D5.2 – Data Management Plan

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CLIMOP Consortium

CLIMOP Consortium consists of a well-balanced set of partners that cover all the needed competencies and the whole value chain from research to operations. ClimOp Consortium includes representatives from aviation industry (IATA, SEA), academic and research institutes (NLR, DLR,TU-Delft, ITU) and SMEs (DBL, AMIGO).

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Executive summary

This document establishes a Data Management Plan for the ClimOp project.

ClimOp aims at fostering the reduction of the climate impact of aviation by identifying a set of incisive operational improvements and defining a sound body of regulations and recommendations for aviation stakeholders and EU policy makers. The aim of such recommendations is to support the development, from the identified operational improvements, of a harmonised set of mitigation measures to be implemented by Aviation stakeholders in Europe.

The description of ClimOp objectives, activities, and research results will be published in several forms to maximise the impact of the action, and the information material will be available on the project website.

The ClimOp research data are as much as possible 'FAIR', that is findable, accessible, interoperable and re-usable. These principles precede implementation choices and do not necessarily suggest any specific technology, standard, or implementation-solution.

Security and data protection are implemented respectively with the use of a private encrypted cloud platform and with the respect of the GDPR provisions, as already described in the Ethical Deliverables of the project and here recalled at the end of the document.

1. ClimOp Data Summary

ClimOp aims at supporting the on-going effort within the Aviation industry to reduce the impact of the Aviation sector on climate. For this purpose, ClimOp will provide EU policy makers with recommendations tailored for each Aviation stakeholder (e.g. airlines, airports, manufacturers, passengers, etc.) to foster the implementation of a harmonised set of sound mitigation strategies at all levels of the aviation sector. This objective will be met through four main strands of activity, here recalled to describe and motivate the structure and organization of the project:

- Identify a set of most-promising Operational Improvements (OIs) that will significantly reduce the climate impact of Aviation, considering both CO_2 and non-CO_2 emissions, and a corresponding set of Key Performance Indicators (KPIs) to measure the impact of these OIs on the climate and on the aviation stakeholders.

- With the selected KPIs, quantify the impact on the climate and on the aviation stakeholders of individual OIs, or various combinations of OIs, using several modelling tools to calculate the response of the climate to these OIs.

- Analyse and propose harmonized mitigation strategies that foster the implementation of these OIs within the Aviation sector.

- Validate the proposed mitigations strategies with key Aviation stakeholders and elaborate recommendations (in terms of policy actions and supporting measures) to ease the implementation of the selected mitigation strategies.

1.1. Description of the data used and produced in the ClimOp project

ClimOp will use data from existing resources and databases, and generate multiple data types and products. For example:

- **Operational Improvements and Key Performance Indicators:** documentation on implementable actions and measures that, when introduced in the list of procedures adopted by the Aviation sector, will change its impact on climate. This documentation includes a detailed description of the OIs, the qualitative benefits foreseen for climate, the challenges to be faced and the necessary requirements to implement them in Aviation, a list of KPIs to quantify the effect of these OIs on climate, the stakeholders involved in the operations, and an estimate of the timescale at which these OIs could be implemented.

- **Modelled data:** data used and generated in the quantitative analysis of the impact of different sets of OIs on climate. This includes, among others, simulated air traffic data, weather data, climate change functions, atmospheric data such as temperature, pressure, density, concentration of different chemical species (CO_2, ozone, methane, NO_X, vapour, etc), data generated with climate-chemistry response models.

- **Mitigation strategies:** documentation on possible harmonised combinations of multiple OIs, with a detailed description of the foreseen impact on climate and on the involved stakeholders based on the analysis performed in WP1, WP2, and WP3 [1].

- **Regulations:** inventory of the existing and possible regulations and policies with a detailed description of their rationale in light of the reduction of the Aviation impact on climate, a study of the effectiveness of the proposed measures and their foreseeable acceptance by

the stakeholders, and recommendations on how to foster the most-promising mitigation strategies by introducing a harmonised set of policies that can encourage Aviation stakeholders to implement the OIs without penalising them in their business.

The expected size of the data generated within ClimOp will not exceed 100GB.

2. FAIR data

The ClimOp research data are as much as possible 'FAIR', that is findable, accessible, interoperable and re-usable. These principles precede implementation choices and do not necessarily suggest any specific technology, standard, or implementation-solution.

14 metrics are used to quantify levels of FAIRness:

TO BE FINDABLE:

F1. (meta)data are assigned a globally unique and persistent identifier, which will last at least 3 years after the completion of ClimOp, as all results generated during the project.
F2. data are described with rich metadata.
F3. (meta)data are registered or indexed in a searchable resource.
F4. metadata specify the data identifier.

TO BE ACCESSIBLE:

A1 (meta)data are retrievable by their identifier using a standardized communications protocol.
A1.1 the protocol is open, free, and universally implementable.
A1.2 the protocol allows for an authentication and authorization procedure, where necessary.
A2 metadata are accessible, even when the data are no longer available.

