



D7.2 DATA MANAGEMENT PLAN

September 2025

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Document information

Grant Agreement	n° 101164596
Project Title	Addressing Priorities of Evaluated Nuclear Data in Europe
Project Acronym	APRENDE
Project Coordinator	Daniel Cano, CIEMAT
Project Duration	01 OCTOBER 2024 – 30 SEPTEMBER 2028 (48 months)
Related Work Package	WP 7
Related Task(s)	T7.3 – Data management
Lead Organisation	CIEMAT
Contributing Partner(s)	LGI
Due Date	30 MARCH 2025
Submission Date	23 September 2025
Dissemination level	PU - Public

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Summary

This deliverable presents the first version of the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE Data Management Plan (DMP). It describes the guiding principle for data management and gives an overview of what data will be gathered and processed in the project, according to the EC [FAIR](#) Data Management principle making data findable, accessible, interoperable and reusable. The document follows the model, provided by the EC¹.

The purpose of the DMP is to contribute to good data handling through indicating what research and other satellite data the project expects to generate and describe which parts of the data that can be shared with the public. Furthermore, it gives instructions on naming conventions, metadata structure, storing of the research data and how to make public data available.

This deliverable will be regularly updated during the project life.

Keywords

APRENDE, Data Management Plan, open data, research data, data repository, data storage, Zenodo, FAIR data

Abbreviations and acronyms

Acronym	Description
DCC	Digital Curation Centre
DMP	Data Management Plan
DOI	Digital Object Identifier
FAIR	Findable, Accessible, Interoperable and Reusable
GA	Grant Agreement
IPR	Intellectual Property Rights
ISSN	International Standard Serial Number
NDA	Non-Disclosure Agreement
ORD	Open Research Data
PII	Publisher Item Identifier
SIEM	Security Information and Event Management
URL	Uniform Resource Locators
WP	Work Package

¹ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/temp-form/report/data-management-plan_he_en.docx <https://enspire.science/wp-content/uploads/2021/09/Horizon-Europe-Data-Management-Plan-Template.pdf> <https://enspire.science/wp-content/uploads/2021/09/Horizon-Europe-Data-Management-Plan-Template.pdf>

Term	Description
arXiv	arXiv is a free, open-access repository for scientific preprints, where researchers can share their work before it is peer-reviewed and formally published. Founded in 1991 and hosted by Cornell University, arXiv covers fields such as physics, mathematics, computer science, quantitative biology, finance, and more.
ENDF	ENDF libraries (Evaluated Nuclear Data Files) are standardized collections of evaluated nuclear data used in simulations and analyses for nuclear reactors, medical physics, radiation shielding, and more. Unlike raw experimental data, ENDF files contain carefully reviewed and modeled datasets that combine experimental results with theoretical calculations to provide the most accurate and complete representation of nuclear interactions.
EXFOR	EXFOR (EXchange FORmat) is an international database that stores experimental nuclear reaction data. Managed by the IAEA in collaboration with the Nuclear Reaction Data Centres (NRDC) network, EXFOR contains measured quantities such as cross sections, angular distributions, and energy spectra for various nuclear reactions involving neutrons, photons, and charged particles.
Gold Open Access	Gold Open access publishing means that an article is immediately provided in open access mode on the publisher or journal's website. Some publishers charge Article Processing Charges (APCs) to make articles open
Green Open Access	Self-archiving (green open access) means that a published article or the final peer-reviewed manuscript is archived (deposited) in an online repository before, alongside or after its publication. In some cases, the author can choose to delay access to the article (embargo period), however, HE rules require the publication be available in online repository at the same time as article's peer-reviewed publication. ²
JEFF	Joint Evaluated Fission and Fusion Nuclear Data Library is a comprehensive collection of evaluated nuclear data maintained by the OECD Nuclear Energy Agency (NEA), specifically by its Data Bank in collaboration with member countries. It supports nuclear applications in both fission and fusion energy systems, as well as research in basic nuclear science, medical physics, astrophysics, and radiation protection.
Personal Data	Personal data is any information that relates to an identified or identifiable living individual. Different pieces of information, which collected together can lead to the identification of a particular person, also constitute personal data. Personal data that has been de-identified, encrypted or pseudonymised but can be used to re-identify a person remains personal data and falls within the scope of the law. Personal data that has been rendered anonymous in such a

² Fact Sheet Open Access to scientific publications and research data: <https://www.horizon-europe.gov.fr/sites/default/files/2021-07/h2020---ipr-helpdesk---open-access-3953.pdf>

	<p>way that the individual is not or no longer identifiable is no longer considered personal data. For data to be truly anonymised, the anonymisation must be irreversible</p>
Zenodo	<p>Zenodo is a catch-all research data repository that enables researchers, scientists, EU projects and institutions to share research results, make research results citable, and search and reuse open research results from other projects. Zenodo is harvested by the OpenAIRE portal and hosted by the CERN cloud infrastructure</p>
DOI	<p>Digital Object Identifier: a unique identifier in a format of a alphanumeric string assigned to digital documents, such as journal articles, research papers, datasets, and reports, to provide a permanent link to their location on the internet. DOIs help ensure long-term access to digital content, even if the URL changes.</p>

1 Introduction

This deliverable describes the data management life cycle for the data to be collected, processed and/or generated by the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project, as a Euratom project. The DMP aims at defining the management strategy of data generated during the project with the purpose of making research data findable, accessible, interoperable and reusable (FAIR). The DMP addresses the following points:

- the handling of research data during and after the end of the project,
- what data will be collected, processed and/or generated,
- which methodology and standards will be applied,
- whether data will be shared/made open access, and
- how data will be curated and preserved (including after the end of the project).

According to the EU's guidelines on the DMP, this document may be updated - if appropriate - during the project's lifetime. The minimum requirement is that the DMP be updated for each periodic evaluation of the project.

The DMP is intended to be a living document in which information can be made available progressively as the project advances.

DMPs should, therefore, have a clear version number and include a change log table with modifications summary.

2 Data Summary

The Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project's main objectives are directly linked to improve nuclear data for modelling and simulation (M&S) tools used by European stakeholders in the application areas of the European Union and its member states that currently have the highest priority.

Type	Definition	Applications
Cross Sections	Probabilities of nuclear reactions occurring at given energies.	Reactor design, shielding calculations.
Decay Data	Information about radioactive decay (e.g., half-lives, decay modes).	Radiological protection, nuclear medicine.
Fission Yields	Distribution of products from nuclear fission.	Fuel burnup, waste management.
Thermal Scattering Data	Neutron interactions with bound atoms in materials at thermal energies.	Thermal reactor simulations, material science.
Resonance Parameters	Cross-section behavior at low energies with resonance effects.	Thermal neutron reactor modeling.
Prompt and Delayed Neutron Data	Neutron emission data during and after fission.	Reactor kinetics and safety analysis.

