



# PIANOFORTE Partnership

## European Partnership for Radiation Protection Research

Horizon-Euratom – 101061037

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### WP9 Call 1 PREDICT- D6.1

## Establishing of the management structure and data management plan of the PREDICT project

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**Lead Author: Clemens Woda**

**With contributions from:** Management Group members

**Reviewer(s):**

Liz Ainsbury (UKHSA, WP5 Lead)

PIANOFORTE Coordination Team (IRSN, WP1&WP9 lead)

Work package / Task	WP 9	T 9.1
Deliverable nature:	<b>Report</b>	
Dissemination level: (Confidentiality)	<b>Public</b>	
Contractual delivery date:	<b>Month 3 (Pianoforte M23)   30 April 2024</b>	
Actual delivery date:	<b>Month 4 (Pianoforte M24)   02 May 2024</b>	
Version:	<b>1.0</b>	
Total number of pages:	<b>10</b>	
Keywords:	<b>Management structure, data management plan</b>	
Approved by the coordinator:	<b>PIANOFORTE Month 27</b>	
Available on PF Website:	<b>August 2024</b>	

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### Abstract

This report has a two-fold objective. First, to describe the management structure to operate the PREDICT project over its three-year duration. Second to describe the PREDICT Data Management Plan (DMP). The DMP addresses the key issues of the data structure, standardised strategies for data collection and archiving, and secure platforms for data sharing according to the FAIR (Findable, Accessible, Interoperable and Re-Usable) principles in the radiation research community.

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## Table of Contents

1. Introduction.....	5
2. Management Board.....	5
3. Data Management Plan (DMP) .....	6
3.1 Basic information about the project .....	6
3.2 Purpose of data collection/generation .....	6
3.3 Relation to the objectives of the project.....	6
3.4 Types and formats of data generated/collected.....	7
3.5 Re-use of existing data .....	7
3.6 Origin of the data .....	7
3.7 Expected size of data.....	8
3.8 Data utility .....	8
3.9 FAIR Data .....	8
3.9.1 Making data findable, including provisions for metadata .....	8
3.9.2 Making data openly accessible.....	8
3.9.3 Making data interoperable.....	9
3.9.4 Making data reusable .....	9
3.10 Allocation of resources.....	10
3.11 Data security.....	10
3.12 Ethical and legal issues .....	10
3.13 Others .....	10

## 1. Introduction

The HORIZON-EURATOM PREDICT project aims to enable the major internationally used decision support systems JRODOS and ARGOS and other nationally used atmospheric dispersion and transport codes and follow-on foodchain models to simulate and predict consequences due to the fallout of a nuclear detonation in Europe or worldwide. A key aspect will be the description of the blast cloud which is complex due to its height, the large number of radionuclides (most short-lived) and variety of particle sizes produced. Using a range of source terms and weather conditions, results from different Partner assessment models will be compared and the uncertainties better understood. Recommendations will be made to improve dose modelling and computing run times. Existing advice on responding to nuclear power plant accidents will be adapted, and public protection strategies will be reviewed and improved ways of communicating these to the public will be developed. A key outcome will be harmonising the technical means of decision-making following a nuclear detonation event at the European level as well as considering social, ethical and communication aspects. There will be pro-active engagement with decision-makers and other stakeholders to ensure that the information arising from the assessment models provides a holistic understanding of the event consequences enabling them to better understand the risks and thereby improving the protection of the public from harm.

To operate PREDICT, a management structure was established in the first three months of the project as described in the following section. PREDICT is expected to generate a number of new findings, scientific results and corresponding data that will be openly accessible to all interested organisations. The development of a data management plan, that constitutes the core of the approaches related to quality assurance, data management, publications and risk management procedures and that follows the FAIR principles outlined in the PIANOFORTE Data management plan ([D 5.2](#)) is an integral part of the PREDICT project and described in detail in section 3.

## 2. Management Board

The Management Board (MB) supports the coordinator in running PREDICT. The MB is the ultimate decision-making body of the project. It oversees the deliverables of the individual work packages, their timely submission and monitors the overall progress made in the six work packages. Regular meetings of the MB are scheduled at three-month intervals at the beginning of the project, with possible adaptation as the project progresses. The MB consists of the leaders of the six work packages of the project.

