

DELIVERABLE D9.2 DISSEMINATION, COMMUNICATION AND EXPLOITATION PLAN

Author(s): J.B. Vos & all partners WorkPackage N°: WP9 Due date of deliverable: 29.02.2020 Actual submission date: 28.02.2020 Document ID: AGILE4.0.D9.2.V1.0.docx

Grant Agreement number: 815122 Project acronym: AGILE 4.0 Project title: Towards cyber-physical collaborative aircraft development Start date of the project: 01/09/2019 Duration: 36 months Project coordinator name & organisation: Pier Davide Ciampa DLR - System Architectures in Aeronautics | Aircraft Design and System Integration Tel: +49 40 2489641-322 E-mail: pier.ciampa@dlr.de

Project website address: www.agile4.eu



DOCUMENT INFORMATION

Document ID	AGILE4.0.D9.2.V1.0.docx	
Version	1.0	
Version Date	28.02.2020	
Author	Jan Vos with input from all partners	
Dissemination level		

APPROVALS

	Name	Company	Date	Visa
Coordinator	Pier Ciampa	DLR	28.02.2020	Dig Dovide Canpe
WP Leader	Jan Vos	CFS Engineering	28.02.2020	PpV-
				Å

DOCUMENTS HISTORY

Version	Date	Modification	Authors
0.1	26.11.2019	Initial Version	Jan Vos
0.2	20.02.2020	Integrate feedback from partners	Jan Vos
1.0	28.02.2020	Further integration of feedback	Jan Vos

LIST OF AUTHORS

Full Name	Organisation
Jan Vos with input from all partners	CFS Engineering

DISTRIBUTION LIST

Full Name	Organisation
AGILE 4.0 Consortium	



TABLE OF CONTENTS

1	EXECUTIVE SUMMARY
1.1	Introduction
2	PLANNED EXPLOITATION OF THE PROJECT RESULTS
2.1	Plans of the consortium as a whole
2.2	Individual partner input
3	PLANNED DISSEMINATION AND COMMUNICATION ACTIVITIES
3.1	AGILE4.0 website
3.2	Social Media11
3.3	Press Releases
3.4	Flyers and Posters
3.5	Newsletters
3.6	Conferences 12
3.7	Advisory Board
3.8	AGILE/AGILE4.0 Academy13
3.9	Links with other H2020 projects14
3.10	Other activities
4	CONCLUSION AND OUTLOOK
5	REFERENCES



LIST OF FIGURES AND TABLES

Table 1: Targeted Conferences	. 1	2
Table 2: Scheduled Conferences	. 1	3



1 EXECUTIVE SUMMARY

1.1 Introduction

The high level objective of the AGILE 4.0 project is to bring significant reductions in aircraft development costs and time-to-market through the implementation of an integrated cyber-physical aeronautical supply chain, thereby increasing the competitiveness of the European aircraft industry, from integrators and high-tiers suppliers to SMEs, leading to innovative and more sustainable aircraft products.

The AGILE 4.0 project high level objective is translated into the following **main technical objectives**:

- To implement a novel design and optimization paradigm leading to the development of innovative and constantly evolving aircraft products, in a time and cost efficient manner. The focus is on the digitalization and modelling of aeronautical systems' architectures, enabling the effective integration of virtual products, virtual manufacturing, and virtual testing.
- To develop technologies (joint platforms, methods, tools) that permit the integration of computational design environments and the collaboration of multiple stakeholders in the aeronautical supply chain, from OEM to SMEs.

The focus is placed on the **secure and efficient collaboration** among the multiple actors involved in the development of complex aeronautical products, from OEM to SMEs, and on the deep **common comprehension of product designs** as enabling condition for the decision making of innovative solutions.

• To develop solutions accelerating the **trade-off and decision making** processes for complex collaborative development scenarios.

The focus is on the development of **user-centric concurrent visualization techniques** and the development of **data analysis and multi-objectives optimization (MOO) methods** supporting large-scale multi-criteria trade-off and decision making.

• To implement a collaborative computational **design and optimization environment** that has a high (re-) configuration flexibility, enabling the assessment of diverse and complex products.

Focus is on the development of efficient **Multidisciplinary Design and Optimization** environments, supporting the efficient and robust optimization of aircraft products during different phases of the development (including **manufacturing and certification**), addressing the **different levels of fidelity**, and associated **uncertainties**.

