

CARE PROJECT FINAL REPORT

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EXECUTIVE SUMMARY

Green technologies are key competitive advantages of future air transport systems. Being aware of the importance to seize those trends, to ensure the competitiveness of their local actors, European regions have to carefully orientate their RTD funding in order to match these aviation technological and environmental challenges but also to generate economic growth and to secure and increase their level of employment. As defined in the initial scope of CARE, the project focuses on four major fields of interest:

- More energy efficient airborne systems,
- Eco-Design,
- Greener Air Traffic Management,
- Multimodal Transport Systems.

Based on an in-depth technical and economical examination of the covered clusters, the CARE consortium analyzed and confronted both the competitive capabilities and technical or business priorities of these regions. The understanding of these regional, European and international dynamics paved the way to the creation of a collective roadmap: the **CARE Joint Action Plan**. The Joint Action Plan is a document proposing 21 actions that bring together the CARE clusters around a common strategy based on 3 pillars which are the excellence, the efficiency and the visibility of European aerospace regions.

CARE clusters are convinced that the technological performance and innovation is one of the key drivers for value creation. The first ambitious pillar of the JAP is therefore the improvement of the level of excellence of CARE clusters members, from laboratories to industries. A CARE Common Research Agenda has consequently been developed, permitting to define a cross-regional technological roadmap on topics of common interests. In order to foster the emergence of RTD projects following this roadmap, CARE aimed at creating a community of stakeholders interested by brainstorming on clean aviation technologies. This led to the creation of Topic Interest Groups for the Emergence of Research (TIGERs). As a result of this process, more than 10 project concepts have been developed and further supported by the CARE team towards appropriate networking events, potential customers or funding opportunities.

The second pillar tackled by the Joint Action Plan is the improvement of the efficiency of regional ecosystems in the CARE regions. Various actions were handled or started, such as the implementation of cross-sector activities in a context where technologies are more and more transversal. An important effort has also been given to the funding of regional RTD projects dealing with green aviation. Further to the already existing regional funding mechanisms, the CARE consortium is convinced by the added value that could be brought by a collaboration and coordination between aeronautics regional funding sources. CARE therefore developed a feasibility study for the setting up of an ERA-Net dedicated to the environmental performance of civil aviation and that could involve private funding sources.

Finally, the third pillar of CARE consisted in giving an important visibility and support to 6 mentored aeronautics regions via a dedicated action plan. These mentored clusters benefited from the experience of more mature clusters and were involved in the CARE programme actions. The visibility of European know-how in green aviation was finally at the heart of CARE dissemination, as internationalization actions permitted to start collaborations at cluster level and SME level with actors, and now partners, from Canada and Mexico.

PROJECT CONTEXT AND MAIN OBJECTIVES

Clean Aerospace: context and opportunities

The CARE project addresses both the issues of the environmental impact of the global air transport system and the competitiveness of the European aeronautics industry. This sector benefits from one advantage: reducing the environmental impact and improving the operations costs are two sides of the same endeavor.

On the other hand, the industry cycle is quite long: aircrafts are built to last at least twenty years, technical and safety certifications are extremely demanding, airport infrastructures have such an impact on territorial management and are so expensive that the decision-making process takes up an impressive amount of time.

The context is also that of a fast growing demand for aircrafts, flight numbers and airport traffic. The whole supply chain must increase on the short and medium term its production output. The air traffic authorities must prepare new systems to organize flight routes and airport approaches.

The industry must then solve traditional growth problems: training more personnel, expanding facilities and equipment, obtaining credit to finance investment and raw materials, keeping products and services competitive while currency exchange rates vary, etc. while some companies chose to organize their activities in several places closer to their markets, e.g. assembly lines in the USA and China.

Tomorrow, when the up-going cycle will reach the top, what will happen with the European companies and industries? The whole aircraft manufacturing supply chain in Europe, from research ideas to maintenance and repair operations, must prepare for this issue now, though it seems a long-term one. Today, the labor force dedicated to aeronautics in Europe reaches 400.000 employees (for the CARE 9 clusters/10 regions, 65% of them). While aviation represents a wealth for many European regions, it is necessary to address its sustainability, within the three pillars of sustainable development: economical, social and environmental.

The CARE Ambition

The CARE Project is an inter-cluster pioneering initiative to engage all stakeholders of the European air transport system in the preparation of the next step, further than the high throughput of the supply chain of today. The conviction of the CARE consortium partners follows the Lisbon Strategy: increasing knowledge and driving it into innovation is the asset for the future. The aim of CARE is therefore to propose a European framework fostering highly innovative solutions to face positively the international and environmental challenges mentioned here above by bringing together different stakeholders, from local innovators to regional and European policy makers.

The actions propose all stakeholders to find a good reason to participate in the future of aviation:

- *SMEs* will have a clear view of innovation avenues as well as research and industry partners.
- *Research labs* will find echo in the industry to transform scientific findings into disruptive innovation.
- *Large corporations'* global requirements will be taken into account by a strong ecosystem of SMEs and labs.
- *Private and public funding organizations* will be able to support the research driven by implementation in the future air transport system.
- *Local governments* will see actions fit with their regional Smart Specialization Strategy, aiming at the reinforcement of employment within their territory.

