Call: HORIZON-WIDERA-2021-ACCESS-03/Twinning

Project SustDesignTex (GA No. 101079009), title: „Sustainable Industrial Design of Textile Structures for Composites" funded by the European Union

Final version of the Data Management Plan

SUSTainable industrial DESIGN of TEXtile structures for composites (SustDesignTex)

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Deliverable Title	**D8.7: Final version of the Data Management Plan (DMP)**
Deliverable Lead:	*Lodz University of Technology*
Related Work Package:	*Work package WP8 – Project management and coordination*
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Abstract:	*This Data Management Plan (DMP) deliverable report outlines the strategies for handling data within the context of the SustDesignTex project. This final version of the DMP, building upon two earlier versions (D8.3 and D8.6), serves to ensure the proper collection, management, sharing, and preservation of data generated throughout the project. It provides a comprehensive overview of how data is organized, stored, backed up, shared, and made accessible to relevant stakeholders while adhering to ethical guidelines, legal requirements, and EU regulations.* *The document details data handling procedures, including data formats, metadata standards, and data storage strategies for long-term preservation. It also addresses data security and privacy considerations, particularly with respect to personal or sensitive data, and outlines measures for compliance with GDPR and other relevant legislation. Finally, this DMP describes the plans for making research data publicly available where appropriate, thus promoting transparency and enabling the reuse of data for future research endeavors.*

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1. Introduction

This final Data Management Plan (DMP) outlines how data was managed throughout the lifecycle of the SustDesignTex project. DMP defines the strategies and methodologies to ensure that data generated or used during the project is handled efficiently, ethically, and in alignment with the principles of FAIR data, that is, data that is Findable, Accessible, Interoperable, and Reusable. This DMP provides a comprehensive overview of the data management practices applied during the project, including:

- The types and formats of data collected or generated;
- The repositories and platforms used for data storage and dissemination;
- Compliance with FAIR principles (Findable, Accessible, Interoperable, Reusable);
- Adherence to data protection regulations, particularly the General Data Protection Regulation (GDPR), in handling personal data such as event registrations and mailing lists;
- The internal responsibilities and tools used for data quality, security, and sharing;
- The sustainability and preservation strategy for data after the end of the project.

2. Description of data – re-use of existing data and/or production of new data

2.1. Types of data that are created and/or collected in the SustDesignTex project

The following types of data were produced thoughout the SustDesignTex project life:

(1) Stakeholder contacts collection: publicly available data;

(2) Textile Reinforcement Composites collection: publicly available data;

(3) Textile industrial design of innovative textile structures for composites solutions collection: primary data;

(4) Quantitative experimental data: primary data; the data contains quantitative information on the innovative textile structures for composites at different stages of their lifecycle;

(5) Workshops, trainings, the Joint Summer School data: primary data; the data contain protocols, written notes, and summaries that were done at the workshops, trainings, and the Joint Summer School, which were be organized according to the project Work Programme;

(6) InnovaTex2023 and InnovaTex2025 Conferences data: lists of people participated in the conferences, submitted papers and articles.

(7) Validation cycles data: primary data.

(8) Employment and financial data: secret data to which only authorized persons have access. The files are password protected

2.2. File Formats and Data Standards

Throughout the duration of the SustDesignTex project, a range of established and widely accepted file formats were used to ensure interoperability, accessibility, and long-term preservation of project data. The selection of these formats reflected the nature of the project's outputs, primarily text-based documents, presentations, data tables, graphics, audio-visual materials, and design assets, as well as the need to share information effectively both within the consortium and with external stakeholders.

Text-based documents were primarily created using Microsoft Office or compatible alternatives. Files were initially saved in formats such as .doc, .docx, .xls, .xlsx, .ppt, and .pptx. To ensure ease of distribution and consistent presentation, all final and approved versions of documents were also made available in the more stable and universally accessible .pdf format. In instances where structured data or larger datasets were managed, especially for participant lists, registration data, or feedback forms, the project made use of .csv and .txt formats. These formats allowed for easier data exchange and compatibility with data processing tools and ensured future readability independent of proprietary software.

Graphic design and illustrations involved a combination of tools, depending on the purpose and target audience. Microsoft Visio was used for flowcharts and technical diagrams, typically saved in .vsd format. Adobe Photoshop was used for image editing, with original files saved in .psd format and published versions exported to .jpg, .png, .tiff, or .ai as required. In cases where scalable vector graphics were needed, the project preferred to use Inkscape, an open-source tool, and worked with .svg format files. These were often converted to .png, .jpg, or .pdf formats for web or print dissemination.

