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Glossary

| Abbreviation | Meaning |
|--------------|--|
| ARK | Archival Resource Key |
| CMT | Core Management Team |
| DMP | Data Management Plan |
| DOI | Digital Object Identifier |
| DoW | Description of Work |
| DSO | Data & Security Officer |
| EbD | Ethics by Design |
| DO | Data Officer |
| EC | European Commission |
| EU | European Union |
| FAIR | Findable, Accessible, Interoperable and Reusable |
| GDPR | General Data Protection Regulation |
| URL | Uniform Resource Locator |
| PURL | Persistent Uniform Resource Locator |
| WP | Work Package |



Summary

The Data Management Plan (DMP) describes the procedure of data management within the project framework as well as data sharing between the project partners and beyond, including data collection, storing, processing and analysis. The aim of the DMP is to ensure that good data handling practice is followed, and data protection measures and ethical issues are considered. By following the H2020 FAIR data management guidelines of the European Commission, the document outlines what data and how will be handled during and after the end of the project. In addition, it defines the compliance of nPETS with the European Union's General Data Protection Regulation (GDPR) as well as adherence to its ethical standards when handling personal data.

The nPETS project aims to contribute to better public health policies by developing new knowledge in the area of transport generated sub 100 nm particle emissions and their toxicology and providing suggestions for effective mitigation measures. Research data containing sub 100 nm emissions information in form of number, size distribution, chemical content and toxic effects. The collected data will be processed and analysed, and the findings will be made available to the public and private decision makers in designing solutions and services.

All data related activities exercised in the project by the consortium partners would follow the relevant guidelines, standard and principles, such as FAIR (Findable, Accessible, Interoperable and Reusable). The data protection is also addressed in the document.

The DMP is considered a living document in which information can be made available on a greater level of detail through updates as the project progresses and when significant changes occur. The DMP will be updated over the course of the project and reported regularly in the project management plan whenever appropriate.



1. Introduction

1.1 About the Plan

The D8.3 deliverable describes the handling of the nPETS data. All the data handling activities in the course of the project will follow the guidelines and principles on data management provided by European Commission for H2020 projects. In addition, the consortium will comply with regulations concerning data handling defined in the GDPR. This Data Management Plan gives an overview of the data that will be generated and processed throughout the project lifespan under GDPR compliance and discusses how to setup the data handling procedures to make the data findable, accessible, interoperable, and re-usable.

The Plan is written in reference to Article 29.3 in the Model Grant Agreement called “Open access to research data”. Projects participants must deposit their data in a research data repository and take measures to make the data available to third parties. The third party should be able to access, mine, exploit, reproduce and disseminate the data. This should also help to validate the results presented in scientific publications. In addition, Article 29.3 suggest that participants will have to provide information, via the repository, about tools and instruments needed for the validation of project outcomes.

Article 29 states that project beneficiaries do not have to ensure access to parts of research data if such access would be lead to a risk for the project’s goals. In such cases, the DMP must contain the reason for not providing access. Regarding the nature of the data, in order to fulfil the required security and privacy requirements in this project, which are set by the Data Protection Directive (Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data), the project assumes the differentiation set in this Directive between Personal and No Personal data. Data are considered as personal data “when someone is able to link the information to a person, even if the person holding the data cannot make this link”. Any data susceptible of being considered as Personal Data will be managed according to this Directive.

The document is open access and will be continuously updated within the project.

1.2 Document audience

The Data Management Plan is aimed at the following audiences and respectively at the fulfilment of the following objectives:

- INEA: to communicate new development of the EC Open Research Data Pilot (ORDP) with the project wherever appropriate.
- Consortium partners: to implement their individual data collection, storage and sharing activities.



2. Principles of data protection, ethics and management

Personal data will be collected through our website and in particular through the “Newsletter Subscription”. In order to facilitate appropriate data management, it is important to know what the legal requirements of data protection are, and understand the general principles for data protection and ethics under GDPR.

2.1 GDPR Principles

The GDPR outlines how personal information is used by organisations, businesses or the government. It enables data subjects to have greater control over their personal data. Consortium partners must follow the six key principles from Article 5 of the GDPR when handling individuals’ personal data.

