PD Dr. Ernst Niederleithinger

Leader WP7 of EU-project PREDIS

Head of division 8.2
„NDT methods for civil engineering“

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 945098.

PREDIS BAM

Towards digital tools for waste package and facility monitoring and prediction

DIGIDECOM2021

MAR 24TH 2021

ERNST NIEDERLEITHINGER & PREDIS WP7

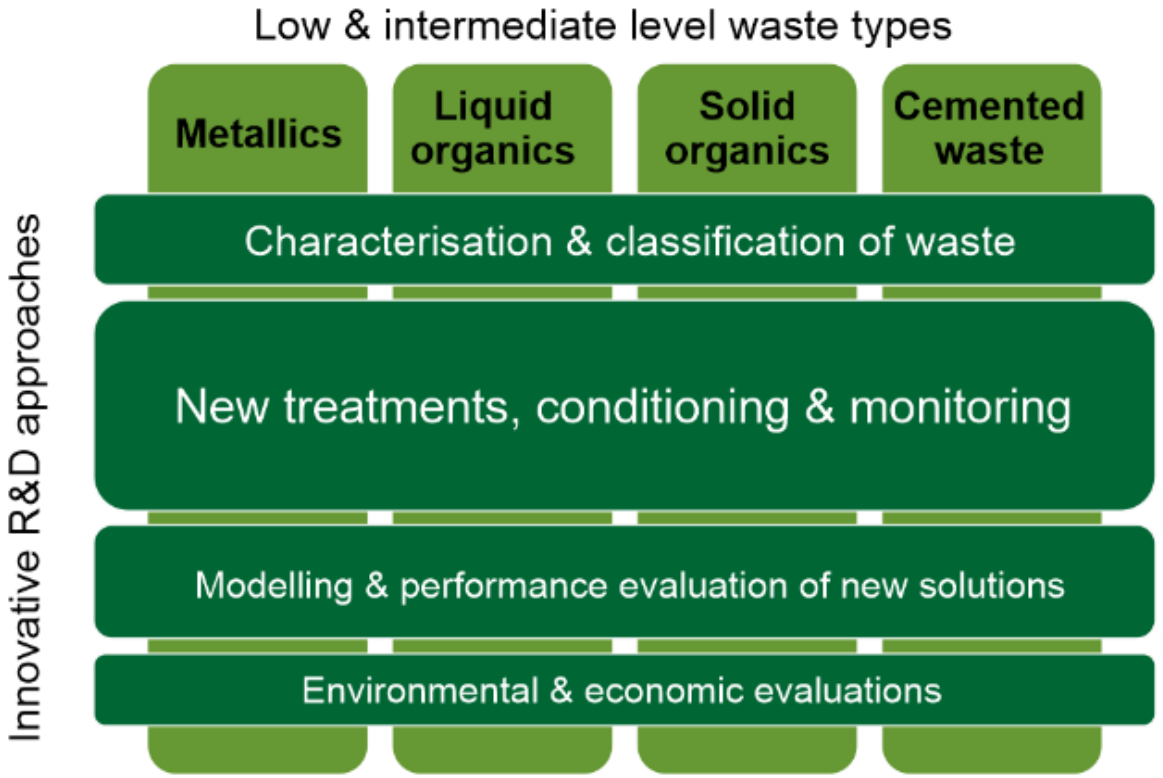
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 945098.

Context: PREDIS WP7 (cemented waste)

EU-project PREDIS:
Pre-disposal management
of radioactive waste

Introduction:
Talk of Erika Holt
(Tue 23rd 13:00)

https://predis-h2020.eu



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WP7 Objectives

- Compile information about the **state of the art** of current methods and procedures for cemented waste management with specific focus on monitoring/long-term storage
- Identify, evaluate and demonstrate store and package **quality assurance (mainly NDE) and monitoring** technologies
- Adapt and demonstrate **digital twin** technology
- Develop and demonstrate methods for **data handling incl. decision framework**
- Identify opportunities for increased **store automation**, reducing human exposure to radiation
- Identify options for **post treatment** of packages and potential approaches to **improve package** design, construction and maintenance.

