



## DELIVERABLE D 9.5

### DATA MANAGEMENT REPORT

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


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## GLOSSARY

Acronym	Signification
DPM	Data Management Plan
EC	European Commission
FAIR (data)	Findable, Accessible, Interoperable and Re-usable (data)
ORD	Open Access to Research Data

# 1 EXECUTIVE SUMMARY

## 1.1 Introduction

This deliverable presents the Data Management Report of the AGILE 4.0 project. In Horizon 2020 the European Commission (EC) has launched a flexible pilot for Open Access to Research Data (ORD pilot). The pilot aims to improve and maximize access to and re-use of research data generated by Horizon 2020 projects. Research data is information (particularly facts or numbers) collected to be examined and considered, and to serve as a basis for reasoning, discussion or calculation. Part of the research data produced in the AGILE 4.0 project is released as open access, so that it can be re-used under the terms and conditions set out in the Grant Agreement. This report follows deliverable D9.3 (Initial Data Management Plan) [1] and describes which and how data has been made openly accessible.

## 1.2 Brief description of the work performed and results achieved

All the research data produced in the project that could be released “*as open as possible*”, has been made publicly available through the AGILE 4.0 project website (<https://www.agile4.eu/>) and the ZENODO.org portal (<https://zenodo.org/communities/agile4/>). References to open research data has been made available through the *Open Data* section of the F&T portal.

## 1.3 Deviation from the original objectives

### 1.3.1 Description of the deviation

The deliverable has been finalized with about two months of delays, since not all the research data was ready to be published as open access at the very end of the project. However, a lot of data has been made publicly available during the project.

### 1.3.2 Corrective action

The delay of the deliverable submission has not had significant impact onto other project activities.

## 2 INTRODUCTION

(Research) **data** refers to information, in particular facts or numbers, collected to be examined and considered as a basis for reasoning, discussion, or calculation. In a research context, examples of data include statistics, results of experiments, measurements, observations resulting from fieldwork, survey results, interview recordings and images. The focus is on research data that is available in digital form. Users can normally access, mine, exploit, reproduce and disseminate openly accessible research data free of charge [2].

As schematized in Fig. 1, research results can be either exploited / protected (through patenting or other forms of protection), or disseminated outside the project consortium, either in open (often together with publications) or restricted access.

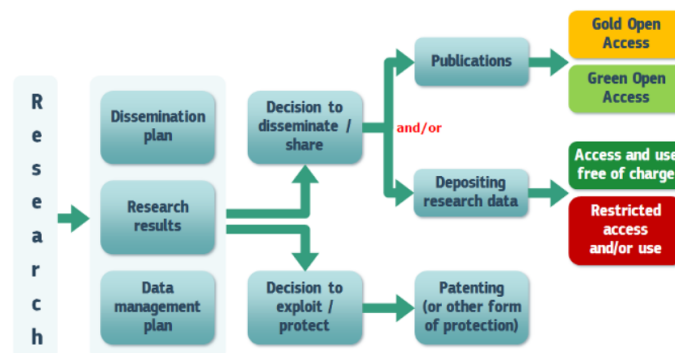


Fig. 1: Schema on the handling of research data in a H2020 European project [2]

According to the European Commission (EC), research data should be made **findable**, **accessible**, **interoperable** and **re-usable** (FAIR). Therefore, a DMP should include information on:

- the handling of research data during & after the end of the project
- what data will be collected, processed and/or generated
- which methodology & standards will be applied
- whether data will be shared/made open access and
- how data will be curated & preserved (including after the end of the project).

An **Initial Data Management Plan (DMP)** has been produced at the beginning of AGILE 4.0 to provide information about the research data to be generated in the project [1]. This deliverable **presents the data generated during the project**, and focuses on the data that has been released as open access, providing information on what data has been openly released, and how.