1. Personal data shall be processed lawfully, fairly and in a transparent manner in relation to the data subject (“lawfulness, fairness and transparency”).
2. Personal data shall be collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes; further processing for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes shall, in accordance with Article 89(1), not be considered to be incompatible with the initial purposes (“purpose limitation”).
3. Personal data shall be adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed (“data minimisation”).
4. Personal data shall be accurate and, where necessary, kept up to date; every reasonable step must be taken to ensure that personal data that are inaccurate, having regard to the purposes for which they are processed, are erased or rectified without delay (“accuracy”).
5. Personal data shall be kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the personal data are processed; personal data may be stored for longer periods insofar as the personal data will be processed solely for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes in accordance with Article 89(1) subject to implementation of the appropriate technical and organisational measures required by this Regulation in order to safeguard the rights and freedoms of the data subject (“storage limitation”).
6. Personal data shall be processed in a manner that ensures appropriate security of the personal data, including protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures (“integrity and confidentiality”).

2.3 Necessary compliant roles under GDPR

In nPETS, the main controller and processor role (terms according to Article 4 of GDPR) will have the Centre for Research and Technology Hellas (CERTH) substituted by Kungliga Tekniska Hogskolan (KTH). They will have an overall responsibility for data management and determine the purposes and means of the collection and processing of personal data in the project.

2.4 nPETS Grant and Consortium Agreements

The following text gives an overview of the grant agreement number 954377 — nPETS regarding the data protection and property rights:



Attention will be paid to the definition of all Intellectual Property Rights (IPR) and relevant rights related to the novel nPETS technologies/methodologies developed during the project. In addressing the IPR arrangements in the Consortium Agreement, nPETS will build on:

- *The Guide on IP in Horizon 2020 for Researchers and SMEs, as provided via the IPR Helpdesk;*
- *The Consortium Agreement tutorial checklist as provided via the IPR Helpdesk and DESCA;*
- *The legitimate interest of the partners.*

A database will manage the research data generated and/or collected during the project. It will be fully available to all consortium members during the project duration, while it will also be uploaded to an open access repository (e.g., Mendeley, Zenodo) so that restricted access will also be granted to researchers outside the consortium. This will include location, transport mode, and measured data from particle size distribution to their toxic properties. In this way, a database will be exploited and accessible for verification, legislation, and re-use, e.g., for identification of sub 100 nm emission hot spots. Once the nPETS project is finished, the database and data visualisations will still be available through this channel.

A novel ranking index, including toxic effects for sub 100 nm emissions, will first be announced on the nPETS website. The website will also visualise the data. In the next step, it will be transferred to the Mendeley Data repository.

2.5 Transferring data outside Europe

Not applicable at this stage since no partner is from outside Europe. As far as the UK is concerned (i.e. prior to Brexit), UK organisations that process personal data are bound by both the EU GDPR and the UK Data Protection Act (DPA) 2018. Although the former does not longer apply directly in the UK once it left the EU, UK organisations must still comply with the Regulation's requirements. More specifically,

- The DPA 2018 already enacts the EU GDPR's requirements in UK law, and
- As part of its contingency planning for a no-deal Brexit, the UK government issued a statutory instrument – the Data Protection, Privacy and Electronic Communications (Amendments etc.) (EU Exit) Regulations 2019 – under the European Union (Withdrawal) Act 2018. This new regime is known as 'the UK GDPR'.



3. Research data summary

Research data containing sub 100 nm emissions information in form of number, size distribution, chemical content and toxic effects. The same instrumentation's will be used in the four cities in which the studies are performed. The basic instruments are: DEKATI ELPI+ for number and size distribution and chemical content. DEKATI DGI for chemical content and toxicology, and ALI for toxic effects. Raw datasets will be stored in a “location, instrument, year, month, day” hierarchical structure. Each collected data set will be containing metadata describing the test conditions. Data will be shared on the open access repository. Processed data will stored separately in a project-related file structure for toxic effects and source appointment effects as well as social acceptance effects.

Typical data set of raw and processed data will be approximately GB in size.