TO BE INTEROPERABLE:

I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
I2. (meta)data use vocabularies that follow FAIR principles.
I3. (meta)data include qualified references to other (meta)data.

TO BE RE-USABLE:

R1. meta(data) have a plurality of accurate and relevant attributes.
R1.1. (meta)data are released with a clear and accessible data usage license.
R1.2. (meta)data are associated with their provenance.
R1.3. (meta)data meet domain-relevant community standards.

2.1. Making data findable, including provisions for metadata

Are the data produced and/or used in the project discoverable with metadata, identifiable and locatable by means of a standard identification mechanism (e.g. persistent and unique identifiers such as Digital Object Identifiers)?[1]

We will produce the appropriate metadata in the ClimOp database and a Digital Object Identifier (DOI) will be available for the whole database.

What naming conventions do you follow?

The general rules that ClimOp will follow in the naming conventions of the ClimOp datasets are the following:

- Field names and database names will be descriptive, self-explanatory and no more than 64 characters.

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[1]   Here and in the following subsections the italic font identifies the questions made available by the Commission in the Template Horizon 2020 Data Management Plan (DMP) V1.0

- Lowercase will be used in all tables and field names.

- Space will be replaced with underscore e.g. the table that will contain Operational Improvements will be named operational_restrictions.

Will search keywords be provided that optimize possibilities for re-use?

Every record of the ClimOp database will include a "keywords" that will make records easily identifiable.

Do you provide clear version numbers?

The ClimOp database will have clear version numbers e.g. V0.1, V1,2.

What metadata will be created? In case metadata standards do not exist in your discipline, please outline what type of metadata will be created and how.

The following metadata will be created:

- What the data file contains

- When the data were generated

- Where the data were generated

- Why the data were generated

2.2. Making data openly accessible

Which data produced and/or used in the project will be made openly available as the default? If certain datasets cannot be shared (or need to be shared under restrictions), explain why, clearly separating legal and contractual reasons from voluntary restrictions.
The data produced by Work Packages marked as Public in the ClimOp Grant Agreement [2] will be made openly available
How will the data be made accessible (e.g. by deposition in a repository)?
All ClimOp public data will be accessible through the project website. The consortium reserves the possibility to export the data produced by Work Packages marked as Public in the Grant Agreement and to deposit it into Zenodo (www.zenodo.org) adding the appropriate metadata mentioned above.
 with the appropriate metadata mentioned above.
What methods or software tools are needed to access the data?
The ClimOp database can be also accessed through the ClimOp website using a simple browser (via a pc or a mobile device).
Is documentation about the software needed to access the data included?
Documentation will be included in the description of the database.
Is it possible to include the relevant software (e.g. in open source code)?
Links to open-source software available to access to the data will be made available together with the data itself.
Where will the data and associated metadata, documentation and code be deposited? Preference should be given to certified repositories which support open access where possible.
ClimOp public data will be deposited on repository provided by Deep Blue. The consortium reserves the possibility to deposit data and metadata to Zenodo.
Have you explored appropriate arrangements with the identified repository?
No arrangement needed. The consortium can publish anything to Zenodo and make it publicly accessible.
If there are restrictions on use, how will access be provided?
No restrictions. Datasets will be open and accessible to all.

Is there a need for a data access committee?
No need for a data access committee.

2.3. Making data interoperable

Are the data produced in the project interoperable, that is allowing data exchange and re-use between researchers, institutions, organisations, countries, etc. (i.e. adhering to standards for formats, as much as possible compliant with available (open) software applications, and in particular facilitating re-combinations with different datasets from different origins)?

What data and metadata vocabularies, standards or methodologies will you follow to make your data interoperable?

We will create the ClimOp vocabulary of terms and we will publish it publicly and openly, in a machine-readable form. The vocabulary will be unambiguously identified either by the field itself or by the associated metadata.

Will you be using standard vocabularies for all data types present in your data set, to allow inter-disciplinary interoperability?

In case it is unavoidable that you use uncommon or generate project specific ontologies or vocabularies, will you provide mappings to more commonly used ontologies?

We will be adopting existing vocabularies to enable optimal reuse of the work that has already been done. When reusing existing vocabularies, we will first take the time to look for what is currently available. For example, there are several vocabularies suggested by the W3C.

2.4. Increase data re-use (through clarifying licences)

How will the data be licensed to permit the widest re-use possible?
Open data.
When will the data be made available for re-use? If an embargo is sought to give time to publish or seek patents, specify why and how long this will apply, bearing in mind that research data should be made available as soon as possible.
No embargo period. Data will be available for re-use as soon as it is generated.
Are the data produced and/or used in the project useable by third parties, in particular after the end of the project? If the re-use of some data is restricted, explain why.
No restriction applies. Data can be re-used by third parties without any restrictions.
How long is it intended that the data remains re-usable?
Potentially forever.
Are data quality assurance processes described?
We will clearly describe the measures to assure data quality including:
- Document data quality requirements and define rules for measuring quality
- Check data validity on an ongoing basis
- Develop the ClimOp platform for tracking and managing data quality incidents.

