D2.1 – TAXONOMY AND MAPPING

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Abstract

This deliverable presents the ECARE Taxonomy developed by the consortium, as well as a list of calls, funded projects and stakeholder competences for the four ECARE project regions: Occitanie and Nouvelle Aquitaine in France, Campania in Italy, and Hamburg in Germany.

In addition, the ECARE consortium has developed Excel tools that are available in appendices of the document. The appendices include Excel tools to map and explain ECARE Taxonomy priorities by regional funding authorities, to map calls, and projects, and aeronautical competences.

The information gathered through this deliverable will be implemented in the ECARE digital platform which, once operational, will provide aeronautics players and funding bodies with a valuable platform to support their activities. The tools developed for this deliverable will make it easier for stakeholders to contribute to the development of the platform.

Keywords

Taxonomy, Clean Aviation, RIS3, SRIA, mapping, public funding, projects, stakeholder competences, tools, regions, France, Italy, Germany

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Table of acronym

ACARE	Advisory Council for Aviation Research and Innovation in Europe
API	Application programming interface
ASD	Aeronautic, Space and Defense
AV	Aerospace Valley
CA	Clean Aviation
CA JU	Clean Aviation Joint Undertaking
CA SRIA	Clean Aviation Strategic Research and Innovation Agenda
DAC	Campania Aerospace District
EASN	European Aeronautics Science Network
EC	European Commission
ECARE	European Clean Aviation Regional Ecosystem
EDA	European Defence Agency
ESA	European Space Agency
ESG	ECARE Stakeholder Group
EU	European Union
HAv	Hamburg Aviation
ISE	Intermediate-sized enterprise
LC	Large companies
MoC	Memorandum of Cooperation
NASA	National Aeronautics and Space Administration
NWS	National Workshop
OEM	Original Equipment Manufacturer
RIS3	Research and Innovation Smart Specialization Strategy
RTO	Research and Technology Organisations
SME	Small and medium-sized enterprises
TNWS	Transnational Workshop
TRL	Technology Readiness Level

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1 Introduction

1.1 Context and deliverable objectives

Today, the aviation sector accounts for about 3.8% of the European Union's total greenhouse gas emissions. Faced with this situation, the European Commission has defined ambitious objectives to 'cut emissions by at least 55%' by 2030, and (ii) to 'become the world's first climate-neutral continent' by 2050, in its European Green Deal strategy.

The aeronautical sector must therefore reinvent itself in order to contribute effectively to these objectives. To this end, the European Clean Aviation Joint Undertaking (CA JU) has been elaborated to guide the research and innovation activities of European companies in the aeronautical sector. However, funding for aviation is fragmented into many different funding instruments and funding bodies, creating misalignments between regional, national and EU initiatives.

The main objective of ECARE is to clarify the landscape of regional/national innovation roadmaps and funding opportunities for aeronautical stakeholders. To identify complementarities and synergies between them to enable the European aeronautical industry to achieve the ambitious targets of the CA JU Programme while maximising public funding impact and efficiency.

In response to that, ECARE project intends to develop and disseminate methodologies to create synergy mechanisms applicable to all EU aeronautical regions. **These methodologies are designed and tested in four major regions of the European aeronautical industry**, namely Occitanie and Nouvelle Aquitaine in France, Hamburg in Germany and Campania in Italy. Since the start of the project, these methodologies have been improved, adapted and tested in these four pilot regions, turning ECARE into a mature operational guidance project.

The aim of work package 2 of the ECARE project was to realise an exhaustive mapping of the calls, funded projects, and competences in the pilot regions. Before starting this mapping, it was essential to agree on the list of technologies encompassing the global scope of Clean Aviation. That is why the first months of the project have been dedicated to defining the ECARE taxonomy, in order to position calls, projects, and competences accordingly.

The ECARE deliverable "D2.1: Taxonomy and mapping" presents the work performed and methodology to be followed on:

- **The ECARE taxonomy** which will be the nomenclature to be used with data collection for mappings (see section 2: The ECARE Taxonomy)
- **The mapping of the calls** for the aeronautical sector at European, national and regional levels (see section 3: Mapping of Regional, National and European)
- **The mapping of the European, national and regional relevant projects**, recently finalised, ongoing and planned to commence (see section 4: Mapping of funded projects)
- **The mapping of the available scientific and industrial stakeholders' competences** (see section 5: Mapping of Aeronautical Competences (SMEs, Intermediary Sized Enterprises, Large companies, RTOs and research universities))

The second main objective of the ECARE project is to replicate, foster, and spread the use of the ECARE methodologies in Europe among representatives of regional/national funding bodies, technology clusters, and other stakeholders. **The project also aims to integrate their information on the ECARE digital platform.** As of today, the project and the ECARE digital platform are operating at a pilot scale in France, Italy, and Germany. However, the consortium expects to increase the number of countries

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available on the platform in the coming months. The consortium also expects to have more than 300 users registered on the platform from at least 10 countries by the end of the project.

2 The ECARE Taxonomy

2.1 Objectives

The consortium developed a new aeronautic taxonomy, the ECARE taxonomy, as the existing taxonomies are outdated and no longer fit for purpose.

The ECARE taxonomy can be used by: (1) private companies (SMEs, Intermediate-sized enterprises, & Large companies), **RTOs and research universities**; and **(2) public funding bodies** (regional, national and European funding bodies).

These two types of stakeholders have different objectives: (1) companies, RTOs and research universities can use the taxonomy to find new funding opportunities, stakeholders' competences and past or present projects by selecting the relevant taxonomy topics, whereas, **(2) the funding bodies** can use it to identify the technological priorities of their ecosystems and/or identify potential funding gaps existing in their geographical area of intervention.

The adoption of a commonly recognised and shared taxonomy is an important element, as the taxonomy will be used as a sort of reference measurement system which will allow to:

- **Evaluate and map technological priorities for regional, national and European funding bodies (see section 2: The ECARE Taxonomy);** for example, if a region characterizes the topic "F. Aerostructures" as a high priority on the ECARE taxonomy, it means that the regional stakeholders have competences and interest to innovate on this topic.
- **Identify aeronautics calls and correlate them with existing competences (see section 3: Mapping of Regional, National and European calls);** Once the calls and the entities will be positioned on the taxonomy topics, it will permit to identify if the funding coverage is large enough or needs to be strengthened or redistributed.
- **Map past and present public funded projects (see section 4: Mapping of funded projects);** which will allow identifying supply chain actors, potential partners for collaborative projects.
- **Identify and map the distribution of aeronautics technological competences, (see section 5. Mapping of Aeronautical Competences (SMEs, Intermediary Sized Enterprises, Large companies, RTOs and research universities))**; This will allow bringing out strengths and weaknesses of technological competences at regional, national and European levels.

All these tools will be implemented into the ECARE digital platform that is currently being developed by the consortium and will be fully available in January 2024.

It is therefore necessary to have an ECARE taxonomy tool easily understandable and quickly usable by all future stakeholders. It must be efficient to use while covering all the technological fields of importance for the decarbonization of aeronautics.

2.2 Methodology to build the ECARE taxonomy

2.2.1 The process of ECARE taxonomy building

In the aerospace sector many taxonomies have been adopted in the past years trying to define a commonly understood, shared and recognised nomenclature of structured technological topics. It is important to note that no taxonomy can fully satisfy the needs of the current aerospace sector, as these needs are constantly evolving due to a variety of factors. It must also be kept in mind that the build-up of

a fully new taxonomy is not a simple process, as it requires the involvement of several different actors (public authorities, companies and individuals), subsector representatives and, moreover, several iterations to negotiate the needs and sensitivity of all stakeholders.

As a first task, the consortium evaluated the existing taxonomies in Europe which are reported in the following paragraphs. They are different in nature and have different dates of updating/ages.

ACARE Taxonomy[1]: The directly related taxonomy used in the last 20 years in Europe in the field of aeronautics was published by the ACARE (Advisory Council for Aviation Research and Innovation in Europe). It includes aeronautic application topics, subtopics and definitions which are interesting for ECARE taxonomy and its latest version dates back to the beginning of 2003.

European Space Agency (ESA) Taxonomy[2]: It refers to the field of space and its 2nd edition was issued in October 2013, it is considered out of scope for what concerns Clean Aviation.

European Defence Agency (EDA) Taxonomy[3]: This taxonomy is tailored for the field of defence and more oriented towards fundamental research or technological bricks at low TRL. The taxonomy comprises interesting elements for ECARE taxonomy and is up to date with its latest version issued at the end of 2021.

Other taxonomies exist which have not been considered because of various and different reasons, such as:

- **WAND Aerospace Engineering Taxonomy[4]:** It is made of 5650 terms and 1 125 synonyms and is considered too detailed.
- **NASA Technology Taxonomy**[5]. The 2020 revision is comprised of 17 distinct technical discipline-based taxonomies that provide a breakdown structure for each technology area. The taxonomy uses a three-level hierarchy for grouping and organizing technology types. It is considered too complex and space-oriented.
- **EASN Thematic Structure**[6]. It is very well structured but considered too much university-oriented
- **Taxonomy of Disruptive Technologies**[7]. It is considered too general and not oriented to aeronautical sector.

Following the study of other taxonomies, it was evident that specific contributions had to be taken into consideration. This was **specifically the case for the ACARE and EDA taxonomies** which involve aeronautical technologies applicable to the Clean Aviation SRIA.

Firstly, the ECARE consortium identified a first list of relevant topics[8] and subtopics[9] from ACARE and EDA elements. **To better illustrate the complex process followed to arrive at the final ECARE Taxonomy some topics and subtopics were not included** while other have been introduced for a better

[1] NLR-CR-2002-688 (daccampania.com)
[2] ESA Technology Tree v4.0
[3] OSRA Defence Technology Taxonomy (europa.eu)
[4] https://www.wandinc.com/taxonomies/wand-aerospace-engineering-taxonomy)
[5] https://www.nasa.gov/offices/oct/taxonomy/index.html
[6] https://www.easn.net/?q=thematic_structure&area=1
[7] Taxonomy of Disruptive Technologies (nydalengroup.com)
[8] **Topic**: Technical domain
[9] **Subtopic**: Technological brick

homogeneity. **Appendix 1 show the process followed for the topics and subtopics selection** which has been obtained by picking up the corresponding elements from ACARE, EDA taxonomy and the evaluation performed by the consortium.

Then, the partners from the four pilot regions evaluated qualitatively this list on the basis of their own knowledge and looking at the Clean Aviation target. As a result, various topics were removed, while new ones were introduced, e.g. the electric, hybrid-electric and hydrogen propulsion systems, which were not initially present in the ACARE and EDA Taxonomy.

Finally, the partners performed a cross-correlation of the final topics and subtopics with their regional Smart Specialisation Strategy for Research & Innovation (RIS3) and the Clean Aviation Strategic Research and Innovation Agenda[10] (CA SRIA). This part of the exercise enabled to adjust the list and thus finalize the definition of the main topics of the ECARE taxonomy. Figure 1 presents schematically the process followed by the ECARE consortium to validate the taxonomy.

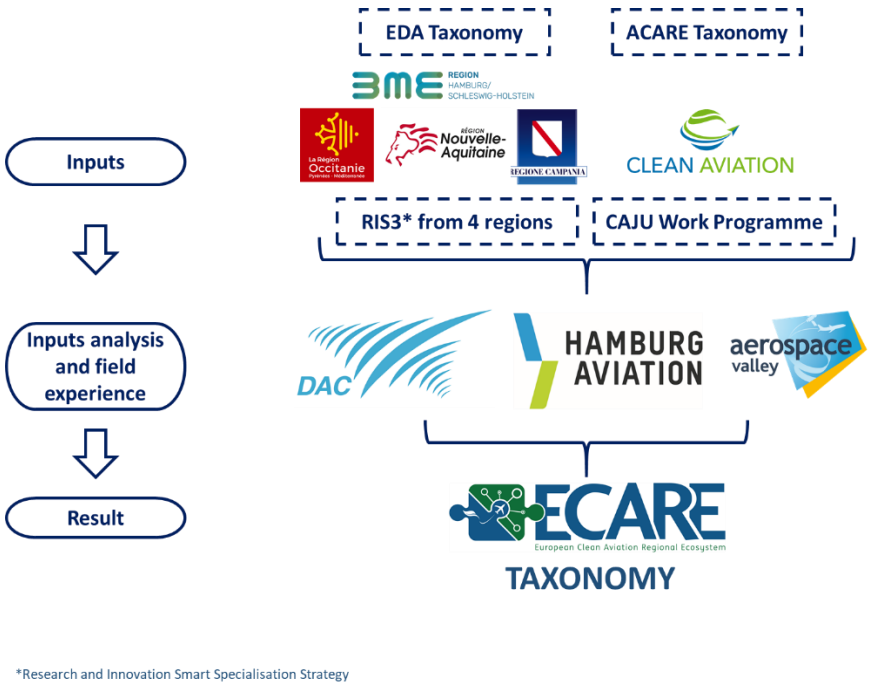

Figure 1: ECARE taxonomy building process

To conclude on the process of ECARE taxonomy building, **the consortium structured a two-level taxonomy with a total of 24 main topics with 210 subtopics.** The information about the selection of the topics and subtopics is available in appendix 1.

2.2.2 The resulting ECARE Taxonomy

The agreed version of the **ECARE Taxonomy is characterized by 24 topics** presented in Table 1. These topics represent the top-level technical domains in aircraft construction, enabling a first breakdown of aircraft technologies. The **full ECARE Taxonomy** is attached as appendix 2.

[10] clean-aviation.eu/sites/default/files/2022-01/CAJU-GB-2021-12-16-SRIA_en.pdf

Table 1: ECARE taxonomy topics

ECARE taxonomy topics
A. Flight physics - A1. Aerodynamics
A. Flight physics - A2. Thermal & Fluidynamics
A. Flight physics - A3. Structural Mechanics & Smart Materials
B. Manufacturing Processes/Design Tools/Techniques
C. Materials Technology - C1. Electronic
C. Materials Technology - C2. Photonic/Optical
D. Device Technology
E. Design Technologies for Platforms
F. Aerostructures
G. Propulsion - G1. Endothermic Systems
G. Propulsion - G2. Propellant & Combustion
G. Propulsion - G3. Electric Systems
H. Avionics & On-board Systems - H1. General
H. Avionics & On-board Systems - H2. Communications
H. Avionics & On-board Systems - H3. Sensor Systems
H. Avionics & On-board Systems - H4. Major subsystems
I. Flight Mechanics
J. Information and Signal Processing Technology
K. Integrated Design & Validation
L. Integrated Systems Technology
M. Human Factors
N. Innovative concepts & scenarios
O. Operating Environment Technology
P. Simulators, Trainers and Synthetic Environments

The subtopics presented in appendix 2 were defined by using and updating the existing definitions of the taxonomies mentioned in section 2.2.1. An example of the taxonomy definition is presented in Figure 2 for the topic “A. Flight Physics - A2. Thermal & Fluid Dynamics” with the related subtopics and their definitions.

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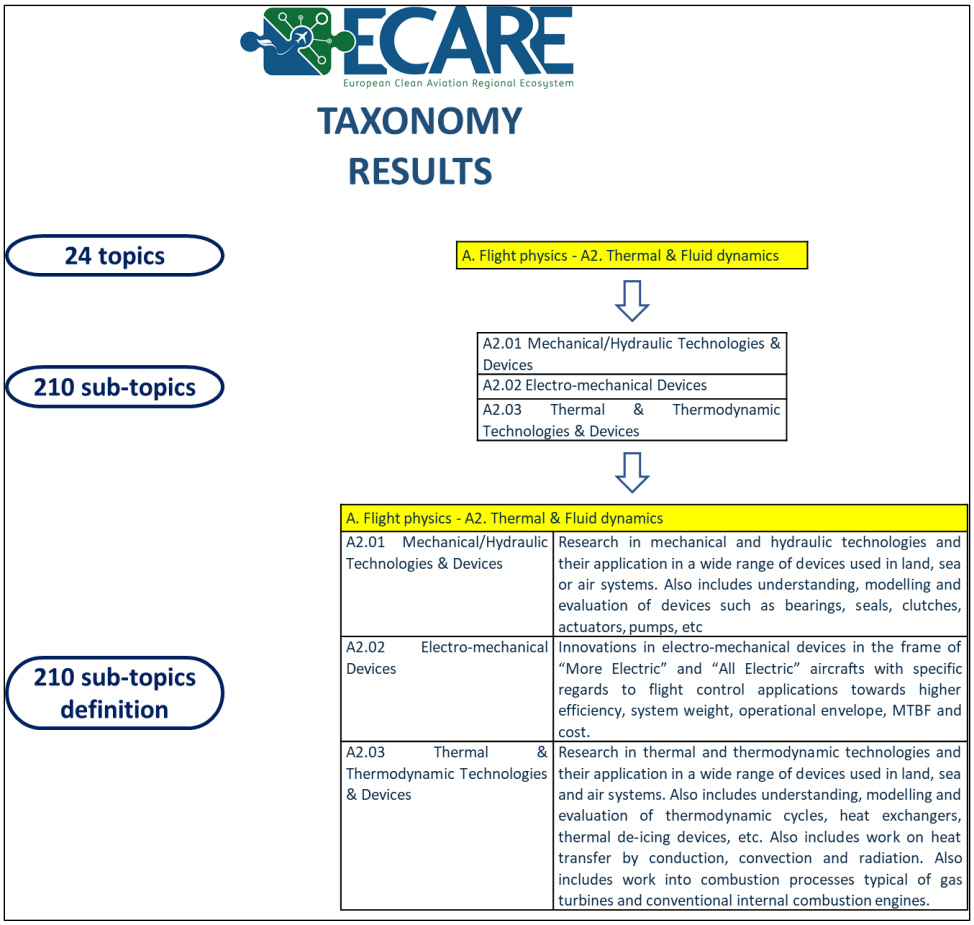

Figure 2: ECARE taxonomy results

The taxonomy as presented in this document has been fixed for the application at the current phase of the ECARE project. However, **feedback on possible alterations were gathered during the 58 interviews performed** (27 SMEs, 11 Large companies, 6 Intermediate-sized enterprise, 7 RTOs and 7 research universities) with aeronautical stakeholders in the four pilot regions, **as well as consulting from the ECARE Stakeholder Group**. The consortium will review feedback from stakeholders after the submission of this deliverable and will identify potential points to be included or modified. This potential iteration will be presented at the ECARE Transnational Workshop in November 2023.

