

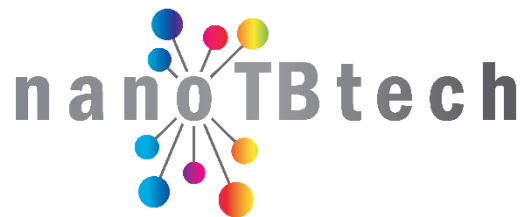


NanoTBTech

*Nanoparticles-based 2D thermal bioimaging
technologies*

H2020-FETOPEN-1-2016-2017

Grant Agreement: 801305



D7.3 (D46)

Data Management Plan

Version 1

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		Date	27/02/2019

Project Deliverable Information Sheet

NanoTBTech Project	Project Ref. No. 801305
	Project Title: <i>Nanoparticles-based 2D thermal bioimaging technologies</i>
	Project Website: http://www.nanotbtech.eu/
	Deliverable No.: D7.3
	Deliverable Type: Open Research Data Pilot (ORDP)
	Dissemination Level: Public
	Contractual Delivery Date: 28/02/2019 (M6)
	Actual Delivery Date: 27/02/2019
EC Project Officer: Barbara GERRATANA	

Document Control Sheet

Document	Title: DMP_v1.docx
	Version 1
	Available at Participant Portal
Authorship	Written by Luis Carlos, Eliana Cavaleiro
	Contributed by Tatiana Costa
	Reviewed by Luís Carlos
	Approved by all the partners

History of Changes

Version	Date	Description	Reviewer
v1	27/02/2019	First version	Luís Carlos



Abbreviations and Acronyms

CA	Consortium Agreement
DMP	Data Management Plan
DoA	Description of Actions
EC	European Commission
FAIR	Findable Accessible Interoperable and Reusable
GA	Grant Agreement
H2020	Horizon 2020 Framework Programme
HE	Horizon Europe
IPR	Intellectual Property Rights
ORDP	Open Research Data Pilot
REA	Research Executive Agency
R&D	Research and Development
SME	Small Medium-sized Enterprises
WP	Work Package(s)



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1. Introduction & Context

NanoTBTech - Nanoparticles-based 2D thermal bioimaging technologies is an European Union's Horizon2020 Programme funded project (Grant Agreement No 801305) coordinated by University of Aveiro (UAVR, Portugal). It will be executed by consortium of 9 partners, two of which SMEs: Fundacion para la Investigacion Biomedica del Hospital Universitario Ramon Y Cajal (Fibirycis, Spain), Centre National de la Recherche Scientifique (CNRS, France), Agencia Estatal Consejo Superior de Investigaciones Cientificas (CSIC, Spain), Institut Za Nuklearne Nauke Vinca (Vinca, Serbia), Instytut Niskich Temperatur I Badan Strukturalnych Im Wlodzimierza Trzebiatowskiego Polskiej Akademii Nauk (WPAS, Poland), Universiteit Utrecht (UU, The Netherlands), Nanoimmunotech SL (NIT, Spain), Biospace Lab SA (Biospace Lab, France) . The project will run from September 1st 2018 to August 31st 2021.

The goal of NanoTBTech is to develop a 2-D thermal bioimaging technology featuring sub-microscale resolution, based on nanothermometers and heater-thermometer nanostructures. In its frame, nontoxic luminescent nanostructures, operating essentially beyond 1000 nm, for *in vivo* nanothermometry and nanoheating, will be designed, synthesized and bio-functionalized. Also a novel imaging system will be developed. It is expected that in the long-term, the developed technology will have a broad impact on non-invasive clinical imaging and theranostics. Multiple conceptual breakthroughs can be further envisaged from the proposed 2D-thermal imaging system, credibly spreading its impact towards non-biomedical technological areas.

The present document – D.7.3 Data Management Plan (DMP) is a deliverable of NanoTBTech project, as a consequence of the participation of the project in H2020 Open Research Data Pilot (ORDP). This pilot was initially restricted to some areas but later started to be applied to all H2020 funded projects aims to improve and maximise access to and re-use of research data generated by H2020 projects, taking into consideration the need to balance openness and protection of scientific information, commercialisation and Intellectual Property Rights (IPR), privacy concerns, security as well as data management and preservation questions. The participation on ORDP is not yet mandatory and, in that regards, it is possible that the beneficiaries of H2020 funded project opt-out of the pilot. However, it is envisaged that the elaboration of DMP becomes compulsory in the next framework programme Horizon Europe (HE).

