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RADICLE
Real-Time Dynamic Control System for Laser Welding

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Content

1. Summary

The Horizon 2020 Work Programme introduces the Data Management Plan (DMP), in which the project consortium specifies the research data that will be open access and how it will be handled during the project.

Open Access refers to the practice of giving online access to all relevant information that is free of charge to the end-user. In this way, data becomes re-usable, and the benefit of public investment in the research will be improved.

A DMP is a report created to provide an analysis of the main elements of the data management policy that is used by the RADICLE Consortium with regard to the project research data.

The DMP spans across the complete research data life cycle. It contains information related to the types of research data that are generated or collected during the project, the standards that are be used, how the research data is preserved and what parts of the datasets are to be shared for verification or reuse. It also reflects the current state of the partnership agreements on data management policies and must be consistent with exploitation and IPR requirements.

The DMP describes in detail what data the *project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved.*

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 DMP

The DMP must cover several topics established by the EC and it describes the Data *Management life cycle for all data sets that will be collected, processed or generated by the research project.*

The DMP is a live document that must *reflect the current status of reflection within the consortium about the data that will be produced*. It is an evolution of D7.18 - First Data Management Plan produced (submitted on M6).

2. Research data

RADICLE's DMP aims to provide an analysis of certain elements of the data management policy that will be used by the Consortium with regard to the project research data.

The DMP covers the complete research data life cycle. It will describe the selected types of research data that will be collected during the project, the data standards that will be used, how the research data will be preserved and what parts of the datasets will be shared for verification or reuse. It also reflects the current state of the Consortium agreements on data management and must be consistent with exploitation and IPR requirements.

The DMP deals with how the project participants will manage the research data generated and/or collected during the project. As agreed by the RADICLE partners, the type of data that will be generated will relate specifically to:

- Characterisation of welding joints;
- Sensor outputs and how they relate to detection of defects;
- Data collection and manipulation;
- Specific knowledge relating to the particular end-user samples.

All data will be stored in-line with the requirements of the Data Protection Directive (95/46/EC) and the European General Data Protection Regulation that will supersede this. The data will be curated by individual partners overseen by the Project Coordinator.

Data created during the project development is being held on secure servers either at local or CLOUD level (or both) depending on partner preference. Access will be provided to all non-confidential results through the gold open access procedures. Green archiving procedures will be used for confidential information that is commercially or technologically sensitive – with eventual access to material that is protected or otherwise becomes declassified.

All aspects of the data will be covered by the Consortium Agreement The appropriate structure of the consortium to support exploitation is addressed in section 2.3.2. The consortium is working work as a part of the Pilot on Open Research Data in Horizon 2020 on a voluntary basis.

2.1. Data Identification

The Data Identification consists in a Data set reference and a Data set name.

2.2. Data Set Description

The Data Set Description includes:

Data Description, Type (Collected/Processed/Generated), Origin (if Collected/Processed), Format, Nature, Scale, Useful to Whom, Does it underpin a scientific publication, Information on existing similar data, Possibility for integration and reuse, Storage and Backup.

2.3. Data Standards and Metadata

Standards used or, if these do not exist, an outline on how and what metadata will be created.

2.4. Data Sharing

Steps to Protect Privacy, Security, Confidentiality, IPR, How the Data will be Shared, Access Procedures, Who controls It, Embargo Periods, Outlines of Technical Dissemination, Software and Tools to Enable Re-Use, Widely Open Access or Restricted to Specific Groups, Repository Where Data will be Stored, Type of Repository (institutional, standard repository for the discipline, etc.

In the case Dataset cannot be shared, the reasons (ethical, rules of personal data, intellectual property, commercial, privacy-related, security-related) will be described.

2.5. Archiving and Preservation (including storage and backup)

The Archiving and Preservation must describe the Procedures for Log-Term Preservation, How Long should the Data be Preserved, Approximated End Volume, Associated Costs and How these are Planned to be Covered.

In addition to the project database, relevant datasets will be also stored in ZENODO, which is the open access repository of the Open Access Infrastructure for Research in Europe, OpenAIRE.

ZENODO was built and developed by researchers, to ensure that everyone can join in Open Science.

The OpenAIRE project, in the vanguard of the open access and open data movements in Europe was commissioned by the EC to support their nascent Open Data policy by providing a catch-all repository for EC funded research. CERN, an OpenAIRE partner and pioneer in open source, open access and open data, provided this capability and Zenodo was launched in May 2013.

3. RADICLE Datasets

Based on the type of data generated during the development of the technical work of the RADICLE project, the consortium has identified the Datasets that will be shared with other researchers, with an Open Access policy. Other types of data that are produced during the project, for instance relating to the end-user samples, are not subject to release to the public, due to IPR restrictions.

Table 1 lists the datasets identified for each Work Package within the RADICLE project.