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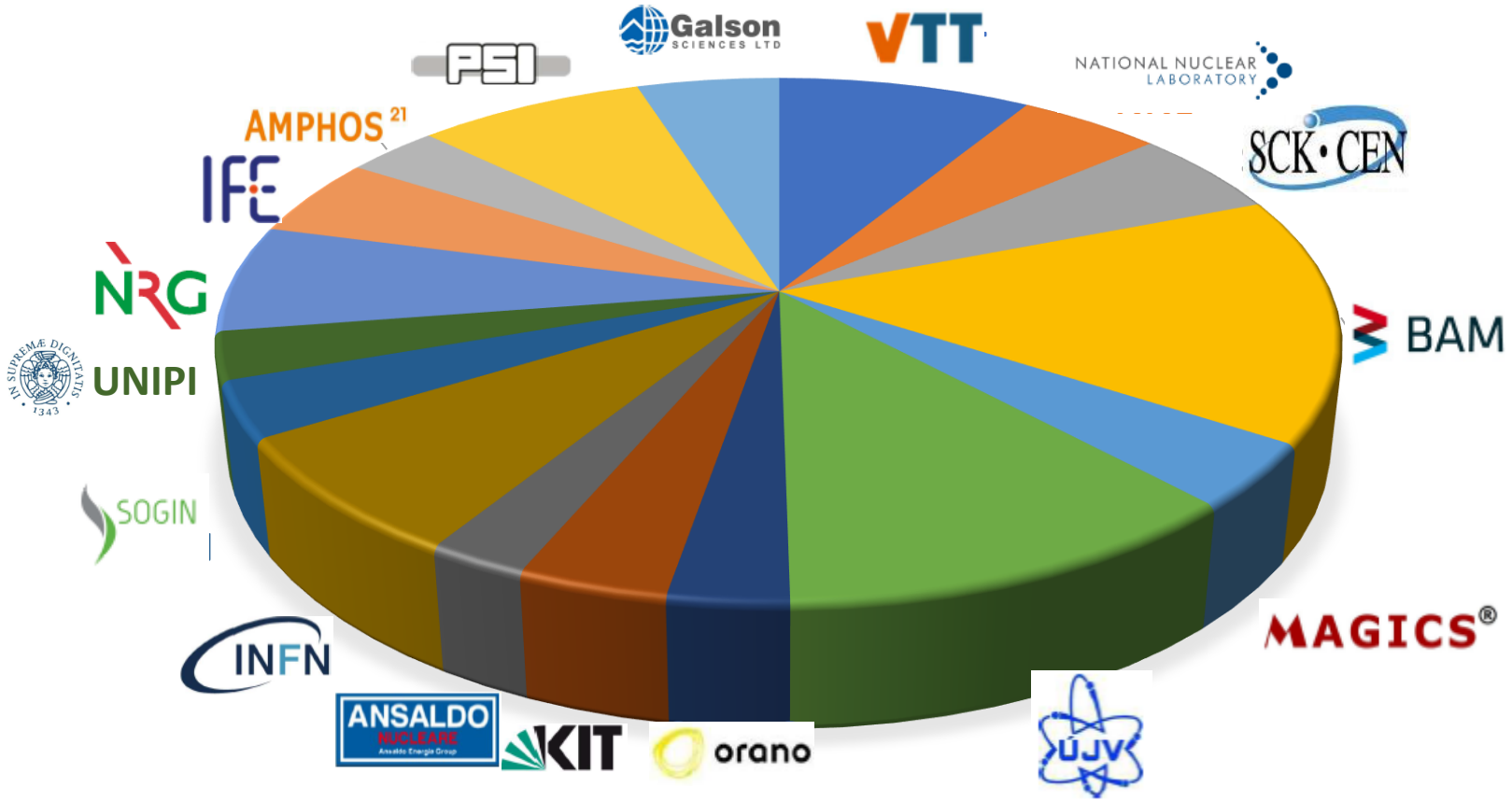
WP7 participants

Total WP budget: 4.8 M€ (EC contribution 50%)