This document follows the Grant Agreement (GA), article 29.3 about “Open Access to research data” and the Consortium Agreement (CA) on data management and is consistent with exploitation and IPR requirements (to date). It is expected that all consortium partners bind to this document and follow the guidelines and procedures hereby described.

Thus, we refer to the NanoTBTech Project n. 801305, GA article 29.3, about “Open Access to research data”:

“Regarding the digital research data generated in the action ('data'), the beneficiaries must:

- (a) deposit in a research data repository and take measures to make it possible for third parties to access, mine, exploit, reproduce and disseminate - free of charge for any user - the following:*
 - (i) the data, including associated metadata, needed to validate the results presented in scientific publications as soon as possible;*
 - (ii) other data, including associated metadata, as specified and within the deadlines laid down in the 'data management plan' (see Annex 1);*
- (b) provide information - via the repository - about tools and instruments at the disposal of the beneficiaries and necessary for validating the results (and - where possible - provide the tools and instruments themselves).”*



2. Data Summary - Purpose, Features and Principles

A DMP is a key element for good data management and, as stated, a requirement for those projects that opt to participate on ORDP.

The purpose of the DMP is to do an analysis of the main data collected and generated in the frame of NanoTBTech project and to design policies and provide a strategy for managing those data, in order to optimize access to and re-use the same. It will cover the complete research data life cycle (Figure 1). In particular, the document describes the types and formats of research data that will be generated or collected, the standards that will be used, how the research data will be preserved and/or what parts of the datasets will be shared for verification or reuse.

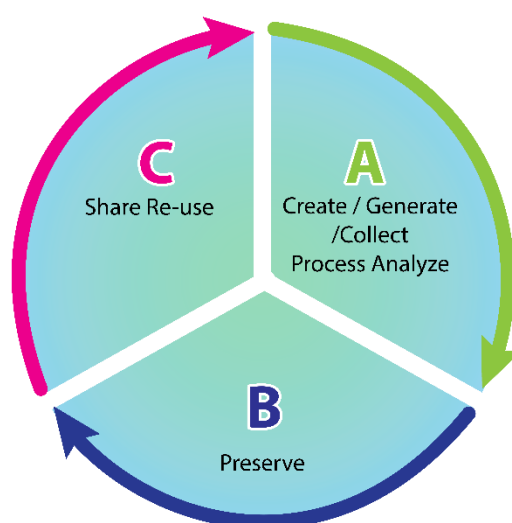


Figure 1. Research Data Life-Cycle (adapted from <https://www.ukdataservice.ac.uk/manage-data/lifecycle> [1]).

The data generated by NanoTBTech can be related to the data management life cycle as follows. Raw data will be generated/collected from lab work, simulations, analysis, measurement and these will be processed and worked into more suitable and usable forms (reports, publications, data tables, images, etc) (step A, Figure 1). Then, there is the need to preserve that data, which implies appropriate naming rules and metadata schemes (step B, Figure 1). Open access policy will be applied to define which datasets will be made accessible (share and re-use, step C, Figure 1).

Due to its nature, NanoTBTech DMP is not expected to be a fixed document, it will rather evolve during the project's lifetime and, therefore, it will be reviewed and updated at regular intervals. Situations that oblige a revision of the DMP are (but not limited to): new data, changes in the consortium policies (innovation potential, decision to file a patent, etc), changes in the consortium composition, etc. At a minimum, it will be updated in M18 and M30, which correspond to the periodic reports due to the EC.

This first version of the document includes a preliminary information the datasets to be produced and/or collected by the project, their nature and some of the specific conditions that are linked to those datasets (at least, the ones that are identifiable to date) and to further detail what was initially considered on GA (in particular on DoA):



“Scientific knowledge (data and publications) produced during the project will be freely available through **open access** schemes. The papers will primarily target journals offering **open access publication** or grant self-archiving (e.g., Nature, Advanced Materials and Physical Review series, Nano Letters, Nanoscale, New England J. of Medicine, J. Clinical Oncology, Cancer Research and Theranostics). All publications will be available through the project website. They will be deposited on Zenodo, which is a catch-all repository for EC funded research provided by CERN, (an OpenAIRE partner). It will enable a green open access option (Zenodo is completely free to access and does not require an account). An **open data management** will also be implemented. While not compromised by the exploitation strategy, the data generated during the project (measurement, simulations, etc.), and the necessary accompanying information, will be publicly accessible on Zenodo via the project’s web site, after publication in peer-reviewed journals.”