Management Board	Person	Institution
Project Co-ordinator (WP6)	Clemens Woda	BfS
WP1	Kasper Anderson	DTU
WP2	Peter Bedford & Kelly Jones	UKHSA

WP3	Wolfgang Raskob	KIT
WP4	Christiane Pözl-Viol Yevgeniya Tomkiv	BfS NMBU
WP5	Lindis Skipperud	NMBU

### 3. Data Management Plan (DMP)

#### 3.1 Basic information about the project

The mission statement of the PREDICT project is to improve operational capabilities of the atmospheric dispersion and dose models used in European decision support systems, so that European Member States can make sound decisions on the protection of the population from the radiological effects of nuclear detonations. To achieve this goal, the project is structured into six work packages, dealing with characterization of airborne radiocontaminants (WP1), modelling improvement (WP2), model comparison (WP3), protective action strategies (WP4), education, training, dissemination (WP5) and project management (WP6).

#### 3.2 Purpose of data collection/generation

Within WPs 1 to 5 of PREDICT, data will be collected and generated for the following purposes:

- To improve the parametrisation of existing models
- To define relevant scenarios that will be used throughout the different work packages
- To provide guidance for long-term model development
- To validate the atmospheric dispersion and transport codes used in the project
- To assess the uncertainty in the model predictions when using the same input data sets
- To develop harmonised protective action strategies and effective ways of communicating protective measures to the public
- To develop materials for training courses and exercises

#### 3.3 Relation to the objectives of the project

One of the main objectives of the project is to enable the major internationally used decision support systems JRODOS and ARGOS and other nationally used atmospheric dispersion and transport codes as well as follow-on foodchain models to simulate and predict consequences due to the fallout of a nuclear detonation in Europe or worldwide. Collection of historical weapon test data for model validation, literature research for source term development and parametrisation, identification of relevant numerical weather data and generation of model run data for uncertainty assessment are important and crucial steps to reach the project objectives, to name only a few.

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### 3.4 Types and formats of data generated/collected

The data produced and collected in PREDICT will be chiefly of numerical nature, e.g.:

- source terms (e.g. csv, xml)
- model input parameters (e.g. csv, xml)
- georeferenced air and ground concentration of selected radionuclides (e.g. shp, geojson, netCDF)
- gamma dose rates and doses at different distances and times (e.g. csv, shp, geojson, netCDF)
- cloud arrival times (e.g. shp, geojson, netCDF)
- numerical weather data (e.g. grib, netCDF)

These data will be made available in the formats of e.g. csv, tiff, netCDF, grib or geojson files. In addition, guidance documents, recommendations for protective actions and risk communications and materials for training courses and exercises will be made available as pdfs as project deliverables.

### 3.5 Re-use of existing data

Existing data on US historical weapon tests of the 1950s will be re-used for model validation. Most of these data are freely available. However, the U.S. Department of Energy - Comprehensive Epidemiologic Data Resource offers test site data in digitised format (e.g. the Town Data Base). These data are not classified and are based on open data to a large extent, registration for access is however necessary. Within the course of the PREDICT project it will be clarified to what extent data from the Town Data Base will be used for model validation and what implications this will have for making the weapon test data available through the STORE platform (see also subsection 3.9). This will be described in an update of the DMP. Development of the source term, particle characteristics, model input parameters in general and guidance for long-term model development will be based on published data from scientific publications in the open literature. Development of protective action and crisis communication strategies will make use of an extensive review and of a comparative analysis of existing advice and communication materials.

### 3.6 Origin of the data

PREDICT will generate new data from sources primarily described in subsection 3.5. These include: (but are not necessarily limited to):

- Published data from nuclear test sites
- Data on dose relevant radionuclides, particle density and size distributions and particle solubility from the open literature
- Data on disaster preparedness, plans and models, assessments of public perception of protective actions

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### 3.7 Expected size of data

It is envisaged that the size of the data resources generated will be in the medium range, in the order of several MBs to hundreds of GBs. The largest amount of data will be the numerical forecast data that will be used for the model intercomparison and model tests.

### 3.8 Data utility

The data will be useful to radiation safety regulators and the larger nuclear emergency preparedness community, in particular for institutions and organisations that want to validate and compare their own models. This will improve the radiological protection of members of the public and the environment in emergency exposure scenarios following a nuclear detonation and provide solutions and recommendations for optimised protection. The data will contribute to the aims of the MEENAS platforms (MELODI, ALLIANCE, EURADOS, SHARE, EURAMED, NERIS), International Organisations, such as the IAEA, OECD-NEA, ICRP, WHO and HERCA, as well as national Regulators and agencies.

### 3.9 FAIR Data

The PIANOFORTE DMP aims to establish a culture of effective data handling following "FAIR" principles so that data are findable, accessible, interoperable, and reusable to facilitate effective open science and sharing among researchers, stakeholders, and policymakers. PREDICT will follow these principles.

#### 3.9.1 Making data findable, including provisions for metadata

Data arising from PREDICT will be made available through the STORE(DB) platform. In STORE each dataset and data item is assigned a persistent STORE ID and a persistent digital object identifier (DOI) which can be used for reference. The ORCID identifier will be used to identify the individuals who submitted the data.