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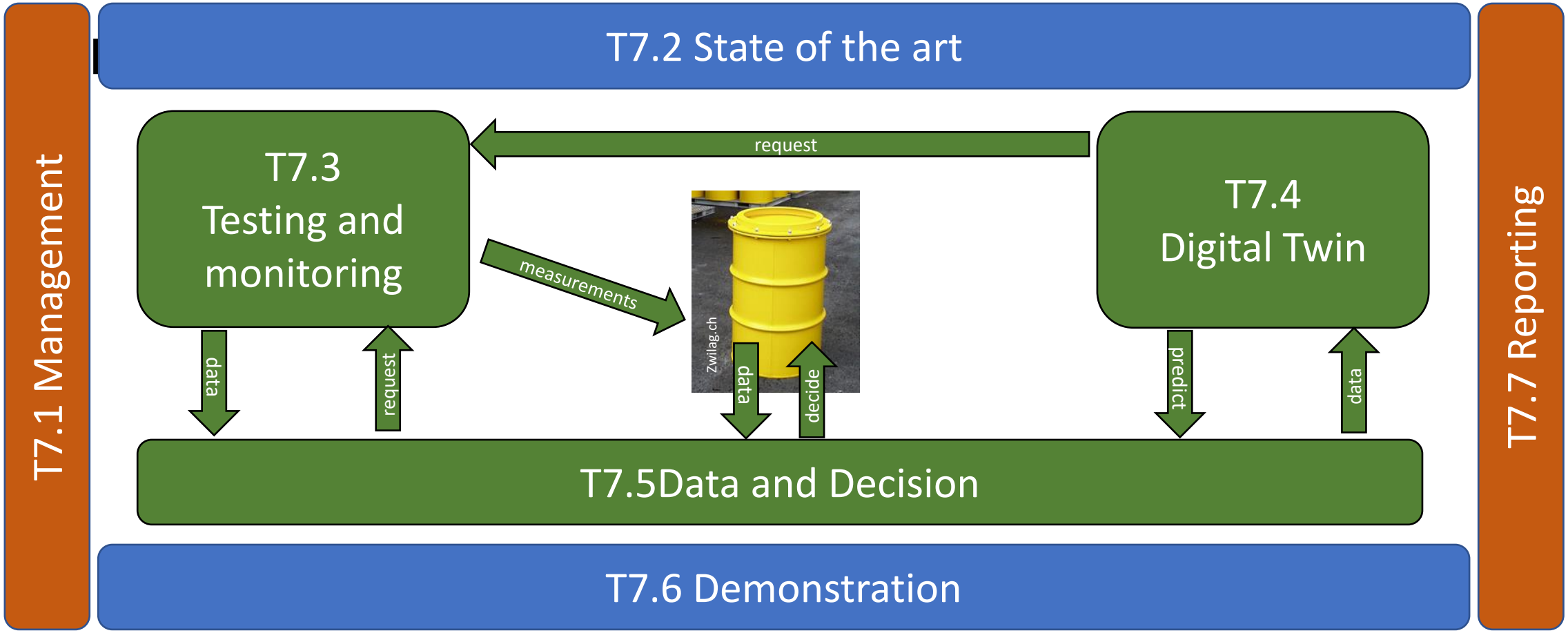
WP7 structure and tasks



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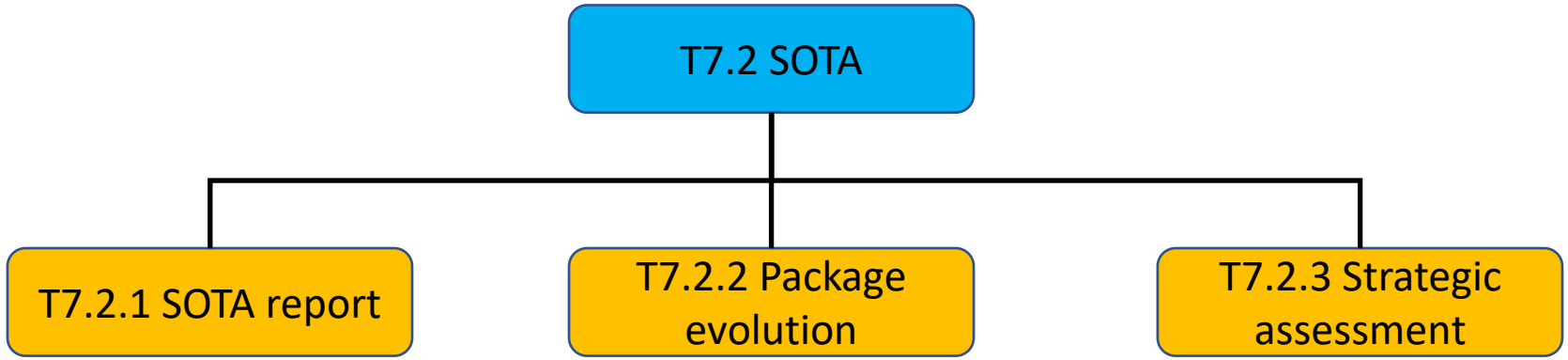
Task 7.2 State of the art

Task leader: Slimane Doudou, GSL



1st deliverable submitted: State of the art report, available via PREDIS website:

https://predis-h2020.eu/wp-content/uploads/2021/03/PREDIS_D7.1_WP7-SOTA_V1-Final_2021_02.pdf