The next versions of the DMP will get into more detail and be amended or corrected where needed.

The present document is based on the template made available by the EC “Template Horizon 2020 Data Management Plan (DMP)” [3], with adaptations. Also, it has been produced following the EC guidelines for project participating in ORDP and FAIR Data Management. In general, FAIR data management implies that research data should be Findable, Accessible, Interoperable and Re-usable (Figure 2 [4]).

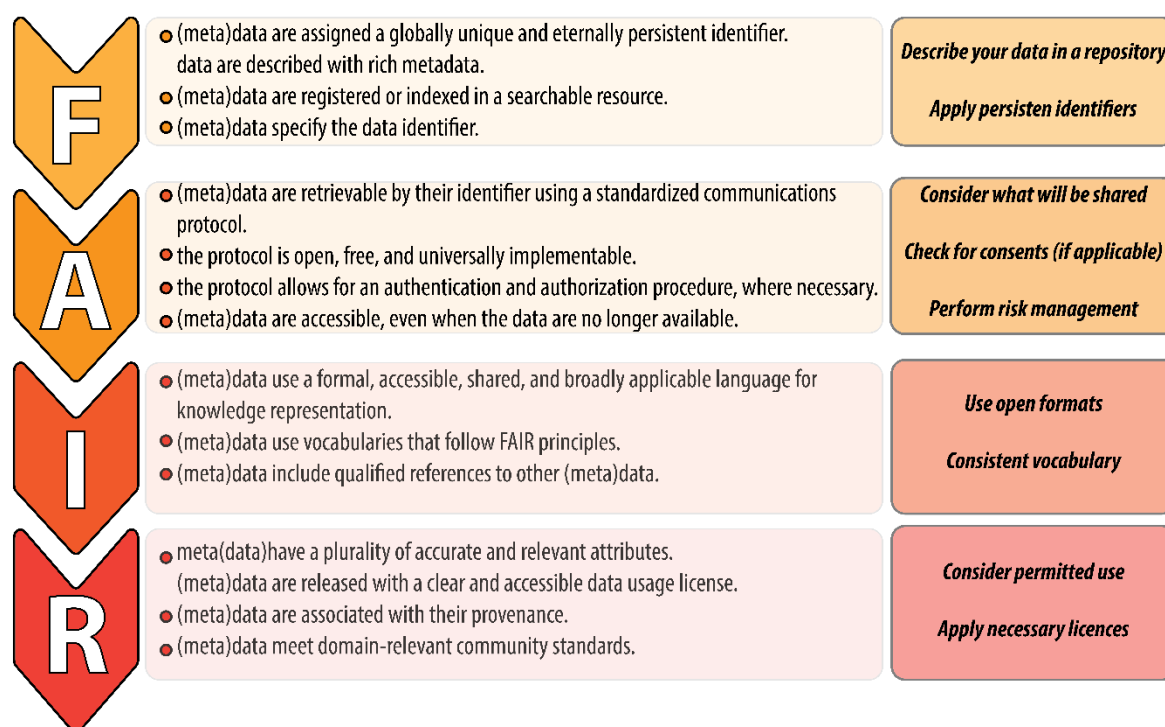


Figure 2. FAIR Data Management Principles (adapted from [4] and [5]).

3. Data Summary - NanoTBTech DataSets

The datasets collected /generated by NanoTBTech can be categorized in 2 main types/categories: **I. Research Data and metadata and II. Publications and other dissemination materials.** In this regard, and depending on the type of the dataset, there are several standards and guidelines the project needs to be aware of and follow, which will be addressed below.