The **AGILE 4.0** project will provide technology solutions to **answer the following questions** that are rarely answered in industry today:

- Should an investment being made to acquire machines for a novel manufacturing process that will lead to a better performing product (i.e. maintenance, manufacturing costs, design benefit), or should it be allocated to investigate a novel aircraft design? This question is addressed by AGILE 4.0 production driven use case (e.g. composite components).
- Given an available development time for the next aeronautical platform, what is the degree of novelty it can be afforded in terms of costs and certification time, traded with



an increase of design performance? This is addressed by the certification driven use-cases (e.g. novel on-board systems architecture)

- How to upgrade constantly evolving systems during its life-cycle? The concurrent design, production, and certification aspects are addressed by AGILE 4.0 upgrade-driven use cases.
- What are the implications due to the uncertainties on the any level of the life cycle of an aircraft, and what is the impact on costs and lead time-to-market? AGILE 4.0 models large scale system of systems scenarios, involving all the stakeholders.

Being able to answer these questions has an enormous impact on the aircraft-design process and on the aircraft configurations being designed using this process.

Exploitation, Communication and Dissemination of the results of the AGILE4.0 project are fundamental to maximize the impact the project will have on the development of future European aircraft and the competitiveness of the European aircraft industry. This deliverable provides the initial plan for communication, dissemination and exploit. It will serve as starting point of the Dissemination, Communication and Exploitation Report (Deliverable D9.4), that will be updated regularly by including dissemination, communication and exploitation activities carried out during the course of the project and that will be delivered at the end of the project.



2 PLANNED EXPLOITATION OF THE PROJECT RESULTS

2.1 Plans of the consortium as a whole

At this stage of the project the Consortium as a whole has not developed yet concrete plans to exploit the results of the AGILE4.0 project.

2.2 Individual partner input

DLR - Institute of System Architectures in Aeronautics's involvement in AGILE 4.0 will bring the know-how, technologies and lessons learnt from coordination of AGILE EU Project (2015-2018) and extend it to AGILE 4.0. The developments made during AGILE 4.0 will expand the AGILE Paradigm envelope and will be used for other EU projects such as Clean Sky, Macbeth (hybrid electric projects), German National Projects and Novel configuration aircraft design projects where in main evaluation concerns of production and certification can be easily handled by AGILE 4.0 framework.

One major objective of **Airbus Defence and Space** is to extend its capabilities for parametric geometry manipulation in the aircraft conceptual design phase. The developments made in AGILE 4.0 will improve the in-house geometry tool Descartes to support placement of fuselage compartments and placement of on-board systems within them. The use of the common parametric aircraft description CAPCS together with the geometric capabilities of Descartes based on it will enable improvements in the overall aircraft development process by eliminating gaps and breaks in the information flow between process steps. This will make the development in general more efficient and less error prone.

The participation of **Bombardier** in the AGILE 4.0 will bring industrial knowhow in terms of design development, manufacturing and certification requirements. The system architecture definition and optimization methodologies developed in the AGILE 4.0 project will improve the early understanding of the complex interactions within the system architecture leading to a more complete set of design requirements. The application of these methodologies will help OEM and suppliers to better assess technology integration risks and ultimately reduce the likelihood of late design changes.

The participation of **CFS Engineering (CFSE)** in the AGILE4.0 project will strengthen the involvement of CFSE in aerospace related projects and may attract new clients and collaborations. The lessons learned and improved methods and tools might also be directly employed in studies CFSE makes for different clients. CFSE is also responsible for the distribution, maintenance and support of the CEASIOM Aircraft Design Environment. The improvements made in CEASIOM during the AGILE4.0 project will be of large interest to the aircraft design community. CFS Engineering plans to involve 3 to 4 Master degree students in the project.

The participation of **Central Institute of Aviation Motors (CIAM)** in the AGILE4.0 project will allow to represent of engines correctly and also to calculate ICAO CO2 emission according to ICAO new CO2 Standard (Annex 16, Vol.III). Engine decks provided by CIAM will support partners simulations (mission, emission, noise, etc.).