Radiation Emission Spectra	Energy and intensity of emitted radiation.	Dosimetry, detector design.
Nuclear Structure Data	Energy levels, spin, parity of nuclei.	Nuclear spectroscopy.
Reactor Parameters	Derived operational quantities of reactors.	Criticality benchmarks, safety analysis.

Table 1. Classification of nuclear data according to their nature.

Meeting the APRENDE objectives requires cooperative work of over 100 researchers from 41 partnering institutions across Europe and beyond. Each partner will collect or generate specific data, related to their tasks as per the GA. This first version of the DMP is the result of the early-stage data inventory by the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE partners. During the action, we are to correct the information given below so that it better reflects the real state of generated research and scientific data, produced by each partner, as well as data produced as a result of other support activities such as project management and dissemination. The nuclear data to be delivered in APRENDE can be classified according to their nature, as listed in Table 1.

All these data are distributed in custom or standard data formats via international repositories or databases. The most common data formats and databases are described in Table 2.

Raw experimental data	RAW experimental data in nuclear science (and more broadly in experimental physics) refers to the original, unprocessed data collected directly from detectors and measurement instruments during an experiment. These data are the first digital or analog output of the experiment, before any corrections, calibrations, or interpretations are applied. RAW experimental data will be stored in specialized data acquisition systems, local or institutional servers, and in some cases, centralized or collaborative repositories. The storage and accessibility of RAW data will follow the policies of the different laboratories and institutions involved in APRENDE.
Analysed experimental data - EXFOR	EXFOR (Experimental Nuclear Reaction Data) is an international database that compiles measured nuclear reaction data from experiments around the world. It includes results such as cross sections, angular distributions, and energy spectra, along with detailed experimental conditions, uncertainties, and bibliographic references. Unlike raw data, EXFOR contains processed and published data, often curated manually from peer-reviewed literature or provided directly by researchers. The database is coordinated by the IAEA and maintained by the Nuclear Reaction Data Centres (NRDC) network, which includes regional centres like NNDC (USA), NEA Data Bank (France), JAEA (Japan), and others. The data are stored and made publicly accessible through the IAEA's Nuclear Data Section (https://www-nds.iaea.org/exfor) and mirrored by regional centres. EXFOR data are primarily used for validation, benchmarking, and research, and differ from ENDF data, which are evaluated (i.e., derived from both experimental and theoretical models) and used in applications like reactor simulations. Tools such as JANIS and the IAEA's EXFOR web interface allow users to search, view, and analyse these datasets.
Evaluated nuclear reaction data - ENDF	ENDF (Evaluated Nuclear Data File) is a standardized format used to store evaluated nuclear data, which are carefully compiled datasets derived from experimental results, theoretical models, and expert

	<p>analysis. These data include reaction cross sections, decay properties, fission yields, resonance parameters, thermal scattering data, and neutron emission characteristics, all essential for applications in reactor physics, shielding, medical dosimetry, and nuclear safety. The ENDF format is a structured ASCII text system organized by file types (MF) and reaction types (MT), designed to be both human-readable and machine-processable for use in simulation codes like MCNP, SCALE, and SERPENT. ENDF-formatted data are maintained and distributed through several major nuclear data libraries: ENDF/B (USA, via NNDC), JEFF (Europe, via the OECD/NEA Data Bank), JENDL (Japan, via JAEA), TENDL (developed by the TALYS project), as well as CENDL (China) and ROSFOND (Russia). These libraries are publicly accessible through dedicated websites such as https://www.nndc.bnl.gov/endl, https://www.oecd-nea.org/dbdata/jeff, and https://tendl.web.psi.ch, where users can browse, download, and analyze the data for scientific and engineering use.</p>
Nuclear structure and decay data – ENSDF	<p>Nuclear structure and decay data describe the properties and behavior of atomic nuclei, including their energy levels, spins, parities, half-lives, decay modes, branching ratios, and the types and intensities of emitted radiation (such as alpha, beta, and gamma emissions). These data are essential for applications in nuclear physics, medicine, astrophysics, safeguards, and reactor monitoring. They are typically stored in the ENSDF (Evaluated Nuclear Structure Data File) format, which is a structured ASCII format developed to allow comprehensive, human- and machine-readable storage of evaluated nuclear structure and decay information. Each ENSDF entry includes detailed nuclear level schemes, decay pathways, and radiation data for individual nuclides, based on peer-reviewed literature and evaluated by expert compilers. The data are curated and maintained by the International Nuclear Structure and Decay Data (NSDD) Network, coordinated by the IAEA, and are stored and made publicly available through databases such as the IAEA Nuclear Data Services (https://www-nds.iaea.org) and the National Nuclear Data Center (NNDC) at Brookhaven National Laboratory (https://www.nndc.bnl.gov/ensdf). These platforms also offer visualization and search tools like the NuDat interface, which allows users to explore nuclear level schemes and decay characteristics across the chart of nuclides.</p>
Integral data – ICSBEP, IRPhEP or SINBAD	<p>Integral nuclear data are results from experiments that measure the behavior of entire nuclear systems, rather than individual reactions, and are essential for validating and benchmarking evaluated nuclear data libraries under realistic conditions. These data include criticality benchmarks (such as effective multiplication factor k_{eff}), reaction rate ratios, neutron and gamma flux distributions, shielding transmission data, decay heat, and other whole-system observables. Unlike differential data, integral data capture the combined effects of multiple nuclear processes and are crucial for assessing the accuracy of simulation codes and nuclear models. Although there is no single standardized format like ENDF or EXFOR, integral data are typically stored in structured reports or databases with detailed experimental descriptions, geometries, compositions, measured values, and associated uncertainties. The most important repositories include the ICSBEP (International Criticality Safety Benchmark Evaluation Project) and IRPhEP (International Reactor Physics Experiment Evaluation</p>

	<p>Project), both hosted by the OECD/NEA, which provide validated benchmarks for criticality and reactor physics, respectively. Shielding-related data are collected in SINBAD (Shielding Integral Benchmark Archive and Database), maintained by the OECD/NEA and IAEA, while decay heat and activation data are often found in specialized libraries or embedded within reactor modeling codes such as SCALE or FISPACT. These resources are publicly accessible through the respective websites of the OECD/NEA and IAEA.</p>
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Table 2. Classification Inventory Table

APRENDE will favour the public distribution of the experimental and evaluated data in standard formats, via the international databases. The information associated to the data will provide responses to the following questions, addressed by all partners and coordinated by each WPL:

- What is the purpose of the generated/collected data
- What types and formats of data will the project generate/collect
- Whether any existing data will be re-used and what will be re-used
- What is the origin/provenance of the data
- What is the expected size of the data that the project intends to generate or re-use
- What is the origin/provenance of the data
- What is the data utility - to whom might your data be useful outside the project

More information and guidelines to better understand how to properly address the points above could be found via the Digital Curation Centre³ (DCC). The DCC was founded in 2004 to enable adherence of research data to FAIR principles. The information shared in the cited resource can be seen as a guideline for the implementation of a successful Data Management Plan.

