NEMESIS

Empowering the Changemakers of Tomorrow

Requirment No. 5

D7.5: Data Management and RRI Plan

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Report Author(s):	**Dr Aristidis Protopsaltis**
Reviewed by:	**Ms Ioanna Garefi** **Mr Gerd Schmidt**
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Acronyms, abbreviations and definitions

Acronyms	Definitions
RRI	Responsible Research and Innovation
LMS	Learning Management System
DMP	Data Management Plan
FAIR	Findable, Accessible, Interoperable and Re-usable
NGO	Nongovernmental Organizations
R&I	Research and Innovation
EU	European Union
SI	Social Innovation
SIPs	Social Innovation Practitioners

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1. Executive Summary

The purpose of the D7.5 Data Management and RRI Plan deliverable is to present the data management and RRI approach for the NEMESIS project.

The data management plan (DPM) is central to good data management. The plan outlines the consortium plans for the data management life cycle, the data to be collected, processed and/or generated in compliance to the H2020 guidelines.

The RRI plan describes the NEMESIS approach towards Responsible Research and Innovation. The NEMESIS approach takes into account the five key dimensions of RRI – Ethics, (Public/Societal) Engagement, Open Access, Gender Equality and Science Education and explains how these will be addressed within the project.

The report is divided in two parts, one describing the Data Management Plan and the other one the RRI plan.

2. Introduction

The aim of this document is to describe the data management (DMP) and Responsible Research and Innovation (RRI) plans that the NEMESIS consortium will follow throughout the duration of the project, to achieve research excellence. This deliverable defines a consistent plan and set of procedures to guarantee the compliance with the EC fundamental principles FAIR data and RRI.

DMPs are a key element of good data management. A DMP describes one of the aims of the NEMESIS project is to make research data findable, accessible, interoperable the data management life cycle for the data to be collected, processed and/or generated. Following the H2020 guidelines and re-usable (FAIR), therefore the NEMESIS DMP should include information on:

- 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).

Over the last years many efforts have tried to reduce the distance between science and society, and assist in making people informed citizens, leading to a European-wide approach in Horizon 2020 called Responsible Research and Innovation. RRI seeks to bring issues related to research and innovation into the open, to examine their consequences and effects into the society, and to provide a framework for examining the relationship between science, technology and society and to experiment and analyse their joint evolution in an inclusive way, for the future. RRI is fundamental for the NEMESIS project because of its social aspects of the innovations and its participatory approach, involving all the stakeholders in creating the necessary resources.

3. Data Management Plan

The NEMESIS data management plan describes the data management life cycle for all data sets that will be collected, processed and generated by the project. More precisely, the management plan will indicate how this Consortium will handle the data compiled during the project, and even after the project is completed. This plan will increase the project efficiency, will save time and resources in the long run and will enhance data security and minimise the risk of data loss.

The different types that NEMESIS will gather during the duration of the project are:

- Personal data of the project participants (teachers, social innovators, students etc.) gathered during the professional development programme (T2.2) during the co-creation labs (T4.1) and through the platform (WP3)
- Interview data in relation to the interviews targeted to SIPs of T1.2 and the training needs analysis of task 2.1
- Content relating to exchanges of comments and views on the project platform between students (T4.3)
- Data related to the co-creation labs, including logistics and metadata
- Usage related data during the project deployment in WP4

- Data pertaining to interactions external to the NEMESIS platform on social networking sites; and
- Open data from open educational resources that will be available through the platform.

3.1. Data summary

The NEMESIS project will collect data from respondents via surveys and interviews that will take place in WP1, WP2 and WP5, during pilot implementation in the co-creation labs and the implementation of the other learning activities in WP4, the engagement and dissemination activities and data collected through the project platform. In particular, during these activities data will be collected from Social Innovation Practitioners, SI organizations, teachers, school leaders and parents. Interviews will be recorded and all collected data from the research activities will be securely stored on WP Leaders electronic storage systems. Data will be also selected from students of primary and secondary education (aged from 7 to 18) that will take part in the evaluation of the educational model.

NEMESIS will involve the collection of human data, which includes text, audio and visual records of what takes place in those settings. Responses provided in questionnaires, interviews, workshop and focus group might be recorded. In case of recordings, the recorded data will not include any personal identification; hence it will not be possible to identify participants afterwards. Information will be processed during the phase of data analysis and will be shown in project reports. It will not be possible to identify the source of the information. The results of this investigation may be published in scientific journals or conferences and may be used in further studies. Nothing of the provided personal data will be handled out to third parties

The obtained data will help the consortium reach its objectives which include testing and evaluating the NEMSIS **innovative learning model, open technologies and participatory relations and processes.**

In common with other projects of this kind, and following the recommendations of local and international data protection procedures[1],[2] , NEMESIS will be structured around a data controller (FAU) ultimately responsible to end users for their data and to the rest of the consortium for agreeing and enforcing guidelines to the data processors. Data processors will be partners (Valnalon, ASOCCE, SEi, CEIP Los Albares, HJS, AEMaia) directly responsible for the processing of personal data in accordance with the guidelines approved by the data controller.