Per principle and following the Grant Agreement (GA) obligations (article 29.3), research data linked to exploitable results will not be put into the open domain if they compromise commercialisation prospects or have inadequate protection. The rest of research data will be deposited in an open access repository (e.g. Zenodo). This will be carefully scrutinised by the Steering Committee, with the help of the partners support structures (e.g. Technology Transfer Offices, Research Support Offices, Libraries). The Advisory Board will also participate, if needed. In any case, the analysis and decision on these matters will follow the EC guidelines (Figure 3) [6]. In practice, compliance with article 29.3 and the former mentioned guidelines will mean that for any of the project findings, that are highly innovative and/or have a high possibility for commercialization 2 actions will be taken: 1) withhold the data for internal use or 2) ensure the correct protection (e.g. apply for a patent application, trademark registration, etc) and initialize technology valorisation efforts in order to find a possible licensee. Additionally, in this context, additional measures will be taken, namely the application of non-disclosure agreements whenever information is to be shared outside the consortium and/or publication delay so that patent application can be filled. Otherwise, the results will be made available Open Access by using online repository services or publishing in journals adhering to Open Access policies (green or gold). Dissemination through the project's website (<http://www.nanotbtech.eu/>) and the project page on CORDIS will also be made.

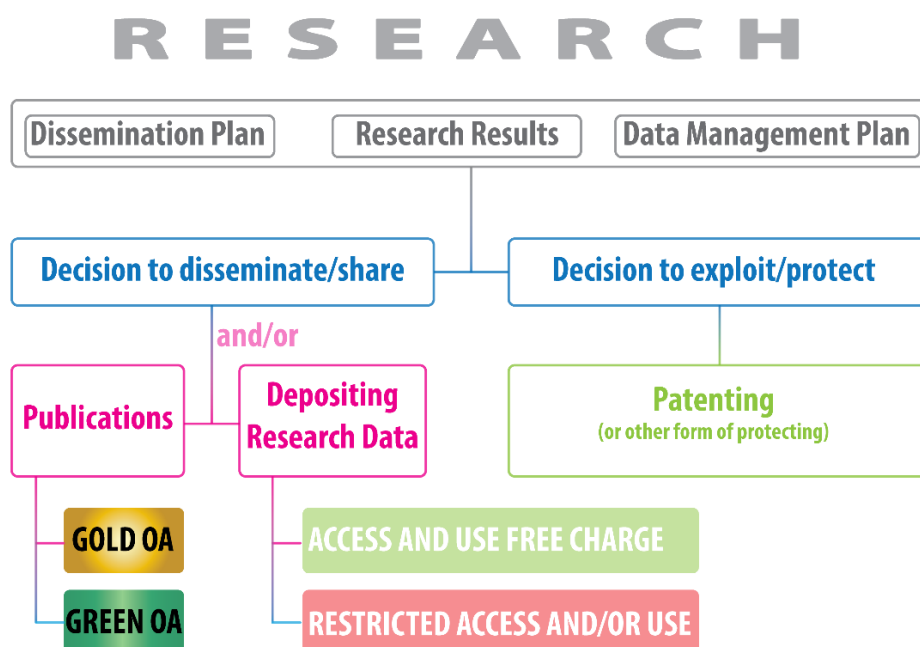


Figure 3. Open access to scientific publication and research data in the wider context of dissemination and exploitation ([6]).



The data generated refer to the experimental and technical data generated/collected during the project execution. Datasets will be generated mainly in the form of spreadsheets, tabulated text files, image files and programming code. Regarding datasets size, at this point of the project, we cannot estimate the total amount of data generated during the project.

In table 1 is listed a summary of the data format generated/collected by NanoTBTech partners. A complete detailed list of data type formats is **in Annex 1**.

File Type	Format
Datasets	“.xls”, “.dat”, “.doc”
Images	“.png”, “.jpg/jpeg”, “.tif/tiff”
Code	“.m”, “.nb”, “.vi”
Other	“.pdf”, “.zip”, “.rar”

Table 1: Summary of data formats used in NanoTBTech

The data collection generated by NanoTBTech will be used, in first instance, by the consortium, subsequently; the results/findings/developments obtained by the NanoTBTech project may be useful to scientific or private entities.

The data sets can be identified and detailed as follows (according to FAIR Data principles) (presented by material type data set).

This table will be used to each dataset

Data set reference and name	<i>e.g. Nanoparticles_DataSet;</i> <i>e.g. Nano Heater-Thermometers_DataSet;</i>
Data set description	The metadata will be recorded in a .xls file comprising the data collection, describing the following key aspects: <ul style="list-style-type: none"> - Consortium partner - Project name - Funding source - Data researcher - Sample name - Sampling procedure - Data collection instruments - Substantive, temporal and geographic coverage of data collection - Data source(s) - Variables - Technical information on files - Citations to related publications (if applicable) - Technical information on files, e.g., information on file formats, file linking
Metadata and Standards	Metadata: The metadata generated for each data set or image, will be organized according the corresponding fields existing in Zenodo.org: <ul style="list-style-type: none"> - Digital Object Identifier - Publication date