- *National governments* will acknowledge an increased level of worldwide competitiveness of each country's aeronautics industry as a European result.
- *European research program officers* drafting calls in green air transport will find proponents, organized in consortia, ready to collaborate and answer the needs.
- *European political decision makers* will foresee a greener European aviation thanks to the highest level of innovation and therefore efficiency and sustainability.

With ambitious aims, CARE is the pioneering part of a long-term action of the associated clusters. It should gain momentum with the extension of the CARE methodology and framework to other EACP clusters (European Aerospace Clusters Partnership), and, further, to international partners offering good research and industry complements.

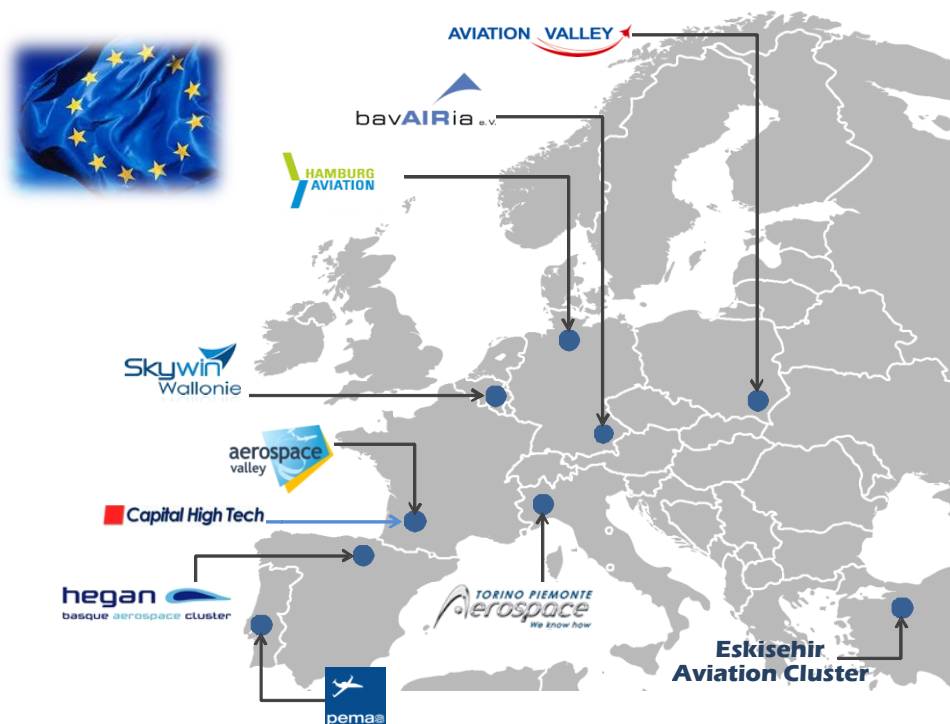


Figure 1: The CARE Consortium

The CARE consortium, is a group of 9 clusters supported by a SME specialized in innovation management. Covering 65% of the European Aeronautics workforce, the CARE group is a pioneering group of the EACP alliance. As mentioned on EACP website, “the EACP aims at initiating an active exchange of information and knowledge between all partners and at developing and realizing concrete steps for long-term trans-national cooperation between clusters and companies for a stronger and more competitive European position in the world aerospace markets.”

The main ambition of CARE is therefore to build a pioneering meta-cluster that will increase the competitiveness of European regions in the field of Green Air Transportation by:

- fostering more efficient R&D investments at regional level,
- stimulating the creation of additional regional research-orientated clusters and
- catalyzing synergies and public-private partnerships relative to both finance and research agendas at the European level.

CARE Objectives

In order to fulfill the ambition mentioned here above, the CARE group defined a set of 8 operational objectives to be reached in the frame of the project.

Objective 1:

- To build a **baseline directory database** of minimum 300 R&D actors from European research-driven clusters ; the strengths for producing and using knowledge for the design, development and operations of greener aviation and traffic management are outlined.

Objective 2:

- To identify those **areas of common interest** on which transnational cooperation between research driven clusters should be fostered in order to enable economic development from more and better R&D investments at regional level in the field of Green Air Transportation.

Objective 3:

- To build a **Joint Action Plan (JAP)** which is validated and supported by all regions and whose financial sustainability is based on the reinforcement of public private partnerships and the mobilization of European, national and regional funds.

Objective 4:

- To ensure the **dissemination of this JAP among and inside 30+ regional clusters** and to have started fostering cross fertilization and partnership building among the various players (research, finance, industry, regional authorities and innovation intermediaries) at both the regional and the European scales.

Objective 5:

- To search for all possible **financing sources** that could be mobilized to support the implementation of the JAP (structural funds, FP7, CIP, etc.)

Objective 6:

- To **support six European regions** with a less developed profile aiming to support their capacity in setting-up and developing regional research-driven clusters.

Objective 7:

- To have an input of about **10 joint proposals to European funding** instruments; these proposals should lean on the valuable contribution of regional actors to the development of new technologies or innovations with strong expected economic impact at the regional levels involved.

Objective 8:

- To internationally **promote** the **worldwide competitiveness** of the regional actors involved in the clusters in the BRIC countries Brazil, Russia, India and China.

CARE RESULTS AND IMPLEMENTATION

Projects from Regions of Knowledge (RoK) programme like CARE are projects that benefit from a very important independence and a high degree of liberty. Indeed, the opportunity given by RoK programme to consortia is to propose their own working methodology, pursuing self-defined objectives, and free to design an action plan to reach these objectives. In addition, it has to be reminded that CARE brings together clusters that are very different one from another even though they are all dealing with aeronautics industry. Size and cluster structure differ between CARE clusters, local and regional roles are not equivalent in each region, and cluster objectives or strategies differ among all partners.

