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HISTORY OF CHANGES		
<u>Version</u>	<u>Publication date</u>	<u>Change</u>
1.0	31.08.2023	Initial version DMPv.1
2.0	28.02.2026	Final update at project end, reflecting actual datasets, storage, sharing, access conditions, repositories and preservation arrangements

DISSEMINATION LEVEL	
X	PU=Public
	PP=Restricted to other program participants (including the EC)
	RE=Restricted to a group specified by the consortium (including the EC)
	CO=Confidential, only for members of the consortium (including the EC)

Executive Summary

This final version of the ICSE Science Factory Data Management Plan (DMP) documents the data management procedures implemented during the full project duration and clarifies the status of project data and outputs at project end. It covers data identification, data collection, data storage, data protection, access conditions, data sharing, publication and preservation beyond the project duration.

The DMP reflects the datasets and outputs generated across the project, including evaluation data from Work Package 5, implementation and documentation data from Work Package 2, communication and dissemination materials from Work Package 6, and relevant project documentation. It distinguishes between anonymised research data that may be shared openly where appropriate, restricted or sensitive data that cannot be made publicly available, and public project outputs such as deliverables, educational materials and dissemination resources.

The ICSE Science Factory project followed the principle “as open as possible, as closed as necessary”. Public deliverables and educational outputs have been made freely accessible through the project website. Relevant publications have been reported in the final reporting system and are intended to be deposited in Zenodo where required and possible after completion of the publication process. Anonymised quantitative datasets suitable for sharing will be archived in a public research data repository after completion of planned publications, provided that ethical, legal and data protection requirements allow this.

Sensitive raw data, including audio or video recordings, non-anonymised case study material and communication materials showing identifiable persons, are not treated as open research data and will not be deposited as reusable datasets unless explicit consent and rights clearance allow this. Such data remain with the collecting institutions or, where applicable, with PHFR as coordinator, and are retained or deleted according to national legal requirements, institutional policies and consent agreements.

The project implemented measures to support the FAIR principles by using standardised instruments, clear documentation, open file formats where possible, anonymisation and pseudonymisation procedures, structured internal storage, and open access to public project outputs. This final DMP therefore records the implemented data management strategy and provides the basis for the long-term preservation, traceability and responsible reuse of project outputs.

1. Introduction

The overall aim of the ICSE Science Factory project was to foster improved science education for all citizens by creating new partnerships in local communities, for example between teachers, students, scientists, researchers, innovators, professionals in enterprises and community actors. These partnerships engaged learners in real-life problem-solving situations within education, the workplace and other learning environments, contributing to a lifelong learning continuum and raising interest in science studies and careers.

During the project, national teams in Germany, Portugal, Croatia, Cyprus and Türkiye implemented Open Schooling Activities, Lighthouse Activities, Interactive Career Talks, local partnership conventions and public fairs. In Open Schooling Activities, schools and community members worked together on science-related challenges on topics related to sustainability, digitalisation and health, developing locally relevant approaches and solutions.

Data requiring management were generated in several Work Packages. These included evaluation data collected in WP5, documentation and implementation data generated in WP2, dissemination and communication materials generated in WP6, and project documentation produced during management, coordination and reporting activities. The project also generated public outputs such as deliverables, educational materials, best practice examples, policy documents and dissemination resources.

All project activities involving data collection were conducted in accordance with European and national data protection requirements, including the General Data Protection Regulation (Regulation (EU) 2016/679), and with the ethical requirements applicable to the participating countries and institutions. Particular attention was paid to activities involving minors. Where required, informed consent was obtained from participants and, in the case of minors, from parents or legal guardians.

This final DMP is based on the Horizon Europe Data Management Plan template and reflects the project-end status of data management. It updates the initial DMP by replacing planned procedures with the measures actually implemented during the project and by clarifying which data and outputs are openly available, restricted, archived or excluded from sharing for ethical, legal or data protection reasons.

2. Data summary

During the ICSE Science Factory project, several types of data and outputs were generated across Work Packages. These data differ in purpose, format, sensitivity, access conditions and potential for reuse. The project therefore applies differentiated access and preservation arrangements.

The main categories of data and outputs generated during the project are summarised below.

