



MINIMAL

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Data management plan (DMP)

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Data Management Plan

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Abstract

The MINIMAL Data management plan (DMP), based on the template provided by the European Commission and in line with the FAIR principles, describes the planned activities for producing, collecting and / or processing research data as part of the MINIMAL project work.

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Nature of the deliverable ¹

R

Dissemination level

PU	Public, fully open. e.g., website	✓
SEN	Sensitive, limited under the conditions of the Grant Agreement	
CL	Classified information under the Commission Decision No2015/444	

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¹ Deliverable types:

R: document, report (excluding periodic and final reports).

DEM: demonstrator, pilot, prototype, plan designs.

DEC: websites, patent filings, press and media actions, videos, etc.

OTHER: software, technical diagrams, etc.

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Executive summary

MINIMAL funded by the European Union's Horizon Europe Programme and the UK Research and Innovation funding agency (UKRI) contributes to a radical transformation in air-transport by providing technology that will, in collaboration with the aviation ecosystem, substantially reduce the climate impact of aviation. The deliverable report D6.2 of the MINIMAL project "Data management plan" (DMP) describes the planned activities for producing, collecting and / or processing research data as part of the MINIMAL project work. The purpose of the DMP is to define how the project will address specific issues, such as confidentiality of commercial or industrial information, data protection, and data sharing within the consortium. It should be noted that the DMP is a living document, which will be updated as the MINIMAL project progresses and when significant changes occur. This document will be submitted a first time in M6 as D6.2 and a revised version of it will be re-submitted at the end of the project in M36 as D6.3.

1. Introduction

Building a sustainable and climate neutral future for aviation is an inevitable requirement for a society with increasing mobility needs. If we are to stabilise the global temperature below the 1.5°C threshold set by the Paris Agreement, rapid action is to be taken. MINIMAL will contribute to a radical transformation in air transport by providing disruptive ultra-efficient and low-emission technologies that will, in combination with the aviation ecosystem, sustainably reduce the climate impact of aviation. The MINIMAL project will, through an unprecedented effort between European engine OEMs, world leading atmospheric physics scientists, and lead researchers in combustion and propulsion, attack the major sources of non-CO₂ and CO₂ emissions in aeroengines. The research work within MINIMAL will be undertaken by industrial and academic partners and will be supported by key stakeholders from a dedicated Advisory Board (AB). Therefore, an efficient data management needs to be set up to ensure a successful collaboration, as it relies on efficient data collection, processing and data sharing between partners and AB members. It is important to note that all MINIMAL partners have clear internal procedures to manage data and policies to ensure data protection and security that provide the standards which will be followed during the project. This Data Management Plan is entirely based on the DMP template provided by the European Commission and follows all the principles described in the guidelines. The principles are FAIR, that is data must be *findable, accessible, interoperable* and *re-usable*. Data management will follow the principles to make all data available “*as open as possible, as closed as necessary*” to allow a balance between open access to research data and protection of confidential data enabling commercial exploitation. Therefore, the DMP will highlight the basic principles supporting data management within the project.

2. Data Summary

While the focus of the first version of the DMP is mainly related to early-stage information given the recent start of the project, the DMP is a living document and will be continuously updated with new generated data and more details will be available as the project progresses. Thus, the revised version planned for M36 will report on the research data (incl. meta-data) produced in the course of the project and other research outputs generated during the project that will be collected, stored, shared and archived as defined by Art. 16 of the Horizon Europe AGA. Non-sensitive data that can be made publicly available will be accessible via open data repositories such [ZENODO](#), [EOSC](#) (European Open Science Cloud) or the [Open Research Europe](#).

The Data will be made available on these open data repositories with common standards and processes. The document coding in MINIMAL is as follows:

Filing code

Each document must be identified with a unique filing code, regardless of the document title, file names and referencing conventions that each partner might use in local archives.