3. Allocation of resources

The responsible for data management in the project is the coordinator Deep Blue. The costs and efforts to make data FAIR are covered by Deep Blue (project coordinator and leader of WP4 in charge of building the ClimOp website and knowledge platform, see Section 1) within the budget already allocated in WP4.

4. Data Security

The storage of the data in ClimOp will depend on the type of data, that is, whether they are public or confidential. For confidential data a repository in the **cloud provided by Deep Blue** is used. The access to this repository is restricted to the members of the ClimOp consortium that requested it, and carefully monitored. External parties can be allowed to download selected material stored on the repository through specifically-generated links. Any access request from external parties needs to be communicated over e-mail to Deep Blue and has to be approved.

On the other hand, for the dissemination of public information, a web page has been created where the deliverables will be uploaded as they are available, so the interested audience can follow the evolution of the project. Additionally, social networks profiles have been created, such as LinkedIn and twitter, where news are shared, not only of the project but also in the research field.

Access to the data will be controlled by the person/s in charge of this task, who will manage not only the users' permissions, but also restricting the computer authorized to access the data.
Due to the large amount of information and the relevance of it, several security measures are taken to avoid the loss of it by making regular backup copies (including incremental backups and regular full backups). In addition, the access to these physical copies is controlled and restricted. On the other hand, to protect information from cyberattacks it is fully encrypted.

5. Ethical aspects

Two Ethical requirements have been identified during the proposal evaluation and grant preparation. Work Package 6 Ethics Requirements was automatically included in the Grant Agreement . The following requirements have been identified by the EC:

- Protection of Personal Data (POPD) Requirement No. 1, the host institution must confirm that it has appointed a Data Protection Officer (DPO) and the contact details of the DPO are made available to all data subjects involved in the research. For host institutions not required to appoint a DPO under the GDPR a detailed data protection policy for the project must be submitted as a deliverable

- Non-EU Countries (NEC): in case activities undertaken in non-EU countries raise ethics issues, the applicants must ensure that the research conducted outside the EU is legal in at least one EU Member State. This must be specified in the grant agreement. In case personal data are transferred from the EU to a non-EU country or international organisation, confirmation that such transfers are in accordance with Chapter V of the General Data Protection Regulation 2016/679, must be submitted as a deliverable. In case personal data are transferred from a non-EU country to the EU (or another third state), confirmation that such transfers comply with the laws of the country in which the data was collected must be submitted as a deliverable. In case personal data are transferred from the EU to a non-EU country or international organisation, confirmation that such transfers are in accordance with Chapter V of the General Data Protection Regulation 2016/679, must be submitted as a deliverable. In case personal data are transferred from a non-EU country to the EU (or another third state), confirmation that such transfers comply with the laws of the country in which the data was collected must be submitted as a deliverable.

Two Ethics Deliverables namely D6.1, D6.2, have been developed following the European Commission Ethics Guidance Material [3,4].

The principles of the European Convention of Human Rights, the rules of the Convention of the Council of Europe for the protection of individuals with regards to automatic processing of personal data and especially the European Directive 95/46/EC, for the protection of personal data, are strictly followed when addressing the ethical questions of ClimOp. In case personal data are transferred from the EU to a non-EU country or international organisation, confirmation that such transfers are in accordance with Chapter V of the General Data Protection Regulation 2016/679, must be included in the corresponding deliverables.

Nothing in this project shall be deemed to require a party to breach any mandatory statutory law under which the party is operating, including any national or European regulations, rules and norms regarding ethics in conducting research. The ClimOp project, as a participant in H2020, confirms that the proposed research and consortium participants fully comply with the principles of the European Charter for Researchers and the European Code of Conduct for Research Integrity of ALLEA (All European Academics) and ESF (European Science Foundation).

All project participants are expected to act in accordance with the ethical guidelines and principles.

As coordinator of the ClimOp project, DBL ensures that any ethical issues that may arise during the project (even if not originally anticipated) is handled appropriately and in a transparent and fair manner.

All sensitive/confidential data used by the project are addressed through the Ethical deliverables.

In particular, part of the data generated within the ClimOp project will be collected in Turkey. The data collection will comply with the Turkish Personal Data Protection Law [5], which was enforced on and has been applied since March 24, 2016. The Law addresses responsibilities of key actors, companies and data processing companies, as well as appropriate methods for processing and

transmitting data. Turkey's Data Protection Law harmonises its data protection framework with that in force in the EU.

References

[1] Grant Agreement No. 875503, Annex 1, Section 1.3.3.
[2] Grant Agreement No. 875503, Annex 1, Section 1.3.2.
[3] D6.1. POPD – Requirement No. 1, Ethics deliverable.
[4] D6.2. NEC – Requirement No. 2, Ethics deliverable.
[5] Turkish Personal Data Protection Law, available for consultation at:
https://www.mevzuat.gov.tr/MevzuatMetin/1.5.6698.pdf and
https://www.kisiselverilerinkorunmasi.org/kanunu-ingilizce-ceviri/