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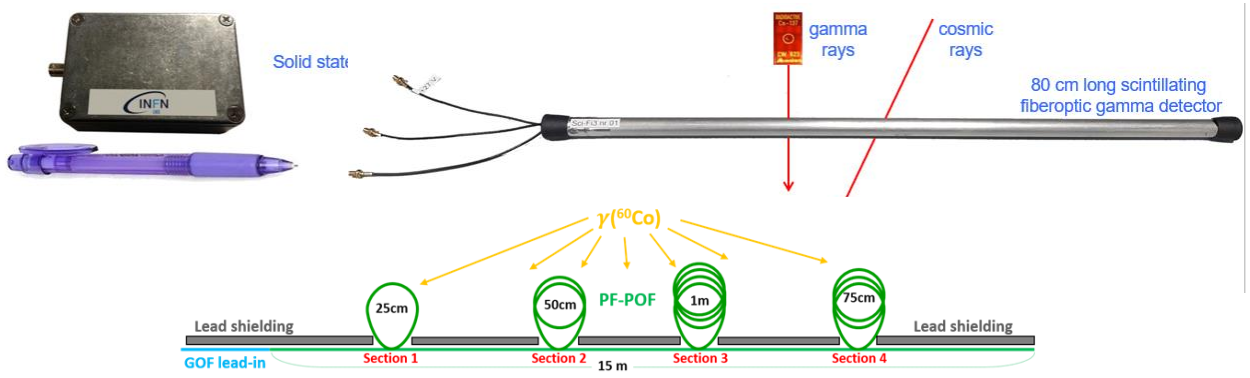
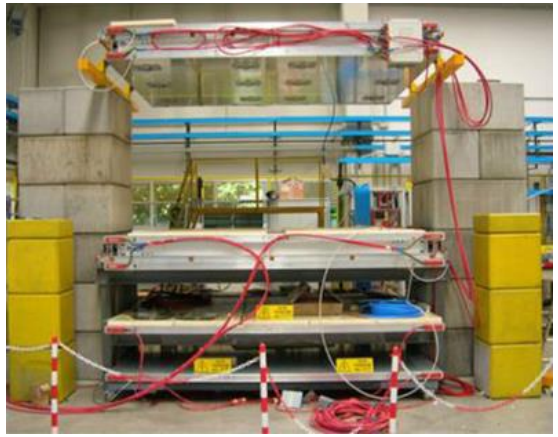
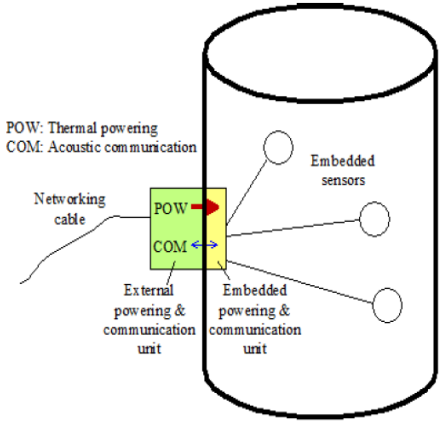
Task 7.3 Testing and Monitoring

Task leader:
Ernst Niederleithinger
BAM

- Subtask T7.3.1 External sensing technologies
- Subtask T7.3.2 Embedded sensing technologies in an instrumented package
- Subtask T7.3.3 Preliminary system testing and optimisation







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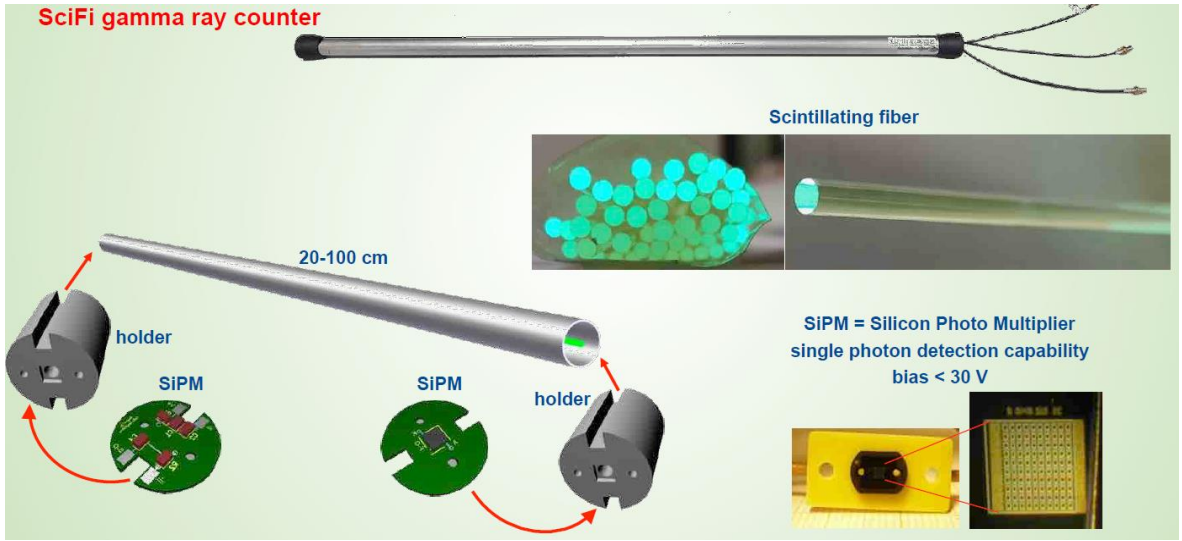
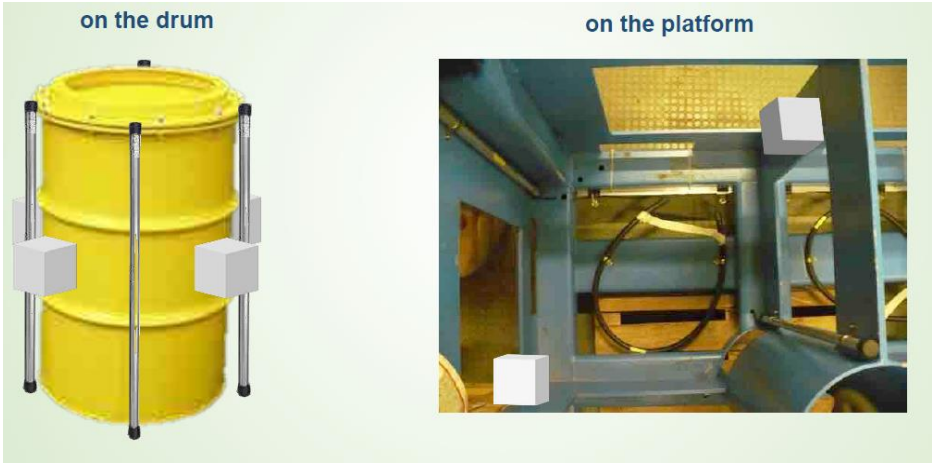
Task 7.3 Testing and Monitoring