3.1 Data set description, reference and name

A standard vocabulary will be used containing location, instrument, year, month, day, test sample id. The naming convention is: city, location/lab, instrument, year, month, day, number/size/element/toxic. The collected data refer to chemical species concentration and it is expressed in mass of the chemical per volume of air or solvent.

3.2 Standards

Even though this is a very early stage identification of standards, below some basic standards that nPETS will follow:

- Microsoft Word 2010 for text based documents (or any other compatible version). doc, .docx, .xls, .xlsx, .ppt, .pptx. Also, especially where larger datasets need to be dealt with, .csv and .txt file formats will be used. All finished and approved documents will also be made available as .pdf documents.
- Illustrations and graphic design will make use of Microsoft Visio (Format: .vsd), Photoshop (Format: different types possible, mostly .png), and will be made available as .jpg, .psd, .tiff and .ai files.
- MP3 or WAV for audio files.
- Quicktime Movie or Windows Media Video for video files.

These file formats have been chosen because they are accepted standards and in widespread use. Files will be converted to open file formats where possible for long-term storage.

However, there are also standards for the generation of the data (through the measurements and analysis) that have to be followed in the several phases of the project. These standards are defined by the provider of the measuring equipment or the chemical and the biological analysis protocol. A thorough description of these standards will be included in the relevant Deliverables in WPs 3-6 each time.

3.3 Data sharing, access and preservation

The digital data created by the project will be diversely curated depending on the sharing policies attached to it. For both open and non-open data, the aim is to preserve the data and make it readily available to the interested parties for the whole duration of the project and beyond. A public database will be provided to registered users allowing them the access to. At this point, the consortium can assure that at least the following measures will be considered for a proper management of data:



- Dataset minimisation. The minimum amount of data needed will be stored so as to prevent potential risks.
- Access control list for user and data authentication. Depending on the dissemination level of the information an Access Control List will be implemented reflecting there for each user the data sets that can be accessed.
- Monitoring and Log of activity. The activity of each user in the project platform, including the data sets accessed, is registered in order to track and detect harmful behaviour of users with access to the platform.
- Implementation of an alert system that informs in real time of the violation of procedures or about hacking attempts.
- Liability. Identification of a person who is responsible for keeping safe the information stored.
- When possible, the information will be also made available in the initiative that the EC has launched for open data sharing from research, which is ZENODO.ORG.

3.3.1 Non-Open research data

The non-open research data will be archived and stored long-term in the EMDESK portal administered by KTH. This platform is currently being employed to coordinate the project's activities and to store all the digital material connected to nPETS. If certain datasets cannot be shared (or need restrictions), legal and contractual reasons will be defined.

3.3.2 Open research data

The open research data will be archived on the Zenodo platform (<http://www.zenodo.org>). Zenodo is a EU backed portal based on the well-established GIT version control system (<https://git-scm.com>) and the Digital Object Identifier (DOI) system (<http://www.doi.org>). The portal's aims are inspired by the same principles that the EU sets for the pilot; Zenodo represents thus a very suitable and natural choice in this context. The repository services offered by Zenodo are free of charge and enable peers to share and preserve research data and other research outputs in any size and format: datasets, images, presentations, publications and software. The digital data and the associated meta-data is preserved through well-established practices such as mirroring and periodic backups. Each uploaded data-set is assigned a unique DOI rendering each submission uniquely identifiable and thus traceable and referenceable.



4. FAIR Guidelines for data Management Plan

4.1 Findable

The nPETS data will be findable through metadata which will be created based on the OpenAIRE guidelines for Data Archives. OpenAIRE has adopted the DataCite Metadata Schema and apart from a Digital Object Identifier (DOI), also accepts other persistent identifier schemes, such as Archival Resource Key (ARK), Handle, Persistent Uniform Resource Locator (PURL), Uniform Resource Name (URN) and Uniform Resource Locator (URL).

All the datasets will have a DOI provided by the public repository Zenodo . In addition, the project's open access peer-reviewed publications will each receive a DOI. As described in the previous section. The data will include a unique ID and a timestamp allowing for proper indexing and handling of the stored data. The project team will create folders which are ordered hierarchically and clearly named. Files will be uniquely named and versioned to including project name, WP id, dataset name wherever applicable, time and date. Regarding its documents/deliverables, nPETS will adopt clear and harmonized naming conventions. Clear version numbers and dates will be provided for all outputs produced by nPETS including documents (e.g. deliverables), software codes, datasets and apps.