For audio and video content, standard, widely compatible formats were chosen to maximize accessibility. Audio recordings were saved as .mp3 or .wav files, while video recordings and promotional materials were published in either .mov (QuickTime Movie) or .wmv (Windows Media Video) formats.

Where possible, files were converted into open or non-proprietary formats (e.g., .pdf, .csv, .svg) to support long-term accessibility and archiving. This approach aligned with the project's commitment to openness, reuse, and compliance with FAIR data principles. The use of these formats supported interoperability across platforms, ensured consistency in communication, and contributed to the sustainability and reusability of project outputs beyond the project's end date.

• How is data being collected, created, or re-used?

The data was primarily collected from stakeholders through registrations and activities related to meetings, training sessions, conferences, summer school, workshops, and experimental tests conducted during the project. The format for data collection varied depending on the source. For example, research data was collected and stored on USB drives allocated to the responsible employees, specifically designated for the

project's cloud storage with the backup copies maintained on physical drives. Other data, both primary and secondary sources, were also collected and stored on the dedicated physical and cloud storage systems allocated to the project, ensuring compliance with the FAIR principle.

- **The size of the data generated or re-used in the project**

The size of the data generated/re-used throughout a project approximately ranges from 700GB to 1TB. This includes pictures, research data and all other documents.

3. Documentation and data quality

• How is the material documented and described, with associated metadata relating to structure, standards, and format for descriptions of the content, collection method, etc.?

To facilitate easy identification and distinction of datasets, each dataset is assigned a unique name, which can also serve as its identifier. All data files, including emails, contain the term "SustDesignTex," followed by a brief description of its content, a version number (or the terms "draft" or "FINAL"), and the abbreviated name of the relevant organization (if applicable). Additionally, each dataset collected, processed, or generated within the project is accompanied by a brief description outlining its content and purpose.

• How is data quality be safeguarded and documented (for example, repeated measurements, validation of data input, etc.)?

Data quality is safeguarded and documented through various methods, including:

- Repeated measurements: One of the best ways to ensure data quality is to take multiple measurements of the same parameter or variable. This helps to identify any errors or irregularities and allows for verification of the data.
- Validation of data input: Before data is entered into a system or database, it was validated to ensure that it meets certain criteria. For example, data can be checked for completeness, consistency, accuracy, and validity.
- Standardized data collection protocols: Data collection protocols was standardized to ensure that data is collected consistently and accurately. This can include using standardized forms, procedures, and techniques.
- Quality control checks: Quality control checks was used to ensure that data is accurate and complete. These checks can include things like data entry verification, data cleaning, and data validation.
- Documentation: All data were documented thoroughly, including the date and time of collection, who collected the data, any relevant environmental conditions, and any other pertinent information. This documentation can help to identify any issues with the data and can be used to support data analysis and interpretation.

4. Storage and backup

• How is storage and backup of data and metadata safeguarded during the research process?

The data collected during the project is stored on a cloud drive to which representatives of individual partners have access. Employees can only access the drive from their work accounts. Every two weeks, a copy of this disk was made, and the data is copied to the physical disk.

• How data security and controlled access to data safeguarded, in relation to the handling of sensitive data and personal data, for example?

Access to sensitive data is available only to the necessary persons - the project manager and persons dealing with the financial and administrative service of the project. At TUL, these data are stored and processed in accordance with the procedures in force at the university and dedicated tools are used for this purpose.

5. Legal and ethical aspects

• How is data handling according to legal requirements safeguarded, e.g. in terms of handling of personal data, confidentiality and intellectual property rights?

Data handling according to legal requirements is safeguarded by adhering to applicable laws and regulations regarding data protection, confidentiality, and intellectual property rights. This includes:

1. Handling of personal data: If the research involves handling of personal data, researchers must comply with relevant data protection laws and regulations, such as the General Data Protection Regulation (GDPR) in the European Union.This includes obtaining informed consent from participants, ensuring that data are kept confidential, and providing participants with the right to access and control their data.
2. Confidentiality: Researchers must take appropriate measures to ensure the confidentiality of research data, particularly if the data contain sensitive or identifiable information. This may involve using secure storage and transmission methods, implementing access controls, and de-identifying data before sharing them. Confidential data includes personal data related to employment. This data is stored and processed in accordance with the internal regulations of each partner.
3. Intellectual property rights: Researchers must respect intellectual property rights, such as patents, copyrights, and trademarks, when handling research data. This includes obtaining necessary permissions and licenses for using or sharing data, and properly attributing sources of data. According to the Consortium Agreement point 8.1: Results are owned by the Party that generates them.