Table 1. Overview of data and outputs generated during the project

Data / output category	WP	Description	Access and preservation
Evaluation questionnaire data	WP5	Anonymised quantitative pre- and post-questionnaire data from primary students, secondary students and adults, collected for Lighthouse Activities, Open Schooling Activities and Interactive Career Talks.	Suitable anonymised datasets will be archived in a public research data repository after completion of planned publications, provided that ethical and data protection requirements allow this. Internal copies are stored by PHFR and/or UNIC according to project responsibilities.
Case study and qualitative evaluation data	WP5	Teacher interviews, student focus groups, observation notes and case study documentation, mainly related to Open Schooling Activities. Raw data may contain sensitive or indirectly identifiable information.	Raw data remain with the collecting institutions and are not made publicly available. Anonymised excerpts or aggregated findings may be used in reports and publications where consent and data protection requirements allow this.

Needs survey data	WP2	Anonymous or anonymised survey data collected to identify community interests and needs related to science, sustainability, health and digitalisation.	Aggregated results may be reported in deliverables and publications. Shareable anonymised datasets may be archived where appropriate.
LHA and OSA implementation documentation	WP2	Reporting templates, observation guides, activity descriptions, best practice examples, implementation protocols, teaching materials and service package resources.	Public deliverables and educational outputs are available through the project website. Materials are provided under the project licence unless rights or third-party restrictions apply.
Communication and dissemination materials	WP6	Texts, images, videos, recordings, website content, social media materials, conference materials and public communication resources.	Photos and videos showing identifiable persons are not treated as open research data and are not deposited as reusable datasets unless consent and rights clearance explicitly allow this. Public communication materials remain available through project channels where appropriate.
Public deliverables and project outcomes	WP1–WP6	Deliverables, reports, policy briefs, best practice collections, educational materials and other project outcomes.	Freely accessible and downloadable via the project website and, where applicable, other dissemination channels.
Publications	All relevant WPs	Journal articles, conference proceedings, abstracts, e-book and other scientific or practice-oriented publications related to the project.	Reported in the final reporting system. Several publications are already available in open access. Relevant publications may be deposited in Zenodo after completion of the publication process where additional repository deposition is required or beneficial. Existing DOIs, repository links or other PIDs are recorded in the final reporting system.
Administrative and project management data	WP1	Consortium coordination records, internal reporting documents, meeting minutes, financial and contractual documentation.	Not treated as research data. Retained by PHFR in accordance with legal, contractual and institutional requirements.

The table distinguishes between research data, implementation documentation, public project outputs, communication materials and administrative records. This distinction is important because not all materials generated during the project are suitable for open sharing. In particular, raw qualitative data, identifiable photos and videos, and administrative records are subject to access restrictions and are not treated as open research data.

2.1 WP5 - Evaluation

Work Package 5, led by the University of Nicosia, collected and analysed evaluation data in order to assess the implementation and effects of the main ICSE Science Factory activity formats. The evaluation focused on Lighthouse Activities, Open Schooling Activities and Interactive Career Talks. Local fairs were documented as dissemination, networking and visibility formats, but they were not part of the WP5 evaluation design. The evaluation addressed questions related to participants' attitudes towards science, scientific self-efficacy, interest in STEM careers, perceptions of Open Schooling, stakeholder experiences, teachers' willingness to continue Open Schooling and support needs for future implementation.

Quantitative data were collected through anonymised electronic questionnaires. Depending on the activity format and target group, pre- and post-questionnaires were used for Open Schooling Activities, while post-questionnaires were used for Lighthouse Activities and Interactive Career Talks. Separate questionnaire versions were used for primary students, secondary students and adults. The questionnaires were developed on the basis of existing instruments, adapted to the objectives of the project, reviewed by experts and piloted before full implementation.

Qualitative data were collected through case studies, including teacher interviews, student focus groups, observation notes and written documentation. These data were used to provide contextualised insights into the implementation of Open Schooling Activities, perceived value, challenges, support needs and sustainability potential. Raw qualitative data may contain sensitive or indirectly identifiable information. They were therefore handled by the collecting partner institutions in accordance with ethical approvals, data protection requirements and institutional procedures.