2.3 Methodology to use the ECARE taxonomy

Further to the taxonomy definition, **the ECARE partners decided to work on a methodology to be used by regional public authorities wishing to map their regional strategies**. **An Excel tool (see appendix 3. Positioning on the ECARE taxonomy) has been developed to facilitate this mapping** in order to help a regional authority to present its key priorities and competences to CAJU and facilitate potential signature of a Memorandum of Cooperation (MoC).

ECARE Excel tool consists of three main tabs:

1) The first tab "1. Introduction" needs to present the funding programs, the links between RIS3 and aviation, and the main investments. This information provides a first view on what exists in the regional ecosystem.

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2.1) The second tab "2. Taxonomy positioning result" is dedicated to the assignment by each entity of Low, Medium or High priority for each topic of the taxonomy. The consortium proposed and defined criteria to help regions to position themselves, which are noted in Table 2.

Table 2: Criteria definition

	Definition of criteria
Low	No major large companies positioned; No significant SME supply chain; Small R&I and industrial activity; No roadmap and funding program on the topic;
Medium	Large companies emerging on the topic; Technology under development but not mature in your region; SME supply chain building up at early stage; Roadmap and funding programmes + few funding calls in the region;
High	Major large companies; Strong industrial positioning on the technology in the region; SME supply chain built on the technology; Roadmap and funding programmes targeting the technology; Important RTO and industry working on the technology;

It is important to note that these criteria have been proposed for regional authorities use. These criteria need to be updated and adapted according to the different potential users of ECARE taxonomy.

2.2) Within the second tab, it is requested that the taxonomy user provides a justification on its topics ranking (see Figure 3). This justification could be done according to the following criteria:

- The key players in the technological brick ecosystem
- The existing funding programs and roadmaps
- Any other information that would help to clarify the positioning

Topics	ECARE taxonomy positioning result	Justify your positioning (Presentation of funding calls and roadmaps on the topics, highlight the SMEs and large companies presence on your territory, etc...)
A. Flight physics – A1. Aerodynamics		
A. Flight physics – A2. Thermal & Fluidynamics		
A. Flight physics – A3. Structural Mechanics & Smart Materials		

	Criteria definition
Low	No major large companies positioned; No significant SME supply chain; Small R&I and industrial activity; No roadmap and funding program on the topic;
Medium	Large companies emerging on the topic; Technology under development but not mature in your region; SME supply chain building up at early stage; Roadmap and funding programmes + few funding calls in the region;
High	Major large companies; Strong industrial positioning on the technology in the region; SME supply chain built on the technology; Roadmap and funding programmes targeting the technology; Important RTO and industry working on the technology;

Figure 3: ECARE taxonomy tool second tab presentation to complete

3) Once the second tab is completed, the third tab "3. Graphs and Tables" will generate graphs and tables automatically (see Figure 4) in order to identify taxonomy topics priority.

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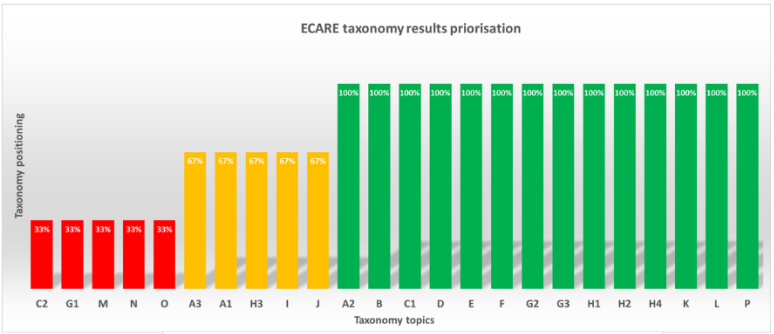
Topics	ECARE taxonomy positioning result
A. Flight physics - A3. Structural Mechanics & Smart Materials	67%
A. Flight physics - A1. Aerodynamics	67%
A. Flight physics - A2. Thermal & Fluidynamics	100%
B. Manufacturing Processes/Design Tools/Techniques	100%
C. Materials Technology - C1. Electronic	100%
C. Materials Technology - C2. Photonic/Optical	33%
D. Device Technology	100%
E. Design Technologies for Platforms	100%
F. Aerostructures	100%
G. Propulsion - G1. Endothermic Systems	33%
G. Propulsion - G2. Propellant & Combustion	100%
G. Propulsion - G3. Electric Systems	100%
H. Avionics & On-board Systems - H1. General	100%
H. Avionics & On-board Systems - H2. Communications	100%
H. Avionics & On-board Systems - H3. Sensor Systems	67%
H. Avionics & On-board Systems - H4. Major subsystems	100%
I. Flight Mechanics	67%
J. Information and Signal Processing Technology	67%
K. Integrated Design & Validation	100%
L. Integrated Systems Technology	100%
M. Human Factors	33%
N. Innovative concepts & scenarios	33%
O. Operating Environment Technology	33%
P. Simulators, Trainers and Synthetic Environments	100%



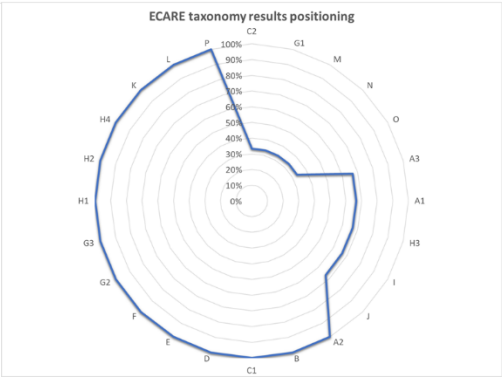


Figure 4: Example of graphs and tables generated automatically following the first tab completion

2.4 Positioning results of one Pilot region on ECARE taxonomy

The three ECARE clusters have collected evaluations from the four pilot regions according to the methodology indicated in section 2.3. **The next section will present the positioning of the Campania region, as an example.** The data collected for all the pilot regions are available **in (see 4:** Pilot regions positioning**.**

2.4.1 Example of Campania region positioning

The Campania region's Research and Innovation Smart Specialization Strategy (RIS3) was developed through a process of consultation and engagement with regional stakeholders. The strategy is aligned with the region's overall policies and available resources. The RIS3 is not directly associated with a specific budget, instead, the regional government periodically issues call for proposals in coherence with the themes of the RIS3. DAC is the main stakeholder including about 90-95% of the regional aerospace ecosystem and contributed a lot to the origin of most of the topics included in the RIS3.

On the basis of these considerations, the assignment of the "high", "medium", "low" rating to ECARE Taxonomy topics has been done by considering the relative importance of those topics in the various technological themes included in the RIS3. Thus, if a taxonomy topic is assigned the rating "low", it means that it is relatively less important (associated with small or low priority themes) compared to other topics.

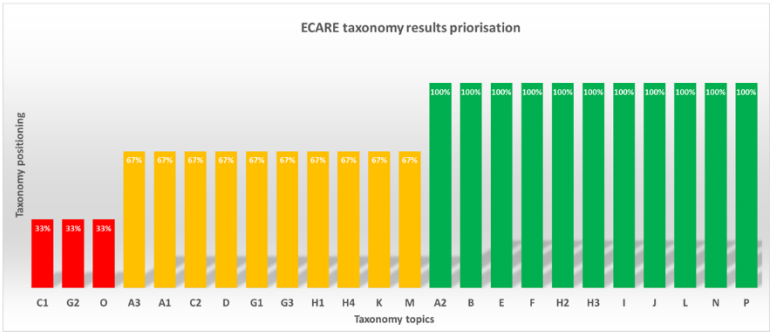
The ratings and corresponding motivations are collected in appendix 4.3, which presents qualitative data and shows where the priorities are in the region for each topic. The results of this assignment are shown in Table 3, which represents the overall correlation with Campania RIS3.

Table 3: Correlation of Campania positioning with ECARE Taxonomy

Topics	ECARE taxonomy positioning result
A. Flight physics - A1. Aerodynamics	Medium
A. Flight physics - A2. Thermal & Fluidynamics	Medium
A. Flight physics - A3. Structural Mechanics & Smart	High
B. Manufacturing Processes/Design Tools/Techniques	High
C. Materials Technology - C1. Electronic	Low
C. Materials Technology - C2. Photonic/Optical	Medium
D. Device Technology	Medium
E. Design Technologies for Platforms	High
F. Aerostructures	High
G. Propulsion - G1. Endothermic Systems	Medium
G. Propulsion - G2. Propellant & Combustion	Low
G. Propulsion - G3. Electric Systems	Medium
H. Avionics & On-board Systems - H1. General	Medium
H. Avionics & On-board Systems - H2. Communications	High
H. Avionics & On-board Systems - H3. Sensor Systems	High
H. Avionics & On-board Systems - H4. Major subsystems	Medium
I. Flight Mechanics	High
J. Information and Signal Processing Technology	High
K. Integrated Design & Validation	Medium
L. Integrated Systems Technology	High
M. Human Factors	Medium
N. Innovative concepts & scenarios	High
O. Operating Environment Technology	Low
P. Simulators, Trainers and Synthetic Environments	High

Figure 5 shows the topics where capabilities and interests are mostly concentrated (topics at 100% in green) for Campania region. The topics identified as the second level of importance are the ones at 66%, highlighted in orange, then, the ones with less focus are the one at 33% in red.

Topics	ECARE taxonomy positioning result
A. Flight physics - A3. Structural Mechanics & Smart Materials	67%
A. Flight physics - A1. Aerodynamics	67%
A. Flight physics - A2. Thermal & Fluidynamics	100%
B. Manufacturing Processes/Design Tools/Techniques	100%
C. Materials Technology - C1. Electronic	33%
C. Materials Technology - C2. Photonic/Optical	67%
D. Device Technology	67%
E. Design Technologies for Platforms	100%
F. Aerostructures	100%
G. Propulsion - G1. Endothermic Systems	67%
G. Propulsion - G2. Propellant & Combustion	33%
G. Propulsion - G3. Electric Systems	67%
H. Avionics & On-board Systems - H1. General	67%
H. Avionics & On-board Systems - H2. Communications	100%
H. Avionics & On-board Systems - H3. Sensor Systems	100%
H. Avionics & On-board Systems - H4. Major subsystems	67%
I. Flight Mechanics	100%
J. Information and Signal Processing Technology	100%
K. Integrated Design & Validation	67%
L. Integrated Systems Technology	100%
M. Human Factors	67%
N. Innovative concepts & scenarios	100%
O. Operating Environment Technology	33%
P. Simulators, Trainers and Synthetic Environments	100%



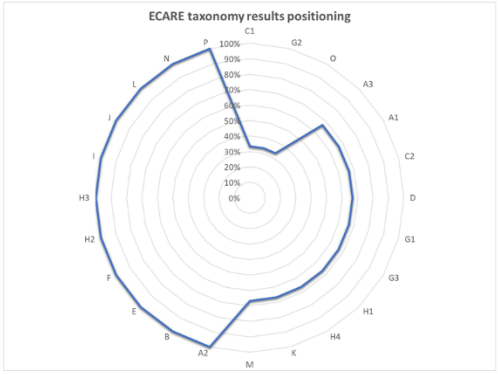


Figure 5: Graphs and tables presenting Campania positioning

Appendix 4.3 reports in details the rationale of Campania region position for each taxonomy topics.

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2.5 Conclusion

The ECARE Taxonomy is a valuable tool for the clean aviation community. It provides a common framework for understanding and discussing about aeronautical technologies.

It is particularly useful for the following objectives:

- **Evaluating and mapping technological priorities:** Identify and prioritize the technological areas that regional, national, and European funding bodies should support, using the ECARE taxonomy as a tool.
- **Identifying funding opportunities**: The ECARE taxonomy can help aviation stakeholders identify available calls for their technologies.
- **Mapping past or present funded projects:** The ECARE taxonomy can help aviation stakeholders identifying funded projects that have already been completed or are under development in a given technological domain.
- **Identifying and mapping the aeronautical technological competences**: The ECARE taxonomy can be used to assess and visualize the distribution of aeronautical technological competences across different regions and countries.

These specific points contribute to the value of the ECARE Taxonomy:

- The taxonomy is based on extensive consultation and feedback from a wide range of stakeholders, ensuring that it is relevant and useful.
- The taxonomy is divided into 24 main topics and 210 subtopics, providing a sufficient level of detail to cover a wide range of aeronautical technologies, with each subtopic having its own definition.
- The taxonomy is available in spreadsheet format, making it easy for stakeholders to use.

3 Mapping of Regional, National and European calls

3.1 Objectives

The mapping of calls will serve as a foundation for the content of the ECARE digital platform, which will be published later in the ECARE project. **This mapping of regional, national and European calls will allow users to identify funding opportunities that are relevant to their technological domain of competence**, and it will also provide different information such as the technological bricks on which the call is positioned, the expected TRL levels and other key information.

The mapping of calls can be used by: **(1) private companies** (SMEs, Intermediate-sized enterprises, & Large companies), **RTOs and research universities**; and **(2) public funding bodies** (regional, national and European funding bodies).

The two types of stakeholders have different objectives: **(1) companies, RTOs and research universities** can use this listing to find new funding opportunities, whereas, **(2) the funding bodies** can use it to identify potential funding gaps existing in their geographical area of intervention.

A mapping of current and future aviation R&I calls at regional, national and European level was performed, in the 3 pilot countries: France, Italy & Germany.

3.2 Methodology

To facilitate the mapping of calls, **the consortium prepared, validated and tested an Excel template (see appendix 5. Tool for the listing of calls)**. This template will act as a methodological tool to map new calls in the future.

The Excel template holds four tabs:

- **The first tab "1. Listing of calls" concerns the presentation of the call**. It includes the following information: (1) Name of the call; (2) Funding body; (3) Type of funding: regional, national or European; (4) Short description of the call; (5) Type of project: Single applicant or collaborative project; (6) TRL beginning; (7) TRL end; (8) Maximum duration in years; (9) Budget per project in K€; (10) Deadline; (11) Country; (12) Region; (13) Website link; (14) Eligible structures: SME[11], Intermediate sized enterprise[12], Large company[13], RTO[14] and research university[15]; (15) Taxonomy topic(s) identified.

[11] **SME:** SMEs employ less than 250 persons. They should also have an annual turnover of up to EUR 50 million, or a balance sheet total of no more than EUR 43 million: SME definition (europa.eu)

[12] **Intermediate-sized enterprise:** An intermediate-sized enterprise is a company employing between 250 and 4,999 persons, and an annual turnover which does not exceed 1.5 billion euros or a balance sheet total which does not exceed 2 billion euros. A company with fewer than 250 employees but an annual turnover greater than 50 million euros and a balance sheet exceeding 43 million euros is also considered to be of intermediate size: ISE definition: INSEE

[13] **Large company:** A large enterprise is an enterprise that checks at least one of the following two conditions: (1) has at least 5,000 employees; (2) has an annual turnover greater than 1.5 billion euros and a balance sheet total of more than 2 billion euros. Definition - Large company | Insee

[14] **RTO:** RTOs are Regional and national actors whose core mission is to harness science and technology in the service of innovation or public bodies and industry, to improve the quality of life and build economic competitiveness in Europe. RTOs are generally non-profit organisations and their revenues are re-employed to fund new innovation cycles. JRC97781.pdf (europa.eu)

[15] **Research university**: Research universities prioritizes research and can be public or private institutions. By definition, research universities offer master' and doctoral degrees along with bachelor' degrees.

- **The three next tabs present different analysis and information (2. Listing of funding bodies; 3. Funding body & taxonomy topic; and 4. Eligible structure & funding)** that can be extracted following the completion of the first tab.