The processes and methods developed in AGILE 4.0 project will enable **EMBRAER S.A.** to design more environmentally friendly aircraft. The introduction of manufacturing, maintenance, certification and safety considerations on the optimization framework is of high interest once it will enable even better decision making on early design phases, significantly reducing rework costs later on. The application of the AGILE paradigm will promote a higher integration between OEM and suppliers that will lead to better products.



The participation of **Fokker Aerostructures** in the AGILE4.0 project will allow Fokker aerostructures to develop and apply engineering techniques that will significantly improve the engineering process of Fokker. These techniques will focus on integrating manufacturability in the engineering process. These new techniques will allow Fokker Aerostructures to reduce the number of engineering hours required, reduce the time to market and improve the manufacturability of an aerostructures component. Furthermore, it will allow Fokker Aerostructures to develop aerostructures of higher performance and/or of lower cost. All these developments will ensure that Fokker aerostructures remains competitive in the global aerostructures market. Finally, 6 Master degree students will work on the project at Fokker Aerostructures.

The AGILE 4.0 project enables **KE-works** to develop and extend the KE-chain platform functionalities to support the execution of the complex systems design and engineering. The project secondly enables KE-works to develop prototype applications with potential customers and examples for other potential customers. Thirdly, the project will include the individual prototype of general functions, such as requirements management. These general function prototypes can be further developed to be part of the commercial platform distribution, coming available for all our customers. Finally, together with other partners, KEworks' ambition is to create an integrated MBSE framework for aircraft applications.

In the LEONARDO S.p.A. (LDO) view, the methodologies developed in the project AGILE 4.0 will find application both in the development of new products and in the updating of those already in service. The intention is in fact to adopt an "agile" computational environment of design and optimization, in particular supported by a proper methodological approach, capable to allow an effective assessment of different and complex development scenarios. Efficiency and error-resilient methods and tools will be the key for facing the future challenges driven by the market and the environment.

NLR will directly apply the tools and methodologies developed - and expertise gained - in the AGILE 4.0 project in NLR's advanced capabilities support for R&D projects with its customers. As NLR operates on the leading edge of the technological state of the art, the advanced AGILE 4.0 tools and methodologies are essential for NLR to remain at the forefront of the developments in this research area. The AGILE 4.0 optimization framework, extending the traditional product design capabilities with specific features for manufacturing, maintenance, certification and safety, is specifically of interest for our customers in the area of aircraft manufacturing. The certification and safety aspects are of interest in co-operations with NLR's customers in the safety and operational field.

The participation of **ONERA** in the AGILE 4.0 project will allow the improvement of its optimization methodologies and tools to consider the key challenges brought by extension of AGILE paradigm to the production and certification domains. The lessons learned on complex and industrial MDO problems will be of major importance to better adapt the research activities to the industry needs. In that aim, contributing to AGILE 4.0 will both strengthen the existing collaboration with Universities and Research Centers and increase the connection with industrial partners.

The involvement of **Politecnico di Torino (PoliTo)** in the AGILE 4.0 project allows the enhancement of ASTRID and RAMS_A tools towards new disciplines (e.g. maintenance, certification, production) and the MDO implementation. The use of Assessment and Decision Making Techniques to new kind of products and disciplines will improve the techniques already developed at PoliTo. The use of a MDO framework and the expertise provided in AGILE 4.0 will be the basis for future research project participations. The results obtained from AGILE 4.0 will enhance the level of the scientific articles related to system design and RAMS. The academic course "Integrated Systems Design" will be improved using the MDO techniques developed in AGILE 4.0 increasing the students' comprehension of the mutual



influence of the different design disciplines and the importance of the certification, production and family concept design.

The involvement of the Institute of Aerospace Systems of **RWTH Aachen University** in the AGILE 4.0 project enables an increase in the project range of the MICADO (Multidisciplinary Integrated Conceptual Aircraft Design and Optimization) project as one of its main research areas. By detailed modelling of maintenance processes, the system integration and evaluation capability of MICADO is extended by an important competence. A PhD student will carry out the project and the results will be published in journal articles. Additionally, undergraduate and graduate students will contribute to the project activities in the form of bachelor and master theses. Within the course "Concept Studies in Preliminary Aircraft Design" the newly acquired competencies are incorporated directly into teaching at the university.