Task leader:
Ernst Niederleithinger
BAM

Example

INFN: “Affordable” gamma and neutron detectors





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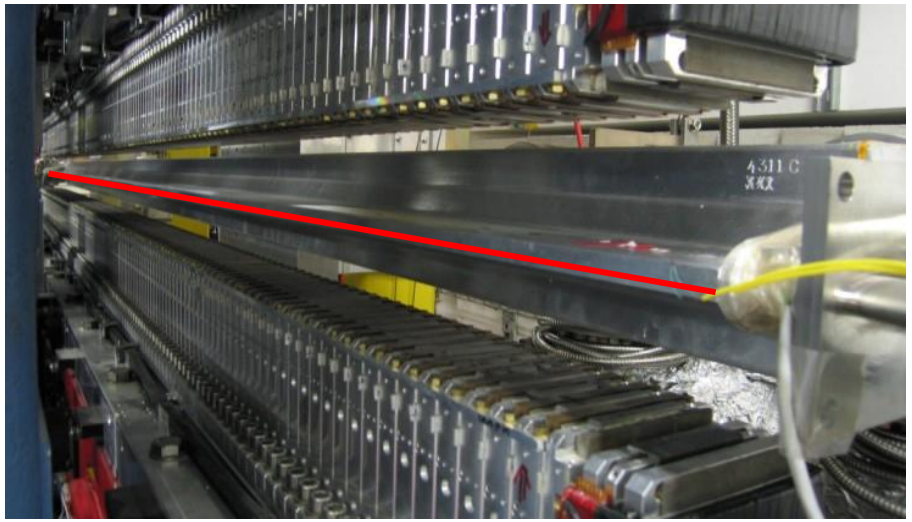
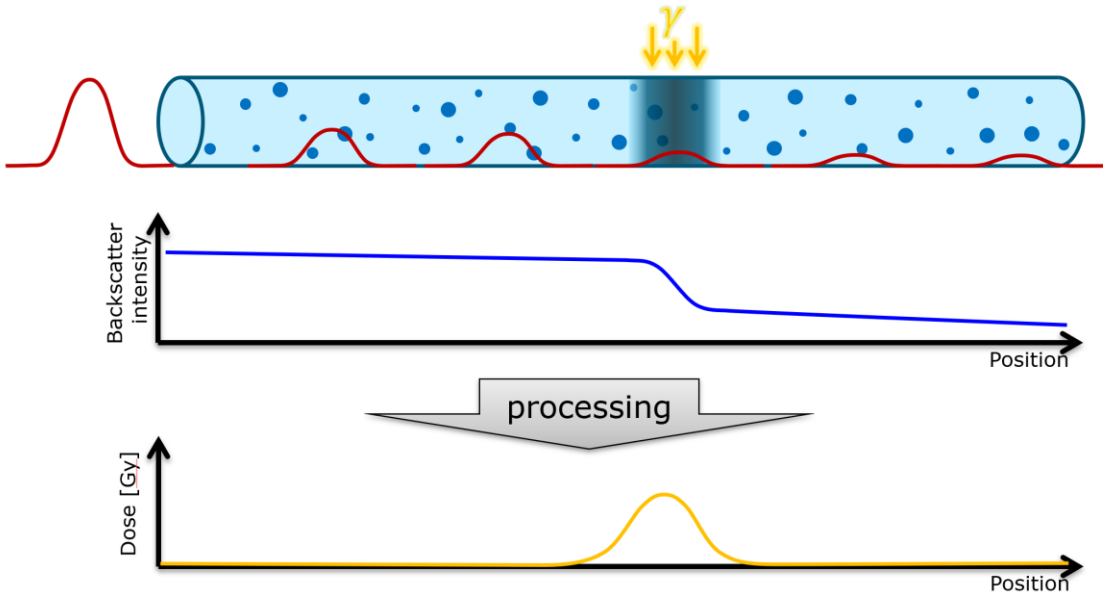
Task 7.3 Testing and Monitoring