### 3 OVERVIEW OF DATA

Tab. 1 shows an overview on the information about data produced during the project. The data that has been released as open access is highlighted by the red frame. Information about this data is provided in the following part of the report.

	Purpose of the Data (in relation to project objectives)	Application Cases Data					Framework Data	
	Category of Data	Disciplinary Data		MDO Data	MBSE Data			
	Type of Data	Tool input	Tool output	MDO process (model, workflow)	MDO result	MBSE result (model)	MBSE metamodel	Framework model
Data Summary	Origin	Disciplinary tool	Disciplinary tool	AGILE 4.0 OCE	PIDO environment	AGILE 4.0 OCE	- MBSE platform - Ontology editor	MBSE platform
	Average size [Mb]	n.a.	Mainly < 10 Mb; sometimes < 100 Mb		More than 100 Mb		Less than 10 Mb	
	Data standard (file format)	CPACS (xml); (.inp); (.npz); (.bdf); (.csv); (.xlsx)	CPACS (xml); (.csv); (.bdf); (.avl); (.dat); (.vtu); (.bulk); (.load); (.png); (.igs); (.stp); (.m); (.npz); (.xlsx)	- CMDOWS (xml)	- CPACS (xml) - IGES (.iges) - STEP (.stp) - NASTRAN (.bdf, .f06, .op2) - (.csv)	- extended SysML (-) - other MBSE std., e.g. CAPELLA (-)	- extended SysML (-) - ontology (owl)	- extended SysML (-)
	Data documentation	n.a.	n.a.	Project deliverables	Project deliverables	Project deliverables	Project deliverables	Project deliverables
	Data owner	Partner	Partner	Consortium	Consortium	Consortium	Consortium	Consortium
	Storage place	- Partner own drive - AGILE 4.0 cloud - KE-chain server	- Partner own drive - AGILE 4.0 cloud - KE-chain server	- KE-chain server	- AGILE 4.0 cloud - KE-chain server - AGILE 4.0 website - Zenodo	- AGILE 4.0 cloud - KE-chain server - AGILE 4.0 website - Zenodo	- AGILE 4.0 cloud - Zenodo	- AGILE 4.0 cloud - Paper
Data Accessibility	Who can access Data	- Only partner - Consortium (with, w/o restrictions)	- Only partner - Consortium (with, w/o restrictions)	- Consortium (with restrictions)	- Consortium (with restrictions) - Open access	- Consortium (with restrictions) - Open access	Open access	Open access
	Where to access Data (only for open access Data)	n.a.	n.a.	n.a.	Accessibility through project website and Zenodo	Accessibility through project website and Zenodo	Accessibility through Zenodo	Published in a paper
	How to access the Data (tools) (N.B. documentation is provided by tool developers)	n.a.	n.a.	n.a.	- xml editor (e.g. notepad - TiGLviewer (geometry visualizer)	- Eclipse Papyrus (+ SysML plug-in) - Eclipse Capella	- MBSE platform - Ontology editor	n.a.