All the information gathered in this Excel form is key, especially once the ECARE digital platform will be available. The platform will allow the automatic generation of calls mapping and/or the identification of funding gaps. **An important objective is to link the ECARE digital platform to the websites of funding bodies with an application programming interface (API)**, allowing the automatic integration of updated information on the platform. Therefore, it is a priority to mention the relevant website link for each call, as well as the taxonomy topic it is referring to. **Each call must be linked to at least one taxonomy topic,** because this will allow companies to identify which calls are relevant to their technological domain of competence.

Table 4 and Table 5 present the template developed by the ECARE consortium for the listing of calls. The Excel tool to collect the listing of calls from stakeholders is available in attachment to D2.1 **(see appendix 5. Tool for the listing of calls)**.

Table 4: Table for the listing of calls (1/2)

													Eligible structures (1: main ; 0: secondary)				
Name of the call	Funding body	Type of call (regional, national or European)	Short description	Type of consortium (single partenaire or consortium)	TRL beginning	TRL end	Maximum duration in years	Budget per project in k€	Deadline	Country	Region	Links	SME	ISE	LC	RTO	Uni

Table 5: Table for the listing of calls (2/2)

	Taxonomy concerned (1: main ; 0: secondary)																						
Name of the call	A1	A2	A3	B	C1	C2	D	E	F	G1	G2	G3	H1	H2	H3	H4	I	J	K	L	M	N	O	P

Since the ECARE digital platform is still under development, all the information must be integrated using an Excel tool. However, the consortium plans to use an online questionnaire available on the ECARE website and directly linked to the digital platform in the future.

3.3 First results and examples of extracted information from the listing of calls

ECARE consortium has identified 291 calls (201 European, 47 national and 43 regional ones) that have been linked to the ECARE taxonomy. The complete list of these calls is available in appendix 6. Table 6 includes more details about the calls distribution among the ECARE pilot countries. These 291 calls, which are not exhaustive and only a representative sample, can be linked to multiple taxonomy topics and will be used to populate the ECARE digital platform.

Table 6: Number of calls per geographical area

Type of funding	Volume of calls
Europe	**201**
European	201
France	**21**
National	13
Regional	8
Germany	**23**
National	22
Regional	1
Italy	**46**
National	12
Regional	34
Total	**291**

The consortium has integrated regional, national, and European calls, directly targeting aeronautics technologies but also transversal ones. Table 7 provides a non-exhaustive list of the funding bodies identified at this stage of the project. This table is an example of the type of information that can be extracted from the listing of calls.

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Table 7: Listing of funding bodies at regional, national and European level

European
EIT Digital
EIT Inno Energy
EIT Manufacturing
Era-Net
Eureka
European Defense Fund
European Innovation Council
European Research Council
Horizon Europe - Clean Aviation Joint Undertaking
Horizon Europe - Clean Hydrogen Joint Undertaking
Horizon Europe - Cluster 4
Horizon Europe - Cluster 5
Horizon Europe - Cluster 6
Horizon Europe - EUROHPC

National
ADEME
Agenzia per la Coesione Territoriale
Agenzia Spaziale Italiana
ANR
BPI France
BPI France / ADEME
Federal Ministry for Economic Affairs and Climate Action - Germany
Federal Ministry of Education and Research - Germany
Ministry of Defence - Italy
Ministry of Industry and Economic Development - Italy
Ministry of University and Research - Italy

Regional
Behörde für Wirtschaft und Innovation (Authority for Economy and Innovation) Hamburg
Campania Region
Region Nouvelle Aquitaine
Region Occitanie
Region Occitanie / BPI France

Apart from this key information, other results can be extracted, which could support funding bodies to identify potential funding gaps on some technologies. In particular, when the information is cross-correlated with the aeronautical stakeholders' competences (see section 5: Mapping of Aeronautical Competences (SMEs, Intermediary Sized Enterprises, Large companies, RTOs and research universities)). Table 8 identifies the ECARE taxonomy topics that are the most funded at regional, national, and European levels, shown in green for clarity. This type of information will allow the ECARE digital platform to map calls to taxonomy topics.

Table 8: Funding bodies linked with geographical coverage and taxonomy topics

Geographical area AND funding body	A1	A2	A3	B	C1	C2	D	E	F	G1	G2	G3	H2	H1	H3	H4	I	J	K	L	M	N	O	P
European	**33**	**36**	**49**	**67**	**38**	**42**	**66**	**37**	**38**	**37**	**56**	**57**	**39**	**40**	**52**	**66**	**38**	**53**	**54**	**59**	**32**	**45**	**31**	**35**
Europe	33	36	49	67	38	42	66	37	38	37	56	57	39	40	52	66	38	53	54	59	32	45	31	35
National	**26**	**28**	**34**	**35**	**31**	**32**	**31**	**32**	**34**	**29**	**32**	**35**	**25**	**29**	**29**	**28**	**25**	**33**	**34**	**36**	**22**	**31**	**26**	**30**
France	10	10	12	11	10	10	10	10	12	10	10	11	10	11	10	10	10	11	13	11	10	10	10	10
Germany	10	10	13	14	14	14	13	13	16	13	15	15	10	11	10	10	10	13	13	16	7	13	9	10
Italy	6	8	9	10	7	8	8	9	6	6	7	9	5	7	9	8	5	9	8	9	5	8	7	10
Regional	**15**	**39**	**40**	**41**	**39**	**14**	**40**	**16**	**17**	**15**	**15**	**41**	**14**	**38**	**41**	**40**	**13**	**40**	**42**	**41**	**12**	**39**	**14**	**37**
France	8	7	7	8	7	7	7	8	8	7	7	8	8	7	8	7	7	7	8	8	7	7	7	7
Germany				1				1	1	1	1	1		1					1					
Italy	7	32	33	32	32	7	33	7	8	7	7	32	6	30	33	33	6	33	33	33	5	32	7	30
Total	**74**	**103**	**123**	**143**	**108**	**88**	**137**	**85**	**89**	**81**	**103**	**133**	**78**	**107**	**122**	**134**	**76**	**126**	**130**	**136**	**66**	**115**	**71**	**102**

As it can be seen in Figure 6, Figure 7 and Figure 8 (see outside the red circle which represents the average on ECARE positioning per level of funding), some key topics are seen of more importance from the funding bodies as the number of available calls is higher than the average.

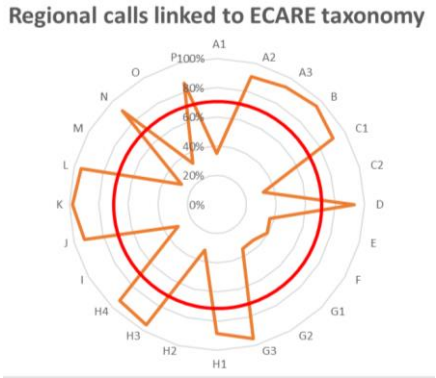

Figure 6: Positioning of regional calls on the taxonomy

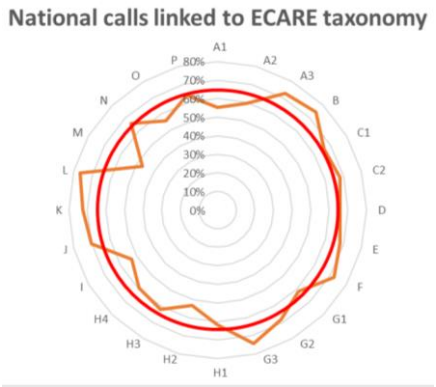

Figure 7: Positioning of national calls on the taxonomy

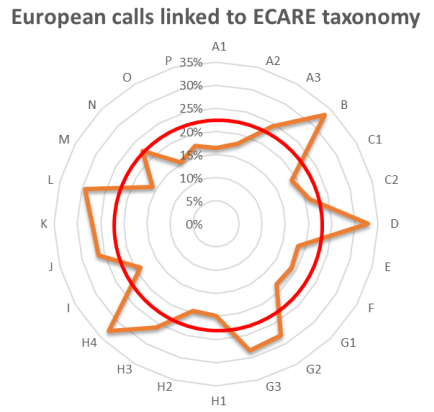

Figure 8: Positioning of European calls on the taxonomy

3.3.1 The example of France with national and regional funding bodies

To demonstrate the analysis following the listing of calls, the result for France with regional and national funding bodies is presented as an example. All additional data for Italy, Germany and Europe can be found in appendix 6 and will be listed on the ECARE digital platform.

The ECARE digital platform will allow users to easily identify funding opportunities for aeronautical companies in each country, as shown by the example of France in Table 9.

A total of 21 calls exist in France for the aeronautics sector (see Table 9). All these calls have been linked to the first level of the ECARE taxonomy topics, so it is possible to identify the gaps and get a technological overview.

Figure 9 shows that all the topics are globally well addressed by French calls. The most addressed topics are the following ones:

- Regional funding programs: A1, B, E, F, G3, H2, H3, K, L
- National funding programs: A3, F, G3, H1, K

Some taxonomy topics are less addressed, such as: M, N, O, P, A2, C1, C2, G2, G1, I, J, H4.

In the future, it is possible to investigate the relevance of funding on particular topics by using a correlation between stakeholder competences and the positioning of calls on the taxonomy.

Table 9: Listing of aeronautics calls in France

ADEME
Appel à projets national "Recyclage des plastiques"
DECARB IND
Études d'écoconception
Investissements d'écoconception
Projets R&D + i
Solutions innovantes pour l'amélioration de la recyclabilité, du recyclage et de la réincorporation des matériaux (RRR)
ANR
Laboratoires communs organismes de recherche publics PME, ETI - LabCom 2023
BPI France
AAC Programme French Tech 2030
ADI - Aide pour le développement de l'innovation
I-DEMO 2
I-DEMO Europe
Subvention Innovation
BPI France / ADEME
Diag Decarbon'Action
Region Nouvelle Aquitaine
DEMONSTRATEUR Nouvelle Aquitaine
Innovation, Amorçage, Investissement Start-up
PTI - Prestation Tremplin Innovation - Région Nouvelle-Aquitaine
Soutien aux projets innovants - Région Nouvelle-Aquitaine
Region Occitanie
"Contrat d'innovation" - Occitanie
Contrat 3S
Contrat Entreprise d'Avenir
Region Occitanie / BPI France
IDEMO REGIONALISE

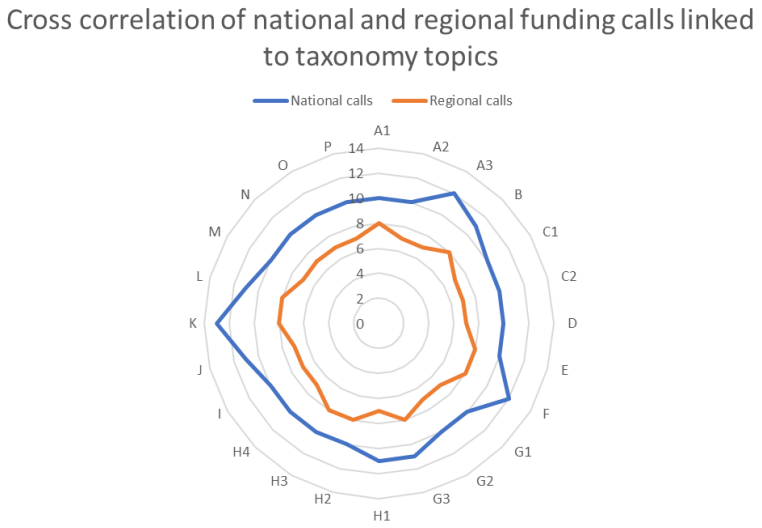

Figure 9: Topics covered by national and regional calls

3.4 Conclusion

The ECARE consortium has identified 291 calls, including 201 ones at the European level, 47 ones at the national level, and 43 ones at the regional level. These calls have been linked to the first level of the ECARE technology domains.

The tool, which has been developed for the mapping of calls, can be used by external stakeholders and facilitates the replication of the mapping for other European regions and countries. The automated analysis integrated into the tool presents first results to the user, and serves as an overview of the provided information.

The data can be correlated to the data collected in the mapping of funded projects and mapping of stakeholder competences, serving as a useful tool to funding bodies wanting to assess the complete picture of the funding landscape.

The digital platform developed by ECARE will map the existing funding opportunities, so that aeronautical stakeholders can use this platform to identify the calls that are relevant to their technological domain of competence.

4 Mapping of funded projects

4.1 Objectives

The mapping of funded projects serves as a basis of contents for the digital ECARE platform, called ECARE digital platform, which will be published at a later stage of the project. On the ECARE digital platform, users will have the opportunity to view a broad range of funded projects as well as calls (as shown previously in section 3). **The funded projects displayed on the ECARE digital platform will allow to get an overview of the funded projects in different regions, the topics and the project partners.**

The mapping of funded projects can be used by: **(1) private companies** (SMEs, Intermediate-sized enterprises, & Large companies), **RTOs and research universities**; and **(2) public funding bodies** (regional, national and European funding bodies).

The two types of stakeholders have different objectives: **(1) companies, RTOs and research universities** can use this mapping to identify past or current projects on one taxonomy topic, whereas, **(2) the funding bodies** can use the tool to assess the landscape of funded project in their region or country, and compare it to other regions or to identify the most funded topics in their geographical area.

Similar to the methodology for the mapping of calls, the aim is to create a methodology for the mapping of funded projects which is replicable to other European regions and countries. The tool to perform the mapping should be easy to understand by external stakeholders. It should also automatically perform a brief analysis, so the user has an overview of the listed projects as a result. The result can be used to access the current state of the funding landscape in the respective region or country.

4.2 Methodology

To collect the data for the mapping of funded projects, the consortium tested and validated an Excel tool which simplifies the replication of the methodology for other regions. It is planned to use this template to collect information for further mappings in the future **(see appendix 7. Tool for the listing of aeronautical projects).**

The Excel template to be completed is divided into two main tabs:

- **The first tab (1. Listing of projects) concerns the collection of funded projects**, which includes a wide range of data, such as: (1) Project title; (2) Funded region; (3) Project partner; (4) Project partner type; (5) Project coordinator; (6) Project consortium; (7) TRL at beginning of the project and TRL at end of project; (8) Funding authority/program; (9) Total funding volume of project; (10) Funding volume of project partner; (11) Percentage of public funding received; (12) Beginning of project; (13) Duration; (14) Project Website; (15) Project description; (16) Taxonomy.
- **The tabs 2. are the automated analysis (2. Number of projects per taxonomy topic; 2.TRL end per funding level; 2. Funding volume of projects)**, after filling in the data into the listing of projects. Three analyses were selected, the first analysis looks at the number of projects per taxonomy brick, the second analysis is an overview of the TRL at the end of the project per funding level. Lastly, the budget is analysed to look at the amount of funding in one geographical area.

Table 10 and Table 11 present the template developed by the ECARE consortium for the listing of projects. The Excel tool to collect project from stakeholders is available in the attachment to D2.1 **(see appendix 7. Tool for the listing of aeronautical projects)**.

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Table 10: Table for the mapping of funded projects (1/2)

Project identification																
Project title	Funded region	Project partner	Project partner type	Project coordinator	Project consortium	TRL at beginning of project	TRL at end of project	Funding level	Funding authority / program	Total funding volume of project (in Million EUR)	Funding volume of project partner (in Million EUR)	% of public funding received (project partner)	Beginning of project	Duration (in months)	Project Website	Project description (max. 100 words)

Table 11: Table for the mapping of funded projects (2/2)

Taxonomy bricks concerned (1: main)																						
A1	A2	A3	B	C1	C2	D	E	F	G1	G2	G3	H1	H2	H3	H4	I	J	K	L	M	N	O	P

4.3 ECARE first results for the mapping of funded projects

The three aeronautical clusters in the ECARE project listed projects in their pilot regions, Occitanie and Nouvelle Aquitaine in France, Campania in Italy and Hamburg in Germany. Projects funded on a regional, national and European level with participation of regional stakeholders were identified and listed. All projects in the aeronautical sector, which were active in the timeframe of January 2019 until current day, were considered for the data collection.

As of June 2023, information about 246 funded projects have been collected, out of which 107 were identified by DAC, 79 by HAv and 60 by AV (see appendix 8: Listing of projects, 29 projects were deleted for confidentiality reasons)

The information collected allows to perform various analysis and gives an insight about the landscape of funded projects. The current table allows to filter and therefore analyse and compare the funding budgets, duration of different funded projects on a European, national and regional level in the pilot regions. The use of the ECARE taxonomy demonstrates the relevance of different taxonomy bricks, and allows to identify potential funding gaps in research topics.