4.2 Accessible

The nPETS Data server hosted at the CERTH will be registered in the Registry of Research Data Repositories. The raw and processed data will be offered under Creative Commons License Attribution-Non-Commercial CC BY-NC. All project deliverables will be available to authorised users in the project SharePoint administrated by KTH.

The public project deliverables and the executive summaries of deliverables which are not public will be available in the project website and will be made available to the ResearchGate. In more detail, the deliverables that have been defined in the Description of Action as Public will be provided with an open space on the project website after their review and approval by the EC, so that anyone may access them. Regarding the deliverables which are confidential, and their content is restricted, an executive summary of the deliverable will be available in the project website after the EC approval.

nPETS will follow the Open Access practice of providing online access to its scientific research articles, selecting either:

- Self-archiving / 'green' open access – the author, or a representative, archives (deposits) the published article or the final peer-reviewed manuscript in an online (institutional, such as KTH OneDrive) repository before, at the same time as, or after the publication.
- Or,
- Open access publishing / 'gold' open access - an article is immediately published in open access mode.

4.3 Interoperable

The nPETS data will be interoperable as the datasets will adhere to standardised formats: ASCII, txt, csv, xml, tiff. If MS Office, pdf viewer or image viewer cannot be used, a text (ASCII) file will be provided with the dataset that explains where a free reader can be obtained.

The nPETS datasets will use Zenodo's meta-data requirements which include description, creator and ownership, access, lifecycle, and persistent identifiers, compliant with the recommended standards



used by DataCite¹ and OpenAIRE². Wording will be selected to be compatible with subject-specific vocabularies such as Scitation (American Institute of Physics) and INSPEC (Institution of Engineering and Technology). Standard vocabularies will be used for all datasets to ensure inter-disciplinary interoperability and re-use.

4.4 Reusable

The data used in scientific publications, posters and oral communications will be made available for re-use wherever appropriate. Any data published in open-access journals will be usable by third parties. The re-use of data that does not relate to peer-reviewed publications will be made available on a case-by-case basis. The data will remain reusable for the lifetime of the CERTH repository.

¹ <https://search.datacite.org/>

² <https://www.base-search.net/>



5. Participation in the Open Research Data Pilot

The nPETS project will participate in the Pilot on Open Research Data in Horizon 2020 and use the specific Horizon 2020 guidelines associated with “open” access to ensure that the results of the project provide the greatest impact possible.

nPETS will ensure the open access to all peer-reviewed scientific publications relating to its results and will provide authorised access to the results presented in deposited scientific publications.

The scientific publications generated in the nPETS project will include the following fields of meta-data at minimal:

The terms: “European Union (EU)”, “Horizon 2020”

- Name of the action (Research and Innovation Action)
- Acronym and grant number (nPETS, 954377)
- Publication date
- Length of embargo period if applicable

When referencing Open access data, nPETS will include at a minimum the following statement demonstrating EU support:

“This publication is produced in the nPETS project which has received funding from the European Union’s Horizon 2020 research and innovation program under grant agreement No 954377”.

If a publication is generated from collaboration between nPETS and other projects, it may include an acknowledgement like:

“This work is supported in part by the H2020 nPETS Project under grant agreement No 954377”.

The nPETS consortium has planned to make the collected and produced data openly accessible. When this is not the case, the meta-data will describe why access has been restricted.

This version of the DMP does not include the actual meta-data about the Research Data being produced in the nPETS project. Details about technical means and services for building repositories and accessing to this meta-data will be provided in the next version of the DMP, if appropriate, and in D2.3.



6. Allocation of resources

The Core Management Team (CMT) will have overall responsibility for data management. The coordinator and the WP8 leader will lead this group and will be responsible for monitoring updates to the Data Management Plan. An Data Officer (DO) at each testing, samples' and data analysis location will be appointed, with relevant independent expertise to monitor the data collection, storage, handling, analysis and recording activities in the project. Members will be selected within the Consortium. An initial list is given below.