Task leader:
Ernst Niederleithinger
BAM

Example

BAM: Fiber optic radiation sensors
Distributed measurement of fiber attenuation profile





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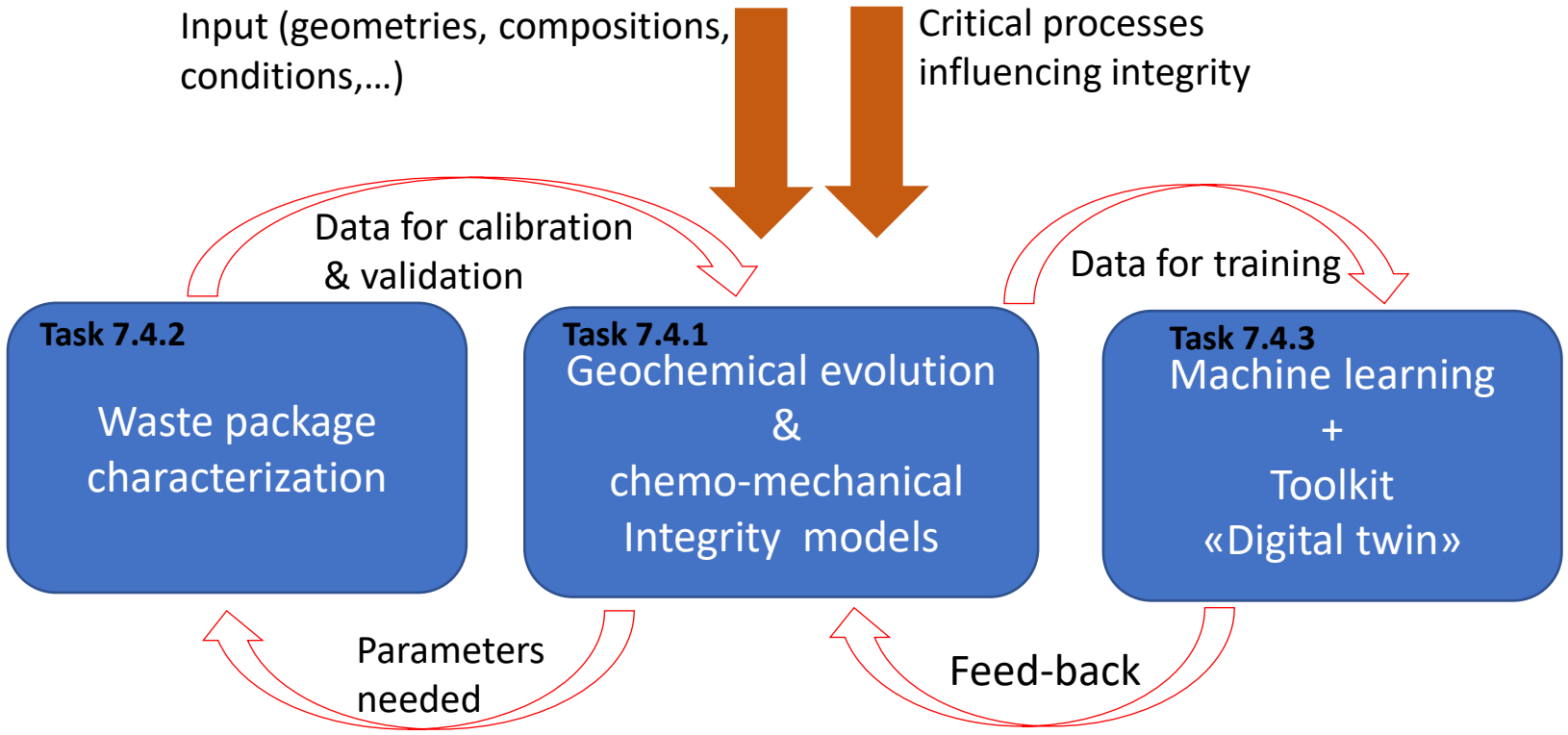
Task leader:
Jan Tits, Wilfried Pfingsten