For deliverables, the file name must start with MINIMAL and contain the following elements as a minimum:

MINIMAL_Dnumber_Short_Title_ReleaseNumber
Example: MINIMAL_D6.2_Data_Management_Plan_R1.0.pdf

For all other project documents, the file name must start with MINIMAL and contain the following elements as a minimum:

MINIMAL_Type_Title_ReleaseNumber
Example: MINIMAL_AGENDA_KOM_R1.doc

Knowledge Portfolio

Based on the Consortium Agreement (CA), an MINIMAL Knowledge Portfolio will be developed by identifying and recording all relevant background, foreground/results and IP that is used or produced

by the MINIMAL consortium. Throughout the project, the Knowledge Portfolio will be updated and amended with additional background (if required) and foreground/results. Each deliverable report will be accompanied by a collector to which partners will be asked to add information on the background and foreground that has been used for the preparation of the report. The knowledge portfolio will be made available for all project partners.

Generated and re-used data

Data, such as existing models and methods, from partners and/or from previous research work, including EU funded project (ULTIMATE, ENABLEH2...) will be re-used in MINIMAL, also existing publicly available published data with references will be re-used in the project. A preliminary overview of data types/outputs reused and shared are as follows:

Experimental: Validation database for NO_x measurements from free-piston rig combustion measurements; Validation database for aerothermal measurements in intercooler rig.

Observational: Impact of technology, operations/ATM, socio-economic factors in climate warming. Output from AirClim.

Images: Cross-sectional drawings of engine concepts, using data from performance analysis; Detailed design plans of combustor rig using whole engine requirements from; Detailed design plans of intercooler concepts based on concept requirements.

Text: Data generated within MINIMAL that will be detailed in Text format in deliverables and other reports

Numerical: Validated multi-species combustion models; Contrail prediction model suitable for alternative fuels. Validated aerothermal models for intercooler design; engine performance model for opposed, dual and crankshaft based CCE concepts for operation with conventional and alternative fuels; aircraft performance models for EIS2030+ covering short-, medium and long-range applications; low-order reduced models for key elements of heat-management system.

Other research outputs: *Publications*: Numerous scientific publications will be published based on results from the research work in MINIMAL, and with a link to already existing publications from other R&I projects and results. *Reports*: Project Management methods and infrastructure in combination with the EU regulation and Grant Agreement rules. Existing background information from ARTTIC Innovation's management practices will be used and adapted to MINIMAL.

Data generated within the project will be in form of scientific peer reviewed publications, deliverable reports, graphs, texts (pdf, txt, ppt(x), doc(x)), images (jpg, png, ai, psd), tables (xlsx, xls, csv) videos (avi).

The origin of the used and generated data in MINIMAL will come from the consortium members (own measurements, calculations, simulations and best-practices), the members of the Advisory Board and public databases. The existing and generated sensitive data in the project will exclusively be used by the members of the consortium and by the members of the Advisory Board who have signed a Non-Disclosure Agreement with the project. The non-commercially sensitive data produced on research activities will be useful to any external researcher.

3. FAIR Data

Producing and using scientific data are key activities to achieve the objectives of MINIMAL. This report describes the data management activities associated with the production of deliverables and scientific publications during the project. The Data collection will be assured in accordance with the MINIMAL Grant Agreement and the Open Research Data Pilot following its principle "as open possible, as closed necessary". It will be based on the FAIR (findable, accessible, interoperable and re-usable) criteria.

3.1. Making data findable, including provisions for metadata

The existing and generated data will be made findable by data type, format, reference and their correct re-use. The data will have its origin from the internal measurements, calculations and simulations of the Consortium members but also from the Advisory Board and public databases. Data will be hosted and made findable through dedicated repositories from partner organisations.