Table 1: List of Data Officers (DOs)

| Test location | Ethics & Privacy Officers |
|---------------------|---|
| Barcelona | Fulvio Amato, CSIC, fulvio.amato@idaea.csic.es |
| Bergamo | Mara Leonardi, BREMBO, Mara_Leonardi@brembo.it |
| Leeds | Haibo Chen, UNIVLEEDS, H.Chen@its.leeds.ac.uk |
| Milan | Andrea Colombo, IRFMN, andrea.colombo@marionegri.it |
| Stockholm | Ulf Olofsson, KTH, ulfo@md.kth.se |
| Tampere | Jorma Keskinen, TAU, jorma.keskinen@tuni.fi |
| Thessaloniki | Dimitri Margaritis, CERTH, dmarg@certh.gr |

To address the data management challenges efficiently, all nPETS partners must respect the policies set out in this DMP and datasets must be created, managed and stored appropriately. Each data producer and WP leader is responsible for the integrity and compatibility of its data during the project lifetime. The data producer is responsible for organising data backup and storage, data archiving and for depositing the data within the repositories.

The estimated costs for making the data Findable, Accessible, Interoperable and Reusable (FAIR) have been kept to a minimum by using a free repository (nPETS database so called nPEDIA) and by making only relevant data FAIR. The costs for making the data FAIR are included in the project's budget and will be claimed if compliant with the Grant Agreement's conditions. Regarding the nPEDIA database, the WP8 leader will be responsible for the maintenance, storage and accessibility of the nPETS datasets.

There are no costs associated with the long-term preservation of the data. The data will increase in value over time because of its impact to air quality, public health and quality of life. It will also enable the methods developed in the project to be used by the project partners and interested bodies.



7. Guidelines for Data Protection and Security

7.1 Data management through the project lifecycle

Data management will follow the defined in this document requirements throughout the project, from the acquisition and generation of data, through data storage, to its deletion. The data management lifecycle is set out in this section, for data to be collected, processed, and shared by the project. The data management lifecycle involves its collection, processing, storage, usage, sharing, retention, and destruction. For each phase, the relevant activities involved will be assessed to ensure that the nPETS requirements are met.

7.1.1 Data collection

Data collection involves both new data and existing one. New data will be generated from devices and tools, whereas existing data will be collected from published or in-house data sources. Regarding new data collection it will be performed at the level of individual work packages. The data collected will be used for analysis of the nanoparticles effects on air quality and the human and animal well being. As a result of the analysis, a set of guidelines will be provided to users and relevant authorities to improve air quality. Used data will be collected through peer reviewed scientific journals, previous projects, and grey papers from industry and administrations. These data will assist to the scientific execution of the nPETS tasks and will verify, when possible, the validity of the project outcomes. During the research and development process, it may be necessary to update these data.

7.1.2 Data processing

Data processing is used for both data preparation and data analysis. Data preparation may include activities such as data cleaning, data validation, data fusion and data integration. Data analysis comprises those activities associated with the exploration and interpretation of data, such as statistical analysis, modelling, and interpretation.

7.1.3 Data storage

Data storage involves procedures used to ensure safety and security of data, while allowing operational convenience for relevant researchers. As data collected in the project will be shared between partners, nPETS will store data using a cloud solution that provides both protection and convenience.

KTH is providing a SharePoint site to store and process the data (raw and aggregated) that are necessary for data analysis and impact assessment. CERTH will provide a dedicated central database to store all data inserted by the partners.

7.1.4 Data sharing

Data sharing includes procedures for sharing between internal partners and sharing with external partners. Both raw and aggregated data will be shared across consortium partners within different work packages or tasks, or external parties. The appropriate controls and permissions regarding data access may vary depending on the relevant data and on those requiring access. Appropriate controls and permissions will be applied to data access and sharing in each case.



7.1.5 Data retention

Data retention concerns the volume of the collected and processed data stored, as well as the duration of time for which it is stored both during the project and after the project has finished. Only data needed by the project will be retained.

7.1.6 Data destruction

Throughout the project partners will agree what data should be retained, shared, or destroyed, to ensure compliance with the data protection aspects. nPETS should destroy all personal and detailed data at a certain time, and only retain anonymised or reworked data under the condition that it cannot be identified as personal data.