In this sense, the first challenge of CARE is to put in place an innovative and collective working methodology, allowing different partners to work in a common way with a common language and comparable data. The ambition is to adopt this methodology in all the regions involved in CARE and to synthesize these regional overviews in order to constitute an analysis for the European CARE cluster. This work will be the basis of the second challenge of CARE: the building of the Joint Action Plan, providing operational guidelines to the CARE consortium for the second part of the project and further.

The CARE methodology relies on 3 main axes of work: the evaluation of the technological position of CARE regions, the study of their innovation ecosystem, and an analysis of the role of clusters in these ecosystems.

Evaluation of the technological position of the CARE regions.

The technological fields of interests for CARE

As defined in the initial scope of CARE, the project focuses on 4 major fields of interest:

- More energy efficient airborne systems
- Eco-Design
- Greener Air Traffic Management,
- Multimodal Transport Systems.

These 4 themes cover a broad segment of aviation. The first task of the project consisted in detailing them into a certain number of more restricted technological challenges.

An initial study of the aeronautics landscape as well as various exchanges and interviews with high level experts permitted to draft a report compiling the 31 main technical and economical challenges faced by the European aviation ecosystem in a globalized context and competition. These 31 challenges have then been evaluated in terms of impact on the competitiveness and greenness of European aviation in order to select 13 top-priority challenges for the CARE group. These 13 challenges are the following ones:

1	Cleaner engines, less fuel burn
4	Improved aerodynamics
5	Aerostructures weight reduction
6	Onboard Energy Management
20	Stripping and Painting
23	Aircraft Recycling
8	Global Competition: OEMs and systems & parts suppliers
15	Raw Materials
17	Safety and Environmental Standards
8	High Fuel Prices
29	Green Airports
30	Access to Airports
31	Green Air Traffic Management

Figure 2: The 13 CARE key-challenges

The technological positioning of the CARE regions in these fields

The common framework made of the 13 key-challenges allows CARE partners to focus on the same topics of interest in order to better compare activities and draw a picture of the European CARE cluster in terms of strengths and weaknesses in these fields of activities. For this purpose, the adopted methodology consisted in building a SWOT analysis (Strengths-Weaknesses-Opportunities-Threats) on each of the 13 key challenges, in each region. Clusters, which are expert triple-helix organizations at the heart of technological trends and priorities, form the perfect groups for such a vision.

Below is represented a graphical illustration of the results concerning the CARE group. This radar-diagram is an illustration of the “Strengths versus Weaknesses” evaluation of the CARE meta-cluster participants, i.e. the capabilities of each region in the 13 key-challenges. Each cluster, in association with a certain number of regional experts, gave a vision on the capabilities of the region to set up or support R&D activities. It must be noted that these key challenges constitute the common thread of the whole CARE endeavor.

