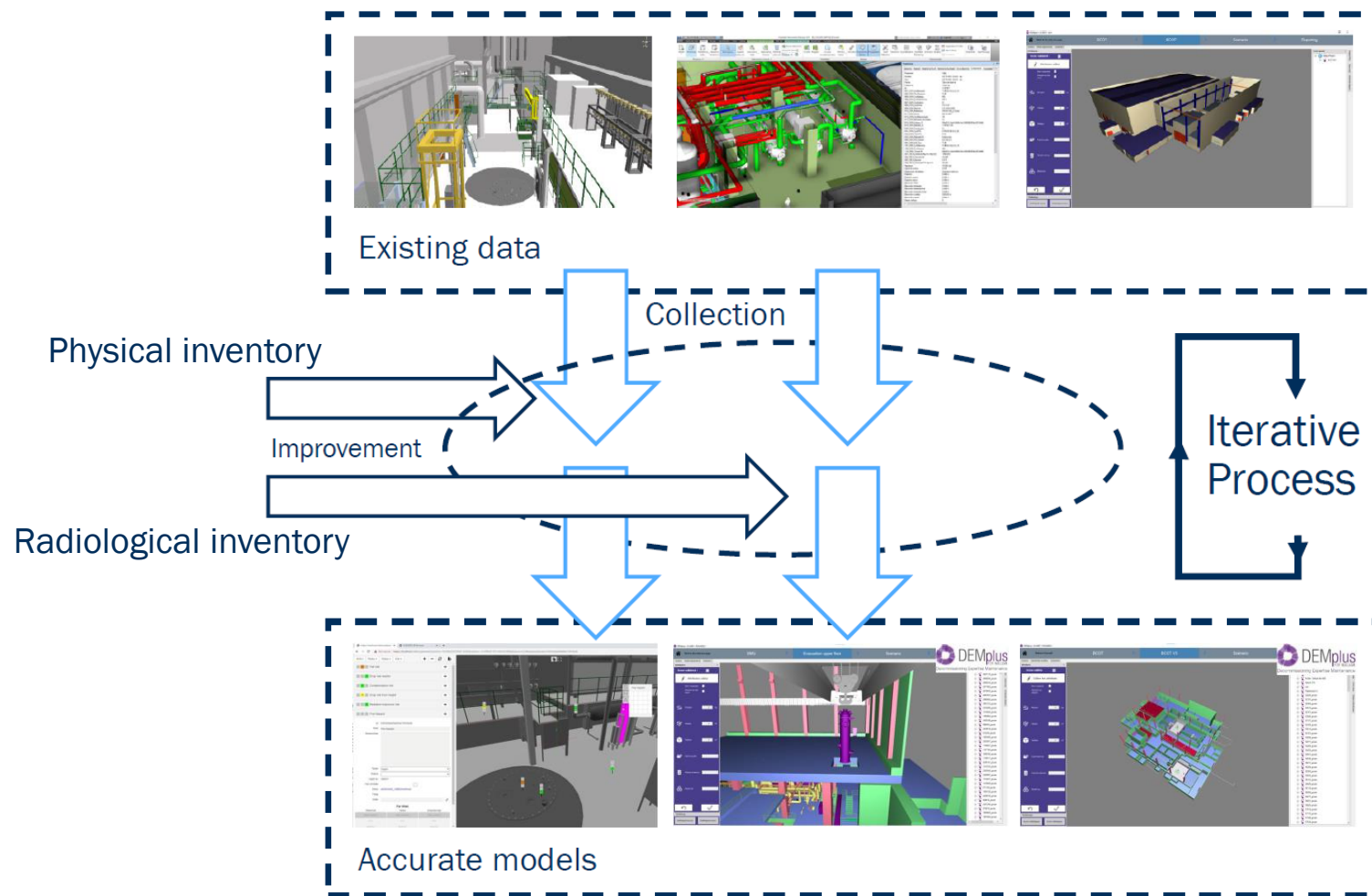
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EDF



PLEIADES Demonstration on use cases

Halden Research Reactor (HRR)

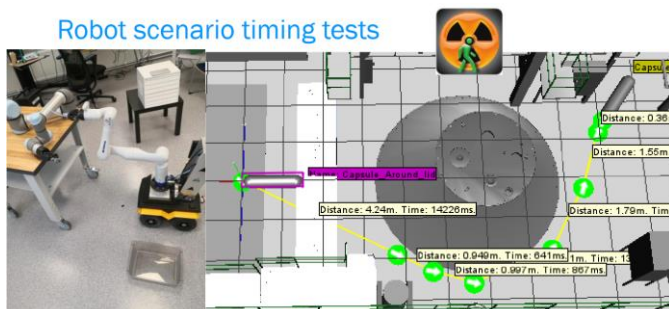
IFE Institute for Energy Technology



US#1:

Manual vs. remote radiological characterization

Robot scenario timing tests



HVRC VRdose® Results

Scenario	Dose rate (mSv/h)
Manual scenario	0.027
Remote / robot scenario	0.027
Manual scenario	0.018
Remote / robot scenario	0.018
Manual scenario	0.023
Remote / robot scenario	0.023
Manual scenario	0.023
Remote / robot scenario	0.023

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US#2:

3D supported vs. digitally enhanced dismantling

SMG 3D model visualization on DEMplus®



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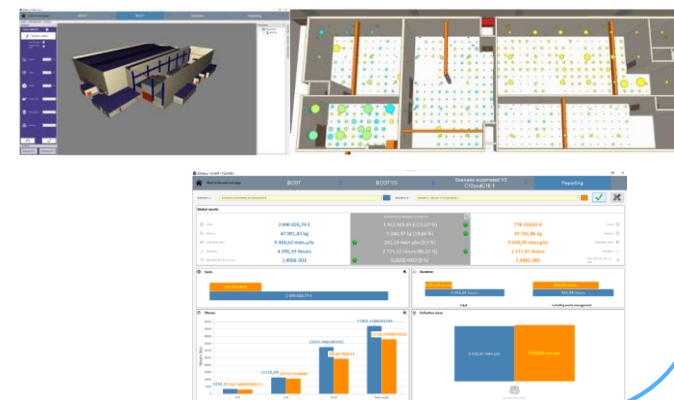
EDF



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

Steps forward

- Working Group of IAEA, OECD-NEA and EU-JRC: working on ontology for managing the knowledge on decommissioning
Future standardization
- Continue in the development of the ontology and the API:
 - Extend the coverage of the supported decommissioning planning activities
 - Integration of other digitalization technologies like artificial intelligence, robotics or integration with sensor networks.
- Promoting the PLEIADES concept



PLEIADES open workshop today 4pm Special Session



Thank you for your attention



Contact:



contact@pleiades-platform.eu



<http://pleiades-platform.eu>



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