3 Data Management Policy: FAIR data

Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE’s general data management policy that is presented in the subsequent chapters has been developed in accordance with Horizon Europe FAIR principles (Findable, Accessible, Interoperable and Reusable), open data requirements and implementation guidelines. It applies mainly to new results that are produced in Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE and that are to be made available by the project consortium as open source, open science and open data.

3.1 Making data findable

This section will provide insight into how Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE intends to make it easier to find data collected or produced by the consortium. The way to proceed in order to achieve this goal is to describe properly the content of the data sets using appropriate tools, regulations and standards as described hereafter.

The dissemination of the data will depend on their nature:

- Raw data from the experiments will be stored at the different laboratories where the experiments took place. Open data policies for each laboratory will apply.
- Analysed experimental data and metadata will be disseminated via the public EXFOR international database.

³ <https://www.dcc.ac.uk/guidance>

- Evaluated nuclear data will be submitted in the ENDF-6 format to the JEFF (Joint Evaluated Fission and Fusion) Nuclear Data Library and distributed via international nuclear databases.
- Integral data will be submitted to the international databases such as ICSBEP, IRPhEP or SINBAD.
- Preprints, PhD theses and Master's theses will become publicly accessible via international public repositories such as arXiv or Zenodo.
- Scientific papers and conference proceedings will be published in peer-reviewed journals and published as Open Access.

Digital Object Identifier (DOI)

All open data, publications, and open-source software generated within the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project will be identifiable through persistent Uniform Resource Locators (URLs). Whenever possible, these results will also be assigned a Digital Object Identifier (DOI) to ensure they are easily and uniquely citable.

For open results stored in the default Open Access repository (arXiv or Zenodo, as described below), a DOI will be automatically generated, along with the added benefit of arXiv's and Zenodo's DOI versioning capabilities.

Open results deposited in institutional repositories, publisher repositories, or other data and research archives will, at a minimum, have persistent URLs for identification. If the hosting institution collaborates with a DOI registration agency, a DOI will also be assigned.

The assignment of unique identifiers such as DOI, Publisher Item Identifier (PII), or International Standard Serial Number (ISSN) to scientific publications will depend on the open access approach (green or gold) selected by the authors. It will also vary based on the policies of the chosen scientific publisher and research repository.

Metadata

In order to keep data findable, it is necessary to provide its metadata. Metadata is a systematic data on the research data themselves. Table 3 shows a list of data provided in the EXFOR files together with the experimental data, given as a list of values with uncertainties.

Metadata Field	Description
Entry ID	Unique identifier assigned to each dataset in EXFOR.
Authors	Names of the researchers who performed or published the experiment.
Title	Brief description of the experimental study.
Reference	Full citation of the publication containing the data.
Related References	Additional sources or previous versions related to the dataset.
Institute	Research institute or laboratory where the experiment took place.
Facility	Name of the experimental setup or location used (e.g., reactor, accelerator).
Experiment Description	Summary of the experimental method and setup.
Reaction	Nuclear reaction studied, in standard notation (e.g., 92-U-235(n,f)).

Monitor Reaction	Standard reaction used for calibration or normalization.
Monitor Cross Section	Reference value of the monitor cross section with uncertainty.
Measured Quantities	List of physical quantities measured and their units.
Uncertainties	Types of uncertainties included and how they were determined.
Data Status	Status of the dataset (e.g., compiled, revised, digitized).
History	Compilation and revision history, including responsible data center.
Compilation Notes	Comments or clarifications added by EXFOR compilers.
Experimental Conditions	Relevant parameters such as energy, angle, or temperature.
Data Tables	Numerical values measured, including uncertainties.

Table 3. Information contained in the EXFOR data.

Metadata enables other researchers to find data in an online repository and is, as such, essential for the reusability of the dataset. By adding rich and detailed metadata, other researchers can better determine whether the dataset is relevant and useful for their own research. Metadata will be uploaded in a standardized form. This metadata will be kept separate from the original raw research data.

The following deposition metadata fields are mandatory for Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE:

- the terms “European Union (EU)” and “Horizon Europe”;
- the name of the action, acronym and grant number;
- the title and description of the deposition metadata,
- the upload type (publication, dataset, software, ...),
- the publication date (ISO8601 format, YYYY-MM-DD), and length of embargo period if applicable;
- the creators/authors of the deposition,
- the persistent identifier (DOI),
- keywords.

EXFOR

The EXFOR (EXchange FORmat) data library is an international database containing experimental nuclear reaction data. Maintained collaboratively by several nuclear data centers under the coordination of the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA), EXFOR plays a crucial role in supporting nuclear science and technology. The database archives a wide range of experimental results from nuclear reactions, such as neutron-induced, charged-particle, and photonuclear reactions. These data

are essential for applications in nuclear reactor design, radiation protection, nuclear astrophysics, and medical physics.

EXFOR was established in the 1960s to preserve experimental nuclear reaction data in a standardized, machine-readable format, facilitating both data sharing and long-term accessibility. The database includes numerical data from peer-reviewed publications, laboratory reports, and sometimes unpublished sources, often accompanied by bibliographic references, experimental details, and comments on uncertainties or corrections. This comprehensive approach ensures high transparency and traceability.

The data in EXFOR are submitted and compiled by a network of Nuclear Reaction Data Centres (NRDC), which include institutions in the United States, Russia, Japan, China, France, and other countries. The format used is structured and allows for complex experimental setups to be described clearly, including information on targets, projectiles, energies, cross-sections, and experimental methods.

EXFOR is accessible online through various user-friendly interfaces and tools that support data retrieval, plotting, and comparison with theoretical models or evaluated data libraries such as ENDF (Evaluated Nuclear Data File). It is widely used by nuclear data evaluators, researchers, and engineers who rely on accurate and consistent experimental datasets to validate models or design experiments.

In summary, the EXFOR library is a cornerstone of nuclear data infrastructure. Its international collaboration, rigorous data standards, and accessibility make it an indispensable resource for advancing nuclear science and its diverse applications.

The EXFOR Format: Structure and Functionality

The EXFOR (EXchange FORmat) system uses a specialized, structured format designed to store and share experimental nuclear reaction data in a way that is both human-readable and machine-processable. The format was developed to ensure consistency, transparency, and traceability across international nuclear data compilations, and has become a global standard for reporting experimental results in nuclear physics.

At its core, the EXFOR format is organized into entries, each representing a unique experiment or dataset. An entry is divided into multiple subentries, which correspond to specific reactions or measurement types within the overall experiment. Each entry includes key metadata such as bibliographic references, authors, laboratories, and experimental conditions.

The format is line-based, with each line starting with a fixed field identifier that denotes the type of information it contains. Some common fields include:

ENTRY: A unique identifier for the dataset (e.g., 12345).

AUTHOR, TITLE, REFERENCE: Bibliographic information.

REACTION: Specifies the nuclear reaction studied, using a standardized notation (e.g., 92-U-235(N,F) -> describing neutron-induced fission of uranium-235).