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	<ul style="list-style-type: none"> - <i>Title</i> - <i>Authors and affiliations</i> - <i>Description</i> - <i>Keywords</i> - <i>Access right</i> - <i>License</i> - <i>Community</i> - <i>Grants</i> <p>Standards:</p> <p>Data and metadata will be given in standard US English. Each data set will be accompanied by a description (field available on Zenodo.org) to identify contents and experimental conditions.</p> <p>Openly shared NanoTBTech data will be identified according to the following guidelines:</p> <ul style="list-style-type: none"> • Data related to a published research article will be named as follows: "First author name _ Article reference_ Figure number (letter)_version.extension" <p>in which the article's reference will be stated as: "Standard Journal Abbreviation + issue number(year)page"</p> <p>and the version will be abbreviated as "v" and numbered in increasing order from less to more recent, starting by 1 with increments of 1 unit, e.g. "v1, v2, v3...".</p> <ul style="list-style-type: none"> • For figures, tables or calculations involving or yielding an ensemble of data files, those will be shared within a compressed folder following the above stated naming convention, in which, the 'extension' will correspond to a standard compressed folder extension (e.g. .zip). In such cases, the name of the individual files included in the compressed folder will be freely chosen by the data owner, making sure that name repetition does never occur and that the content of each individual file is clearly described in a supporting text file. • Data from other sources, e.g. public presentations, posters, summary reports, etc. will be shared within a single compressed folder named as: "First author _ DOI Zenodo _version.compression extension" <p>in which, the DOI given by Zenodo.org will be used to link the data to its source (e.g. conference poster).</p>
Data sharing	<p>The data generated by the project will be shared among the consortium members whenever necessary. A shared platform in NanoTBTech website will be used to upload and share generated data to be used by the consortium members.</p> <p>To whom it may interested in NanoTBTech data can access the majority of those data (public) mainly through publications (Open Access Scientific Journals) dissemination materials and Zenodo.org.</p> <p>Raw and processed data will be openly accessible according decisions from the consortium members.</p> <p>NanoTBTech data will be available through Zenodo.org website. This is a catch-all repository for EC funded research provided by CERN, an OpenAIRE</p>



	<p>partner. Zenodo.org does not require an account, login or password given free access to the deposited data.</p> <p>The Creative Commons Licensing will be used for all data deposited on Zenodo.org, protecting the ownership of each data sets.</p> <p>NanoTBTech data will mostly be available for re-use as soon as possible. If the data are used in a publication or other, it will be deposited on Zenodo.org as the publication is public. The access to the data will follow the same embargo as the publication deposited on Zenodo.org.</p> <p>The unpublished data, after the decision by the consortium, will be deposited in a data repository for a certain time also determined by the consortium.</p>
Archiving and preservation (including storage and backup)	<p>Each NanoTBTech consortium partners is responsible for data quality, since they are the data producers. In any case, the consortium follows the standard practices in physics and chemistry: reproducibility, reliable statistical analysis, noise/error bars evaluation, consistency with other experimental results and theory.</p> <p>Zenodo.org server will allow the long term of data generated, at least as long CERN is operating. If for some reason Zenodo.org close, the migration to another repository will be guaranteed.</p>
Reported by	The data set generator

4. Allocation of Resources and Responsibilities

Compliance with FAIR principles implies costs. These can be related, for instance, to Open Access publication, project website maintenance, use of repositories or copyright licensing. The table below lists some of the costs identified:

Publication in "Open Access journals"	<p>Costs related to open-access to research data in H2020 are eligible for reimbursement under the conditions defined in the H2020 GA, in particular Article 6 and Article 6.2.D.3, but also other articles relevant for the cost category chosen.</p> <p>In this regard, these costs were anticipated and considered in the project budget. The cost of sharing, in case of multiple authors, will be decided among the authors on a case-by-case basis.</p>
Project Website Operation	Supported by the coordinator of the project (including HR for site maintenance)
Data archived at ZENODO	Free of charge
Other fees	As each partner is responsible for the data it produces, any other fee will be responsibility of the data owner.
Long term preservation and storage	<p>Data preservation for at least 1 year after the project end is required (GA 31.3).</p> <p>The final dataset will be transferred to the ZENODO repository, which ensures sustainable archiving of the final research data. Additional data storage will be ensured by each partner institutions' data repositories.</p>



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The UAVR, as coordinator of the project, will be responsible for DMP writing/updating/coordination as well as, together with the NanoTBTech Steering Committee, by monitoring its implementation, ensuring that all the partners comply with it. Each project partner is responsible for the data it produces (data generation, metadata production, data quality and proper data management), and should comply with the present deliverable and included guidelines.