Figure 10 shows the combined number of projects per taxonomy bricks with data collected by all three clusters. Again, the projects can cover several taxonomy bricks. The most covered taxonomy brick is **B. Manufacturing Processes/Design Tools/Techniques with 91 projects**, while the least covered taxonomy brick is C. Materials Technology C2. Photonic/Optical with 9 projects. Overall, the majority of taxonomy bricks are covered by 15 to 30 projects**.**

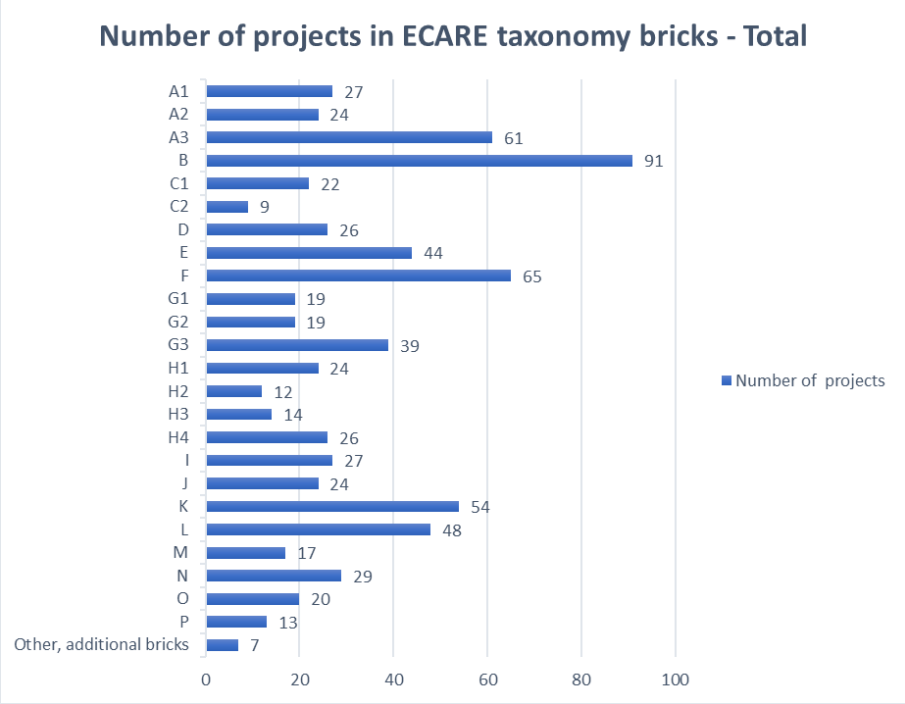

Figure 10: Total number of projects covering ECARE taxonomy bricks

The table used for the mapping of funded projects is a living document which will continuously be improved, and is **planned to be integrated within the ECARE digital platform.**

4.3.1 Analysis of Hamburg example

To provide an example for one region as suggested with the Excel tool, an analysis of the data collected by Hamburg Aviation is presented. For the region of Hamburg, **22 projects with European funding**, **45 projects with national funding** and **12 projects with regional funding** were identified.

Each project can cover multiple taxonomy topics. And all taxonomy bricks are covered, with a minimum of three projects per taxonomy brick (Figure 11). Figure 11 **shows that the most covered taxonomy brick is B. Manufacturing Processes/Design Tools/Techniques, with 32 projects, followed by K. Integrated Design & Validation, with 23 projects.** Taxonomy bricks covered with 10 to 20 projects are A3, E, F, J, L and N. The remaining taxonomy bricks are covered by fewer than ten projects. Thematic gaps in funding can be identified only when looking at the lower numbers. With three projects, A2, D, G1 and H4 are the least common taxonomy bricks. **The coverage of the region of Hamburg taxonomy is similar to the coverage by the pilot countries (see Figure 10 and Figure 11).**

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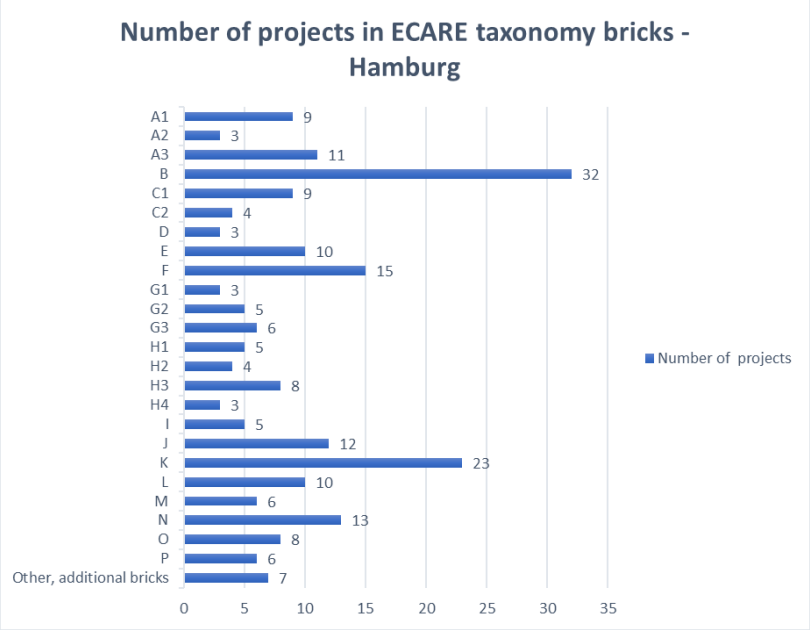

Figure 11: Number of projects in ECARE taxonomy bricks - example of Hamburg

Based on the collected data, it is possible to analyse the TRL of funded projects. This analysis can help to understand the direction of investments in aeronautics and help to identify areas of aeronautical technology where there are gaps and additional investment needed. Figure 12 presents the distribution of TRL at start and end of the projects in Hamburg, the total number being 79 projects per start and end. For some projects, the TRL at the start or end of the project has not been specified by the respective funding bodies. Most projects start with a TRL of 4, and some projects with a TRL of 1,2 or 3. Other than one project which has a TRL of 5 at the start, there is no projects with a TRL of higher than 4 at the start. However, the majority of projects are reaching a TRL of 5-6 at the end of projects. Lower TRL at the end of the project are less common, meaning that the main focus in Hamburg is on applied research. One project with a TRL of 7 at the end of the project was identified. Other than that, there are no projects that start or end with a TRL of higher than 6. Thus, funding for TRL higher than 6 can be identified as a gap for the region of Hamburg.

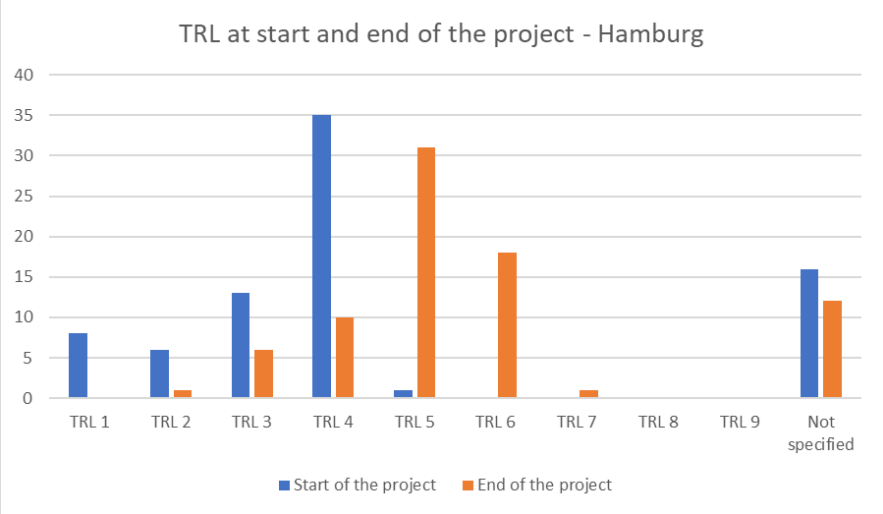

Figure 12: TRL at start and end of the project - Hamburg

4.4 Conclusion

The ECARE project has mapped 246 funded projects in the aeronautical industry, with 60 projects identified by Aerospace Valley, 107 projects by Campania Aerospace District, and 79 projects by Hamburg Aviation. The mapping covers projects funded by the European, national, and regional levels in the pilot regions of France, Italy, and Germany. This serves as a basis of content for the ECARE digital platform, which will be published at a later point in the project. On the ECARE platform, users will have the opportunity to view a broad range of funded projects completed or undergoing in different regions, with relevant information on funded topics, and project partners.

The mapping of funded projects also provides valuable insights into the landscape of funded projects in the aeronautical industry. For example, the analysis of the 246 projects shows that the most funded taxonomy bricks in general are B. Manufacturing Processes/Design Tools/Techniques and F. Aerostructures. Specifically, for the region of Hamburg, the most funded taxonomy bricks for projects are B. Manufacturing Processes/Design Tools/Techniques and K. Integrated Design & Validation. Moreover, the analysis identified a gap in funding for TRL higher than 6 for the region of Hamburg. Using the provided methodology, any region can replicate the mapping of funded projects and perform automated different analyses.

Overall, the mapping of funded projects is a valuable resource that will provide users of the ECARE digital platform with a comprehensive overview of funded projects in the aeronautical industry. The mapping will also help users to identify funding opportunities, potential partners, and the latest technological trends in the industry.

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5 Mapping of Aeronautical Competences (SMEs, Intermediary Sized Enterprises, Large companies, RTOs and research universities)

5.1 Objectives

The mapping of aeronautical competences also serves as a foundation for the content of the ECARE digital platform. This listing will allow companies to map their competences and technological bricks in a clear and visible format.

The mapping of stakeholders can be used by: **(1) private companies** (SMEs, Intermediate-sized enterprises, & Large companies), **RTOs and research universities**; and **(2) public funding bodies** (regional, national and European funding bodies).

The two types of stakeholders have different objectives: **(1) companies, RTOs and research universities** can use this listing to find new partner for collaborative project, while, **(2) the funding bodies** can use it to identify the technological competences of their ecosystem.

5.2 Methodology

To facilitate the integration of stakeholder's competences, **the consortium has prepared, validated and tested an Excel tool.** Table 12 shows a sample of the template, which includes all the required fields **(see also appendix 9. Tool for the listing of aeronautical competences)**. This template will also be used for continuous mapping in the future.

Table 12: Table for the mapping of Aeronautical competences

			Type of structure =>1: main				ECARE Taxonomy (1: main ; 0: secondary)																							
Organisation	Country	Region	SME	ISE	LC	RTO	A1	A2	A3	B	C1	C2	D	E	F	G1	G2	G3	H1	H2	H3	H4	I	J	K	L	M	N	O	P

The Excel sheet to complete is divided in two tabs:

- **The first tab concerns the presentation of organisations** which includes: (1) Name of the organisation; (2) Country; (3) Region; (4) Type of structure (SME, Intermediate-Sized Enterprise, Large Company, RTO and research university); (5) ECARE taxonomy topics.
- **The second tab summarises the information** extracted following the completion of the template with two graphs.

This listing of aeronautical competences per region and country will create a European-scale mapping tool that presents organisations and their technical competences, as shown for France in Figure 13.

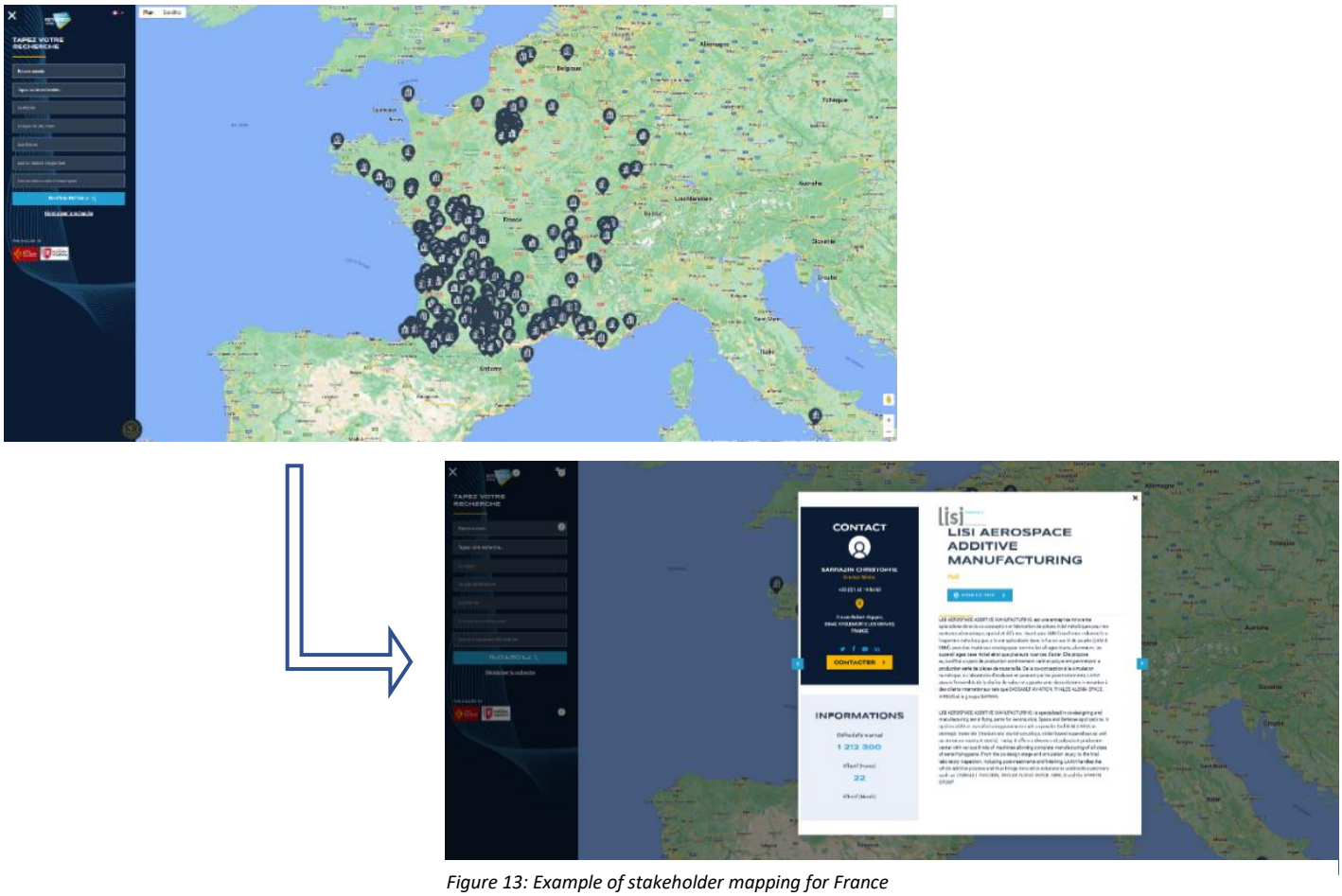

Figure 13: Example of stakeholder mapping for France

5.3 First mapping of aeronautical stakeholders' competences in France, Italy and Germany

The ECARE consortium conducted an analysis of the aeronautical competences in their respective regions. Using the template described here below, each cluster identified and linked the actors to the 1st level of taxonomy topics. **The ECARE project has identified a total of 348 stakeholders competences, with 175 organisations identified by Aerospace Valley, 94 by Hamburg Aviation and 79 by Campania Aerospace District.**

5.3.1 Aerospace Valley regions in France

Aerospace Valley is a cluster, leading the Aeronautics, Space and Drones sectors, the cluster counts 837 members in 2023 with 357 organisations (SMEs, large companies, Intermediate-sized enterprises, RTOs and research universities) identified as having an aeronautical activity. Members of the board of directors are composed of all types of organisations such as: large companies: Airbus SAS, Dassault Aviation, Safran, Liebherr; SMEs: Rescoll, Delfox, Elixir Aircraft; RTOs: ONERA, CNRS; and research university: ISAE-SUPAERO; public bodies: regional council of Nouvelle Aquitaine and Occitanie.

At this stage of the project, Aerospace Valley identified 175 organisations which can be divided into 3 locations, see Table 13:

	SME	ISE	LC	RTO	Uni	Total
Nouvelle-Aquitaine	44		8	6	4	**62**
Occitanie	63	6	10	9	6	**94**
Other regions	16	2	1	0	0	**19**
Total	**123**	**8**	**19**	**15**	**10**	**175**

Table 13: Repartition of identified organisations per region in France

- 55% from Occitanie region,
- 37% from Nouvelle Aquitaine region,
- And 9% from other French regions.

These 175 organisations identified and linked to the ECARE taxonomy are composed of: 123 SMEs, 8 Intermediate-sized companies, 19 large companies, 15 RTOs and 10 research universities.

The presentation is divided into three geographical areas.

5.3.1.1 Occitanie region

Entities from the Occitanie region globally address all taxonomy topics, with some specificities. The topic A.3 - Flight physics - Structural Mechanics & Smart materials is the most addressed one. This can be explained by a well-structured supply chain involving aeronautics parts manufacturers and the strong presence of integrators who manufacture and assemble aircraft in the region, such as AIRBUS, Ascendance, ATR, and AURA AERO.

Topic B - Manufacturing Processes/Design Tools/Techniques is also addressed by many companies, as additive manufacturing and heat treatment technologies are strongly integrated into new manufacturing processes. Occitanie has strong skills in the design and assembly of high-power electric motors for propulsion, which is reflected in topic G3 - Electric systems Propulsion coverage. High competencies can be found at RTOs such as IRT Saint Exupéry and ONERA, as well as at OEMs such as Liebherr, Safran, ISP system, and aircraft manufacturers such as Airbus.

Occitanie and Nouvelle Aquitaine have a high prevalence of entities working on the same topics. The next table presents the positioning of the identified companies on the taxonomy topics and highlights the topics mostly covered by entities from Occitanie.