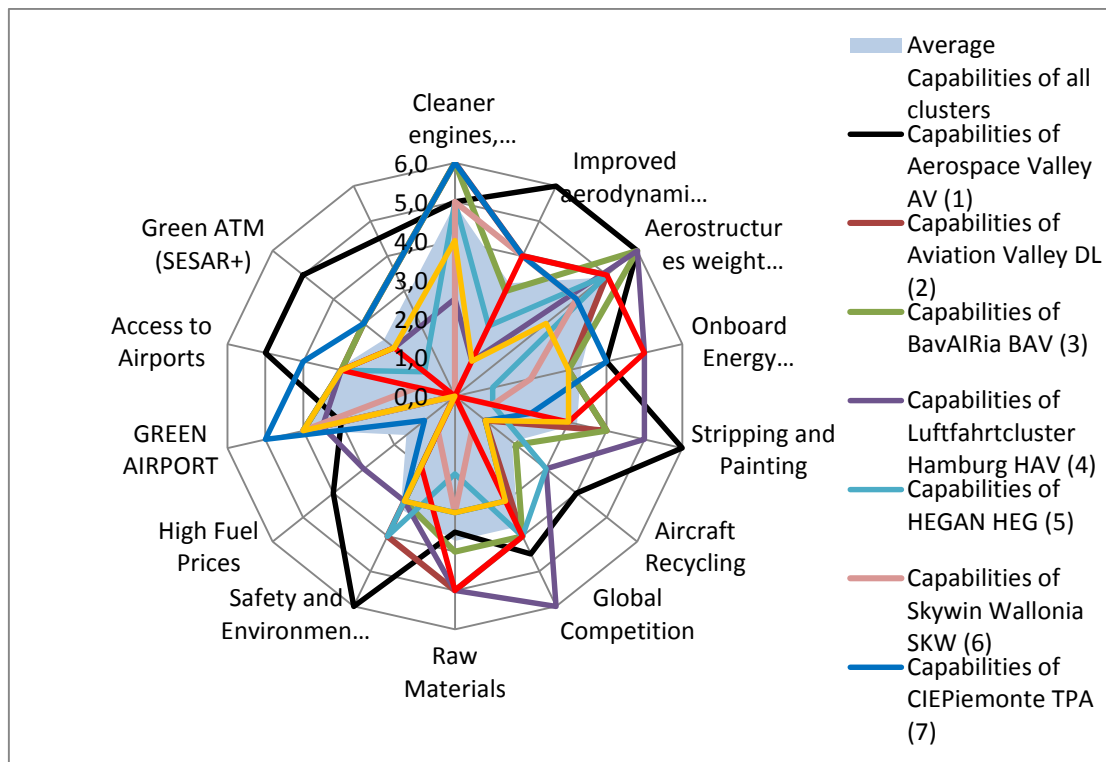


Figure 3: Self evaluation of the regional capabilities of CARE regions

The following step consisted in representing a synthesis of the “Opportunities vs. Threats” trends. In other terms, how each key challenge is considered by each cluster? The following curve provides a general idea of the answer of CARE group (On the same model than the previous diagram, regional experts evaluated their regions on a 100 points scale, a score of 100 representing a challenge having top importance for the regional industry profile).

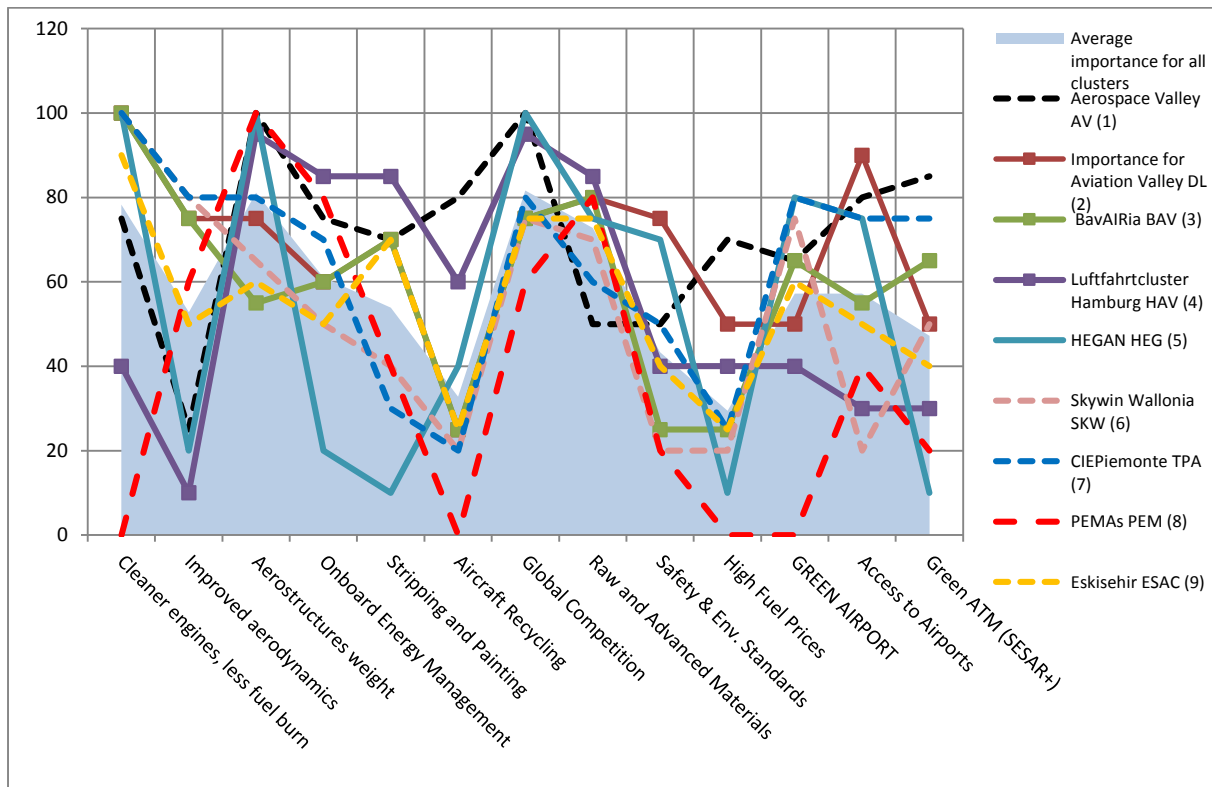


Figure 4: Self-evaluation of the importance of each challenge for the CARE regions

Regional cross-checks of both of these data leads to interesting information on the complementarities between regions since it allows to compare which challenges are on the one hand very important for a region, and in other hand, synonym of high expertise in other regions. This cross-check analysis is also significant to build the JAP, as a first step toward the definition of cross-regional collaborations. Finally, limiting to the European scale and focusing on the average of the CARE cluster profiles (the blue areas in the 2 previous diagrams), it is possible to plot the importance of challenges vs. the capabilities of the CARE group as a whole.