Data will be stored with the servers of the ILIAS platform, located in Germany at ILI's premises, and data processing will be done in accordance with the laws of the country of the data source (i.e., the users) in combination with the appropriate laws of the country where the servers are installed. All data will be stored on secure, password-protected servers and no third party will have access. There will be appropriate backups and firewall protection. The ILIAS platform is an open source platform but it will be installed locally, protected by password and firewall and not third party,

[1] https://ico.org.uk/media/for-organisations/documents/1546/data-controllers-and-data-processors-dp-guidance.pdf

[2] http://ec.europa.eu/justice/data-protection/data-collection/obligations/index_en.htm

outside the consortium will have or be able to access the data. Finally, personal data collected during the project will be destroyed at the end.

3.2. FAIR Data

FAIR data is a prerequisite for proper data management and data stewardship. ... Contemporary e-Science requires **data** to be Findable, Accessible, Interoperable, and Reusable in the long-term, and these objectives are rapidly becoming expectations of agencies and publishers.

We intend to share our dataset in the publicly accessible disciplinary repository ILIAS and/or FAUbox using descriptive metadata as required/provided by that repository. The repository assigns DOIs for clear identification and citability of the dataset. Additional metadata of the dataset will be offered within a separate XML file in a standardized way by using the schema, which is suitable for the discipline. Folders will be organized in a hierarchical and clear structure. Files will be uniquely identifiable and versioned by using a name convention consisting of project name, dataset name, method used, ID, place and date.

3.2.1. Making data openly accessible:

All data will be made available to the consortium partners and to third parties that might be interested. However, there will be different access levels. Anonymized data will be made openly available. Sensitive data will not be publicly available, according to data protection law. Access can be granted onsite at the repository (visiting scientist) or - with sufficient clearance – through controlled remote data processing.

The following software is needed to access the data: word/spreadsheet processing program (e.g. Office, OpenOffice), Adobe PDF Reader, image viewing software (e.g. XnView), XML viewer, Browser, video viewing programs (e.g. VLC Media Player).

No additional documentation is needed for the software. The data, metadata and documentation will be deposited in the NEMESIS SI Open Learning platform server for 5 years.

3.2.2. Making data interoperable:

The data, metadata and documentation are compliant to disciplinary standards, open file formats and use controlled vocabularies and the standard metadata schema for easy interoperability and re-use.

3.2.3. Increase data re-use (through clarifying licenses):

The data will be licensed under Creative Commons CC BY 4.0 International. All data will become available during the last three months of project end. Parts of the data can become available even before due to journal publications. There will be no restriction period. The data can be re-used by other scientists in the field. The data quality is ensured by different measures, these include validation of the sample, data from all piloting countries and even more, large number of participants (students, teachers, SIPs etc.) and comparison with results of similar studies. As open

formats are used for data archiving, the data will remain re-usable until the repository withdraws the data and the minimum will be 5 years after the completion of the project.

3.3. Allocation of resources

No extra costs are anticipated in making the NEMESIS data FAIR.

3.4. Data security

Data security refers to protective digital privacy measures that are applied to prevent unauthorised access to computer systems, databases, websites and data repositories. All NEMESIS data will be stored securely and safely.

3.4.1. Data access and storage

Participants will be informed as part of the consent process that this material was intended for release to the Technology Enhanced Learning (TEL) research community. Early versions (prior to anonymization and censoring) will be kept on password-protected file systems. Data storage and handling processes will ensure protection and confidentiality: All data will be stored on secure, password-protected servers at ILI's premises and not third party will have access. There will be appropriate backups and firewall protection. If data is to be released outside NEMESIS, a second approval process will be carried out for all involved participants. Data will be used for research purposes only, and we will hold the data only for the time of research, and as long as the scientific community can benefit from these data.

3.4.2. Anonymization and censoring

Segments of collected data that participants wish to be deleted will be erased. The content will be removed from the data records and replaced by a "deleted" tag. Participants will be identified exclusively by an ID code or alias throughout the data documentation (except where their names naturally occurred in a voice stream). All names and contact information will be deleted from the demographic database prior to release.

3.4.3. Data sanitisation

Data sanitisation will be used to protect the privacy and confidentiality of students' data. The sanitisation method to achieve that is the one proposed by the German Federal office for IT Security. It is called the VSITR standard, which overwrites the hard-drive with 7 passes.