Table 14: Aeronautic competences in Occitanie with reference to ECARE Taxonomy topics (1/2)

								ECARE Taxonomy (1st level topics)																						
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
DAHER AEROSPACE	France	Occitanie			1			■	■	■																		■		
3DIS TECHNOLOGIES	France	Occitanie	1									■			■												■				
ADF	France	Occitanie	1								■																				
AEROSOFT France SAS	France	Occitanie	1																												■
AIR SYSTEMS	France	Occitanie	1									■																			
AIRBUS OPERATIONS SAS	France	Occitanie			1			■	■	■	■				■	■				■	■	■	■			■	■	■	■	■	■
AIRBUS PROTECT	France	Occitanie	1								■																				
ALTEN SUD OUEST	France	Occitanie	1								■	■				■	■		■						■	■	■				
ALTITUDE AEROSPACE FRANCE	France	Occitanie	1						■	■									■							■	■				
ARTEC AEROSPACE	France	Occitanie	1					■		■																					
Ascendance Flight Technologies	France	Occitanie	1					■	■	■							■		■										■		
Ascent Integration SAS	France	Occitanie	1							■	■																				
ATECA	France	Occitanie	1							■	■				■	■															
ATMOSPHERE	France	Occitanie	1																											■	
ATR - AVIONS DE TRANSPORT REGIONAL	France	Occitanie		1				■	■	■	■				■	■				■	■	■	■			■	■	■	■	■	■
AURA AERO	France	Occitanie	1					■	■	■	■			■	■	■			■	■			■	■	■	■	■	■			■
AVIONS MAUBOUSSIN	France	Occitanie	1					■	■	■																			■		
BEYOND AEROSPACE	France	Occitanie	1					■	■	■																			■		
Blue Spirit Aero	France	Occitanie	1					■	■	■																			■		
CAPGEMINI ENGINEERING	France	Occitanie			1										■																
CENTRALE DU TRI PAR EXTRUSION - CENTRIEX	France	Occitanie	1							■																					
CERFACS	France	Occitanie				1		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
CGR CRISTIN	France	Occitanie	1							■																					
CGx AERO in SYS	France	Occitanie	1																	■					■	■			■		
CIRTEM	France	Occitanie	1									■																			
CMJ Test Systems	France	Occitanie	1																							■					
CNRS	France	Occitanie				1		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
COBRATEX SAS	France	Occitanie	1							■																					
COLLINS AEROSPACE (ROCKWELL COLLINS FRANCE)	France	Occitanie			1							■		■	■			■	■	■	■	■	■	■	■	■	■	■	■		
CONSEIL ET TECHNIQUE	France	Occitanie	1							■																					
CONTINENTAL AUTOMOTIVE FRANCE SAS	France	Occitanie			1							■																			
CT INGENIERIE	France	Occitanie	1					■		■																■	■				
DAK-MEKATRONIK-AEROSPACE	France	Occitanie	1																												■
DELAIR	France	Occitanie	1																■												
DELTY	France	Occitanie	1																							■					
ECM - Engineering Conception Maintenance	France	Occitanie	1								■																				
EMITECH	France	Occitanie	1																							■	■				

Table 15: Aeronautic competences in Occitanie with reference to ECARE Taxonomy topics (2/2)

								ECARE Taxonomy (1st level topics)																										
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
eMotion Tech	France	Occitanie	1																												
ENAC	France	Occitanie				1																									
ENIT	France	Occitanie				1																									
EnSHEIT	France	Occitanie				1																									
EQUIP'AERO	France	Occitanie	1																												
ERNEO	France	Occitanie	1																												
ESTEVE-SA	France	Occitanie	1																												
EXPLEO FRANCE	France	Occitanie			1																										
FACT GROUP	France	Occitanie	1																												
FIGEAC AERO	France	Occitanie	1																												
GARNASYS	France	Occitanie	1																												
GLENAIR FRANCE	France	Occitanie	1																												
H2PULSE	France	Occitanie	1																												
HENSOLDT NEXEYA France	France	Occitanie	1																												
HYCCO	France	Occitanie	1																												
INPT	France	Occitanie				1																									
INSAT	France	Occitanie				1																									
IRT SAINT EXUPERY	France	Occitanie				1																									
ISAE SUP-AERO	France	Occitanie					1																								
ISP SYSTEM	France	Occitanie	1																												
LATECOERE S.A.	France	Occitanie		1																											
LIEBHERR-AEROSPACE & TRANSPORTATION SAS	France	Occitanie			1																										
MECAPROTEC INDUSTRIES	France	Occitanie	1																												
MGH Energy	France	Occitanie	1																												
Mines d'Albi	France	Occitanie					1																								
Mines d'Ales	France	Occitanie					1																								
NEHIA	France	Occitanie	1																												
NEXIO	France	Occitanie	1																												
NOBRAK	France	Occitanie	1																												
NOVATEM	France	Occitanie	1																												
NXP SEMICONDUCTORS FRANCE SAS	France	Occitanie			1																										
ONERA	France	Occitanie				1																									
PCM ENGINEERING	France	Occitanie	1																												
PHILOTECH	France	Occitanie	1																												
QAIR FRANCE	France	Occitanie	1																												
RATIER-FIGEAC	France	Occitanie		1																											
SAFETYN	France	Occitanie	1																												
SAFRAN POWER UNITS	France	Occitanie			1																										
SCALIAN	France	Occitanie		1																											
SEFEE "AN AMPHENOL COMPANY"	France	Occitanie	1																												
SEG Dielectriques	France	Occitanie	1																												
SEGNERE	France	Occitanie	1																												
SERMA INGENIERIE	France	Occitanie	1																												
SOBEN	France	Occitanie	1																												
SOGECLAIR	France	Occitanie		1																											
SOPRA STERIA GROUP	France	Occitanie			1																										
SPECIFIC POLYMERS	France	Occitanie	1																												
SPHEREA	France	Occitanie		1																											
SUDAERO	France	Occitanie	1																												
TECALEMIT AEROSPACE	France	Occitanie	1																												
TEM	France	Occitanie	1																												
TORAY ADVANCED COMPOSITES	France	Occitanie	1																												
Univ de Montpellier	France	Occitanie					1																								
Univ de Perpignan	France	Occitanie					1																								
UNIVERSITE TOULOUSE - JEAN JAURES	France	Occitanie					1																								
ZELIN	France	Occitanie	1																												
ZEROAVIA FRANCE	France	Occitanie	1																												
TOTAL			**63**	**6**	**10**	**9**	**6**	**23**	**23**	**40**	**34**	**26**	**14**	**19**	**23**	**23**	**20**	**23**	**29**	**19**	**17**	**17**	**23**	**17**	**18**	**31**	**28**	**19**	**32**	**15**	**17**

The graph below gives a quick overview of companies positioning in Occitanie region:

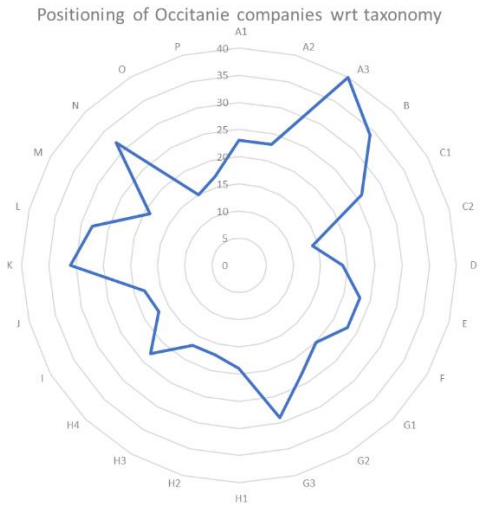

Figure 14: Positioning of aeronautics actors in Occitanie with reference to taxonomy topics

Most stakeholders are active in A3, B, K and N taxonomy bricks followed by G3 and L ones, due to Occitanie technological priorities. The graph shows that all taxonomy bricks are globally covered by Occitanie stakeholders, with a low coverage in Category C2, O and P categories.

5.3.1.2 Nouvelle Aquitaine region

The Nouvelle Aquitaine region is globally positioned on all taxonomy topics, with some specificities. The topic most addressed is A.3 - Flight physics - Structural Mechanics & Smart materials. This can be explained by the region's focus on new types of composite materials for aircraft weight reduction. The main actor in Nouvelle Aquitaine is Airbus Atlantic as a major composite manufacturer.

New innovative materials lead to new means of production, such as additive manufacturing and heat treatment, which are well developed in Nouvelle Aquitaine. This is reflected in topic B - Manufacturing Processes/Design Tools/Techniques coverage, where several companies such as Safran, CETIM, CMP Composites have been positioned as shown in Table 16. As an example, major OEMs are investing in additive manufacturing technologies in the region, such as Safran, which announced the start of construction of its Safran Additive Manufacturing Campus in the Bordeaux area. On the topic F. Aerostructure, Nouvelle Aquitaine is also well positioned with Airbus Atlantic and Aero Composite who manufacture aircraft fuselage.

Occitanie and Nouvelle Aquitaine have a high prevalence of entities working on the same topics. The next table presents the positioning of the Nouvelle Aquitaine companies on the taxonomy topics and highlights the most covered ones.

Table 16: Aeronautic competences in Nouvelle Aquitaine with reference to ECARE Taxonomy topics

								ECARE Taxonomy (1st level topics)																								
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
3DiTex	France	Nouvelle-Aquitaine	1																												
AD INDUSTRIES HYDRAULICS	France	Nouvelle-Aquitaine	1																												
AERO COMPOSITES SAINTONGE	France	Nouvelle-Aquitaine	1																												
AERO MECANIC'S	France	Nouvelle-Aquitaine	1																												
AEVA	France	Nouvelle-Aquitaine	1																												
AIRBUS ATLANTIC	France	Nouvelle-Aquitaine			1																										
AKIRA TECHNOLOGIES	France	Nouvelle-Aquitaine	1																												
AQUITAINE ANALYSE DE STRUCTURES	France	Nouvelle-Aquitaine	1																												
AQUITAINE ELECTRONIQUE	France	Nouvelle-Aquitaine	1																												
ARIANE GROUP	France	Nouvelle-Aquitaine			1																										
ATELIERS BIGATA	France	Nouvelle-Aquitaine	1																												
AXYAL	France	Nouvelle-Aquitaine	1																												
BAC BOBINAGE	France	Nouvelle-Aquitaine	1																												
BLACK SWAN TECHNOLOGY SAS	France	Nouvelle-Aquitaine	1																												
BT2i Group	France	Nouvelle-Aquitaine	1																												
CANOE - Centre Technologique Nouvelle-Aquitaine Composites & Matériaux Avancés	France	Nouvelle-Aquitaine	1																												
CDA DEVELOPPEMENT	France	Nouvelle-Aquitaine	1																												
CETIM	France	Nouvelle-Aquitaine				1																									
CMP COMPOSITES	France	Nouvelle-Aquitaine	1																												
CNRS	France	Nouvelle-Aquitaine				1																									
CONSTRUCTION STRUCTURES AERONAUTIQUES	France	Nouvelle-Aquitaine	1																												
Copelectronic	France	Nouvelle-Aquitaine	1																												
DASSAULT AVIATION	France	Nouvelle-Aquitaine			1																										
DEEP CONCEPT	France	Nouvelle-Aquitaine	1																												
DELMON GROUP - SOCAT	France	Nouvelle-Aquitaine	1																												
DIAB SAS	France	Nouvelle-Aquitaine	1																												
EDF SA	France	Nouvelle-Aquitaine			1																										
EIGSI de la Rochelle	France	Nouvelle-Aquitaine					1																								
ELIXIR AIRCRAFT	France	Nouvelle-Aquitaine	1																												
E-MERSIV	France	Nouvelle-Aquitaine	1																												
ENSGTI	France	Nouvelle-Aquitaine				1																									
ERSYA (Ergonomie des systèmes avancés)	France	Nouvelle-Aquitaine	1																												
ESI GROUP	France	Nouvelle-Aquitaine	1																												
ESTIA	France	Nouvelle-Aquitaine				1																									
ETSEME	France	Nouvelle-Aquitaine	1																												
GDTECH FRANCE	France	Nouvelle-Aquitaine	1																												
GEORGET	France	Nouvelle-Aquitaine	1																												
HEADING WEST AERO	France	Nouvelle-Aquitaine	1																												
IDEATEC	France	Nouvelle-Aquitaine	1																												
INGELIANCE - MERIGNAC	France	Nouvelle-Aquitaine	1																												
INRIA	France	Nouvelle-Aquitaine				1																									
LAUAK GROUP	France	Nouvelle-Aquitaine	1																												
LYNXDRONE	France	Nouvelle-Aquitaine	1																												
NEOGY	France	Nouvelle-Aquitaine	1																												
OMEGA SYSTEMES Aquitaine	France	Nouvelle-Aquitaine	1																												
PRAGMA INDUSTRIES	France	Nouvelle-Aquitaine	1																												
RESCOLL, SOCIETE DE RECHERCHE	France	Nouvelle-Aquitaine	1																												
SAFRAN HELICOPTER ENGINES	France	Nouvelle-Aquitaine			1																										
SAFT	France	Nouvelle-Aquitaine			1																										
SERMA TECHNOLOGIES	France	Nouvelle-Aquitaine	1																												
SUMMOP 86	France	Nouvelle-Aquitaine	1																												
SURVITEC SAS	France	Nouvelle-Aquitaine	1																												
SYLPHAERO	France	Nouvelle-Aquitaine	1																												
TECNALIA	France	Nouvelle-Aquitaine				1																									
THALES AVS France SAS	France	Nouvelle-Aquitaine			1																										
THALES DMS FRANCE SAS	France	Nouvelle-Aquitaine			1																										
TOYAL EUROPE	France	Nouvelle-Aquitaine	1																												
Univ Bordeaux	France	Nouvelle-Aquitaine					1																								
univ de Pau	France	Nouvelle-Aquitaine					1																								
Univ de Poitier	France	Nouvelle-Aquitaine					1																								
V2I	France	Nouvelle-Aquitaine	1																												
VOLTAERO SAS	France	Nouvelle-Aquitaine	1																												
TOTAL			**44**	**0**	**8**	**6**	**4**	**15**	**16**	**28**	**23**	**21**	**13**	**16**	**15**	**19**	**17**	**14**	**22**	**16**	**14**	**17**	**17**	**14**	**12**	**19**	**19**	**13**	**23**	**13**	**12**

The graph below gives a quick overview of companies positioning in Nouvelle Aquitaine region:

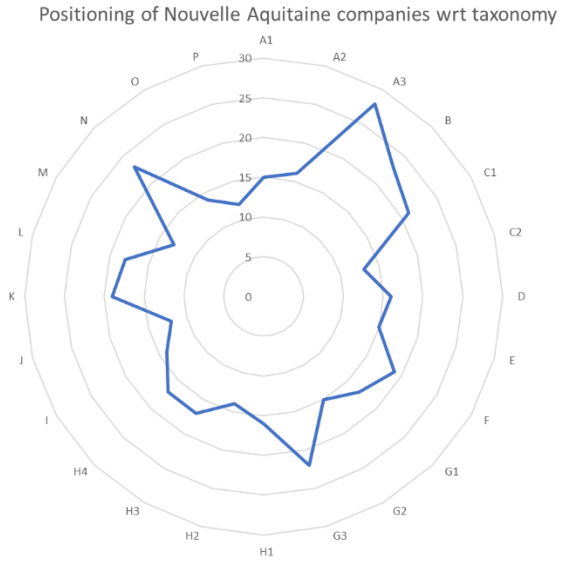

Figure 15: Positioning of aeronautics actors in Nouvelle Aquitaine with reference to taxonomy topics

It can be identified that most stakeholders are active in A3, C1, G3 and N taxonomy bricks followed by F, K and L, in relation with Nouvelle Aquitaine region focus. The graph visualizes that all taxonomy bricks are covered by the stakeholders, however, there is low coverage in C2, J and P categories.

5.3.1.3 Other regions

Due to the small number of companies identified in the other regions, it is not possible to conduct a proper analysis. However, the matter will be addressed with the help of our ECARE Stakeholders Group, when more companies will be added to the mapping. The next table shows the positioning of the identified companies on the taxonomy topics and highlights the topics with the most entities.

Table 17: Aeronautic competences in Aerospace Valley other regions with reference to ECARE Taxonomy topics

								ECARE Taxonomy (1st level topics)																							
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
CORIMA Technologies SAS	France	Auvergne-Rhône-Alpes	1																											
DUC Hélices Propellers	France	Auvergne-Rhône-Alpes	1																											
ELDEC FRANCE (Crane Aerospace & Electronics)	France	Auvergne-Rhône-Alpes	1																											
Elyse Energy	France	Auvergne-Rhône-Alpes	1																											
LIMATECH SAS	France	Auvergne-Rhône-Alpes	1																											
NOVPOWER	France	Auvergne-Rhône-Alpes	1																											
CORIOUS COMPOSITES	France	Bretagne	1																											
TAME POWER / Tronico - Alcen	France	Bretagne		1																										
NIMESIS	France	Grand Est	1																											
PARADOX	France	Grand Est	1																											
CKP ENGINEERING	France	Île-de-France	1																											
DAHER AEROSPACE	France	Île-de-France			1																									
DIRISOLAR	France	Île-de-France	1																											
FLYING WHALES	France	Île-de-France	1																											
NIKON METROLOGY	France	Île-de-France	1																											
POLLEN AM	France	Île-de-France	1																											
POLYTEC FRANCE	France	Île-de-France	1																											
SABENA TECHNICS	France	Île-de-France		1																										
TEMISTH	France	Provence-Alpes-Côte d'Azur	1																											
TOTAL			**16**	**2**	**1**	**0**	**0**	**3**	**4**	**7**	**4**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**3**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**4**	**1**	**0**

5.3.2 Campania in Italy

The technological domain of Aerospace is primarily identified by the industrial sectors: Aeronautics, Space and Defence & Security.