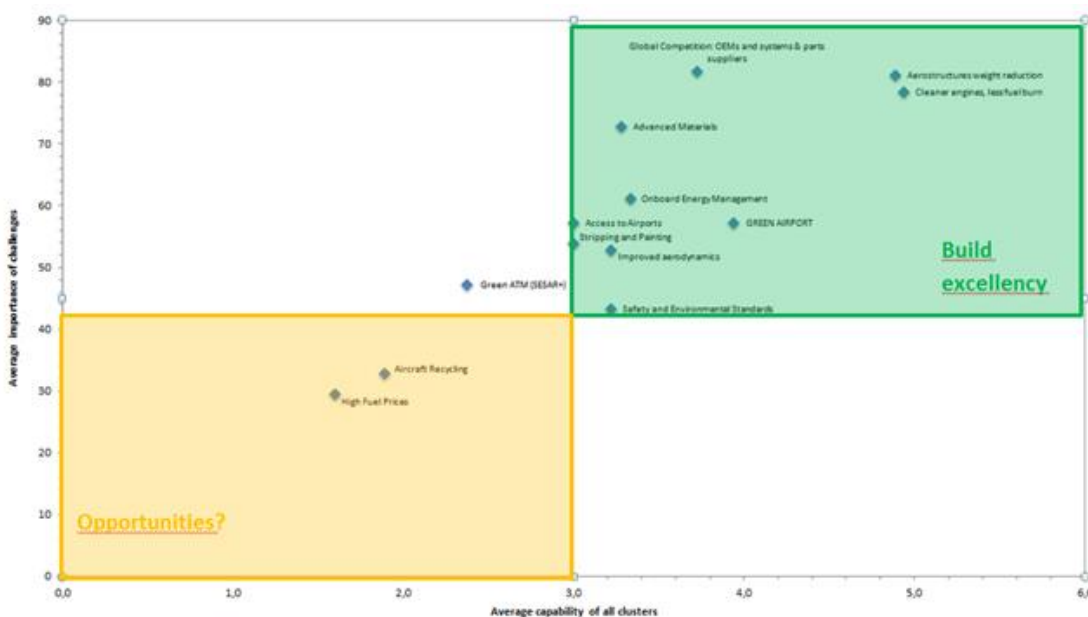


Figure 5: Capabilities VS Importance of challenges for the CARE consortium

As a first observation, *High Fuel Prices* mitigation and *Aircraft Recycling* are considered as the least important topics for the CARE clusters. About *High Fuel Prices* mitigation, a reason is that clusters have very limited capacity to act on this topic, closely linked to international and geopolitical data and influences that exceed the scope of regional clusters (or are perceived by clusters as out of their scope of action). *Aircraft Recycling* is also perceived as a challenge of lower importance compared to the other challenges. The main reason is that all CARE regions are mainly manufacturing regions, with very few infrastructures in aircraft dismantling and recycling. Furthermore it has to be taken into consideration that business models about aircraft second lives are not mature enough and do not show enough business volume to federate important dynamics in this field, which results in a lower importance given to this challenge.

This evaluation also positioned the *Green ATM* challenge as one of the less important challenges. This positioning is mainly due to a lack of knowledge of ATM activities among clusters which are historically more concerned by manufacturing technologies, as the positioning of *Aerostructure weight reduction* and *Cleaner Engines* illustrates.

Focusing on the top-right hand corner of the plot where the clusters have the most important capabilities, sub-groups of challenges can be detected:

Importance of challenges



Figure 6: Focus on the importance of challenges vs. capabilities of regional clusters for excellence building

These plots illustrate the positioning of the 13 key challenges for the CARE cluster and the classification into 4 groups:

1. The high-expertise and top-priority challenges
2. The high importance challenges where the clusters are not expert
3. The challenges with lower importance for the clusters members
4. *3 challenges (fuel prices, aircraft recycling, green ATM) are not mentioned on the above graph, as the clusters don't feel expert about how to leverage results.*

The results of this analysis process are detailed in the report D3.2 “Complementarities”. The main conclusion is that the European CARE inter-regional cluster is mainly a manufacturing cluster, focusing on aerostructures and aircraft parts. Some global-scale challenges are also of key importance for the CARE cluster, but with less knowledge and action capacity like Advanced & Raw materials or Global competition for example (the second group of challenges). Finally other challenges (the third group) can be considered as smaller or less important for the members.

The Joint Action Plan proposes various approaches and actions for each of these 3 groups of challenges and will give a strategy to answer the question: **How can CARE capitalize and build excellence on its best strengths, and what to do with the weaker interest in top challenges?**

In terms of methodology, 3 results are of high interest at this point:

- Regional clusters have an up-to-date vision of their regional positioning in green aviation challenges, an analysis which is comparable to other European regions,
- The CARE meta-cluster acquired a knowledge of its profile and positioning in green aviation,
- The methodology has been experimented and improved by this exercise, which enables additional clusters to easily join the CARE group and this European evaluation.

An expression of interest from 300 European SMEs and laboratories

Each cluster member of the CARE group gives a strong importance and specific services to the SMEs of their local territory. As CARE proposes a cross regional operational plan, it has to be reminded that SMEs and laboratories are the main targets of this project. In this sense, the CARE methodology aims at linking the previously described CARE technological profile to SMEs and laboratories of CARE regions.

For this purpose, CARE builds a network of small-size actors having competencies and interest in green aviation and collaborative projects. The key word here is “volunteer” since all the actors mapped in the CARE cartography expressed their willingness to join the network. An important detail for the federation of this network is that interviews and manifestations of interest have been carried out in local language thanks to the use of adapted questionnaires and presentations. These actors will be the target of SME-oriented actions and services of the Joint Action Plan.

Evaluation of the innovation eco-system in each region

Collaborative projects activity

The deliverable D2.3 “State of Play of Regional RTD Policies”, submitted to the European Commission in 2013, describes the strengths and weaknesses of the CARE regions in the public support to research and development, and tackles this matter from a SME perspective. One of the guiding principles of this study is to provide an observation on how companies (and especially SMEs) are involved in innovative collaborative projects.