Only anonymised or pseudonymised information was shared within the consortium for analysis and reporting. Quantitative data were processed in anonymised form. Qualitative case study information was transcribed, translated where necessary, pseudonymised or anonymised before being used in cross-country analysis. Sensitive raw data remain with the collecting institutions and are not made publicly available.

The evaluation results are reported in the final evaluation deliverable D5.2 and in related publications. Anonymised quantitative datasets suitable for sharing will be archived in a public research data repository after completion of planned publications, provided that ethical, legal and data protection requirements allow this.

2.2 WP2 Lighthouse activities and open schooling

Work Package 2, led by the Instituto de Educação da Universidade de Lisboa, generated data and documentation related to the design, implementation and refinement of Lighthouse Activities and Open Schooling Activities.

At the beginning of the project, needs surveys were used to identify community interests and needs related to science topics, with particular attention to sustainability, health and digitalisation. Separate survey versions were developed for children aged 6 to 11 and for participants aged 12 and older. The surveys supported the planning of context-sensitive Lighthouse Activities and Open Schooling Activities in the partner countries.

During implementation, WP2 generated activity documentation, reporting templates, observation guides, activity descriptions, implementation protocols, pedagogical materials, best practice examples and service package resources. These outputs were used to document how Lighthouse Activities and Open Schooling Activities were implemented, adapted and refined across the five partner countries.

The main public outputs generated in WP2 include best practice examples of Lighthouse Activities and the Service Package for Open Schooling for Schools. These resources are available through the project website and are intended to support reuse and adaptation by schools, universities, non-formal education providers and other stakeholders.

Where WP2 documentation includes personal data, images or contextual details that could identify participants, such information is not treated as open research data and is only used or published where appropriate consent and rights clearance are available. Publicly available WP2 materials are provided under the project licence unless specific third-party rights or restrictions apply.

2.3. WP6 Dissemination, Communication and Exploitation

Work Package 6, led by Hacettepe University, generated communication, dissemination and exploitation outputs to make the ICSE Science Factory project visible to its target groups and to support the uptake of project results.

The data and outputs generated in WP6 include texts, images, videos, recordings, website content, social media materials, conference materials, newsletters, media-related materials and documentation of dissemination and exploitation activities. These materials were used on the project website, institutional websites, social media channels, at conferences and public events, and in project reporting.

Photos and videos were used only where appropriate consent was available. In the case of minors, parental or legal guardian consent was obtained where required. Materials showing identifiable persons are not treated as open research data and are not deposited as reusable datasets unless consent and rights clearance explicitly allow this.

Public communication and dissemination materials remain available through project and institutional channels where appropriate. They support the visibility, transferability and long-term use of project outputs but are distinct from research datasets in the strict sense.

3. FAIR Data

The ICSE Science Factory project applied the FAIR principles in a manner adapted to the data generated, taking into account ethical requirements, data protection obligations and the educational nature of the project. The project followed the principle “as open as possible, as closed as necessary”.

Public deliverables, educational resources and practice-oriented outputs have been made freely accessible through the project website. Anonymised quantitative datasets suitable for open sharing will be archived in a public research data repository after completion of planned publications, provided that ethical, legal and data protection requirements allow this. Sensitive raw data, including audio or video recordings, non-anonymised case study material and materials showing identifiable persons, are not made publicly available.

The project supported findability, accessibility, interoperability and reusability through standardised instruments, structured documentation, open file formats where possible, metadata, clear access conditions, licensing arrangements and long-term preservation measures.

3.1 Making data findable, including provisions for metadata

Public deliverables and educational outputs are findable through the ICSE Science Factory project website. Publications have been reported in the final reporting system, including available identifiers such as DOIs, repository links, URLs or other persistent identifiers where available.

Shareable anonymised research datasets will be deposited in a public research data repository, such as Zenodo, only after all planned publications have been completed, provided that ethical and data protection requirements allow this. The repository will assign persistent identifiers, such as DOIs, and provide metadata to support identification, citation and reuse.

Datasets and outputs are documented using descriptive metadata, including title, authors or responsible institutions, project acronym, country, date, dataset type, access conditions, licence and relevant keywords. Keywords include, where applicable, science education, STEM education, Open Schooling, Lighthouse Activities, Interactive Career Talks, scientific literacy, sustainability, health, digitalisation and education for sustainable development.