DATA: Numerical values such as cross sections, uncertainties, and energies.

MONITOR: Describes the method used to normalize or monitor the experiment.

ERR-ANALYS: Provides a detailed explanation of error sources and magnitudes.

Data tables are clearly marked and follow a consistent format, typically listing independent variables (e.g., energy) alongside measured quantities (e.g., cross section) and their associated uncertainties. The use of consistent units, notation, and coding enables automated parsing and analysis.

Additionally, each entry includes a COMMON section, which defines experimental constants or settings shared by multiple subentries, and a STATUS field indicating the review status of the dataset.

Overall, the EXFOR format balances human readability with the rigor needed for automated data processing and international collaboration. Its structured yet flexible design ensures that complex experimental information can be accurately archived, compared, and reused across a wide range of nuclear applications.

All the details on the EXFOR data format can be found in "EXFOR Formats Manual: EXchange FORmat for Nuclear Reaction Data" Compiled by the Nuclear Data Section of the International Atomic Energy Agency (IAEA), in cooperation with the Nuclear Reaction Data Centres (NRDC) Network. IAEA-NDS-207, Rev. 2010 or later versions.

This document is publicly available on the IAEA Nuclear Data Services website and provides a comprehensive description of the EXFOR format structure, coding conventions, dictionary of reaction types, field identifiers, data units, and example entries. It serves as the primary guide for data compilers and users working with EXFOR (<https://www-nds.iaea.org/exfor/> or <https://www-nds.iaea.org/publications/indc/indc-nds-207.pdf>)

ENDF-6 files

The ENDF (Evaluated Nuclear Data File) format is a standardized, machine-readable format used to store evaluated nuclear data—that is, nuclear reaction data that has been critically assessed and combined from experimental measurements and theoretical models. Developed by the U.S. Cross Section Evaluation Working Group (CSEWG) and maintained through international collaboration (including the IAEA and NEA), the ENDF format is essential for applications in nuclear reactor simulations, radiation shielding, medical physics, and nuclear astrophysics.

The ENDF format is highly structured and designed for automated processing by nuclear data processing codes such as NJOY and PREPRO. It stores data in ASCII text with fixed-width fields, organized into six-digit records for computational efficiency and consistency.

ENDF files are divided into materials, each representing a specific nuclide (e.g., U-235), and each material is subdivided into files (numbered 1–40), which contain different types of data:

- MF1: General information and documentation.
- MF2: Resonance parameters (e.g., resolved and unresolved regions).
- MF3: Neutron reaction cross-sections.
- MF4: Angular distributions.
- MF5: Energy distributions.
- MF6: Product yields and spectra.
- MF7–MF40: Other data types, including thermal scattering, photon production, and decay data.

Each file contains sections identified by reaction types (called MT numbers, e.g., MT=102 for neutron capture). The data are presented as numeric arrays, coefficients, or tabulated functions using a combination of linear-linear, log-log, or tabulated interpolation schemes. Records are grouped into three types: CONT (control), LIST, and TAB1/TAB2, each with a specific structure for different kinds of information.

The ENDF format is intentionally low-level and designed to be unambiguous for nuclear data processing codes. Because of this, it is not meant for direct human interpretation but rather for use with software tools that translate ENDF into usable forms (e.g., pointwise cross sections, multigroup libraries).

In summary, the ENDF format is a foundational component of nuclear data infrastructure, enabling precise, consistent, and comprehensive representation of evaluated nuclear data for scientific and engineering applications worldwide. Its structured design ensures reliable data exchange, reproducibility, and long-term preservation.

The Evaluated Nuclear Data File (ENDF) libraries are distributed globally through several official repositories and nuclear data centers. These institutions ensure the availability and accessibility of ENDF data for various applications in nuclear science and technology. Below is a list of major ENDF file repositories worldwide:

1. National Nuclear Data Center (NNDC) – Brookhaven National Laboratory, USA
Website: <https://www.nndc.bnl.gov/endl/>

Description: The NNDC is the primary distribution center for the ENDF/B libraries, including the latest releases such as ENDF/B-VIII.1. It offers tools for data retrieval, visualization, and processing, supporting a wide range of nuclear applications.

2. International Atomic Energy Agency (IAEA) – Nuclear Data Section
Website: <https://www-nds.iaea.org/endl/>

Description: The IAEA provides access to various evaluated nuclear data libraries, including ENDF, through its Nuclear Data Services. It also coordinates the International Network of Nuclear Reaction Data Centres (NRDC), facilitating global collaboration in nuclear data dissemination.

3. OECD Nuclear Energy Agency (NEA) – Data Bank
Website: <https://www.oecd-nea.org/databank/>

Description: The NEA Data Bank distributes the Joint Evaluated Fission and Fusion (JEFF) library, which is formatted in ENDF-6. It serves as a central repository for nuclear data in Europe and supports international nuclear data evaluation projects.

4. Japan Atomic Energy Agency (JAEA) – Nuclear Data Center
Website: <https://wwwwnc.jaea.go.jp/>

Description: JAEA maintains the Japanese Evaluated Nuclear Data Library (JENDL), which is distributed in ENDF format. The center provides access to evaluated nuclear data for research and development in Japan and internationally.

5. China Nuclear Data Center (CNDC) – China Institute of Atomic Energy

Website: <http://www.nuclear.csdb.cn/>

Description: CNDC manages the China Evaluated Nuclear Data Library (CENDL), offering evaluated nuclear data in ENDF format. It supports nuclear research and applications within China and contributes to international data exchange.

6. Russian Nuclear Data Center – Institute of Physics and Power Engineering (IPPE)

Website: <http://www.ippe.ru/podr/nucdat/>

Description: The Russian centre provides access to the BROND (Russian Evaluated Neutron Data Library), formatted in ENDF, supporting nuclear data needs in Russia and participating in international collaborations.

- www-nds.iaea.org

7. Los Alamos National Laboratory (LANL) – T-2 Nuclear Information Service

Website: <https://nucleardata.lanl.gov/>

Description: LANL offers processed ENDF libraries tailored for use with Monte Carlo codes like MCNP. These libraries are essential for simulations and analyses in nuclear engineering and research.

- nucleardata.lanl.gov
- nucleardata.lanl.gov

These repositories collectively ensure the global distribution and accessibility of ENDF libraries, supporting a wide range of nuclear science and engineering applications.