The goal of this study is to collect quantitative information about collaborative projects among regional actors in order to give qualitative appreciation of the importance of these collaborative projects in the CARE European cluster. This work targets the regional, national and European projects. It is important to remind that the roles of clusters are different in each region, which gives them different access to information. For example, some clusters like Skywin in Wallonia have access to an exhaustive knowledge of collaborative projects activity in their region, including the collaborative projects that are not part of the cluster. At the same time, clusters like Aerospace Valley only have access to projects that have been developed with the support of the cluster. For these regions, trends and qualitative information are preferred to the comparison of detailed figures.

As a first conclusion of the study, a high disparity between regions in terms of collaborative project activity and associated funding support is observed. The following graph provides an overview of the funding granted to cluster members in order to join collaborative projects, and shows that leading regions obviously have the highest rate of collaborative projects and associated funding over the last five-year period.

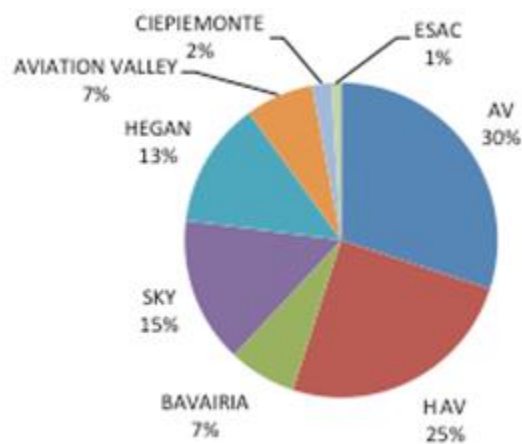


Figure 7: Distribution of public funding between CARE clusters

In addition, the study highlights differences of behavior in terms of collaborative projects activity. Certain regions have a strong interest for European collaborations while others give their preference to regional projects. The distribution is presented in the following plot (figure 8).

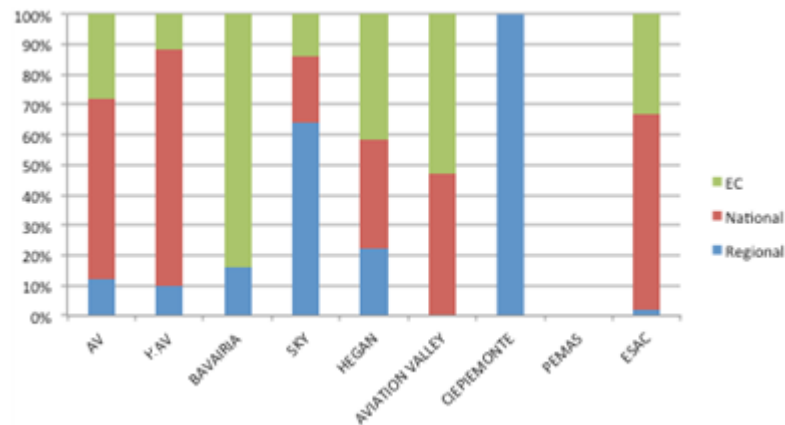


Figure 8: Mix of funding sources for collaborative projects in each cluster

* *CIEPIEMONTE* was not able to gather information out of the regional scope for this study.

As confirmed by this figure, the study shows that the comfort of national and regional funding (when they exist) does not encourage looking for European and international collaborations and funds. Regions like Midi-Pyrénées/Aquitaine, Hamburg and Wallonia are regions where aeronautics is the target of a very important national and regional support for collaborative projects. On the other hand, several regions like Basque Country suffer from a general decrease of national funding and must orientate their collaborative projects to European frameworks.

From a technological point of view, this preliminary study also reveals that CARE regions focus their innovation mainly on the manufacturing of aircrafts and parts. Indeed, as illustrated in the following chart, budget for collaborative projects mainly go to efficient systems and eco-design.

	Green Areas						
	Dev. Budget of projects per Area / year, all Funding Systems (M€)						
	1	2	3	4	5	6	7
	<i>Efficient Systems</i>	<i>Eco Design</i>	<i>Greener Air Traffic Management</i>	<i>Green Multimodal Transport</i>	<i>Other</i>	Total	Total (%)
AEROSPACE VALLEY	61,9	14,3	5,9	2,7	71,0	155,9	28%
HWF	90,2	9,9	5,4	2,4	0,0	119,9	22%
BAVAIRIA						25,5	5%
SKY	65,9	0,0	0,0	0,0	0,0	65,9	12%
HEGAN	15,8	16,4	1,8	0,0	110,0	144,0	26%
AVIATION VALLEY	18,0	5,0	0,3	0,8	0,0	24,1	4%
CIEPIEMONTE	15,6					15,6	3%
PEMAS							
ESAC	3,0	1,0	0,0	0,1	0,0	4,1	1%
TOTAL	270,4	46,7	13,5	6,0	181,0	555,1	100%
	49%	8%	2%	1%	33%	93%	

Figure 9: Total regional budget of collaborative project per year

* *PEMAS* data could not be gathered due to national scheme of incentives, which are open for R&D projects in every area, not only for aeronautics. In addition, no data for the aerospace sector alone is available.

Support to innovation

The work previously mentioned also aims at mapping the general concerns that SMEs and laboratories face in their access to innovation and collaborative projects. In front of these difficulties it is also relevant to highlight the most efficient practices in terms of support mechanisms, institutional role and access to information.