Internal files are organised using structured folders and naming conventions that allow attribution to the project, dataset type, date and responsible partner institution. Versioning is applied where files are revised or updated.

3.2 Making data openly accessible

The ICSE Science Factory project distinguishes between open, restricted and non-shareable data. Public deliverables, educational materials, best practice examples, service packages and policy-related outputs are freely accessible and downloadable through the project website. Several scientific and practice-oriented publications are already available in open access and have been reported in the final reporting system.

Anonymised quantitative research datasets suitable for sharing will be deposited in a public research data repository after completion of the planned publication process, provided that ethical, legal and data protection requirements allow this. Until then, data are stored internally by the responsible institutions and used for project reporting and scientific publication.

Sensitive raw data, including audio and video recordings, non-anonymised interview material, focus group material and identifiable communication materials, are not made publicly accessible. These data remain with the collecting institutions or, where applicable, with PHFR as coordinator, and are managed according to institutional policies, consent agreements and data protection requirements.

Access to restricted data within the consortium is limited to authorised project members. Data transfer between partners took place through secure institutional systems, including BW Sync&Share, and only anonymised or pseudonymised data were shared for cross-country analysis where necessary.

3.3 Making data interoperable

The project used open and widely accessible file formats wherever possible. Quantitative data are stored in CSV format or other widely used spreadsheet-compatible formats. Qualitative documentation is stored in plain text, RTF, DOCX or PDF formats where appropriate. Public educational resources and deliverables are provided in formats that support access, download and reuse.

The project used standardised questionnaires, interview templates, observation guides and reporting templates across partner countries to support comparability and cross-country analysis. Documentation was prepared to clarify data structure, variable meaning, activity context and methodological procedures.

Where data are deposited in a repository, accompanying metadata and documentation will be provided to support interpretation, reuse and citation. Interoperability is supported by the use of common terminology across the project, including Open Schooling Activities, Lighthouse Activities, Interactive Career Talks, sustainability, health and digitalisation.

3.4 Increase data re-use (through clarifying licenses)

Project outputs intended for public reuse, including deliverables, educational materials and practice-oriented resources, are provided under the project licence CC BY-NC-SA 4.0 unless otherwise stated or unless third-party rights apply.

Shareable anonymised research data deposited in a public repository will be licensed under CC BY-NC-SA 4.0, or a later compatible version, unless a different licence is required by the repository, publisher or institutional policy. This licence allows users to share and adapt the material for non-commercial purposes, provided that appropriate credit is given, changes are indicated and derived material is distributed under the same licence.

Photos, videos and other materials showing identifiable persons are not automatically licensed for reuse. They are only used or shared where consent and rights clearance allow this. Such materials are not treated as open research datasets.

The reuse potential of the project lies primarily in anonymised evaluation data, public deliverables, educational resources, implementation templates, best practice examples and methodological documentation. These outputs may be useful for researchers, schools, teacher educators, non-formal education providers and organisations working on Open Schooling, STEM education, science literacy, sustainability education and education for sustainable development.

4. Allocation of resources

The costs related to data preparation, storage, documentation and data management were covered by the project budget and by institutional resources of the participating partners. Data preparation included cleaning, anonymisation or pseudonymisation, documentation, formatting, quality checks and preparation of datasets and outputs for reporting, publication or archiving.

PHFR, as project coordinator, is responsible for the final DMP update and for the coordination of post-project data management arrangements. UNIC, as WP5 lead, is responsible for the evaluation datasets and related documentation generated within WP5. The collecting partner institutions remain

responsible for sensitive raw data collected in their national contexts, including interview recordings, focus group materials, observation notes and other non-anonymised or indirectly identifiable material.

After the end of the project, PHFR will retain the relevant project documentation, final reporting files, public deliverables and coordination-related records. Research data and central materials underlying publicly reported results will be retained for at least ten years, in line with the principles of good scientific practice at PHFR. Sensitive raw data will be retained or deleted according to national legal requirements, institutional policies and consent agreements.

Anonymised quantitative datasets suitable for sharing will be archived in a public research data repository after completion of planned publications, provided that ethical, legal and data protection requirements allow this. Public deliverables and educational outputs remain accessible through the project website. Additional deposition in Zenodo is planned for relevant publications and outputs where required and possible.