The participation of **Central Aerohydrodynamic Institute named after Prof. N.E. Zhukovsky (TsAGI)** in the AGILE 4.0 project will enrich the TsAGI experience and expand communications with aerospace companies. TsAGI will improve technologies of Hi-Fi aerodynamic optimization by using AGILE 4.0 advanced optimization methodologies and tools and realize them in inhouse EWT CFD solver. The realisation of advanced technologies in own tools permits to solve complex optimization problems if framework of industrial applications. This possibility together with acquired links with industrial partner will allow participating in applied projects for the novel aircrafts design.

Delft University of Technology (TUD) is represented in AGILE4.0 by two sections. The main result pursued by the Aerospace Structures and Computational Mechanics (ASCM) section is the bridging of the gap between preliminary design and manufacturing of composite structures. These specific results will be used to consolidate the new design for manufacturing research area numerically, at the TUD Faculty of Aerospace Engineering and will be further developed in on-going collaborations with Airbus and future EU projects. The Flight Performance and Propulsion (FPP) section aims at strengthening its position in the international MDO community to further attract research funds, consolidate the collaboration with Fokker GKN and initiate new ones with the other AGILE 4.0 industrial partners. FPP seeks the opportunity to demonstrate, on design cases of industry-level complexity, the benefit of KBE technology, as key enabler (together with MDO) for a Front Loaded product development approach. The methodologies to be developed in WP4 will contribute to the extension of the TUD open source platform KADMOS (developed in AGILE) by means of a novel AI base MDO advisory capability. This will enable the exploitation of KADMOS in industrial environment, thus reducing the gap between the current state-of-the art and state-of-practice of MDO in industry. Students, researchers and PhD will fundamentally contribute to the project activities and will provide the basis to further develop and exploit AGILE4.0 results and mindset, both in academia and modern industry. Developed tools and related knowledge will be also used to update and enrich the MSc study curriculum, to better address societal needs. The involvement of University of Naples "Federico II" in the AGILE 4.0 project will enhance the collaboration industries like Leonardo and Bombardier. The link between aircraft design on one hand, and maintenance and production issues on the other hand will be used to increase the aircraft design capabilities of the research group and to improve teaching material concerning aircraft design courses. The experience matured through AGILE 4.0 will be used to improve tools and software developed by the research group (i.e. JPAD and ADAS) that are extensively used for both University courses and other research projects and collaboration with companies. All parallel and future research projects in which UNINA will be involved will have some advantages coming from lessons learnt and results of the AGILE 4.0 project. Several PhD students will be involved for their thesis in AGILE 4.0. Additionally, undergraduate and graduate students will contribute to the project activities in the form of bachelor and master theses and this will be a great added value for the exploitation of the project towards involvement of young students in relevant research topics strictly connected



to industrial needs and criteria. Currently a MSc student is working on the project and he will graduate in June/July 2020.

The involvement of **Concordia University** in the AGILE 4.0 project allows to establish a new, strong relationship to the AGILE 4.0 partner organizations for potential research collaborations, and to build on the existing partnership with Canadian partners. The expertise provided by Concordia University on complex systems design and conceptual aircraft design, especially for energy efficient system architectures and the effective model based architecting and design approach will be expanded through the project. The use of AGILE 4.0 developed tools and methodologies will enable the development of an MDO environment required to perform aircraft systems research in a more efficient manner. One PhD student and two MSc students will be trained through the project. A post-doctoral fellow will participate in year 1 of the project. But a wider implication in AGILE academy activities is planned and will benefit more students in the Aerospace Engineering programs. Concordia University is expecting high-calibre publications and presentations at international conferences.



3 PLANNED DISSEMINATION AND COMMUNICATION ACTIVITIES

3.1 AGILE4.0 website

The AGILE4.0 internet website has become on-line in November 2019 [1], and will be used to communicate and disseminate project results. The website has a **protected area** (AGILE4.0 Cloud) to permit data and information exchange between the consortium members, and a **dissemination area** were information approved for publication will be made available.

3.2 Social Media

A LinkedIn group "AGILE4.0 Project" has been created and will be used as a second channel (similar to public website) to communicate and disseminate the project results: https://linkedin.com/company/agile4

An AGILE4.0 Twitter account has been created: <u>https://twitter.com/AGILE4project</u> The M5 meeting organized in Lausanne in February 2020 was announced on Twitter, and about 3000 people have seen this announcement.