At regional level, schemes like the Wallonia's Plan Marshall give a very successful orientation for collaborations between large groups, SME's and research institutes (Mandatory consortium agreement to get the support) and to "Green" projects (encouraged approach for "Green objectives"). The national French CIR scheme (Credit Impôt Recherche) also deserves to be mentioned since this tax credit reimburses 30% of the R&D expenditures of French companies. At the same time, The Federal Funding System "Leading Edge Cluster Competition" in Germany (for the benefit of Hamburg Aviation) is more adapted to focused topics and smaller projects, which help the SME participation without necessarily involving an OEM. In other words, even if each region has its own drivers and context of decision, many support schemes exist in the various CARE regions, and many tools or funding mechanisms try to encourage SMEs to go into innovation.

In this context, the CARE approach consists in establishing a list of these support schemes in the various regions and to confront them to the opinion of the SMEs of the CARE network about these existing ecosystems.

Generally speaking, the following feelings are commonly expressed by SMEs in the CARE regions are:

- Most of CARE clusters members are interested in being contacted by clusters for European activities. Indeed, an important limit of European activity in cluster regions is that there is a lack of support given to companies interested in European opportunities. The feeling of some companies is that they have difficulties in finding appropriate calls for projects or funding sources among the many European existing opportunities. Even if that kind of services is already proposed by some clusters or networks such as NCP or EEN, companies would need support in the application and not only calls detection.
- The members having benefitted from European funding through a collaborative projects are quite proud of it, as it brings excellent opportunities in working on state-of-the-art topics with key European existing or new partners
- The administrative tasks associated to Intellectual Property and consortium agreements are also not easy to tackle for SME's. This problem is addressed in the CARE ERA-NET proposal.
- The SMEs often need to be supported by OEMs to have good chances of success in application, or to build projects that fit market needs. This difficulty for small companies is also addressed in the CARE ERA-NET non-research actions.
- The closer to the actors the funding authorities are, the higher the rate of success of the applications is. The CARE ERA-NET builds on this field-based asset by proposing the network's "driver's seat" to the regional authorities.

The ambition of the CARE Joint Action Plan is to propose joint actions adapted to these common concerns, favoring a better articulation and a more efficient way to tackle collaborative projects.

The role of clusters in the CARE regions

A benchmark of CARE clusters activity

The CARE clusters are deeply different in each CARE region. Roles and objectives are diverse, sizes or structures are not comparable and scopes of activities diverge among the CARE partners. At first sight, these variations can be sources of obstacles in the building of cross-cluster collaborations. But the CARE methodology aims at capitalizing on the differences in order to exchange best practices and support the emerging clusters in their initial decisions and directions. For this purpose, a benchmark has been carried out in order to map the characteristics of CARE clusters. The chart presented below is an extract of the questionnaire that collects the relevant information among clusters. As it will be described in section 3, this benchmark will also allow clusters willing to join CARE methodology to easily compare their organization with the CARE clusters specificities.

Characteristics	Yes/No and/or Explanation, comments...
Strategic Reflection Defined	
Innovation Strategy Defined	
Monitoring of Services and Activities Structured	
Steering bodies, committees, working groups	
Communications among members	
Recognition of the Cluster in Publications, Press, Media	
Customers and Members Satisfaction Assesment	
...	

In addition to this questionnaire, each cluster has contributed by sharing some information on his best practices as a basis for mutual learning. This led to the production of the CARE Compendium of Good Practices, which summarizes the best practices of CARE clusters and analyzes its potential transferability to other clusters.

Here are listed 3 examples of good practices that are potentially transferable between CARE clusters:

- ❖ The concept of Aerospace Valley shared VIE (“Volontaire International en Entreprise”): an intern going abroad within the frame of the French VIE programme is shared between 3, 4 or 5 companies members of Aerospace Valley, having development objectives in the same country (Germany, Canada, Brazil, India, China ...). Locally, the VIE intern is generally hosted in the facilities of a large company such as Airbus or Latecoere. He/She is helped by a “godfather” to facilitate his/her professional insertion. Job assignments generally consist of local technology and market watch, commercial prospecting... 50% of the cost is taken in charge by the cluster, while the other half is shared by the concerned companies.

- ❖ The Skywin cluster launches every year a call for projects in the name of the Walloon government aiming at
 - promoting collaboration between universities, businesses and research centres
 - fostering the development of high added value innovative products and services which have the potential to be marketed internationally

The support from the Walloon Region can take different forms: investments in infrastructure, buildings and equipment; R&D funding; investment grants; training support; attracting foreign investments; and export promotion.

- ❖ Innovation and technological growth are key features for Torino Piemonte Aerospace companies. In February 2012, TPA launched Technical Working Tables, focused on technologically innovative topics and aimed at sharing ideas and launching competitive projects and products in order to:
 - compare current manufacturing practices with customers and peers
 - understand where customers are going
 - align manufacturing capabilities with customers
 - define new technological milestones.

A total number of 24 good practices emerged from this evaluation, which represents an important knowledge base in terms of experience feedback, for the mutual progress of clusters and for the support to emerging clusters.

A common point is observed throughout the CARE consortium: all clusters have activities in the field of collaborative projects, source of innovation for smaller actors. Concrete actions to foster innovative projects are different as described in the next paragraphs, but the final purpose is the same: join initiatives to be more competitive.