Tab. 1: Overview of the data being produced in the AGILE 4.0 project

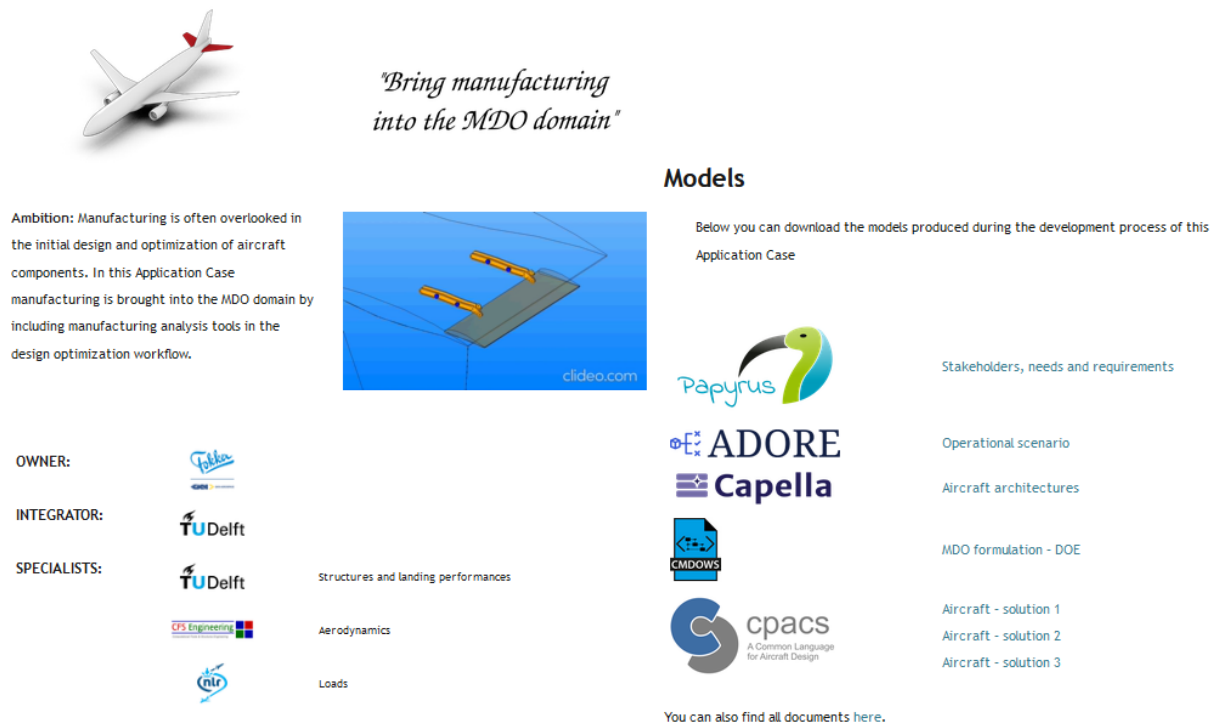
## 4 OPEN ACCESS DATA

Data relative to the **Application Cases** and the **Framework** developed in the AGILE 4.0 project have been released as open access. Data is accessible, it can be re-used, and repository links are available and provided below.

### 4.1 Application Cases Data

Data produced during the development of the 7 Application Cases addressed in AGILE 4.0 has been openly released through the AGILE 4.0 project website and the ZENODO repository (see two edited screenshots in Fig. 2 and Fig. 3, relative to the application “Manufacturing”).

#### Application Case: Manufacturing



*“Bring manufacturing into the MDO domain”*

**Ambition:** Manufacturing is often overlooked in the initial design and optimization of aircraft components. In this Application Case manufacturing is brought into the MDO domain by including manufacturing analysis tools in the design optimization workflow.

**OWNER:** Politecnico di Milano

**INTEGRATOR:** TU Delft

**SPECIALISTS:** TU Delft, CUS Engineering, nlr

Structures and landing performances

Aerodynamics

Loads

**Models**

Below you can download the models produced during the development process of this Application Case

Stakeholders, needs and requirements: Papyrus

Operational scenario: ADORE

Aircraft architectures: Capella

MDO formulation - DOE: CMDOWS

Aircraft - solution 1: cpacs

Aircraft - solution 2: cpacs

Aircraft - solution 3: cpacs

You can also find all documents [here](#).

Fig. 2: Edited screenshot of the AGILE 4.0 webpage collecting open data about the Application “Manufacturing” (<https://www.agile4.eu/ac1-manufacturing>)

#### AGILE 4.0 Models of Application “Manufacturing”

Bruggeman, Anne-Liza; van der Laan, Ton; Sonneveld, Jente; La Rocca, Gianfranco

This page contains the models produced during the development of the Application Case “Manufacturing”, addressed in the H2020 AGILE 4.0 Project.