PAUL SCHERRER INSTITUT

Task 7.4 Digital Twin



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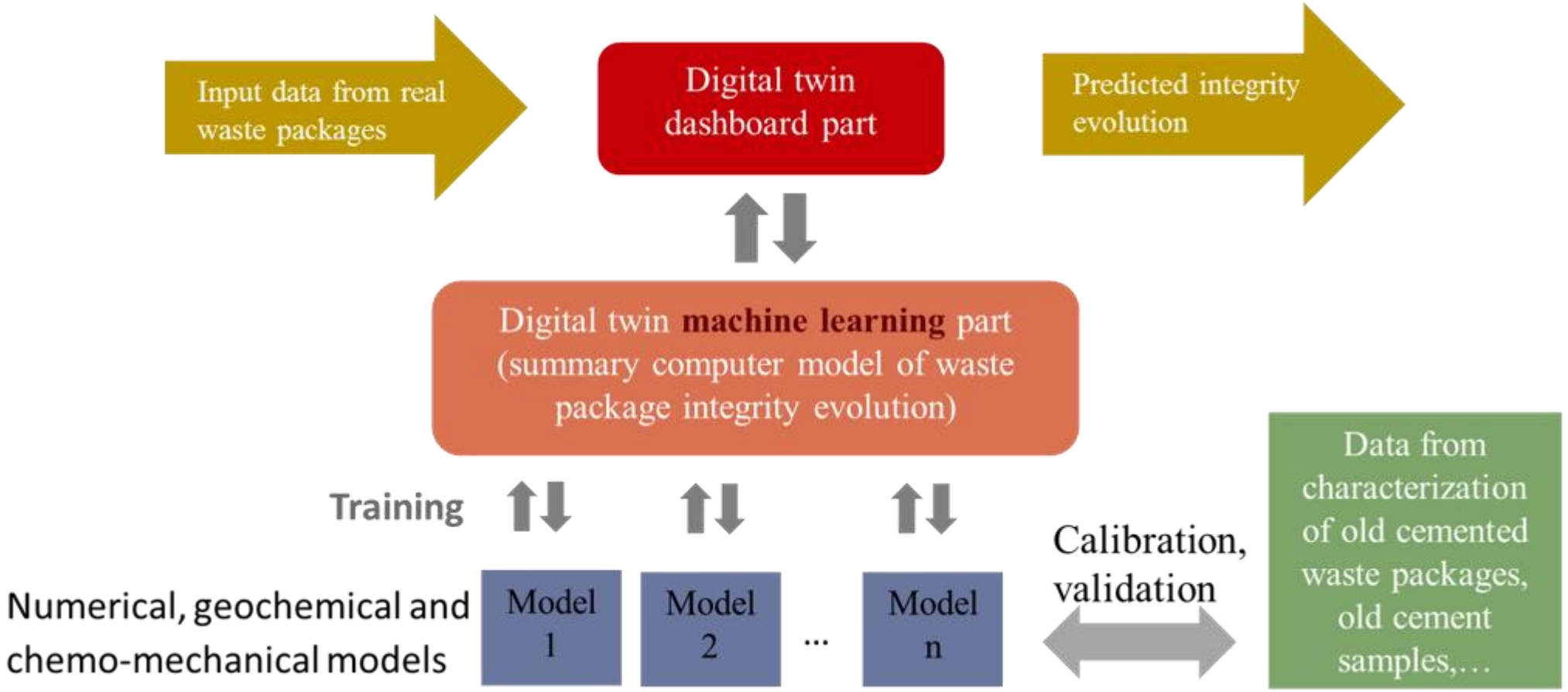
Task leader:
Jan Tits, Wilfried Pfingsten