Table 1 – RADICLE Datasets

#	Dataset	Main responsible for data	Related WP(s)
1	Acoustic monitoring sensor data	TWI, LOE	WP2
2	S355 test data	TWI, LOE	WP2, WP3
3	Validation trials data for S355	MTC	WP6

As the research on this data is still ongoing, the information provided in this report is subject to be updated until the end of the project, and presented with further detail on D7.20 - Final Data management plan produced.

4. Dataset #1 - Acoustic monitoring sensor data

The initial characterisation of Dataset number 1, the acoustic monitoring sensor data is presented next, on Table 2:

Table 2 - Acoustic monitoring sensor data

Dataset Characterisation	Description
Dataset reference and name	RADICLE_Acoustic_Sensor_Data
Dataset description	The RADICLE_Acoustic_Sensor_Data consists on the data generated by one of the methods used to inspect the laser welding process. Data is created by acoustic monitoring sensors, that allow for the recording of high-frequency tones derived frond the interactions of the laser beam with the molten metal. Non-contact acoustic monitoring is something which is relatively cheap to implement (thus may be interesting for further research applications) and so is continuing to be monitored during the project.
Standards and metadata	To be decided when data is moved to ZENODO.
Data storing	Currently the dataset RADICLE_Acoustic_Sensor_Data is being stored on a secure hard drive, under the responsibility of WP3 leader, LOE.
Archiving, preservation and sharing	Open access RADICLE data will be designed to remain operational for 5 years after project end. By the end of the project, the final dataset will be transferred to the ZENODO repository, which ensures sustainable archiving of the final research data. Items deposited in ZENODO will be retained for the lifetime of the repository, which is currently the lifetime of the host laboratory CERN and has an experimental programme defined for the at least next 20 years. Data files and metadata are backed up on a nightly basis, as well as replicated in multiple copies in the online system.

5. Dataset #2 - S355 test data

The initial characterisation of Dataset number 2, the S355 test data is presented next, on Table 2:

Table 3 - S355 test data

Dataset Characterisation	Description
Dataset reference and name	RADICLE_S355_Test
Dataset description	The RADICLE_S355_Test dataset consists on the raw data related to testing the laser welding process on S355 steel (a high-strength low-alloy structural grade), in a butt-weld configuration. S355 is a material commonly applied throughout the 'heavy industry' sectors, including transport (road, rail and marine), yellow goods (earth-moving and construction machinery), civil engineering and energy sectors. Hence, the RADICLE consortium will provide open access to the data collected during the test trials, to allow for further use of this information.
Standards and metadata	To be decided when data is moved to ZENODO.
Data storing	Currently the dataset RADICLE_S355_Test is being stored on both a secure hard drive and a web repository, under the responsibility of TWI and VTT.
Archiving, preservation and sharing	As it has been described before, open access RADICLE data will be designed to remain operational for 5 years after project end. By the end of the project, the final RADICLE_S355_Test dataset will be transferred to the ZENODO repository, which ensures sustainable archiving of the final research data.

6. Dataset #3 - Validation trials data for S355

The initial characterisation of Dataset number 3, the validation trials data for S355 is presented next, on Table 2:

Table 4 - Validation trials data for S355

Dataset Characterisation	Description
Dataset reference and name	RADICLE_S355_Validation
Dataset description	The RADICLE_S355_Validation dataset consists on the raw data related to validations trials for the laser welding process on S355 steel (a high-strength low-alloy structural grade), in a butt-weld configuration. S355 is a material commonly applied throughout the 'heavy industry' sectors, including transport (road, rail and marine), yellow goods (earth-moving and construction machinery), civil engineering and energy sectors. Hence, the RADICLE consortium will provide open access to the data collected during the validation trials, to allow for further use of this information.
Standards and metadata	To be decided when data is moved to ZENODO.
Data storing	The dataset RADICLE_S355_Validation not yet available. Storing procedures will be agreed with MTC, WP6 leader.
Archiving, preservation and sharing	As it has been described before, open access RADICLE data will be designed to remain operational for 5 years after project end. By the end of the project, the final RADICLE_S355_Validation dataset will be transferred to the ZENODO repository, which ensures sustainable archiving of the final research data.

7. Conclusions

This documents is the second iteration of RADICLE's Data Management Plan (DMP). The purpose of the DMP is to provide an analysis of the main elements of the data management policy that will be used by the Consortium with regards to the project research data.

The DMP is not a fixed document: on the contrary, it has and will evolve during the lifespan of the project. This second version of the DMP includes an overview of the datasets to be produced by the project, and the specific conditions that are attached to them.

The final version of the DMP will get into more detail and describe the practical data management procedures implemented by the RADICLE project, with the goal of complying with the requirements set out by RADICLE's participation in the Pilot on Open Research Data launched by the European Commission along with the H2020 programme.