The models include:

- Stakeholders, Needs and Requirements as a Papyrus project
- Scenarios as a Capella project
- System Architectures (as HTML files)
- MDO formulations (as XDSM in HTML files)
- MDO results (as CPACS files, tables)

More information about the Application Case “Manufacturing” can be found [here](#).

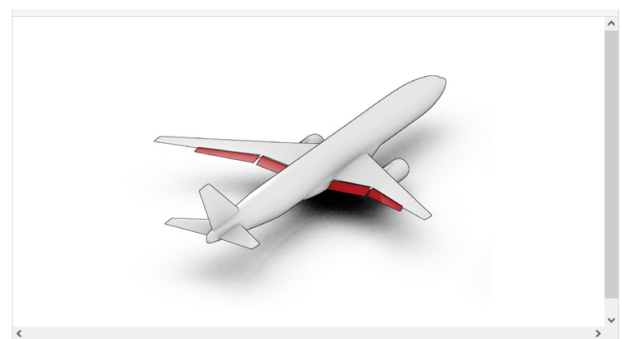


Fig. 3: Edited screenshot of AGILE 4.0 ZENODO page collecting open data about the Application “Manufacturing” (<https://zenodo.org/record/7729437>)



For each one of the seven application cases, developed models published as open access include:

- **Stakeholders, Needs and Requirements** as a [Papyrus project](#)
- **Scenarios** as a [Capella project](#)
- **System Architectures** (as HTML files)
- **MDO formulations** (as XDSM in HTML files)
- **MDO results** (as [CPACS files](#), tables)

Below are reported the links to the repositories where data of the 7 Application Cases can be openly accessed.

#### **AGILE 4.0 Models of Application "Manufacturing"**

- Link AGILE 4.0 website: <https://www.agile4.eu/ac1-manufacturing/>
- Link ZENODO repository: <https://zenodo.org/record/7729437>

#### **AGILE 4.0 Models of Application "Supply Chain"**

- Link AGILE 4.0 website: <https://www.agile4.eu/ac2-supply-chain/>
- Link ZENODO repository: <https://zenodo.org/record/7624789>

#### **AGILE 4.0 Models of Application "Electrification"**

- Link AGILE 4.0 website: <https://www.agile4.eu/ac3-electrification/>
- Link ZENODO repository: <https://zenodo.org/record/7729658>

#### **AGILE 4.0 Models of Application "Maintenance"**

- Link AGILE 4.0 website: <https://www.agile4.eu/ac4-maintenance/>
- Link ZENODO repository: <https://zenodo.org/record/7756858>

#### **AGILE 4.0 Models of Application "Certification"**

- Link AGILE 4.0 website: <https://www.agile4.eu/ac5-certification/>
- Link ZENODO repository: <https://zenodo.org/record/7575517>

#### **AGILE 4.0 Models of Application "Retrofitting"**

- Link AGILE 4.0 website: <https://www.agile4.eu/ac6-retrofitting/>
- Link ZENODO repository: <https://zenodo.org/record/7574121>

#### **AGILE 4.0 Models of Application "Family"**

- Link AGILE 4.0 website: <https://www.agile4.eu/ac7-family-concept/>
- Link ZENODO repository: <https://zenodo.org/record/7573295>

## **4.2 Framework Data (MSBE Ontology)**

The **Model Based System Engineering (MBSE) ontology** being developed in the project is published as open access in ZENODO (<https://zenodo.org/record/4671896>). The available files represent the meta-models, **rendered by OWL**, supporting the development of complex systems. The ontology uploaded onto this page has been developed to address the development of complex aeronautical systems investigated in AGILE 4.0 Project, but it can be used to address any other kind of system.

# **5 REFERENCES**

- [1] AGILE 4.0 , "D9.3 Initial Data Management Plan," AGILE 4.0 project (H2020-815122), 2021.
- [2] European Commission, "Open access," [Online]. Available: [https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access\\_en.htm](https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm). [Accessed 2021 March 26th].