An AGILE4.0 Wikipedia page will be set-up.

An AGILE4.0 project group has been created on researchgate.com

3.3 Press Releases

A press release in German and English was published on October 15, 2019, on the DLR website:

https://www.dlr.de/content/de/artikel/news/2019/04/20191015_europaeischesforschungsprojekt-agile-4-0-gestartet.html

Other partners will prepare press releases related to events organized in the framework of the AGILE4.0 project.

3.4 Flyers and Posters

An AGILE/AGILE4.0 poster was prepared for the 2nd MDO Workshop held at IRT Saint Exupery in Toulouse, November 19-20, 2019.

3.5 Newsletters

Newsletters will be prepared in the course of the project.



3.6 Conferences

Conferences targeted for dissemination of AGILE4.0 project results are the following:

Meeting	Description	Frequency	quency Where		Participants
AIAA Scitech	Focuses on all aspects of aerospace	Annual, January	USA	Academia and industry	3000-4000
AIAA Aviation	Focuses on aviation including multi disciplinary design optimization	Annual, USA June a		Academia and industry	2000-2500
EASN	European	Annual	Europe	Academia, some industry	200-300
EUCAS	European	Bi-annual	Europe	Academia, some industry	600-700
ICAS	Focuses on all aspects of Aeronautics	Bi-annual	Across the world	Academia and industry	800-1000
SECESA	Systems and Concurrent Engineering for Space Applications	Bi-annual	Europe	Academia and industry	100-200
MBSE Workshop	Model Based Space Systems and Software Engineering	NA	Europe (ESA/ESTEC)	Academia and industry	NA

Table 1: Targeted Conferences



Conference	Date	Location	Partners	WP	Title
AIAA Aviation 2020	June 2020	Reno, USA	ConU	4, 7	Connecting Model-based Systems Engineering and Multi- disciplinary Design Analysis and Optimization for Aircraft Systems Architecting
AIAA Aviation 2020	June 2020	Reno, USA	Fokker	5,6	2 abstracts submitted
AIAA Aviation 2020	June 2020	Reno, USA	PoliTO, DLR	7	1 abstract submitted
AIAA Aviation 2020	June 2020	Reno, USA	DLR	1, 4, 7, 8	5 abstracts accepted
ICAS 2020	September 2020	Shanghai, China	PoliTO	7	2 abstracts submitted
ICAS 2020	September 2020	Shanghai, CN	DLR	1, 4	4 abstracts accepted

Scheduled participation in conferences (abstracts submitted or accepted) are:

Table 2: Scheduled Conferences

Partners DLR and ONERA organize 2 sessions at AIAA Aviation in June 2020 on the topic: "Integrating MVSE and MDO: how can we bridge the gap". Partners Concordia University, Embraer and Fokker GKN will present papers on AGILE/AGILE4.0 in these sessions.

3.7 Advisory Board

An Advisory Board will be created. Confirmed members of the board are:

Thierry Chevalier, Head of Digital Design Manufacturing of Airbus France. Christopher Jouannet, Principal Engineer Aircraft Conceptual Design at SAAB

3.8 AGILE/AGILE4.0 Academy

Discussions are held to continue the AGILE Academy, and it is planned to launch the academy again at the start of 2021 when new technologies developed in AGILE4.0 become available.



3.9 Links with other H2020 projects

Pier Ciampa has been invited to the advisory board of the EU funded project Madeleine that focuses on the development and validation of multidisciplinary design tools for optimization (Grant Agreement 769025), see also https://www.madeleine-project.eu/

3.10 Other activities

An AGILE 4.0 stand might be arranged in occasion of the ILA Berlin 2020 to disseminate the outcomes of the project. The proposal has been submitted to the EC, but not yet accepted.

Leonardo will organize internal meetings to raise awareness and promote the methodologies developed within the AGILE 4.0 project in order to pave the way for the subsequent exploitation of the project results.



4 CONCLUSION AND OUTLOOK

This document presented the AGILE4.0 project communication, dissemination and exploitation plan. Communication and dissemination activities are already underway.

5 REFERENCES

[1] D. Charbonnier, AGILE 4.0 Deliverable D9.1 Website, November 2019.