PAUL SCHERRER INSTITUT PSI

Task 7.4 Digital Twin



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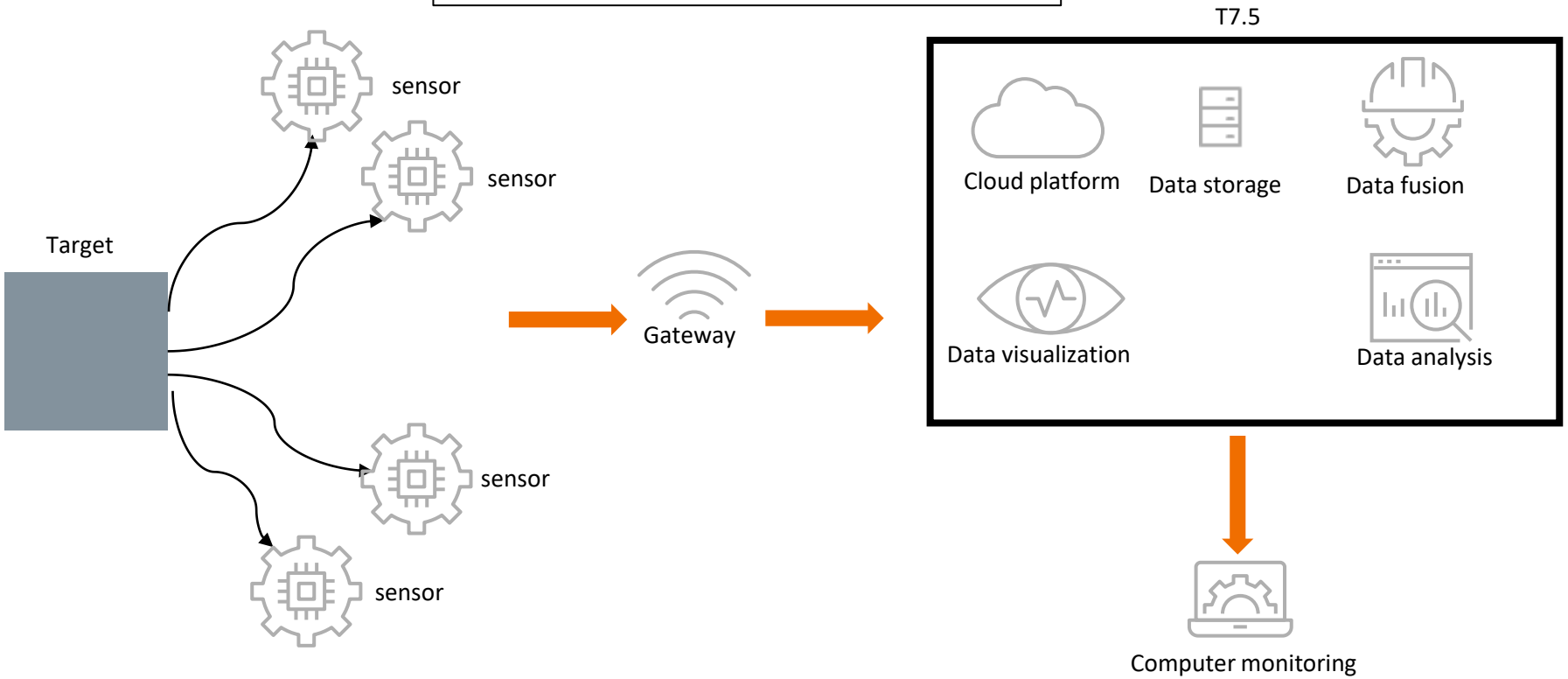
Task 7.5 Data processing handling and fusion

Task leader:
Tuomas Koskinen (VTT)

T7.5.1 Data handling, processing and fusion platform
T7.5.2 ML and advanced signal processing
T7.5.3 Decision framework



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Task 7.6 Demonstration and implementation

Task leader
Sabah Ben Lagha
(ORANO)

- **Subtask T7.6.1 Evaluation of technologies and developed systems from an end-user perspective**
  - Develop a waste package prototype for performing large-scale trials,
  - choose and evaluate the most relevant and promising NDE/sensing techniques
- **Subtask T7.6.2 Demonstrating systems and methods**
  - Implement the experimental set-up defined in Subtask 6.1,
  - Select the technologies to be validated,
  - perform a series of full-scale trials in a realistic testing environment
- **Subtask T7.6.3 Definition of potential mitigation actions and design improvements**
  - Proposal of improved designs that eliminate any weak points identified during the course of the project and conceptual design for the use of the project results in automatized store concepts

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Work Package 7 Impacts

- **More versatile and reliable condition monitoring technologies**, which have been demonstrated on operating radioactive facilities and made available to end users
- **Improved accuracy in predicting the behaviour of waste/packages** in stores through the integration of models with store and package monitoring information obtained using digital and machine learning technologies to enhance sampling, monitoring strategies and multi-method data fusion
- **Increased safety**: reduction of exposure time to personnel connected to remediation activities, reduction of risk of RN dispersion (locally or to the environment), gaining local stakeholder trust
- **Reduced cost** (20% or greater reduction in costs related to late-stage detection of damage or deterioration within waste packages)
- **Minimised environmental footprint** resulting from optimised treatment, packaging and store operations.

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Work Package 7 Deliverables

All 10 deliverables in WP7 are of the type „public“ and will be made available to anybody interested in the project and its results.

Reports and publications can be downloaded from the PREDIS project website. Topics covered will be:

- innovative integrity testing and monitoring techniques and its demonstration
- digital twin and modelling technologies
- innovative data handling and decision framework technologies
- report on the economic, environmental, and safety impact

The State of the Art report is already available, other reports/articles will be published in 2023 & 2024

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Thank you very much for your attention!

- **Contact WP7 / PREDIS:**

WP7 Leader: PD Dr. Ernst Niederleithinger

BAM Bundesanstalt für Materialforschung

ernst.niederleithinger@bam.de

- **Information & support:**

PREDIS General information & participation

(https://predis-h2020.eu/)

PREDIS WP7 Webinar

(https://predis-h2020.eu/wp-content/uploads/2021/02/Summary-of-Predis-WP7-Webinar_19-1-2021.pdf)

Questionaire about NDE application

(https://link.webropolsurveys.com/Participation/Public/52c047de-f591-4ebc-a05d-1abd4adb6c2d?displayId=Fin2158132)

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