The authoritative reference for the ENDF (Evaluated Nuclear Data File) format is the ENDF-6 Formats Manual, officially designated as ENDF-102. This manual is maintained by the Cross Section Evaluation Working Group (CSEWG) and published by the National Nuclear Data Center (NNDC) at Brookhaven National Laboratory. It provides comprehensive specifications for the ENDF-6 format, which is the standard for storing evaluated nuclear reaction data. Nuclear Energy Agency (NEA) www-nds.bnl.gov www-nds.iaea.org

The most recent version of the manual is:

ENDF-6 Formats Manual: Data Formats and Procedures for the Evaluated Nuclear Data Files ENDF/B-VI and ENDF/B-VII Report BNL-90365-2009 Rev.1 (ENDF-102), Edited by M. Herman and A. Trkov, Published: July 2010 Available at: www-nds.iaea.org www-nds.iaea.org

The manual details the structure, formatting rules, and conventions used in ENDF-6 files, covering aspects such as file and section identifiers, data types, and the representation of nuclear data. It serves as the definitive guide for data evaluators, users, and developers working with ENDF-formatted nuclear data.

arXiv: An Open Repository for Scientific Preprints

arXiv (pronounced “archive”) is a free and open-access digital repository for scholarly preprints in fields such as physics, mathematics, computer science, quantitative biology, statistics, economics, electrical engineering, and more. Established in 1991 by physicist Paul Ginsparg, arXiv is hosted by Cornell University and supported by a global consortium of libraries and

research institutions. It serves as a crucial platform for the rapid dissemination of scientific results prior to peer-reviewed publication.

The primary function of arXiv is to allow researchers to share their work with the global community without the delays associated with traditional publishing. Authors upload preprints—versions of their research papers that have not yet undergone formal peer review—which are then freely available for anyone to read, download, and cite. Submissions are moderated for relevance and scientific appropriateness, but not formally reviewed, allowing for much faster publication and visibility.

Each paper on arXiv is assigned a unique identifier and is permanently archived, ensuring long-term access. Authors can revise their submissions in response to feedback, with all versions remaining accessible. This transparent versioning system supports academic dialogue and iterative improvement of research.

arXiv has had a transformative impact on scientific communication, particularly in disciplines like high-energy physics and mathematics, where it is standard practice to post preprints before journal submission. It promotes open science by eliminating access barriers, accelerating the pace of discovery, and enabling broader participation in scientific discourse.

In summary, arXiv is a cornerstone of open-access scientific publishing. It democratizes access to cutting-edge research, fosters collaboration, and enhances the visibility and impact of scholarly work across the globe.

ArXiv is cited as Ginsparg, P. (2011). arXiv at 20. *Nature*, 476, 145–147.
<https://doi.org/10.1038/476145a>

This article, written by arXiv's creator Paul Ginsparg, offers a retrospective on the platform's development and impact over two decades. It is often used as the authoritative source when citing arXiv itself as a platform or concept.

Zenodo

The Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project will store its open data in Zenodo, an open-access online repository designed for research data: <https://zenodo.org/communities/aprende-project>. Zenodo's structure, features, and management adhere to FAIR data principles. As a service provided by OpenAIRE and hosted by CERN, Zenodo allows researchers to deposit both publications and datasets, offering tools to connect them using persistent identifiers and enabling proper data citation.

Zenodo is specifically designed to support the core principles of FAIR—making data findable, accessible, reusable, and interoperable—which are essential for Open Research Data (ORD) projects. It is a versatile repository that accommodates researchers, scientists, EU-funded initiatives, and institutions by offering the following benefits:

Facilitating the sharing of research outputs in various formats, including text, spreadsheets, audio, video, and images, across all scientific disciplines.

Enhancing visibility and recognition of research by making outputs citable and seamlessly integrating them into reporting systems for funding bodies such as the European Commission.

Enabling easy access to and reuse of shared datasets.

Automatically generating Digital Object Identifiers (DOIs) for all deposits.

Connecting research outputs to the OpenAIRE portal for broader accessibility and integration.

Zenodo serves as a comprehensive platform to ensure Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE research data is well-managed, accessible, and aligned with open science principles.

Search keywords

Zenodo allows to perform simple and advanced search queries using the keywords. Zenodo also provides a user guide with easy-to-understand examples. In addition, the consortium will define a set of general keywords that should apply to corresponding public datasets, scientific publications and public deliverables. Example of such key words:

Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE, reliability assessment, nuclear physics, additive manufacturing, nuclear safety, nuclear reactor.

Other repositories

Examples of other repositories that will be used to make data openly available include HAL (<https://hal.archives-ouvertes.fr>) and potentially other national repositories known by the partners:

- TESEO (<https://www.educacion.gob.es/teseo/listarBusqueda.do>) for Spanish PhD theses.
- Thesis in nuclear engineering prepared at the Jozef Stefan Institute (Slovenia): <https://repozitorij.uni-lj.si/>
- National repositories of countries of partners.

Naming conventions

Files and folders at data repositories will be versioned and structured by using a name convention consisting as follow: FileType_PROJECTNAME_[name of the document]_Vxy.FileExtension.

FileType can be:

D for Deliverable

DS for DataSet

F for File (generic, ex. images, table, document).

Version numbers

Individual file names and datasets will contain version numbers that will be incremented at each revision (Vxyz). For publications, versioning is in general not necessary.

Zenodo provides DOI versioning of all datasets uploaded to their communities, which allows us to edit and update the uploaded datasets after they have been published. This also allows us to cite specific versions of an upload and cite all versions of an upload.

3.2 Making data openly accessible

3.2.1 By default openly available data

In order to maximise the impact of Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE research data, the results are shared within and beyond the consortium. Selected data and results will be shared with the scientific community and other stakeholders through publications in scientific journals and presentations at conferences, as well as through open access data repositories.

Moreover, in Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE, we have strived to make all 51 deliverables open for public access.

The Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project datasets are first stored and organized in a database by the data owners (personal computer, or on the institutional secure server) and on the project's website. All data are made available for verification and re-use, unless the task leader can justify why data cannot be made openly accessible. To protect the copyright of the project knowledge, Creative Commons license will be used when needed.

The project Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE public datasets and deliverables (data access policy unrestricted) will be accessible by:

- APRENDE project web-site
- EXFOR
- ENSDF
- ENDF repositories at international organisations.
- OpenAIRE
- arXiv
- Zenodo and its national homologues for ORDP data and datasets
- Open access journals

All data deposited on Zenodo are accessible without restriction to the public.

Exceptions are the following:

- Copyright and permissions for re-using third-party datasets
- Processing and combining input data from many different sources may lead to unclear IPR situations regarding the generated output data, therefore such repurposed data (e.g. model output data) can only be made open if any of the underlying data (e.g. model input data) is open, too.
For this: potential users must contact the IPR (Intellectual Property Rights) team or the data owner in order to gain access. If necessary, appropriate IPR procedure (such as non-disclosure agreement - NDA) will be used.
- Personal data treatment and confidentiality issues.
- Datasets referring to the quality and quantity of certain elements at risk, such as people and critical infrastructures, are not open by default as their publication may pose privacy, ethical or security risks.
- Data-driven business models.
- Data that will be exploited commercially will not be made open.

3.2.2 Data Accessibility

Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE open results will be made accessible according to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon Europe.

Open data: All open results (data, software, public documents, scientific publications) of the project will be openly accessible at an appropriate Open Access repository (i.e. Zenodo) as soon as possible. Research data needed to validate the results in the scientific publications will be deposited in a data repository at the same time as a publication. Non-public research data will be archived at the repository using a restricted access option.