To safeguard data handling according to legal requirements, researchers may need to consult with legal experts and data protection officers to ensure compliance with applicable laws and regulations.

• How is correct data handling according to ethical aspects safeguarded?

During the project realization, no research involving humans or animals were conducted. Therefore, the project is not concerned with the aspect of data ethics.

5. Accessibility and long-term storage

• How, when, and where will research data or information about data (metadata) be made accessible? Are there any conditions, embargoes, and limitations on the access to and re-use of data to be considered?

Researchers may choose to deposit their data in open-access repositories or data archives, such as Dryad or Zenodo, or in institutional repositories, such as those maintained by universities or research organizations. The data will be made available, first and foremost, via the TUL Digital Repository of Science CYRENA (CYfrowe REpozytorium NAuki: http://repozytorium.p.lodz.pl/?locale-attribute=en), which collects, archives and makes available the academic achievements of TUL staff in the full-text form. The repository contains primarily scientific articles, books, monographs, conference materials, presentations, and data storage. In some cases, data may be deposited in subject-specific repositories that cater to a particular community of researchers.

The open research data are also archived on the Zenodo platform (http://zenodo.org), an 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).

Metadata are also made accessible, ideally through standardized metadata schemas that are widely accepted within the research community. This metadata should provide sufficient information to enable the data to be discovered, understood, and re-used by other researchers. The accessibility of research data and metadata is carefully planned and communicated, taking into account any conditions, embargoes, or limitations on access and re-use. Researchers aim to make their data and metadata as accessible as possible while also ensuring that any sensitive or confidential information is properly protected.

6. Responsibility and resources

• Who is responsible for data management and (possibly) supports the work with this while the research project is in progress? Who is responsible for data management, ongoing management and long-term storage after the research project has ended?

Each SustDesignTex project partner is responsible for storing data they generate during the realization of the project and providing it to the Lodz University of Technology (TUL) at the time of reporting and whenever requested by the project coordinator institution(TUL). The project coordinator institution (TUL) is responsible for storing the data during and beyond the project's lifespan. According to the Consortium Agreement point 8.1: Results are owned by the Party that generates them. It, therefore, requires data collection by the respective partner.

• What resources (costs, labour input or other) are required for data management (including storage, back-up, provision of access, and processing for long-term storage)? What resources are needed to ensure that data fulfills the FAIR principles?

The resources required for data management depend on the scope and scale of the data being managed, as well as the specific requirements for storage, backup, access provision, and processing. In the project incurred the costs related to the purchase of hard drives for backing up data, hardware (storage devices), software (e.g., data management systems, backup and recovery software), and labor (e.g., IT staff, data curators).

To ensure that data were fulfilling the FAIR principles, additional resources were being allocated throughout the project, including:

1. Metadata creation: Rich, accurate, and standardized metadata were being created and maintained to support data discovery and re-use. This process was requiring additional labor and expertise.
2. Data formatting and standardization: Data were being formatted and standardized according to community-accepted standards to ensure interoperability and future re-use.
3. Data quality control: Data were being cleaned and checked to meet the quality standards necessary for meaningful re-use, which was requiring dedicated resources for quality control processes.
4. Data access and sharing: Efforts were being made to make data accessible in ways that maximized its re-use potential. This included developing data sharing agreements, ensuring proper access, and enabling correct attribution and citation, all of which were requiring ongoing attention and resources.

Long-term storage and preservation: Data were being archived and preserved to ensure long-term accessibility, which was demanding additional storage infrastructure and planning for sustainability.

Overall, ensuring that the data were fulfilling the FAIR principles was requiring a significant and continuous investment of resources, including hardware, software, and labor, as well as expertise in data management, metadata creation, standardization, sharing, and preservation.

7. Conclusion

Over the course of the SustDesignTex project, data management activities were carried out in alignment with the project's coordination and networking objectives. Data was primarily collected through stakeholder engagement, event participation, and experimental activities, and was stored securely using both physical and cloud-based systems. Widely accepted and open file formats were used to ensure interoperability and long-term accessibility. A large volume of data stored with differences depending on the types of data collected and processed. Resources were invested in hardware, software, and skilled labor to support data handling, backup, and security. Additional efforts were made to fulfill the FAIR principles, including the creation of standardized metadata, data quality control, and strategies for sustainable sharing and preservation.

By implementing these measures, the project ensured that its data remained accessible, reusable, and valuable to stakeholders beyond the project's lifetime, supporting transparency, knowledge transfer, and future collaboration in the field.