The project website offers also the possibility to host data in a secured page which is accessibly only via a password. Non-sensitive data, including but not exclusively, deliverable reports and scientific publications will be made publicly available regularly via the website and findable with description and keywords via the meta tag data system of the website. This will also enhance the possibilities for re-using the data. MINIMAL Data will also be identifiable and locatable by means of a standard identification mechanism through the Digital Object Identifier (DOI) that will be included in the scientific publications. Other data sets and relevant research outputs, as well as their authors, will be labelled with Persistent Identifiers (PIIDs): ORCID iDs for researchers; ROR IDs for research organisations, grant DOIs for projects, where applicable.

Moreover, confidential metadata will be made findable through the knowledge portfolio of the project that includes all relevant background, foreground/results and IP that is used or produced by the MINIMAL consortium.

3.2. Making data accessible

The data produced and/or used in the project that will be made openly available (by default) are the scientific publications that will follow the open access rules of the European Commission (EC). These scientific papers will be hosted in trusted open science repositories, such as Chalmers University's repository "Chalmers research" (<https://research.chalmers.se/en/>), or Cranfield University's CORD (Cranfield Online Research Data) repository and available for the public. The data will be made accessible with no limited duration on these repositories.

In line with the principles "*as open as possible and as closed as necessary*", raw data produced and archived by the partners will be documented (incl. provenance and quality assurance processes) and made accessible in open access repositories. The tools used to produce them will be listed and documented. The scripts used to process the data when preparing publications will be made freely available. The MINIMAL website will also make data accessible via its pages dedicated for scientific publications and deliverable reports. Confidential data (e.g. sensitive deliverable reports) will furthermore be stored and archived in the MINIMAL collaborative workspace on "innovation place", to ensure partners a full accessibility to information that is needed to carry out successfully the research work. To enable wider access to scientific facts and knowledge for researchers, innovators and the public across the European Union, the MINIMAL consortium is making a dedicated effort to ensure open access of its research work, as far as possible. Therefore, 14 out of 32 deliverable reports are public (44%).

3.3. Making data interoperable

Project partners depositing data in a repository will strive to adhere to standards for formats, as much as possible compliant with available (open) software applications as e.g. from the CERIF guidelines. They will also strive to use a standard vocabulary for all data types present to allow interdisciplinary interoperability.

Interoperability within the consortium and Advisory Board

The data produced within MINIMAL will be fully interoperable within the Consortium as there is a direct link between the Work Packages (Figure 1). A number of results produced (or lessons learnt) within a work package will be used as input for the research work within another work package.

The data will also be shared and discussed with experts outside of the consortium, who are part of the Advisory Board. At meetings, and online, the data will from MINIMAL will feed into the discussions with the Advisory Board members and the expertise and advice from the Advisory Board will in their turn feed into the project's research.