Zenodo-hosted APRENDE community is now accessible via the following link: <https://zenodo.org/communities/aprende-project> and is managed by the Coordinator with the PMO support. Each Partner is in charge of uploading files (publications, datasets, workshop materials etc), where they are major author/data owners.

Scientific publications: Providing open access to peer-reviewed scientific publications can be ensured either by publishing in green or gold open access journals with or without author processing fees. Any scientific publications from Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE and the related bibliographic metadata must be made available as open access and published on the project website as well as linked to the OpenAIRE portal (<https://www.openaire.eu/openaire-portal>) and the Funding & Tenders Portal (<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/results-innovation-support>). To automate the process of linking scientific publications and related research data to OpenAIRE, the publication should be deposited in an OpenAIRE-compliant repository (such as Zenodo or Re3data, for example), either by the authors of the publication (green open access) or by a scientific publisher (gold open access). While additional forms of disseminating open access papers, including academic social network sites such as ResearchGate (<https://www.researchgate.net/>) are possible, an electronic copy of the publication has to be deposited in suitable open access repository in the first place. According to the European Research Council's Guidelines on Open Access, "Venues such as Research Gate or Academia.edu that require users to register in order to access content do not count as repositories. The posting of publications on a personal, institutional or project specific webpage or the deposit in a publicly accessible Dropbox account is not sufficient to satisfy the requirements either."

If the chosen repository is not fully OpenAIRE compliant, the publications or data must be linked at <https://www.openaire.eu/participate/claim> with the respective funding agency (European Commission in this case). Green open access journals or gold open access journals without author processing fees should be preferred for disseminating scientific publications of the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project. Nevertheless, the journal visibility and prestige (translated in the Impact Factor), together with the speed of publication, should be considered when choosing a journal for publication of a manuscript. According to the EC recommendation, authors of the publication are encouraged to retain their copyright and grant adequate licences to publishers.

- Green open access (self-archiving)
Green open access or self-archiving means that the published article or the final peer-reviewed manuscript (AAM or VoR) is archived by the researcher itself in an online repository, in most cases after its publication in the journal. The journal must grant the researcher the permission to self-archive the final peer-reviewed article, without an embargo period (immediate open access-HE requirement). To find suitable green open access publishers, researchers are encouraged to consult RoMEO (<http://sherpa.ac.uk/romeo>), a searchable database of publisher's policies regarding the self- archiving of journal articles on the web and in Open Access repositories.
- Gold open access (open access publishing)
Gold open access means that the publication is available by the scientific publisher as open access. Some journals require an author-processing fee for publishing open access. Author-publishing fees for gold open access journals can be reimbursed within the project period and budget. Some publishers allow the researcher to deposit a copy of the article in a repository, sometimes with an embargo period. For finding suitable gold open access publishers, researchers are encouraged to consult the Directory of Open Access Journals (<https://doaj.org/>), a service that indexes high quality, peer-reviewed open access academic journals that use an appropriate quality control system.

A simplified schematics to depict various pathways to render publications openly accessible and HE compliant is given in Figure 1 below:

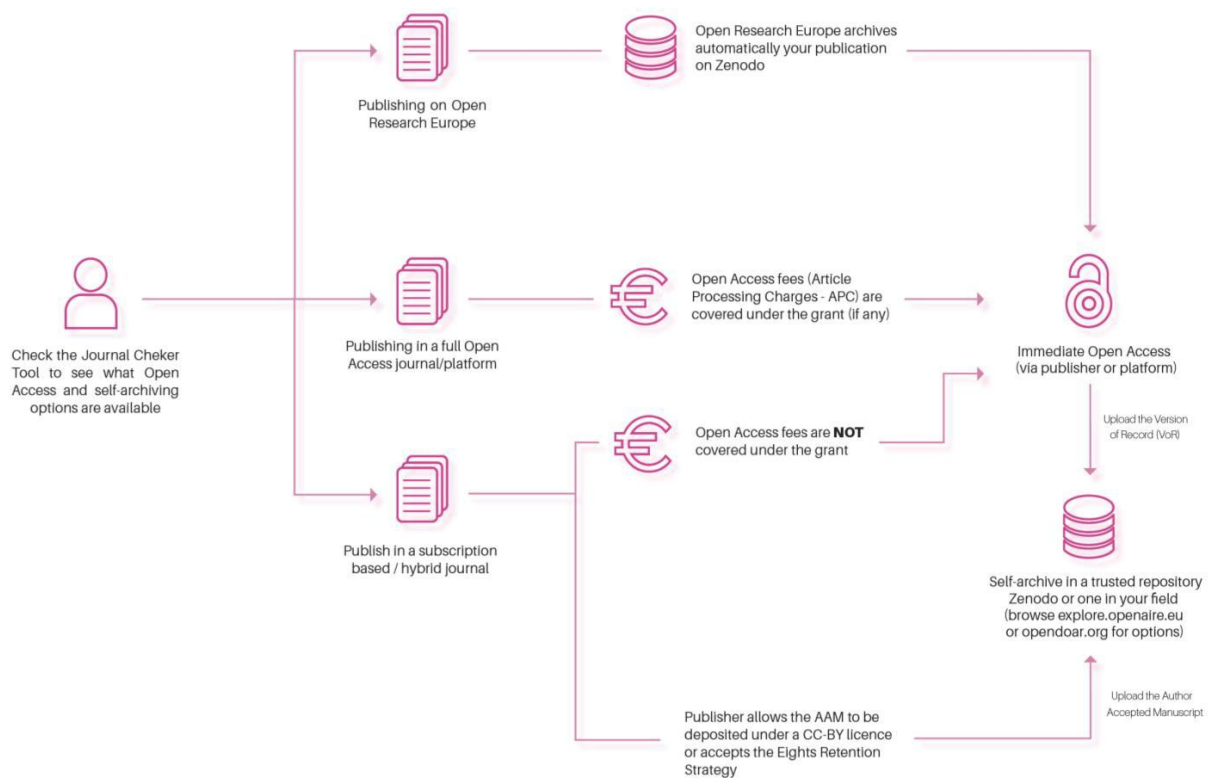


Figure 1. Open Access schematics, image adapted from OpenAIRE webinar England & Malaguarnera2022.10.5281/zenodo.7324364

Regarding the mere access to open data deposited as data files in a data repository, there are no special methods or software tools needed. The files can be downloaded from the data repository using a standard web browser. The offline viewing, interpreting, processing and editing of data files downloaded from the data repository, it heavily depends on the type and format of the data.

3.2.3 Specific partner provisions

Every partner, who will institute a restricted access to their datasets, will be asked to install a protocol where the identified collaborators will be explained how to access these datasets. If applicable, this will be mentioned in the next version of the Data Management Plan.