From a structural point of view, the Campania aerospace chain, sees some large companies of international importance (Leonardo, EMA, GE Avio Aero, MBDA, Vitrociset, Telespazio, OHB, Atitech) around which a local system of small and medium-sized enterprises revolves: such a structuring of the

supply chain is the result of interaction and competitive methods based on the development of Large Production Programs.

On the technological front, the institution in 2012 of the Aerospace District of Campania (DAC) in the form of a limited liability consortium company has provided the supply chain with a useful tool for aggregation, synergy and collaboration, which is favouring the development of shared strategies based on the identification of technological streams and priority projects, as well as system actions in favour of internationalization, the formation of specific skills and partnerships.

Currently, DAC cluster involves 195 direct and indirect partners, not all members can be positioned into the ECARE taxonomy, as some of them, for example the associations, do not directly work in production or research. **Therefore, 79 members were identified for a positioning within the ECARE taxonomy. 48 of those are SMEs, 8 large companies, 10 Intermediate-sized enterprises, 8 RTOs and 5 research universities.**

DAC has the capability of integrating almost all the regional players of the technological and productive supply chain and putting them in relation with RTOs and research universities. This allows the creation of an innovative governance model ensuring a proper representation for each member while at the same time offering a collaborative system of project & knowledge management with an integrated view.

Furthermore, DAC performs several horizontal activities in order to address the regional strategy in the aerospace field, including: vocational training and high education, technology transfer and communication, duality and internationalization.

Mapping the 79 direct members of DAC results in a good representation of the regional sharing among SMEs, Large companies, Intermediate-Sized Enterprises, RTOs and research universities, as illustrated in the next tables Table 18**, which also measures them with respect to the ECARE Taxonomy.**

CLEAN AVIATION

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Table 18: Aeronautics competences in Campania with reference to ECARE Taxonomy topics (1/2)

								ECARE Taxonomy (1st level topics)																							
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
3DNA	Italy	Campania	1																											
A.ABETE	Italy	Campania	1																											
ADLER AERO	Italy	Campania	1																											
AEROSOFT	Italy	Campania	1																											
ALA	Italy	Campania			1																									
ALI (consortium)	Italy	Campania	1																											
ALTAIR Engineering	Italy	Campania			1																									
ARESCOSMO	Italy	Campania	1																											
ATITECH	Italy	Campania			1																									
ATM	Italy	Campania	1																											
AVIO AERO	Italy	Campania			1																									
BLUE ENGINEERING	Italy	Campania		1																										
BSERVICE - ENG	Italy	Campania	1																											
C.I.R.A. (consortium)	Italy	Campania				1																								
C.N.R.	Italy	Campania				1																								
CADLAND	Italy	Campania	1																											
CALEF (consortium)	Italy	Campania				1																								
CALTEC (consortium)	Italy	Campania	1																											
CHAIN (consortium)	Italy	Campania				1																								
CMD	Italy	Campania		1																										
CORISTA (consortium)	Italy	Campania	1																											
CTM	Italy	Campania	1																											
D'AMBRA	Italy	Campania	1																											
DARES	Italy	Campania	1																											
DE.MA.	Italy	Campania		1																										
DESA'	Italy	Campania	1																											
Digitalcomoedia	Italy	Campania	1																											
EMS	Italy	Campania	1																											
ENEA	Italy	Campania				1																								
ENGITECH	Italy	Campania	1																											
eProlnn	Italy	Campania	1																											
GEVEN	Italy	Campania			1																									
HTT	Italy	Campania	1																											
I.D.S.	Italy	Campania		1																										
INAF	Italy	Campania				1																								
INTELLIGENTIA	Italy	Campania	1																											
IT CENTRIC	Italy	Campania	1																											
LAER	Italy	Campania		1																										
LEAD TECH	Italy	Campania	1																											
LEONARDO	Italy	Campania			1																									
LINEAR	Italy	Campania	1																											
MAGNAGHI AERONAUTICA	Italy	Campania		1																										
MAJOR BIT CONSULTING	Italy	Campania	1																											
MBDA ITALIA	Italy	Campania			1																									
ME.SE. (consortium)	Italy	Campania				1																								

Table 19: Aeronautics competences in Campania with reference to ECARE Taxonomy topics (2/2)

								ECARE Taxonomy (1st level topics)																							
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
MEDINOK	Italy	Campania		1																										
MES Consulting	Italy	Campania	1																											
METITALIA	Italy	Campania	1																											
MIGMA	Italy	Campania	1																											
NAIS	Italy	Campania	1																											
NEXT	Italy	Campania	1																											
NM2	Italy	Campania	1																											
O.M.P.M.	Italy	Campania	1																											
OHB-Italia	Italy	Campania		1																										
PROTOM	Italy	Campania	1																											
S.A.M. (consortium)	Italy	Campania	1																											
SAB AEROSPACE	Italy	Campania	1																											
SF Consulting	Italy	Campania	1																											
SIPAL	Italy	Campania	1																											
SKYTECNO	Italy	Campania		1																										
SOPHIA HIGH TECH	Italy	Campania	1																											
SPACE FACTORY	Italy	Campania	1																											
STEP SUD MARE	Italy	Campania	1																											
STOA' (consortium)	Italy	Campania				1																								
TECHNOVA	Italy	Campania	1																											
TECNAM	Italy	Campania		1																										
TECNOLOGIE INDUSTRIALI & AERONAUTICHE	Italy	Campania	1																											
TECNOSISTEM	Italy	Campania	1																											
TELESPAZIO	Italy	Campania			1																									
TESI	Italy	Campania	1																											
TRANS-TECH	Italy	Campania	1																											
UNIVERSITA' DEGLI STUDI DEL SANNIO	Italy	Campania					1																							
UNIVERSITA' DEGLI STUDI DI NAPOLI FEDERICO II	Italy	Campania					1																							
UNIVERSITA' DEGLI STUDI DI NAPOLI PARTHENOPE	Italy	Campania					1																							
UNIVERSITA' DEGLI STUDI DI SALERNO	Italy	Campania					1																							
UNIVERSITA' DELLA CAMPANIA "L. VANVITELLI"	Italy	Campania					1																							
UNMANNED4YOU	Italy	Campania	1																											
VAIM	Italy	Campania	1																											
WIND	Italy	Campania	1																											
TOTAL			**48**	**10**	**8**	**8**	**5**	**15**	**34**	**39**	**35**	**19**	**14**	**29**	**30**	**35**	**14**	**8**	**15**	**25**	**16**	**22**	**9**	**12**	**35**	**27**	**23**	**14**	**17**	**13**	**13**

The graph below gives a quick overview of companies positioning in Campania region:

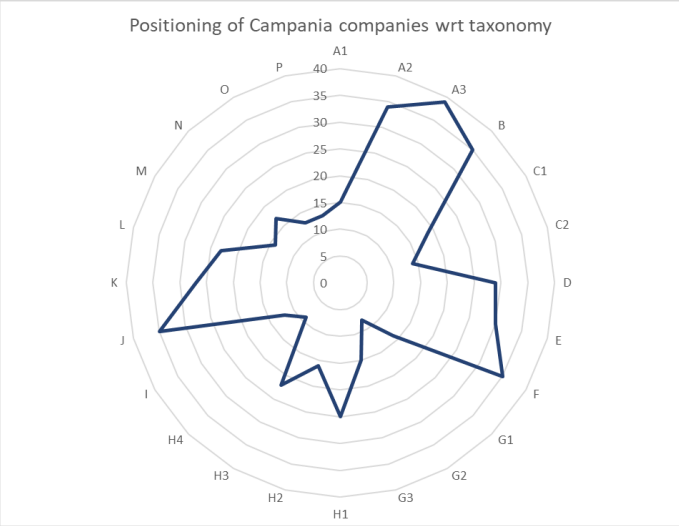

Figure 16: Positioning of aeronautics actors in Campania region with reference to taxonomy topics

Most stakeholders are active in A3, F & J taxonomy brick followed by D and H1 ones. The graph visualizes that all taxonomy bricks are covered to some extent by the stakeholders in Campania. However, there is low coverage in G2 and I coverage.

5.3.3 Hamburg

Hamburg Aviation's stakeholders form an alliance of business, science and politics. The founding members are the major companies Airbus and Lufthansa Technik, Hamburg Airport, the associations Hanse-Aerospace, HECAS and BDLI, the institutes and research facilities DLR, HCAT+ and ZAL as well as the four Hamburg universities - Hamburg University of Applied Sciences (HAW Hamburg), Hamburg University of Technology (TUHH), Helmut Schmidt University (HSU), University of Hamburg (UHH). Additionally, Hamburg Invest as well as the Ministry of Economics and Innovation Hamburg are representing the political stakeholder side.

Not all members can be positioned into the ECARE taxonomy, as some of them, for example the associations, do not directly work in production or research. **Therefore, 94 members were identified for a positioning within the ECARE taxonomy. 45 of those are SMEs, 26 Intermediate-sized enterprises, 13 large companies, 5 RTOs and 5 research universities.**

The most crucial aspect in the aeronautical industry in Hamburg is aircraft production and cabin. The cabin includes electricity, lighting, seats, on-board entertainment, lavatories, and waste and water management. Several companies and a significant number of SME work in these fields. In the taxonomy, those fields can be categorized in the categories F. Aerostructures and H. Avionics & On-board Systems, even though the specific competences are not demonstrated through the positioning in the taxonomy. Aircraft production can be categorized into A3. Structural Mechanics & Smart Materials and F. Aerostructures.

Furthermore, the category G2. Green Propellant & Combustion are especially relevant, as there are a number of stakeholders working on hydrogen as fuel and related topics. One example to name is the Hydrogen Aviation Lab, a project by ZAL, Lufthansa Technik, DLR and Hamburg Airport, funded by the Ministry of Economics and Innovation of Hamburg. The Hydrogen Aviation Lab researches hydrogen as aircraft fuel and the corresponding infrastructure. The positioning demonstrates that the Aeronautical competences of Hamburg Aviation are widely spread and cover most taxonomy bricks.

Table 20: Aeronautics competences in Hamburg with reference to ECARE Taxonomy topics (1/2)

								ECARE Taxonomy (1st level topics)																							
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
3D ConTech GmbH & Co. KG	Germany	Hamburg	1							■	■	■			■											■					
3D.aero GmbH	Germany	Hamburg	1							■	■				■											■					
AAA Assistance Aéronautique & Aérospatiale GmbH	Germany	Hamburg	1								■	■				■			■	■	■	■	■				■				
ADEST GmbH	Germany	Hamburg	1							■	■	■	■													■					
Aero-Coating GmbH	Germany	Hamburg	1							■	■																				
AERQ	Germany	Hamburg		1										■							■								■		
Aertec Solutions GmbH	Germany	Hamburg	1											■		■				■	■	■	■		■		■				
AES Aircraft Elektro/Elektronik System GmbH	Germany	Hamburg	1									■		■	■				■	■	■	■	■		■		■				
AIR TECCON GmbH	Germany	Hamburg	1					■	■	■	■					■	■	■	■	■	■	■	■	■	■	■	■				■
Airbus Operations GmbH HAMBURG	Germany	Hamburg			1			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Aljo Aluminium-Bau Jonuscheit GmbH	Germany	Hamburg		1						■	■					■															
Altran Deutschland S.A.S. & Co. KG	Germany	Hamburg		1						■	■	■	■	■	■	■		■	■	■	■	■	■		■	■	■				
AMAS Technology GmbH	Germany	Hamburg	1								■					■												■			
Ampower GmbH & Co. KG	Germany	Hamburg	1								■					■												■			
AviationPower GmbH	Germany	Hamburg	1																									■			
AXISCADES GmbH	Germany	Hamburg	1							■	■			■	■	■				■	■	■	■	■	■	■	■				
Battenberg ROBOTIC GmbH & Co. KG	Germany	Hamburg	1							■	■					■															
Beagle Systems GmbH	Germany	Hamburg	1					■	■	■	■	■	■	■	■	■	■	■	■					■		■			■		
BOB Engineering GmbH	Germany	Hamburg	1							■	■				■	■										■		■			
Boeing Distribution Services Inc.	Germany	Hamburg			1					■	■	■	■			■						■		■							
Bostonair GmbH	Germany	Hamburg	1								■																	■			
Boysen GmbH & Co. KG	Germany	Hamburg			1					■	■					■				■											
Burnless concepts GmbH	Germany	Hamburg	1													■				■	■			■	■	■					
CompriseTec GmbH	Germany	Hamburg	1							■	■					■										■					
CT Ingenieure GmbH	Germany	Hamburg	1					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
CTC GmbH	Germany	Hamburg		1						■	■					■										■	■	■			
Dassault Systemes Deutschland GmbH	Germany	Hamburg			1																					■	■	■			
Dedienne Aerospace Germany GmbH	Germany	Hamburg		1													■	■	■								■				
Deharde GmbH	Germany	Hamburg		1				■	■	■	■	■	■			■															
DERICHEBOURG Atis GmbH	Germany	Hamburg			1			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Diehl Aviation Hamburg GmbH	Germany	Hamburg			1						■			■							■	■	■			■					
DLR Deutsches Zentrum für Luft- und Raumfahrt e. V.	Germany	Hamburg				1		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
DM-AirTech GmbH	Germany	Hamburg	1																										■	■	■
Drees & Sommer GmbH	Germany	Hamburg			1						■				■											■			■		
E.I.S. Aircraft Products and Services GmbH	Germany	Hamburg	1								■					■				■	■	■	■			■					
E.I.S. Electronics GmbH	Germany	Hamburg	1								■	■		■					■						■		■				
FD/MethCon GbR	Germany	Hamburg	1							■	■				■											■	■				
Ferchau Engineering GmbH	Germany	Hamburg		1							■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				
FormTech GmbH	Germany	Hamburg	1							■	■					■															
Franke + Pahl GmbH	Germany	Hamburg	1								■				■											■	■	■			
GATE Alliance GmbH	Germany	Hamburg				1																						■			
GELUTEC - Berufliche Schule Gesundheit Luftfahrt Technik (BS 10)	Germany	Hamburg					1																					■			
Global Aviation Services Interior GmbH	Germany	Hamburg	1								■				■	■				■			■					■			
Hamburg Airport	Germany	Hamburg			1													■			■	■							■		
Hamburg Centre of Aviation Training - Lab (HCAT+) e. V.	Germany	Hamburg				1																						■			
HAW Hochschule für Angewandte Wissenschaften Hamburg	Germany	Hamburg					1	■	■	■				■				■	■							■		■	■		
H. BUTTING GmbH & Co. KG	Germany	Hamburg		1						■	■					■															

Table 21: Aeronautics competences in Hamburg with reference to ECARE Taxonomy topics (2/2)