5. Data Security

The NanoTBTech approach for the sake of data security will follow provisions listed below:

- Data should be stored in at least two different locations to avoid data lost
- Data should be encrypted whenever necessary (e.g. confidentiality issues)
- The use of USB flash drives should be limited
- Follow a systematic labelling procedure in order to insure coherence along the datasets.

Data will be uploaded in Zenodo.org and stored in CERN Data Centre. On the long-term storage, the institutional repositories of each partner should provide a satisfactory level of security.

To date, no major issues regarding personal data security are foreseen.

6. Ethical Aspects

This section is to be covered in the context “ethics section” of DoA. All the actions, protocols and procedures related with NanoTBTech project described in DoA will strictly follow the Ethic’s Directives and Rules delivered by the World Medical Association (Declaration of Helsinki), the European Parliament, the Council of Europe, the European Commission and the European Group on Ethics in Science and New Technologies. Also, and in particular to what human cells and animals is regarded:

A file will be put together and kept (ready for submission to REA upon request), containing the following documents for the human/cells tissues and animal experiments:

- NTBT_EA1 - If the origin is commercial, details in cell/tissue types and information on provider should be kept on file;
- NTBT_EA2 - If the origin is within the project, details on cell/tissue types and ethics approval information should be kept on file;
- NTBT_EA3 - If the origin is from another project; details on cell/tissue types and information on authorization of primary owner including references to ethics approval should be kept on file.
- NTBT_EA4 - Relevant authorizations for the animal experiments;
- NTBT_EA5 - Project authorization;
- NTBT_EA6 - Training certificates/personal licenses of the staff involved in animal experiment.
- NTBT_EA7 - Description of the nature of the animal experiments;
- NTBT_EA8 - Description of the procedures used to ensure animal welfare;
- NTBT_EA9 - Description on how you will comply to the three Rs principle (Replacement, Reduction and Refinement).



7. Other Issues

Details in relation to other national/funder/sectorial/departmental procedures for data management used by each partner are not herein presented as this is a public DMP release.

8. Conclusions

The present DMP constitutes the first release of the NanoTBTech DMP and is planned to be updated whenever significant changes arise and in any case of the document planned revision (in M18 and M30, which correspond to the periodic reports due to the EC).

9. Bibliography and Sources

- [1] UK Data Service, "Research Data lifecycle," [Online]. Available: <https://www.ukdataservice.ac.uk/manage-data/lifecycle>. [Accessed 6 11 2018].
- [2] European Commission, "H2020 templates :Data Management Plan v1.0," 2016.
- [3] W. Mijnhardt, "FAIR Principles for #Data Sharing: Findable, Accessible, Interoperable, and Re-usable," Twitter, 21 02 2016. [Online]. Available: <https://twitter.com/wmijnhardt/status/701478975743332354>. [Accessed 6 11 2018].
- [4] Force11 discussion forum, "The FAIR data Principles," Force11, [Online]. Available: <https://www.force11.org/group/fairgroup/fairprinciples>. [Accessed 6 11 2018].
- [5] European Commission, "Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research data in Horizon 2020," European Commission - Directorate For Research and Innovation, Bruxelles, 2017.
- [6] European Commission, "guidelines on FAIR data management in Horizon2020," European Commission, 2016.



10. Annexes

Annex I

Data File Extensions

File ext.	Description	Editing software
dat	Generic data file	Text editors (e.g. Notepad)
txt	Text file	Text editors (e.g. Notepad)
doc	Text file	MS Word
xls	Spreadsheet	Spreadsheet software (e.g. MS Excel)
cvs	Spreadsheet	Spreadsheet software (e.g. MS Excel)
jpg	Raster image	Standard image viewers
png	Raster image	Standard image viewers
tif	Raster image	Standard image viewers
nb	Code	Wolfram Mathematica
xml	Code	XML editors
pdf	Portable document format	Standard PDF viewers
zip	Archive file format	Standard file archivers
rar	Archive file format	Standard file archivers