3.2.4 How access will be provided if there are restrictions on use of data

Where a restriction on open access to research data is necessary, attempts will be made to make data available under controlled conditions to other individual researchers. In the case where restricted or embargoed data is stored in the Zenodo repository (under "restricted access" rights), information about the restricted data will be published in the repository, and details of when the data will become available will be included in the metadata. According to the Q&A session "Open Research Data in HE and Zenodo repository", metadata for both open, closed, embargoed and restricted records are always publicly available in Zenodo. Data files and data sets for restricted access records are only visible to their owners and to those the

owner grants access. Restricted access allows a researcher to upload a dataset and provide the conditions under which he/she grants access to the data. Potential end-users wishing to request access must provide a justification for how they fulfil these conditions. The owner of the dataset gets notified for each new request and can decide to either accept or reject the request. If the request is accepted, the requester receives a secret link which usually expires within 1-12 months.

3.3 Making data interoperable

Partners will take into consideration EXFOR, ENDF and OpenAIRE guidelines for online data interoperability: <https://guidelines.openaire.eu/en/latest/> and metadata standards according to the [Metadata Standards Directory](#) (Engineering, Physical Sciences & Mathematics and General Research Data) guidelines.

Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project members will be using standard vocabulary for all data types. No data sets that require the development of novel specific standards and methodologies to facilitate interoperability have been generated in the project so far. All datasets generated are expected to map to commonly used ontologies.

3.4 Increase data re-use (throughout clarifying licences)

This section outlines the foreseen licensing practices that support compliance with FAIR principles, and archival policies that will guide the responsible sharing and preservation of project data, balancing open access with necessary restrictions on protected datasets.

Licensing

Where possible, Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE data will be licenced following the guidelines provided by CESSDA Training ([Licensing your data](#)) and Creative Commons Licence (<https://creativecommons.org/choose/>) or (<http://ufal.github.io/public-license-selector/>) by integrating the appropriate abbreviation into the shared file.

According to Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE Grant Agreement, data and software are owned by the beneficiary that generates them. Nevertheless, the owners of open results arising from the project are encouraged to release their work preferably under a Creative Commons Attribution 4.0 (CC-BY-4.0).

For datasets deposited on a public data repository (i.e. Zenodo), the access is unlimited. Restrictions on re-use policy are applied for all protected data, whose re-use will be limited within the project partners.

Longevity

Data necessary to validate the results presented in the publication will be archived in a FAIR-compliant repository (in our case Zenodo) and be linked to the publication. Raw data not directly relevant to the publication will be stored securely and made available upon justified request. Data associated with public deliverables will be shared once the deliverable has been approved and accepted by the EC. For other public datasets not directly linked to a scientific

publication or deliverable, such datasets will be made available upon assessment by the Executive Committee that it is ready for publishing, and in the final months of the project at the latest.

All data necessary to validate the results presented in the publication will be archived in a FAIR-compliant repository. Raw data not directly relevant to the publication will be stored securely and made available upon justified request.

Open data can be reused in accordance with the Creative Commons licences. Data classified as confidential will as default is not reusable due to privacy concerns.

The public data will remain reusable via Zenodo for at least 20 years, according to Zenodo's general policies (<http://about.zenodo.org/policies/>).

Since no research data has been produced within the project to date, the specific question of its re-usability by third parties or usability period is not fully developed in the current version of the DMP document.

3.5 DMP quality and review

Quality evaluation and reporting processes are implemented throughout the entire project to assess both project outputs (data/products) and overall progress (refer to Deliverable 7.3 - Project Quality Plan). All deliverables undergo an internal peer review to ensure high-quality standards. Deliverable leaders must submit their deliverables to their WP leader and the coordinator for quality checks.

Project results and data will be continuously analysed and collected throughout the project duration. To support this, each partner will update the Communication & Dissemination Plan (Deliverable 6.1) once a year, documenting articles, papers, and scientific publications. A dedicated table (currently under development) will be used to record all research data and publications. WP leaders and publication authors are required to update this table periodically. The Data Management Plan will be regularly updated to reflect any changes, including revisions to the online research data repository. This repository will include descriptions of datasets and research data as they are generated and collected.

3.6 Management of other research outputs

Beyond data management, beneficiaries should plan for the management of additional research outputs generated or reused during their projects. These outputs may be digital (e.g., software, workflows, protocols, models) or physical (e.g., new materials, antibodies, reagents, samples). Beneficiaries should evaluate which FAIR data principles apply to these outputs and provide detailed plans for their management, sharing, and reuse.

4 Data security and dedicated platforms

To increase data security, the following measures will be implemented:
generated data will be stored in a way resilient to the data carrier damage, loss or malfunctioning: on institutional servers of each partner and three online sites as described further in this section.

Encryption will be applied if deemed necessary by the researchers involved.

The use of USB flash drives will be minimized.

Files will be labelled systematically to maintain consistency within the final dataset.

As for the estimation of the exact final volume of generated data – it is difficult to accomplish at this time since the data that will be initially included in the project has not been fully identified

yet (currently in M6 of the project). An initial inventory of up to 1 Tb of data is identified by the Consortium in the **Erreur ! Source du renvoi introuvable.** More exact estimation on the data size will be made closer to the project's mid-term.

Besides the public platforms offered by international organizations for the dissemination and storage of nuclear data (EXFOR, ENDF), three data hosting sites will be used within the framework of this project: consortium internal platform Teams, project's website and the EU Zenodo platform for dissemination of the publications and results.

All key public data produced by the project will be stored on Zenodo and a selection of files will also be made available on the project website.

Internal project data will be stored on the Teams platform. It will not be accessible for individuals external to the project.

For each platform, we will outline the security and storage of the data hereafter:

Teams

Accessibility: APRENDE Teams is accessible only to the project consortium.

Data security will be ensured through established procedures and suitable technologies, such as the HTTPS protocol for encrypted internet transactions, alongside compliance with European and global security standards (ISO, ITU, W3C, IETF, and ETSI).

Frequency of backups: daily backups to a datacenter in France (*Linkwe* service provider).

The security standards you meet or apply: Security Information and Event Management (SIEM), as well as IDS and IPS systems and complies with GDPR rules for personal data management.

What happens to the data once the project is finished? The content of the Teams collaborative space remains available 1 year after the end of the project, then it is archived on a local server in Paris (except personal data which are destroyed).

Data archiving: after the project end the data is stored on a local server in Paris, replicated on another site geographically, without time limit.

Typical size of Teams repository at the start of the project is 30 Gb and can be extended to up to several hundreds of Gb according to the project needs.

Zenodo

Data Protection / Backup: Zenodo data is located in a CERN datacenter (European Union) and a daily incremental backup is installed (for more details on server management and backup see <https://about.zenodo.org/infrastructure/>).

Access security: access to Zenodo requires password authentication. Data security is guaranteed according to the platform description (see <https://about.zenodo.org/infrastructure/>).

Confidentiality of sensitive data: by its nature and design, Zenodo does not allow the storage of confidential data, the data is public and freely accessible. However, Zenodo allows users to upload files under closed access, which means that the users will not be able to access the files you uploaded. The files are however stored unencrypted and may be viewed by Zenodo operational staff under specific conditions. This means that "closed access" on Zenodo is not suitable for secret or confidential data.