								ECARE Taxonomy (1st level topics)																										
Organisation	**Country**	**Region**	**SME**	**ISE**	**LC**	**RTO**	**Uni**	**A1**	**A2**	**A3**	**B**	**C1**	**C2**	**D**	**E**	**F**	**G1**	**G2**	**G3**	**H1**	**H2**	**H3**	**H4**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
Heinze Akademie für Technik und Design	Germany	Hamburg				1																										
Helmut-Schmidt-Universität	Germany	Hamburg					1																									
HID Human Interface Design GmbH	Germany	Hamburg	1																													
Hochschule 21 gGmbH	Germany	Hamburg					1																									
HQW Precision GmbH	Germany	Hamburg		1																												
Hübner GmbH & Co. KG	Germany	Hamburg		1																												
Hufschmied Zerspanungssysteme GmbH	Germany	Hamburg		1																												
IABG Industrieanlagen-Betriebsgesellschaft mbH	Germany	Hamburg		1																												
Innovint Aircraft Interior GmbH	Germany	Hamburg	1																													
INTEC Industrie-Technik GmbH & Co.KG	Germany	Hamburg		1																												
jetlite GmbH	Germany	Hamburg	1																													
KREMA Yachtservice & Interior Design GmbH	Germany	Hamburg	1																													
Krüger Aviation GmbH	Germany	Hamburg	1																													
LATelec GmbH	Germany	Hamburg		1																												
Latesys GmbH	Germany	Hamburg		1																												
Lufthansa Technik AG	Germany	Hamburg			1																											
Mankiewicz Gebr. & Co. (GmbH & Co KG)	Germany	Hamburg	1																													
Mapaero GmbH	Germany	Hamburg	1																													
mb + partner	Germany	Hamburg	1																													
Nordwig Werkzeugbau GmbH	Germany	Hamburg	1																													
P.E.R. Flucht- und Rettungsleitsysteme GmbH	Germany	Hamburg	1																													
PACE Aerospace Engineering and Information Technology GmbH	Germany	Hamburg		1																												
Premium AEROTEC GmbH	Germany	Hamburg			1																											
PRETECH Predictive Design Technologies GmbH	Germany	Hamburg	1																													
PRETTL Electronics Lübeck GmbH	Germany	Hamburg		1																												
Safran Engineering Services GmbH	Germany	Hamburg			1																											
Scholz Mechanik GmbH	Germany	Hamburg	1																													
Schüschke GmbH & Co. KG	Germany	Hamburg	1																													
SGS Germany GmbH	Germany	Hamburg			1																											
Sigma Aerospace Metals Germany GmbH	Germany	Hamburg	1																													
SII Deutschland GmbH	Germany	Hamburg		1																												
SILVER ATENA	Germany	Hamburg		1																												
Sitec Aerospace GmbH	Germany	Hamburg		1																												
Sogeclair aerospace GmbH	Germany	Hamburg		1																												
Sogeti High Tech GmbH	Germany	Hamburg			1																											
Stahlkontor GmbH & Co. KG	Germany	Hamburg		1																												
Synergeticon GmbH	Germany	Hamburg	1																													
TEST-FUCHS	Germany	Hamburg		1																												
Thelsys GmbH	Germany	Hamburg	1																													
Treo - Labor für Umweltsimulation GmbH	Germany	Hamburg	1																													
TUHH Technische Universität Hamburg	Germany	Hamburg					1																									
Vartan Aviation Group GmbH	Germany	Hamburg		1																												
VecCtor GmbH	Germany	Hamburg	1																													
VINCORION Jenoptik Advance Systems GmbH	Germany	Hamburg		1																												
WIKO Technik e.K.	Germany	Hamburg	1																													
ZAL Zentrum für Angewandte Luftfahrtforschung GmbH	Germany	Hamburg				1																										
ZIM FLUGSITZ GmbH	Germany	Hamburg		1																												
TOTAL			**45**	**26**	**13**	**5**	**5**	**14**	**17**	**42**	**64**	**20**	**15**	**25**	**20**	**51**	**18**	**22**	**28**	**37**	**30**	**25**	**29**	**17**	**23**	**43**	**35**	**20**	**12**	**4**	**5**

The graph below gives a quick overview of companies positioning in Hamburg region:

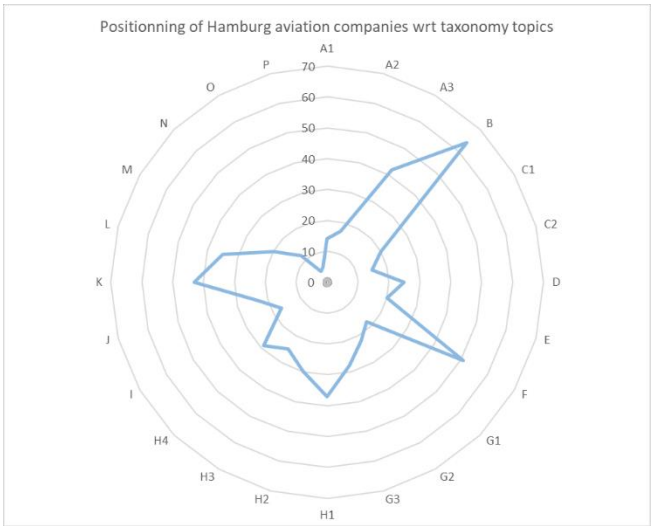

Figure 17: Positioning of aeronautics actors in Hamburg region with reference to taxonomy topics

It can be identified that most stakeholders are active in B taxonomy brick, followed by F, K and H1 ones. This result goes along with the focus of the Hamburg region in aircraft production and cabin. The graph visualizes that all taxonomy bricks are covered to some extent by the stakeholders in Hamburg. However, there is low coverage in A1 and C2 categories.

5.4 Conclusion

The mapping of aeronautical competences is a valuable tool that will provide users of the ECARE digital platform a comprehensive overview of the technological capabilities of companies and research institutions in the European aeronautical sector. The mapping will be useful for companies to find new partners for collaborative projects, and for funding bodies to identify the technological competences of their ecosystem.

The ECARE consortium has made significant progress in mapping the aeronautical landscape. In addition to the Excel template developed to facilitate the collection of data on stakeholders' competences, the consortium has performed an analysis of aeronautical competences in their region. Each cluster identified the actors and linked them to the first level of the taxonomy topics, following the methodology presented. **The ECARE project has identified a total of 348 organisations in the aeronautical industry, with 172 organisations identified by Aerospace Valley, 94 by Hamburg Aviation and 79 by Campania Aerospace District.** This information highlights the commitment of the consortium to making the platform a success.

The ECARE consortium plans to expand the mapping to other European countries in the future. This will provide a more complete overview of the technological capabilities of the European aeronautical industry, and will make it easier for companies and funding bodies to find the partners, resources and information they need.

Overall, the mapping of aeronautical competences is a valuable resource that will help to create new methodologies and synergies for public funding, as funding bodies will be able to better target their investments to support the development of key technologies.

6 Final Conclusion

The Deliverable D2.1 sets the bases for the ECARE project work to be performed further on. The ECARE Taxonomy has been thought as a technological backbone for calls, projects and competences mapping. It is a well-designed and comprehensive tool that provides a common framework encompassing aeronautical technologies aligned with Clean Aviation technological perimeter. It is based on extensive consultations and feedback from a wide range of stakeholders, and it is divided into 24 main topics and 210 subtopics, with detailed technical definitions. **This level of detail ensures that the taxonomy is relevant and useful for a wide range of uses, including:**

- **The mapping of calls** which will provide companies with a one-stop platform to identify relevant calls. At this stage of the project, ECARE identified 291 calls.
- **The mapping of funded projects** which will give companies and funding bodies an overview of the current landscape of funded projects in the aeronautical sector. To date, the ECARE project has mapped 246 funded projects.
- **And the mapping of aeronautical competences** which will help companies to find new partners for collaborative projects and support funding bodies in identifying the technological competences of their ecosystems. ECARE already identified a total of 348 organisations.

The information gathered through the ECARE work package 2 will be implemented into the ECARE digital platform which, once operational, will provide aeronautics players and funding bodies with a valuable tool to support their activities. For example, companies will have the possibility to use the platform to identify funding opportunities that are relevant to their technological domain of competence. And funding bodies can use the platform to identify technological gaps and target their investments accordingly.

In addition, the ECARE consortium has developed Excel tools that are available in appendices of the document. The appendices include tools for mapping of calls, projects, and aeronautical competences. These tools will make it easier for stakeholders to contribute to the development of the platform.

The ECARE digital platform together with its integrated information will act as a valuable tool to help creating new methodologies and synergies in public funding at the regional, national, and European levels. In addition, it should support the Clean Aviation JU in its objective of MoCs signatures with European aeronautical regions.

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Appendix 1 - Schematic of ECARE Taxonomy building process

Resulting ECARE Taxonomy	*Action to build ECARE Taxonomy*	Full ACARE Taxonomy	Elements of EDA Taxonomy
A. Flight physics - A1. Aerodynamics		**1. Flight physics**	
A1.01 Computational Fluid Dynamics	*from ACARE*	Computational Fluid Dynamics	
A1.02 Unsteady Aerodynamics	*from ACARE*	Unsteady Aerodynamics	
A1.03 Aeronautical Propulsion Integration	*from ACARE*	Aeronautical Propulsion Integration	
A1.04 Airflow Control	*from ACARE*	Airflow Control	
A1.05 High lift Devices (BLI, high lift propeller,...)	*from ACARE*	High lift Devices	
A1.06 Wing Design	*from ACARE*	Wing Design	
	cancelled from ACARE	Aerodynamics of External and Removable items	
A1.08 Wind Tunnel Testing/Technology	*from ACARE*	Wind Tunnel Testing/Technology	
A1.09 Wind tunnel Measuring Techniques	*from ACARE*	Wind tunnel Measuring Techniques	
A1.10 Computational Acoustics	*from ACARE*	Computational Acoustics	
A1.11 External Noise prediction	*from ACARE*	External Noise prediction	
A. Flight physics - A2. Thermal & Fluidynamics			**A12 - Mechanical, Thermal & Fluid-Related Technology & Devices**
A2.01 Mechanical/Hydraulic Technologies & Devices	*from EDA*		A12.01 - Mechanical/Hydraulic Technologies & Devices
A2.02 Electro-mechanical Devices	*New introduction*		
A2.04 Thermal & Thermodynamic Technologies & Devices	*from EDA*		A12.03 - Thermal & Thermodynamic Technologies & Devices
A. Flight physics - A3. Structural Mechanics & Smart Materials			**A01 - Structural &Smart Materials & Structural Mechanics**
A3.01 Metals & Metal Matrix Composite Technology	*from EDA*		A01.01 - Metals & Metal Matrix Composite Technology
A3.02 Ceramic, Ceramic Matrix Composites and Glass Technology	*from EDA*		A01.02 - Ceramic, Ceramic Matrix Composites and Glass Technology
A3.03 Polymers & Polymer Matrix Composite Technology	*from EDA*		A01.03 - Polymers & Polymer Matrix Composite Technology
A3.04 Structural Materials processing - Joining Technology	*from EDA*		A01.04 - Structural Materials processing - Joining Technology
A3.05 Structural Material Processing- Surface Protection Technology	*from EDA*		A01.05 - Structural Material Processing- Surface Protection Technology
A3.06 Non-Destructive Evaluation & Life Extension of Structural Materials	*from EDA*		A01.06 - Non-Destructive Evaluation & Life Extension of Structural Materials
A3.07 Corrosion and Wear Control Technology	*from EDA*		A01.07- Corrosion and Wear Control Technology
A3.08 Structural Mechanics	*from EDA*		A01.08 - Structural Mechanics
A3.09 Structural Materials Processing - Forming	*from EDA*		A01.09 - Structural Materials Processing - Forming
A3.10 Structural Materials Processing - Bonding	*New introduction*		
A3.11 Structural Material Processing - Material Removal	*from EDA*		A01.10 - Structural Material Processing - Material Removal
A3.12 Smart/Functional Materials for Structural Uses	*from EDA*		A01.11 - Smart/Functional Materials for Structural Uses
A3.13 Nanostructured materials	*New introduction*		
			A02 - Signature Related Materials
A3.14 Acoustic & Vibration	*from EDA*		A02.01 - Acoustic & Vibration Absorbing Materials

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Resulting ECARE Taxonomy	*Action to build ECARE Taxonomy*	Full ACARE Taxonomy	Elements of EDA Taxonomy
B. Manufacturing Processes/Design Tools/Techniques			**B12 - Manufacturing Processes/Design Tools/Techniques**
B.01 Design for Improved Reliability & Maintainability	*from EDA*		B12.01 - Design for Improved Reliability & Maintainability
B.02 Cost Engineering	*from EDA*		B12.02 - Cost Engineering
B.03 Concurrent Engineering and Reduced Design Cycle	*from EDA*		B12.03 - Concurrent Engineering and Reduced Design Cycle
B.04 Advanced Prototyping	*from EDA*		B12.04 - Advanced Prototyping
B.05 Additive Manufacturing	*New introduction*		
B.06 Robotics	*New introduction*		
B.07 Techniques and Systems for Production Manufacturing	*from EDA*		B12.05 - Techniques and Systems for Production Manufacturing
B.08 Project Management and Control	*from EDA*		B12.06 - Project Management and Control
B.09 Manufacturing Process Simulation	*from EDA*		B12.07 - Manufacturing Process Simulation
B.10 Lean Manufacturing	*from EDA*		B12.08 - Lean Manufacturing
B.11 Process Control Technology	*from EDA*		B12.09 - Process Control Technology
B.12 Environmentally Friendly Factory Processes	*from EDA*		B12.10 - Environmentally Friendly Factory Processes
B.13 Knowledge-based Engineering	*from EDA*		B12.11 - Knowledge-based Engineering
C. Materials Technology - C1. Electronic			**A03 - Electronic Materials Technology**
C1.01 Silicon-based materials	*from EDA*		A03.01 - Silicon-based materials
C1.02 III-V Compounds	*from EDA*		A03.02 - III-V Compounds
C1.03 SiC-based materials	*New introduction*		
C1.04 Other Semiconducting Materials	*from EDA*		A03.03 - Other Semiconducting Materials
C1.05 Insulating & Dielectric Materials	*from EDA*		A03.04 - Insulating & Dielectric Materials
C1.06 Carbon-based Materials	*from EDA*		A03.05 - Carbon-based Materials
C. Materials Technology - C2. Photonic/Optical			**A04 - Photonic/Optical Materials & Device Technology**
C2.01 Optical Materials & devices	*from EDA*		A04.01 - Optical Materials & devices
C2.02 IR/Visible/UV Detector Materials & Devices	*from EDA*		A04.02 - IR/Visible/UV Detector Materials & Devices
C2.03 Non-Linear Optical Materials & Devices	*from EDA*		A04.03 - Non-Linear Optical Materials & Devices
C2.04 Display Materials & Devices	*from EDA*		A04.04 - Display Materials & Devices
C2.05 Laser - all types	*from EDA*		A04.05 - Laser - all types
D. Device Technology			**A05 - Electronic, Electrical & Electromechanical Device Technology**
D.01 Device Concepts and Fabrication	*from EDA*		A05.01 - Device Concepts and Fabrication
D.02 Device Packaging	*from EDA*		A05.02 - Device Packaging
D.03 Device Integration/reliability	*from EDA*		A05.03 - Device Integration/reliability
D.04 Electrical Batteries (non propulsive)	*from EDA*		A05.04 - Electrical Batteries
D.05 Electrical Fuel Cells (non propulsive)	*from EDA*		A05.05 - Electrical Fuel Cells
D.08 RF Power Sources & Devices	*from EDA*		A05.07 - RF Power Sources & Devices
D.09 Acoustic Power Sources & Devices	*from EDA*		A05.08 - Acoustic Power Sources & Devices
D.10 Other Electrical Power Sources & Devices	*from EDA*		A05.09 - Other Electrical Power Sources & Devices
D.11 Electric Motors	*from EDA*		A05.10 - Electric Motors
D.12 Inertial/Gravitational Devices	*from EDA*		A05.11 - Inertial/Gravitational Devices

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Resulting ECARE Taxonomy	Action to build ECARE Taxonomy	Full ACARE Taxonomy	Elements of EDA Taxonomy
E. Design Technologies for Platforms			**B03 - Design Technologies for Platforms and Weapons**
E.01 Aerodynamic Designs	*from EDA*		B03.01 - Aerodynamic Designs
E.03 Structural Designs	*from EDA*		B03.03 - Structural Designs
E.04 Mechanical Designs	*from EDA*		B03.04 - Mechanical Designs
E.05 Thermal/Cryogenic Designs	*from EDA*		B03.07 - Thermal/Cryogenic Designs
E.06 Electrical/Electronic Designs	*from EDA*		B03.08 - Electrical/Electronic Designs
E.08 Acoustic Designs	*from EDA*		B03.10 - Acoustic Designs
E.09 Environmental Protection Designs	*from EDA*		B03.11 - Environmental Protection Designs
F. Aerostructures		**2. Aerostructures**	
F.01 Metallic Materials & basic processes	*from ACARE*	Metallic Materials & basic processes	
F.02 Non-Metallic Materials & basic processes	*from ACARE*	Non-Metallic Materials & basic processes	
F.03 Composite Materials & basic processes	*from ACARE*	Composite Materials & basic processes	
F.04 Advanced Manufacturing Processes & Technologies	*from ACARE*	Advanced Manufacturing Processes & Technologies	
F.05 Structural Analysis and Design	*from ACARE*	Structural Analysis and Design	
F.06 Aero-elasticity	*from ACARE*	Aero-elasticity	
F.07 Buckling, Vibrations and Acoustics	*from ACARE*	Buckling, Vibrations and Acoustics	
F.08 Smart Materials and Structures	*from ACARE*	Smart Materials and Structures	
F.09 Structures behaviour and Material Testing	*from ACARE*	Structures behaviour and Material Testing	
F.10 Internal Noise prediction	*from ACARE*	Internal Noise prediction	
	not of CA JU interest	Helicopter Aero-acoustics	
F.11 Noise Reduction	*from ACARE*	Noise Reduction	
F.12 Acoustic Measurements and Test Technology	*from ACARE*	Acoustic Measurements and Test Technology	
F.13 Aircraft Security	*from ACARE*	Aircraft Security	
F.14 Optimized aircraft/propulsion integration	*New introduction*		
G. Propulsion - G1. Endothermic Systems		**3. Propulsion**	**B02 - Propulsion and Powerplants**
G1.01 Reciprocating and Rotary IC Engines	*from EDA*		B02.02 - Reciprocating and Rotary IC Engines
G1.02 Air-breathing propulsion	*from ACARE*	Air-breathing propulsion	
G1.03 Rocket Engines and Ramjets	*from EDA*		B02.03 - Rocket Engines and Ramjets
G1.04 Scramjets	*New introduction*		
G1.05 Transmissions and Powertrains	*from EDA*		B02.06 - Transmissions and Powertrains
G1.06 Final Drive - Air Propellors and Rotors	*from EDA*		B02.10 - Final Drive - Air Propellors and Rotors
G1.07 Performance	*from ACARE*	Performance	
G1.08 Ultra efficient gas turbine	*from EDA*		B02.01 - Gas Turbines
G1.09 Ultra efficient bypass turbine	*New introduction*		
G1.10 Turbomachinery/Propulsion Aerodynamics	*from ACARE*	Turbomachinery/Propulsion Aerodynamics	
G1.11 Heat Transfer	*from ACARE*	Heat Transfer	
G1.12 Nozzles, Vectored Thrust, reheat	*from ACARE*	Nozzles, Vectored Thrust, reheat	
G1.13 Engine Controls	*from ACARE*	Engine Controls	
G1.14 Auxiliary Power Unit	*from ACARE*	Auxiliary Power Unit	
	cancelled from ACARE. Too generic	Fuels and Lubricants	
G1.16 Test Bench Calibration	*from ACARE*	Test Bench Calibration	
G1.17 Engine Health Monitoring	*from ACARE*	Engine Health Monitoring	
G1.18 Experimental Facilities and Measurement Techniques	*from ACARE*	Experimental Facilities and Measurement Techniques	
G1.19 Computational methods	*from ACARE*	Computational methods	
G1.20 Emissions pollution	*from ACARE*	Emissions pollution	