3.4.4. Integrity of Data

All records should include sufficient detail to permit examination for the purpose of replicating the research, responding to questions that may result from unintentional error or misinterpretation, establishing authenticity of the records, and confirming the validity of the conclusions. Meticulous record-keeping is a sound scientific practice which provides an accurate contemporaneous account

of observations that become a permanent reference for the researcher, who otherwise might not remember several weeks, months, or years later exactly what had been observed or what methods had been used.

All data should be recorded contemporaneously with the production or observation of the data.

Questionnaires should be stored without identifiers, using only code numbers to link them to computerized files. Records, including transcripts of taped interviews, can be redacted to remove names and other key identifiers. The rules and procedures for carrying out such redactions should be available to anyone who reviews the data.

3.4.5. Data recovery

In case of data damage, corruption and loss the appropriate techniques will be used. However, the servers where the NEMSIS data will be stored will be backed up daily to avoid data corruption or loss. Additionally, all partners will save locally their data. In the unfortunate case of needing to recover data a specialized disk-imaging procedure will be used to recover every readable bit from the surface. Once this image is acquired and saved on a reliable medium, the image can be safely analysed for logical damage and will possibly allow much of the original file system to be reconstructed.

3.4.6. Use and Misuse of Data

NEMESIS researchers are acquainted with the relevant quantitative methods available for processing data, including graphical and tabular methods of presentation, error analysis, and tests for reliability. Research integrity requires not only that reported conclusions are based on accurately recorded data or observations but that all relevant observations are reported. It is considered a breach of research integrity to fail to report data that contradict or merely fail to support the reported conclusions, including the purposeful withholding of information about confounding factors. NEMESIS partners are committed to avoid that. Whenever necessary, help is will be provided by ILI-FAU since FAU has expertise in dealing with such issues.

3.5. Ethical aspects

All ethical aspects have been covered in a separate deliverable D8.1 Ethics Requirements submitted to the EC on month 5.

4. RRI

“Responsible Research and Innovation means that societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society. RRI is an ambitious challenge for the creation of a Research and Innovation policy driven by the needs of society and engaging all societal actors via inclusive participatory approaches” (European Union 2012, 2013). Within this EU approach, the RRI framework consists of 6 key elements: public engagement, science education (formal and informal), gender equality, open access, governance and ethics. All these aspects are

an integral part of NEMESIS since NEMESIS is ambitious to present **a new approach towards the attainment of Social Innovation (SI) skills** by combining **innovative learning models, open technologies and participatory relations and processes**.

4.1. Public engagement

Public Engagement fosters R&I processes that are collaborative and multi actor. All societal actors work together in order to align its outcomes to the values, needs and expectations of society.

Engagement of all societal actors (citizens, researchers, educators, parents, students, policymakers, business, NGOs etc.) and their participation in the research and innovation (R&I) process in accordance with the value of inclusiveness is reflected in the chapter of the Fundamental Rights of the European Union (European Union, 2010, art. 23). The European Union advocate to mutual learning process and agreed practices needed to develop join solutions to societal problems and opportunities and to pre-empt possible public value failures of future innovation

Public engagement is pivotal for NEMESIS. NEMESIS focuses on social innovation (SI) and SI can only became reality with the engagement of the public. More specifically, NEMESIS will plan and achieve public engagement by creating a Social Innovation Practitioners (SIPs) Community. SIPs participate in the co-creation of the educational resources and the implementation of the learning activities with students providing thus a strong link to the business, social economy and civil society world. This link to real life social innovation experiences can be highly inspirational and beneficial for young students and the society.

Additionally, the NEMESIS model presupposes the engagement of stakeholders (teachers, school leaders, students, parents as well as social innovation practitioners) into a participatory context and culture aware process for knowledge co-creation and collective learning. Particularly these stakeholders will be engaged and collaborate in different project phases. Initially they come together in the framework of the co-creation labs which is as a key element of the NEMESIS educational model. The aim of the co-creation labs is to bring together interdisciplinary and cross-generational teams aiming at the design and implementation of open educational resources and the learning activities that will be implemented at the project. As a result, new knowledge and educational paths are co-created and students together with all the other actors are active participants of this process instead of passive receivers. In addition to co-creation labs, collective learning, and therefore public engagement, is performed during other phases such as for example during the project-based learning activities where students will collaborate with peers, SIPs, teachers and their parents to develop projects and present them through digital stories. The later will enable the development of an online community where knowledge sharing is constant and learning never stops.

Through these activities NEMESIS will engage multiple actors and connect the R&I process to the society.

4.2. Science education

Science Education has a twofold focus, one is to enhance the current education process to better equip citizens with the necessary knowledge and skills so they become better informed and actively involved citizens; and second to increase the number of researchers (promote scientific vocations).

The aim of NAMESIS is primarily on the first aspect of science education by offering an innovative educational process and the development of the co-creation labs were multiple actors are involved in the development of the educational material and the learning process and the connection of real life problems and science education becomes evident.