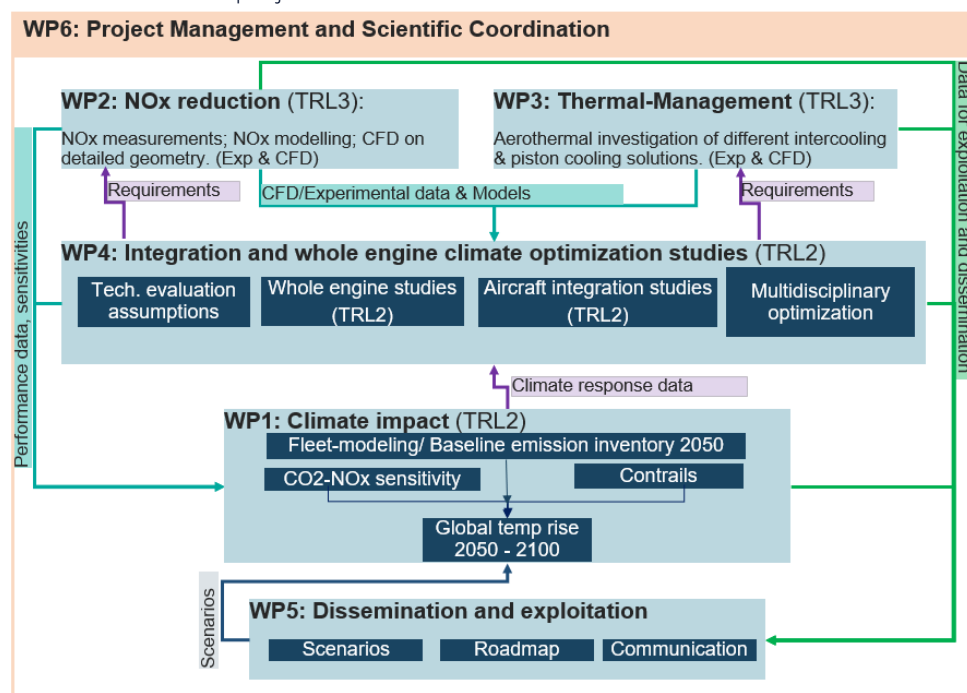


Figure 1: Work plan structure

Interoperability between the consortium and third parties

The data will also be interoperable by external parties from the public. Through the numerous scientific papers, workshops and conferences planned in MINIMAL, the Consortium will ensure the widest dissemination possible of its results and will allow a data exchange and interoperability between researchers, institutions, organisations, countries and all interested entities.

The data and metadata will use standard vocabulary to allow inter-disciplinary interoperability. In instances where “discipline specific” nomenclature or vocabulary is contained in the data, an effort will be made to provide clarification using more commonly used nomenclature or vocabulary.

3.4. Increase data re-use

The data in this project will be disseminated in scientific publications and their accompanying supplementary experimental data. Open access will be provided to MINIMAL publications. In case the publication itself cannot be made open access directly from the publisher, a final revised version of the manuscript containing all necessary experimental details will be made accessible via dedicated repositories. The data produced will be mainly data from experimental measurements, simulations and calculations, not excluding other types of data. In general, technologies researched and matured in MINIMAL will be realised in the medium to longer term and it is therefore important that the data is accessible and re-usable well after project completion.

As mentioned previously, data will be procured using established and sustainable repositories ensuring access to the data beyond the project lifetime. Original data will be stored on internal servers of the partners. If access restrictions are necessary to data, MINIMAL will aim to embargo access to files rather than withhold access in full. The project plans major dissemination and communication activities which will increase the visibility of the project and also directly the re-use of the MINIMAL data.

4. Other research outputs

Other research outputs such as scripts and workflows and protocols are also managed according to the Open Science and FAIR criteria and stored in the same repositories (the outputs for internal use are stored on the collaborative workspace).

5. Allocation of resources

Data management activities concern the whole project and need to be coordinated and monitored both at project and work package level. Data management is also linked to publication of project results and thus dissemination activities. In MINIMAL, an Innovation Management Team with consortium members is created in order to monitor the IP generated within the project and ensure the highest potential exploitation of the MINIMAL results. Coordinator Chalmers University, with the support of partner ARTTIC Innovation, is in charge for preparing and maintaining the project's data management plan and register and oversees proper handling of data by the partners. For this, 1 Person Months has been allocated. Moreover, each partner will be responsible for acquiring, storing, sharing own data and other outputs according to the rules and requirements defined by the Grant Agreement and Data Management Plan. For this, 0.5 PM per partner is planned.

6. Data security

All MINIMAL partners are aware of their responsibility for making sure the necessary provisions are in place within their organisations to ensure data security (including data recovery, secure storage and transfer of sensitive data). University repositories do respond to the necessary data security policies. Open repositories such as the EU-backed portal [Zenodo](#), or [ORE](#) are also ensuring all security criteria. As for the sensitive documentation of the project, the latter is stored in the secured MINIMAL collaborative workspace set up by the project office.

7. Ethical aspects

There are no ethical issues identified for MINIMAL.

8. Other issues

For the data collected and generated in the context of the MINIMAL project, only the procedures outlined in the Grant Agreement are used.