5. Data security

During the project, data were stored and exchanged through secure institutional systems. PHFR used BW Sync&Share for safe data storage and transfer within the consortium. Access was limited to authorised project members and protected through individual accounts, passwords and encrypted connections. BW Sync&Share was used as an internal working and storage environment and is not treated as a public open data repository.

Sensitive data remained with the partner institutions that collected the data. Such data were stored on institutional systems with restricted access and were handled according to national and European data protection requirements. Data shared within the consortium for evaluation and reporting purposes were anonymised or pseudonymised where required.

Questionnaire data were collected anonymously. The pre-post design used matching codes that enabled comparison without directly identifying respondents. Qualitative data from interviews, focus groups and observations were transcribed, translated where necessary, and anonymised or pseudonymized before being used for cross-country analysis.

Photos and videos were stored and used only where consent was available. Materials showing identifiable persons are not treated as open research data and are not deposited as reusable datasets unless explicit consent and rights clearance allow this.

After the end of the project, relevant project data and documentation will be retained by PHFR and/or the responsible partner institutions according to their roles in the project. Research data and central materials underlying publicly reported results will be retained for at least ten years. Data that cannot be retained or shared under the applicable consent, ethical or legal conditions will be deleted according to institutional procedures.

6. Ethical aspects

The ICSE Science Factory project complied with European and national data protection laws and with the ethical requirements applicable in the participating countries and institutions. Ethical considerations were particularly relevant because the project involved students, including minors, teachers, community members and other stakeholders.

Data collection was based on informed consent procedures. Where minors were involved, parental or legal guardian consent was obtained where required. Participants were informed about the purpose

of data collection, confidentiality, voluntary participation and the handling of their data. Questionnaire data were collected anonymously. Qualitative data were anonymised or pseudonymised before being shared for cross-country analysis.

Photos and videos were only published where appropriate consent was available. Participants who did not consent to being photographed or filmed were not disadvantaged academically or socially. No withdrawal request after project end has been reported to the coordinator.

Sensitive raw data, including audio and video recordings, interview material, focus group material and non-anonymised case study documentation, are not made publicly available. They remain with the collecting institutions and are retained or deleted according to national legal requirements, institutional policies and consent agreements.

The project followed the principle “as open as possible, as closed as necessary”. This means that public outputs and anonymised data suitable for sharing are made available where possible, while personal, sensitive or rights-restricted data are protected and excluded from open sharing.

7. Closing Statement

This revised and expanded version constitutes the final project-end update of the ICSE Science Factory Data Management Plan. It documents the data management measures implemented during the project and clarifies which data and outputs are openly available, restricted, archived or excluded from sharing for ethical, legal or data protection reasons.

The DMP confirms that the project implemented differentiated data management procedures in line with the FAIR principles and the Horizon Europe principle “as open as possible, as closed as necessary”. Public deliverables, educational materials and project outcomes remain freely accessible through the project website. Relevant publications and shareable anonymised datasets will be deposited in suitable repositories, such as Zenodo, after completion of the planned publication process, where required and possible.

PHFR, as coordinator, will retain relevant project documentation and central materials after project end. Research data and central materials underlying publicly reported results will be retained for at least ten years. Sensitive raw data remain with the collecting institutions, will not be made publicly available unless ethical, legal and consent-related conditions explicitly allow this, and will be retained or deleted according to national legal requirements, institutional policies and consent agreements.

8. References

- European Commission, Participant Portal H2020 Online Manual: https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm
- European Commission, Horizon Europe Programme Guide, Version 5.1, 15. September 2025
- General Data Protection Regulation (GDPR, Regulation (EU) 2016/679: <https://gdpr-info.eu/>
- Pädagogische Hochschule Freiburg. Satzung zu guter wissenschaftlicher Praxis und wissenschaftlichem Fehlverhalten. Lesefassung vom 25. Juni 2021, https://www.ph-freiburg.de/fileadmin/shares/Zentral/Forschung/Dateien/Satzung_Gute_wissenschaftliche_Praxis_Lesefassung.pdf
- Zenodo open data repository: <https://zenodo.org/>