Scientists and researchers are the backbone of knowledge-based economies. However, Europe faces shortage of science related professionals, it also needs to enhance the current education process to better equip future researchers and other societal actors with the necessary knowledge and tools to full participate and take responsibility in the R&I process. NEMESIS shares the aim to boost the interest of children and youth in science and especially in the mutually beneficial relation between science and society, so they can become the researchers of tomorrow and contribute to a science-literate society.

4.3. Gender equality

The dimension of gender equality is defined according to a three-dimensional construct[3] addressing three pillars, Horizontal and vertical participation of women in research, Structural change in institutions and Gender in research content.

The first pillar, horizontal and vertical participation of women in research, comprises measures to promote women in fields, where they are underrepresented as well as to increase female participation in management and decision-making positions. The goal here is to reduce gender segregation and (under-) representation of women in research and innovation. The NEMESIS has addressed this issue by having a large number of female scientists and SIPs in the consortium, guiding and driving the project.

The second pillar comprises structural measures aimed at revising existing organisational arrangements to progressively eliminate barriers impeding women's advancement to top positions and factors inducing women to drop out of science. This pillar is the one that NEMESIS might have the least influence because it does not have the capabilities to make structural changes. However, as part of the policy recommendations NEMESIS will try to promote such changes.

The third pillar of gender equality – the integration of a gender dimension in research and innovation content – is legitimised by the gender mainstreaming strategy on the one hand a d by quality standards in science and research on the other (Caprile et al. 2012). The project takes into strong consideration during the whole process of the project design and implementation gender equality issues. Particularly, the project encourages the promotion and involvement of female

[3] https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/meta-ana lysis-of-gender-and-science-research-synthesis-report.pdf

social innovators to ensure that young girls are also exposed to female role models of social innovators.

Finally, NEMESIS fully supports the European Union policy on equal opportunities between women and men. To this end, participation of women in the management structure is continually encouraged and supported. Project staff of all partners is composed according to the principle of equal opportunity and member organisations strongly enforce an equal opportunity policy within their human resources selection processes.

4.4. Open access

Regarding, open access NEMESIS considers two broad lines: Open access (OA) and Open Data (OD).

Open access (OA) refers to the idea of making research results freely available to anyone that wants to access and re-use them. One of the main d rivers of the OA idea is to make publicly funded rese arch accessible to the general public. NEMESIS will make all its results, publications and deliverables available freely to anyone that is interested and wants access. Additionally, NEMESIS will also use an open source platform (ILIAS) to develop its SI Open Learning platform. The access to the platform will also be available to anyone who might be interested.

However, the term open access also encompasses the free access to the research data that underpins publications or research projects, also referred on its own as Open Research Data (OD). Open Research Data is usually distributed with requirements of attribution and share-alike (copies or adaptations of the data need to be shared using the same principles as the source). NEMESIS will offer free access to data in a safe and secure way, protecting the participants' rights but at the same time allowing scientists and other researches to validate its results.

NEMESIS believes that free and early access to scientific work might improve the quality of scientific research and facilitate fast innovation, constructive collaborations among peers, and productive dialogue with civil society.

4.5. Governance

According to the RRI tools project governance of RRI is any form of coordination designed to foster and mainstream RRI within an organisation or in the interaction with other stakeholders in an inclusive, transparent, reflective and adaptive way. The approach of governance in the RRI looking that it can include concepts such as uncertainty, purposes, motives and political and social complexion along with possible paths of research and innovation (Stilgoe, Owen, & Macnaghten, 2013). This is exactly what NEMESIS is aiming of doing. NEMESIS encourages all the different stakeholders to work together throughout the research process to increase the relevance of policies and apply RRI principles at all stages. Governance dimension is interlinked with gender, public engagement, open access, and ethics.

4.6. Ethics

The ethical aspect of RRI focuses on research integrity, the prevention of unacceptable research and research practices; and science and society the ethical acceptability of scientific and

technological developments. NEMESIS will comply with the ethical standards and guidelines of Horizon 2020, at all stages from all partners. All participant institutions are required to comply with the EU directive 95/46/EC on data protection and with any updates on standards or requirements it might receive during the lifetime of the project. Additionally, NEMESIS has an appointed ethics manager who oversees the whole ethical procedure and makes sure that all partners comply with the NEMESIS ethical approach and procedures outlined in deliverable D8.1 Ethics Requirements.

5. Conclusions

The NEMESIS consortium has created a comprehensive management plan that guaranties the FAIR use of data and show that the consortium is committed to protect the data gathered during the life of the project and keep it safe beyond. Additionally, the NEMESIS consortium has outlined the RRI principles that guide the implementation of the project and are inherent to the nature of the project.

6. References

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