#### 3.9.2 Making data openly accessible

The knowledge on parametrisation properties, obtained within WP1 will be documented in the deliverable D.1.1 and is thus publicly available. Recommendations for future research developed within WP2 will be also published in an open accessible deliverable. Results from the model comparison and testing will be also published openly. Further, all the parameters and if applicable model improvements will be made available to all ARGOS and JRODOS users worldwide.

Recommendations for protective actions as well related to communication will be published in open accessible deliverables. Publications, that will focus more on the methodological aspects of the derived data in the deliverables, will be made open access either through 'Gold' or 'Green' routes (<https://beta.elsevier.com/open-access?trial=true>). As mentioned above data generated within



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PREDICT will be deposited in the STORE<sup>DB</sup> platform. Where possible the release of the data will be timed such that it coincides with publication of linked papers. Most data (if not all) will be licensed under the Creative Commons Attribution license (CC-BY).

In this respect, all new findings together with improved parametrisations will be open accessible to all interested organisations.

### 3.9.3 Making data interoperable

All data used and generated will use existing formats such as ASCII or generally available formats used for documentation of reports, such as MICROSOFT Word. The numerical weather data will be stored in the GRIB format that is used by all national and international weather services as well as users of decision support systems. The GRIB format encompasses the data structure and ontology classes defined by the World Meteorological Organization (WMO).

Ontologies and mapping of data will follow on the one hand side the specific needs of ARGOS and JRODOS but on the other hand a data base structure will be developed allowing to use the data in standard database formats that are open access. This will encompass all data generated within the project, such as measurement data, input data and result data. A more detailed description, after implementation, will be provided in an update of the DMP.

### 3.9.4 Making data reusable

Following the publication of the papers, all data generated by the project will be publicly reusable, in particular after the end of the project. Data on STORE will be kept live for 15 years.

The leader of the work packages will have the responsibility for data management within their WP and either act as data wrangler themselves or appoint someone within the WP working with the data for this position. The data wrangler(s) will overview the generated data, be responsible for publishing the data, data curation and upload to STORE with appropriate documentation. As written before, standard formats will be used that can be processed by open access software.

The overall responsibility for data quality and data management for the project as a whole rests with the coordinator with oversight from PIANOFORTE. Quality assurance is further supported by the fact that most of the partners of PREDICT work related to ISO9001 (or equivalent) standards or have adopted ISO17025 (or equivalent) for their work activities. Further to this, all partners of PREDICT follow internal quality management procedures that allow to trace their scientific research activities and will act according to the European Code of Conduct for Research Integrity.

### 3.10 Allocation of resources

PREDICT will use the STORE repository for publishing research data, at no cost for service or data storage. The costs for data curation, validation and deposition are included in the costs of the tasks. Individual investigators within the projects have personal responsibility for the curation of their shared data. Responsibilities for data management have been identified in the previous subsection.

### 3.11 Data security

Personal data of consortium members will be handled with the institutional rules of each of the organisations that are all certified for handling such data.

An institutional SharePoint two-factor authentication (2FA) will be used for storing data to be exchanged between PREDICT members. The 2FA represents highest security standards. As stated in the PIANOFORTE DMP, data stored in STORE are dynamically mirrored at other geographically distant locations and are frequently backed up. The infrastructure is subject to disaster preparedness provisions of the German Federal government in case of civil disaster or nuclear accident. Data is transferred using secure protocols.

As all data will be generated through open literature from scientific publications there should not be any obstacles related to data security. Military or protected data will not be used in PREDICT; therefore, no special protection rules will be allied in storing data locally.

### 3.12 Ethical and legal issues

For the same reason as for data security, the project will not produce any foreseeable ethical or legal issues for the work planned in the work packages 1 to 3, 5 and 6. The information on yield and source terms for nuclear weapons will be based on open literature, no classified, sensitive or confidential information will be used or generated within the project. For WP 4, it will be explored whether additional national funding can be secured to carry out complementary research. If successful, this would include testing of communication materials. Ethical approval will then be sought for any research that will involve personal data (e.g. focus groups, interviews) according to the requirements in the countries involved. This will be considered in the planned proposal and would then also be described in more detail in an update of the PREDICT DMP.

### 3.13 Others

The DMP needs to be updated over the course of the project whenever significant changes arise (e.g. change in data format, new details on data structure and expansion of existing ontologies, new

complementary tasks in WP4 that require ethical approval (see above), change in consortium composition) or if the PIANOFORTE DMP is revised. The minimum intervals for revisiting and updating of the PREDICT DMP are linked to the periodic evaluation/assessment of the project. This implies updates in 2025 and 2026, but more are possible, if needed.