Data longevity: Zenodo supports long-term preservation of your data deposits, as the repository is projected to be maintained for the lifetime of the host laboratory CERN, defined as at least the next twenty years (see section 3.4 above).

APRENDE WEBSITE

Frequency of backups: daily backup, replicated over 7 days.

The location of your storage center: the storage center is in Germany at IONOS in an ISO certified European datacenter.

The security standards you meet or apply: the website and applications do not use cookies. The access to the website and application is via an SSL certificate (https).

The website remains active for 3 years after the end of the project without content updates but with continued maintenance in operational condition. Then it is destroyed and the domain name terminated.

Data archiving: the data is stored on a local server in Paris, replicated on another site geographically, without time limit.

5 Ethical aspects

5.1 General Data Protection Regulation

Partners shall cooperate in order to enable one another to fulfil legal obligations arising under applicable data protection laws (the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data and/or relevant national data protection law applicable to said Partner) within the scope of the performance and administration of the project and of the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE Consortium Agreement; and comply with regulations on intellectual property rights (IPR).

Users wishing to utilize the TEAMS platform for the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project must register by creating an account. During registration, users are required to provide an email address and password and consent to the processing of their email address for account-related communication and management purposes. Users may withdraw this consent at any time, which will result in the deletion of their account.

5.2 Sensitive data

Sensitive data is data that is either private or confidential and includes personal user data. The proper management of sensitive data is imperative to maintain the individual privacy and remain in compliance with both EU and international regulations.

In order to ensure sensitive data is properly managed, data that is considered sensitive should first be identified. Thus, the main ethical and privacy issues with sensitive data arise from ensuring the data remains private and that proper consent is obtained before the data is shared or published in any way, as for example, in case of event pictures and promotional images depicting persons.

When possible, collected response data will be anonymized so that it cannot be directly attributed to the responder (for example, by delineating a numeric code to an individual). In addition, data will be reported in aggregated forms to further prevent any form or individual from being identified through their response. If anonymization is not possible, then the explicit permission will be received prior to the publication of sensitive data. In any case, sensitive data will always remain confidential. Lastly, personal or human-related data is not part of the core Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE's activities (as for example in the fields of medicine, genetics, sociology etc.), which minimizes any possible risk of mishandling sensitive data.

To ensure proper communication with external audience, any person can subscribe for Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE Newsletter. The collected data represents a list of email address and names associated with them. The data is stored on Brevo's servers, which are GDPR compliant. More details can be found here:

<https://help.brevo.com/hc/en-us/sections/18503544961042-GDPR>. At current stage of the project there are no plans to generate or re-use any other personal user data. If sensitive data generation is anticipated at later stage, the lead partner will take consultancy measures from their local data protection officer (DPO) regarding the following steps for the data use, storage and access.

6 Resource allocation

Effective data management is a critical aspect of the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project, encompassing both financial and non-monetary considerations. Estimating costs for data-related activities can be complex, as many tasks are integrated into standard research workflows. This section outlines the key cost elements associated with data collection, storage, and accessibility, as well as the responsibilities of different stakeholders in ensuring compliance with data management policies. It also details the financial aspects of making data FAIR and the roles of the consortium members in overseeing these processes.

Costs

Generally, the estimation of costs of data management activities is not straightforward, as many activities are integrated with standard research process and data analysis. Ideally, it is necessary to estimate the time-cost related to data collection, data entry and transcription, data validation and documentation and the cost of preparing data for archiving and re-use. Those resources that include time and effort costs (i.e. data records preparation, maintenance of technical infrastructure, individual preparation effort needed to use the infrastructure etc.) are so-called non-monetary costs. Since the researchers and the management team are the main generators of data in Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE, all these costs are related to them. The consortium expects that monetary costs for FAIR data will be mainly related to Open Access publication of papers (research articles and reviews), combined with patent protection of exploitable results, and possibly maintenance of hosting infrastructure (servers) for data storage.

Monetary costs related to Open Access data in HE are eligible for reimbursement under the conditions defined in the GA, but also other articles relevant for the cost category chosen. Each partner is responsible for managing the costs related to making data accessible to others beyond the consortium.

Some examples of costs for making data FAIR include:

- “Gold” Open access publication fees. The cost sharing, in case of multiple authors, shall be decided among the authors on a case-by-case basis. This point will be updated in the next version of the document, as the consortium will have more information on the number and cost of the “gold” open access publications ;
- Data archiving at Zenodo and its national homologues: free of charge;
- Copyright licensing with Creative Commons: free of charge.

No immediate costs are anticipated for open data that is stored for long-term preservation. Additional details will be reported, as needed, in future versions of the DMP.

Regarding the question of long term raw data preservation, no specific arrangements have been done in the consortium yet, although, a) with a great degree of confidence we can state that raw data will be kept in the internal repositories at each institution in line with the local data storage guidelines (more details to be provided in the next version of the document), and b) long-term storage requirements will also be met with the help of the one-stop Zenodo repository. At later stages, the consortium will decide whether and how some raw and processed data can also be long term stored in the common Teams space that is allocated for the project by the PMO.

Responsibility

Data management activities concern the whole project and needs to be coordinated and monitored both at project and WP level. Data management is also linked to publication of project results and thus dissemination activities.

The overall responsibility for data management lies with the project coordinator **CIEMAT**.

The members of the Executive Committee (i.e. WPLs) are also responsible of the Data Management of Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE datasets and research data in agreement with each organization's internal process, outlined by their local Data Protection Officer (DPO).

The Coordinator (project data manager) and WPLs (WP data managers) are responsible for:

- Co-developing and implementing the data management plan and policy with project management.
- Monitoring data collection, publication activities, and deadlines.
- Ensuring open results (data/software) are deposited in compliant repositories and linked to the project.
- Writing, updating and uploading the DMP.
- Advising on publication paths (green/gold open access) and offering customized help and further guidance for publishing scientific publications.
- Verifying journal compliance with HE open data policies before manuscript submission.
- Ensuring green access publications are deposited in repositories.
- Making publication metadata available in the R&I Participant Portal and Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE website.
- Ensuring research data linked to publications is in repositories.
- Tracking embargo periods and notifying partners.
- Linking OpenAIRE publications with the Project.
- Describing data or publications (by means of appropriate metadata) per Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE policies and using project-provided templates/tools.

Conclusion

This document outlines the core principles and guidelines for data management within the Addressing Priorities of Evaluated Nuclear Data in Europe – APRENDE project. As a dynamic document, it will be revised and updated throughout the project duration. In the future updates to the DMP, we plan to address progress regarding the online research data repository, including the collection, sharing, and detailed description of datasets and research data as they are progressively generated and gathered.



Figure 2: Example of a figure

Bibliography

[Use the APA citation style – see <https://www.library.cornell.edu/research/citation/apa> for details]

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