7.2 Data protection and ethics through data management lifecycle

7.2.1 Data collection, generation and analysis sites

The data will be managed by authorised personnel who will store it in their local server under security measures. Data will be backed-up regularly. The back-up regime will be case-dependent, taking account of the frequency of data production. When the data are no longer needed, it will be also deleted from backups.

7.2.2 Data breach notification procedure

Despite the safeguarding efforts being made by nPETS partners, the risk of a data breach cannot be reduced to zero. Authorised partners will detect potential or actual data breach as soon as possible to avoid or minimize any associated risk to the data. Data breaches may include accessing by unauthorised third parties, deliberate or accidental loss, corruption, and disclosure by data handlers. In the case that a data breach occurs, the following actions and considerations will be taken:

- The project coordinator and the WP8 leader will contact the authorised personnel responsible for data handling in the site, to identify the breach, to investigate how it has happened, to assess the risks, and to contain the breach.
- The project coordinator and the WP8 leader document the data breach, information of affected individuals and their data records (such as categories and numbers), potential risks, and mitigation strategies.



8. Ethical aspects

8.1 Ethics by design

The aim of EbD is to ensure that ethical conduct is a default mode of operation. Its aim is to draft a proactive approach to ethical issues, so that such issues are considered and addressed at an early stage of the study.

Several foundational principles for EbD have been developed by Borrett et al. (2017), which are summarised below alongside a description of how they are implemented in nPETS:

- **Proactive not reactive:** Rather than wait for ethical concerns to be identified in the review process or ethical infractions to occur during the study period, ethics by design aims to prevent them from occurring. In nPETS, all partners are required to plan the research design, the procedures, and the materials with an ethical concern, instead of mitigating consequences later.
- **Ethical research as the default position:** The goal is to establish ethical research, rather than research with ethical oversight. nPETS will establish a culture of ethical research and monitor ethical concerns at all times.
- **End-to-end ethical incorporation:** While ethical concerns are part of the research planning, ethical considerations may arise during the conduct of the study that the partners will need to address.
- **Visibility and transparency:** It is of utmost importance that potential and actual ethical concerns are discussed locally amongst the partners. The individual partners are given the responsibility to adhere to ethical standards, rather than reporting issues at a later stage of the research, in order that timely take actions when necessary.
- **Respect for human research contributors at all times:** This is the default position in a culture of ethical research and the basis of the ethics by design. During the whole duration of the project, the external contributors in nPETS will be able freely to withdraw or modify their consent, and to ask at any time for the destruction of all or part of the data that they have contributed.

8.2 Testing with leaving beings

Within nPETS tests will take place with both cells and Zebra fish. Regarding cells these are lab cells created for testing purposes and simulate the human ones. Therefore there are no ethical issues foreseen in this case. Regarding Zebra fish embryos, these are considered compliant with 3Rs principles (relative replacement of animal tests). Any procedure that will be done in these animals from about 5 days after fertilization will comply with the EU Directive 2010/63/EU on the protection of animals used for scientific purposes [3]. This includes euthanizing animals, which are no longer needed, whose suffering needs to be ended or whose organs are collected for further analysis.



9. Conclusions

This document introduces the plan for data management that the project will follow, identifying the datasets that will be collected or generated, and describes how data will be stored and shared. In addition, repositories and resources for sharing data are identified. It is anticipated that the most significant datasets are the quantitative and qualitative datasets produced by the laboratory and the measuring campaigns i.e. WPs3-6. It is intended that where possible these data will be made available through open access repositories, starting from spring 2022. All project deliverables which are flagged with the dissemination level “PUBLIC” will be published on CORDIS portal and the project webpage.

The present deliverable is the first version of the DMP. The Project Management Team will regularly reflect with the consortium members to refine and update the DMP. More detailed procedures, descriptions, forms, etc. will be added as they become available through the ongoing work in the respective WPs. The next update will include detailed data set descriptions collected in that period.

The deliverable also provides guidelines of data protection for the consortium partners. Based on the GDPR requirements and principles, when dealing with personal information, the procedures and measures will comply with GDPR requirements.



Literature

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