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Resulting ECARE Taxonomy	Action to build ECARE Taxonomy	Full ACARE Taxonomy	Elements of EDA Taxonomy
G. Propulsion - G2. Green Propellant & Combustion			
G2.01 Drop-in combustion (bi-fuel)	*New introduction*		
G2.02 Hydrogen combustion	*New introduction*		
G2.03 Combustion	*from ACARE*	Combustion	
G2.06 Sustainable Aviation Fuels	*New introduction*		
G2.07 Hydrogen as fuel	*New introduction*		
G2.08 Hydrogen compound to feed fuel cells	*New introduction*		
G. Propulsion - G3. Electric Systems			
G3.01 Electrical propulsion architectures (parallel, serie, distributed)	*New introduction*		
G3.02 Smart/integrated electric machine controller (Electrical motor and/or generator)	*New introduction*		
G3.03 Smart/integrated electric machine controller (inverter)	*New introduction*		
G3.04 High voltage battery	*New introduction*		
G3.05 Fuel cell	*New introduction*		
G3.06 Power/energy management	*New introduction*		
G3.07 Turbo-electric	*New introduction*		
G3.08 Electrical propeller (duct or fan)	*New introduction*		
G3.09 Multi-physics modelling (electrical, thermal)	*New introduction*		
G3.10 integrated electrical propulsion test bed (functionnal, HIRF, dielectric…)	*New introduction*		
H. Avionics & On-board Systems - H1. General		**4.1 Aircraft Avionics, Systems & Equipment Avionics & on-board systems**	
H1.01 Avionics	*from ACARE*	Avionics	
H1.02 Cockpit System, Visualisation & Display Systems	*from ACARE*	Cockpit System, Visualisation & Display Systems	
H1.03 Navigation/Flight Management/Autoland	*from ACARE*	Navigation/Flight Management/Autoland	
H1.04 Warning Systems	*from ACARE*	Warning Systems	
H1.05 Electronics & Microelectronics for on-board systems	*from ACARE*	Electronics & Microelectronics for on-board systems	
H1.06 Sensors integration	*from ACARE*	Sensors integration	
H1.07 Flight Data/Flight Recording	*from ACARE*	Flight Data/Flight Recording	
H1.08 Communications Systems	*from ACARE*	Communications Systems	
	cancelled from ACARE	Identification	
H1.10 Avionics integration	*from ACARE*	Avionics integration	
H1.11 Optics - Optronics - Laser - Image processing and data fusion	*from ACARE*	Optics - Optronics - Laser - Image processing and data fusion	
	cancelled from ACARE	Electronic Library System	
H1.13 Aircraft health and usage monitoring system	*from ACARE*	Aircraft health and usage monitoring system	
H1.14 Smart maintenance systems	*from ACARE*	Smart maintenance systems	
H1.15 Lighting systems	*from ACARE*	Lighting systems	
H1.16 Aircraft Security	*from ACARE*	Aircraft Security	

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Resulting ECARE Taxonomy	*Action to build ECARE Taxonomy*	Full ACARE Taxonomy	Elements of EDA Taxonomy
H. Avionics & On-board Systems - H2. Communications			**B10 - Communications and CSI-related Technologies**
H2.01 Communications systems - below microwave frequencies	*from EDA*		B10.01 - Communications systems - below microwave frequencies
H2.02 Communications systems - micro and millimetre wave	*from EDA*		B10.02 - Communications systems - micro and millimetre wave
H2.03 Communications systems - IR/Visible/UV	*from EDA*		B10.03 - Communications systems - IR/Visible/UV
H2.05 Geographic Information systems	*from EDA*		B10.11 - Geographic Information systems
H2.06 Optimisation, Planning & Decision Support systems	*from EDA*		B10.12 - Optimisation, Planning & Decision Support systems
H2.08 Network Management systems	*from EDA*		B10.14 - Network Management systems
H2.09 Air Traffic Control systems	*from EDA*		B10.15 - Air Traffic Control systems
H2.11 On-board Entertainment Systems	*New introduction*		
H. Avionics & On-board Systems - H3. Sensor Systems			**B06 - Sensor Systems**
H3.01 Sensors/Antennas	*from EDA*		B06.01 - RF Sensors/Antennas - Active
H3.02 Electrical & Electrochemical Sensors	*from EDA*		B06.11 - Electrical & Electrochemical Sensors
H3.03 Magnetic Sensors	*from EDA*		B06.12 - Magnetic Sensors
H3.04 Microsensor systems for Active Control of Structures	*from EDA*		B06.15 - Microsensor systems for Active Control of Structures
H3.05 Motion Sensor systems	*from EDA*		B06.16 - Motion Sensor systems
H3.06 Piezo sensors	*New introduction*		
H3.07 Thermal sensors	*New introduction*		
H3.08 Piezo-Thermal sensors	*New introduction*		
H3.09 Environmental Monitoring Systems	*from EDA*		B06.17 - Environmental Monitoring Systems
H. Avionics & On-board Systems - H4: Major s/s		**4.2 Aircraft Avionics, Systems & Equipment Power systems**	
H4.01 Electrical Power Generation & Distribution (High voltage harness and protection)	*from ACARE*	Electrical Power Generation & Distribution	
	cancelled from ACARE	Pneumatic systems	
H4.02 Hydraulic power generation & distribution	*from ACARE*	Hydraulic power generation & distribution	
		4.3 Aircraft Avionics, Systems & Equipment Cabin systems	
	from ACARE	Passenger and freight systems	
H4.03 Hydrogene distribution and protection (gas, liquid)	*New introduction*		
H4.04 Environmental control System	*from ACARE*	Environmental control System	
H4.05 Water and waste systems	*from ACARE*	Water and waste systems	
		4.4 Aircraft Avionics, Systems & Equipment Other Systems	
H4.06 Fuel Systems	*from ACARE*	Fuel Systems	
H4.07 Hydrogen systems (hydrogen cryogenic tank, hydrogen gas tank)	*New introduction*		
H4.08 Landing gear and braking systems	*from ACARE*	Landing gear and braking systems	
		Fire protection systems	

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Resulting ECARE Taxonomy	Action to build ECARE Taxonomy	Full ACARE Taxonomy	Elements of EDA Taxonomy
I. Flight Mechanics		**5.1 Flight Mechanics - Stability and Control**	**B07 - Guidance and Control systems for Weapons and Platforms**
I.01 Open-loop Aicraft Stability Analysis	*from ACARE*	Open-loop Aicraft Stability Analysis	
I.02 Flight control system	*from ACARE*	Flight control system	
I.03 Navigation systems	*from EDA*		B07.01 - Navigation systems
I.04 Guidance and Control systems	*from EDA*		B07.03 - Platform Guidance and Control systems
I.06 Display systems	*from EDA*		B07.05 - Display systems
		5.2 Flight Mechanics - Performance	
I.07 Aicraft Performance Analysis	*from ACARE*	Aicraft Performance Analysis	
I.08 Optimisation of Aircraft Performance	*from ACARE*	Optimisation of Aircraft Performance	
		5.3 Flight Mechanics - Failure and Hazard Studies	
I.09 System Failure and Damage Analysis	*from ACARE*	System Failure and Damage Analysis	
I.10 Environmental Hazard Analysis	*from ACARE*	Environmental Hazard Analysis	
J. Information and Signal Processing Technology			**A09 - Information and Signal Processing Technology**
J.01 Data & Information Management Technology	*from EDA*		A09.01 - Data & Information Management Technology
J.02 Digital Signal Processing Technology	*from EDA*		A09.02 - Digital Signal Processing Technology
J.03 Optical Signal Processing Technology	*from EDA*		A09.03 - Optical Signal Processing Technology
J.04 Image/Pattern Processing Technology	*from EDA*		A09.04 - Image/Pattern Processing Technology
J.05 Optimisation & Decision Support Technology	*from EDA*		A09.06 - Optimisation & Decision Support Technology
J.06 Information & Data Fusion Technology	*from EDA*		A09.08 - Information & Data Fusion Technology
K. Integrated Design & Validation		**6.1 Integrated Design & Validation (methods & tools) - General**	
K.01 Methods and tools for Collaborative Product & Process Engineering	*from ACARE*	Methods and IT tools for Collaborative Product & Process Engineering	
K.02 On-board systems engineering	*from ACARE*	On-board systems engineering	
K.03 Environmental and EM compliance engineering process	*from ACARE*	Environmental and EM compliance engineering process	
K.04 Flight/Ground Tests	*from ACARE*	Flight/Ground Tests	
K.05 Life-cycle Integration	*from ACARE*	Life-cycle Integration	
	cancelled from ACARE	System Certification	
	cancelled from ACARE	Fault Tolerant Systems	
	cancelled from ACARE	Hazard Analysis	
	cancelled from ACARE	Safety modelling	
	cancelled from ACARE	Air Safety Data analysis	
	cancelled from ACARE	System reliability	
	cancelled from ACARE	Security/Risk analysis	
	cancelled from ACARE	Maintenance Modelling	
	cancelled from ACARE	Infra-red and Radar Signature Control	

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Resulting ECARE Taxonomy	Action to build ECARE Taxonomy	Full ACARE Taxonomy	Elements of EDA Taxonomy
		6.2 Integrated Design & Validation (methods & tools) - AERONAUTICAL IT	
K.06 Maintenance Modelling	*New introduction*		
K.07 Advanced information processing	*from ACARE*	Advanced information processing	
K.08 Collaborative Decision Making	*from ACARE*	Collaborative Decision Making	
K.09 Simulator environments & Virtual reality	*from ACARE*	Simulator environments & Virtual reality	
K.10 Decision Support Systems	*from ACARE*	Decision Support Systems	
K.11 Information management & Knowledge management (Methods & tools)	*from ACARE*	Information management & Knowledge management (Methods & tools)	
K.12 Autonomous operation	*from ACARE*	Autonomous operation	
			A08 - Computing Technology & Mathematical Techniques
K.13 Aeronautical Software Engineering	*from ACARE & EDA*	Aeronautical Software Engineering	A08.01 - Software Engineering
K.15 COTS Software Assessment	*from EDA*		A08.03 - COTS Software Assessment
K.19 Software Verification and Accreditation Techniques	*from EDA*		A08.11 - Software Verification and Accreditation Techniques
		6.3 Integrated Design & Validation (methods & tools) - OPERATIONAL	
	included in K.01	Development of operational research methods & tools	
	included in K.09	Development of synthetic environment & virtual reality tools	
	cancelled from ACARE. Not an R&D issue	Aircraft Performance Assessment	
	not of CA JU interest	Airport performance assessment	
	not of CA JU interest	Business modelling	
		6.4 Integrated Design & Validation (methods & tools) - R&D INFRASTRUCTURE	
	included in K.09	Numerical Models (including Fast Time Simulation)	
	included in K.09	Real Time Simulators	
	cancelled from ACARE. Too generic	General Purpose Equipment	
	cancelled from ACARE. Too generic	Reference Data for R&D Use and live/RT data Use	
		6.5 Integrated Design & Validation (methods & tools) - VALIDATION	
	included in K.01	Methodology	
	included in K.04	Large scale validation Experiments	
	included in K.04	Large scale validation Platforms	

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Resulting ECARE Taxonomy	Action to build ECARE Taxonomy	Full ACARE Taxonomy	Elements of EDA Taxonomy
L. Integrated Systems Technology			**B09 - Integrated Systems Technology**
L.01 Systems Engineering and Integrated Systems Design	*from EDA*		B09.01 - Systems Engineering and Integrated Systems Design
L.03 Radiation Hardening	*from EDA*		B09.03 - Radiation Hardening
L.04 Robotics and Automated systems in Operational Systems	*from EDA*		B09.04 - Robotics and Automated systems in Operational Systems
L.05 Reliability and Maintainability of Systems	*from EDA*		B09.05 - Reliability and Maintainability of Systems
L.06 Health Monitoring systems	*from EDA*		B09.06 - Health Monitoring systems
L.07 Safety systems	*from EDA*		B09.07 - Safety systems
L.08 System Repair Technologies	*from EDA*		B09.08 - System Repair Technologies
L.09 Electromagnetic Compatibility	*from EDA*		B09.09 - Electromagnetic Compatibility
L.10 Integrated System Testing and Evaluation	*from EDA*		B09.11 - Integrated System Testing and Evaluation
L.11 Middleware systems	*from EDA*		B09.12 - Middleware systems
M. Human Factors		**9. Human Factors**	**A10 - Human Sciences**
M.01 Human Factors Integration, Man-machine Interface	*from ACARE*	Human Factors Integration, Man-machine Interface	
M.04 Human Performance Modelling Techniques	*from ACARE & EDA*	Human Performance Modelling & Enhancement	A10.14 - Human Performance Monitoring Techniques
M.05 Human Survivability, Protection and Stress Effects	*from ACARE & EDA*	Human Survivability, Protection and Stress Effects	A10.04 - Human Survivability, Protection & Stress Effects
M.06 Physical Protection systems	*from ACARE & EDA*	Human Information Processing	B11.02 - Physical Protection systems - Environment
M.07 Human Factors in Manufacturing	*from EDA*		A10.15 - Human Factors in Manufacturing
M.08 Individual & Team Training	*from ACARE & EDA*	Selection & Training	A10.05 - Individual & Team Training
N. Innovative concepts & scenarios		**10. Innovative concepts & scenarios**	
N.01 Scenario analysis	*from ACARE*	Scenario analysis	
N.02 Unconventional configurations and new aircraft concepts	*from ACARE*	Unconventional configurations and new aircraft concepts	
N.03 Breakthrough technologies	*from ACARE*	Breakthrough technologies	
O. Operating Environment Technology			**A11 - Operating Environment Technology**
O.01 Terrain Science	*from EDA*		A11.02 - Terrain Science
O.02 Meteorology	*from EDA*		A11.03 - Meteorology
P. Simulators, Trainers and Synthetic Environments			**B08 - Simulators, Trainers and Synthetic Environments**
P.01 Skills Training systems	*from EDA*		B08.01 - Skills Training systems
P.04 Virtual Reality	*from EDA*		B08.05 - Virtual Reality
P.05 Extended Reality	*New introduction*		
	not of CA JU interest	**7. Air Traffic Management**	
	not of CA JU interest	Overall ATM	
	not of CA JU interest	Airspace Management	
	not of CA JU interest	Flow and Capacity Management	
	not of CA JU interest	Communications and Systems Technology	
	not of CA JU interest	Navigation Systems	
	not of CA JU interest	Surveillance Sensor Systems	
	not of CA JU interest	ATM Automated Support	
	not of CA JU interest	Airport Traffic Management	
	not of CA JU interest	Airport Operations	
	not of CA JU interest	Airline Operations	
	not of CA JU interest	Meteorological	
	not of CA JU interest	R&D Management Co-ordination	
		8. Airports	
	not of CA JU interest	Security Equipment	
	not of CA JU interest	Crisis Management	
	not of CA JU interest	Airport External Safety	
	not of CA JU interest	Airport Security	

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Appendix 2 to 9 are Excel documents available in attachment to D2.1, they can be subdivided in 2 types:

- **ECARE results**: Appendix 2, 4, 6 & 8
- **ECARE tool:** Appendix 3, 5, 7 & 9

Appendix 2 - ECARE taxonomy topics, subtopics and definitions

Appendix 3 - Tool for the positioning on ECARE taxonomy

Appendix 4 - Pilot regions positioning: Occitanie, Nouvelle Aquitaine, Hamburg & Campania

Appendix 5 - Tool for the listing of calls

Appendix 6 - Listing of regional, national & European calls

Appendix 7 - Tool for the listing of aeronautical projects

Appendix 8 – Listing of regional, national & European projects

Appendix 9 - Tool for the listing of aeronautical competences

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