Similarly, common difficulties are also observed in the CARE group on the cluster members projects follow-up: clusters cannot perform an adequate follow-up of launched projects and can hardly measure the efficiency of the funding systems, due to a general lack of instruments to collect feedback from project leaders. According to several clusters, even the funding authorities themselves did not implement such tools.

Clusters as a vector of internationalization

The previously mentioned selected practices provide a good vision of the services and supports offered by clusters to their members. Within this panel of services, and although the role of clusters differ from one region to another, internationalization of small-size actors is a common concern of all CARE clusters.

These clusters have their own network of international partners composed of clusters, research organizations, companies, foreign local authorities etc. The ambition of CARE is to build a European and interregional CARE cluster capable of federating networks and creating well identified and unified relationships. The size and critical mass of actors represented by CARE is an opportunity for all the clusters composing the CARE group. Indeed, while regional clusters create links with other clusters, a CARE European Cluster will be able to establish dialogue at a higher scale with other potential meta-clusters, or international organizations like SESAR or CleanSky.

With the same logics based on the technological positioning of the CARE regions in the 13 key-challenges, the methodology used to internationalize CARE consists here in identifying potential new partners in order to:

- **complete** the needs of the CARE consortium : with partners having complementary technical know-how in the weakest key-challenges of CARE European cluster or common interests or level of excellence in green challenges

- **promote** the cutting-edge know-how of CARE metacluster: with key-partners or target countries where CARE can provide an insight or a support to European SMEs export activities or potential R&D collaborations.

The following chart is a summary of the mapped fields of activity or sectors where to find new international partners for CARE.

	Topic
Partners with technical expertise	ICT-Energy Management
	Materials
	Recycling
	Biofuels
	Space
Partners of other fields of activity	Automotive
	Logistics
	Multimodality/ Airports

On the same model, the next chart lists the countries where CARE tries to disseminate and accelerate the promotion of CARE.

Geographical areas	South Africa
	Brasil
	Mexico
	India
	Russia
	Canada

	China
	United States

Among each field of interest and geographical target, several potential partners have been identified and contacted thanks to the network of CARE clusters. Bilateral discussions have led to the identification of several knowledge transfer or economic development opportunities between CARE and these new potential partners. While not all the discussions led to positive results, this step permitted to initiate strong links around several topics of common interest. The final step is the establishment of specific collaborations with the identified opportunities; which will be detailed later of this report. The detailed approach and list of all targeted partners are compiled in the report D3.4 “Possible routes for European based cooperation”.

The CARE methodology, a first positive result

A pioneering activity federating clusters

The CARE methodology presented above is quite innovative since it allows that various clusters collaborate with a common language, a harmonized evaluation process, as well as common objectives and fields of interest. It represents the process toward the creation of a European-scale cluster, capable of conducting a collective approach for excellence and efficiency in the regional innovation eco-systems.

The following chart summarizes the 3 main steps of the methodology adopted by each CARE partner. It aimed at identifying the role of clusters, the activity in their own territory as well as the activity developed for internationalization.

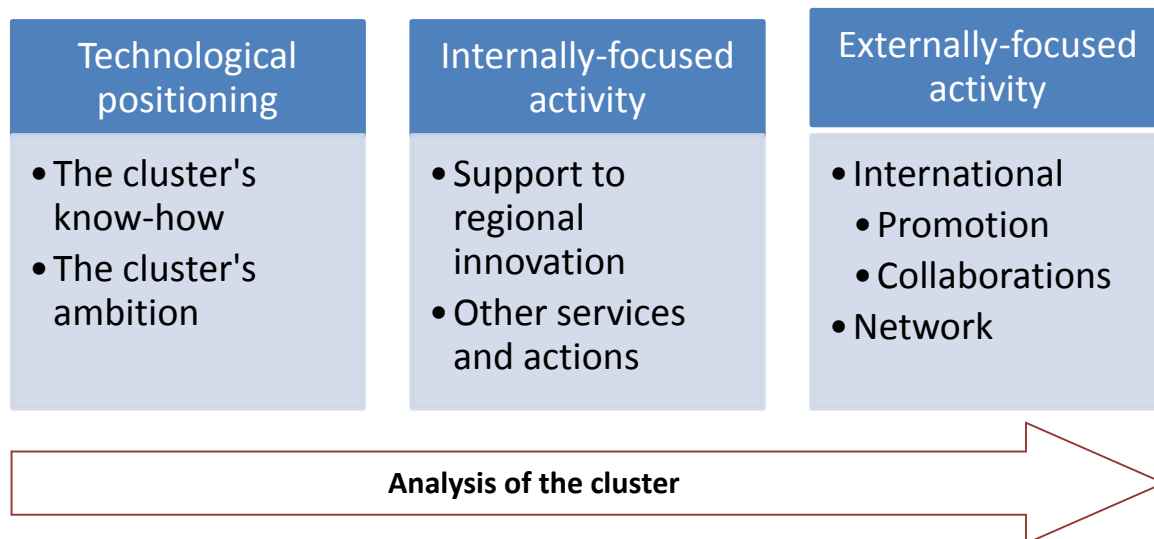


Figure 10: Axes of individual cluster analysis

In order to consolidate and structure the equivalent of European meta-cluster, the methodology also consisted in creating links and articulations between these regional results. Comparison of outcomes, discussions on complementarities, identification of common concerns and needs, were key-elements of the first period toward common objectives and actions as illustrated in the green box below.

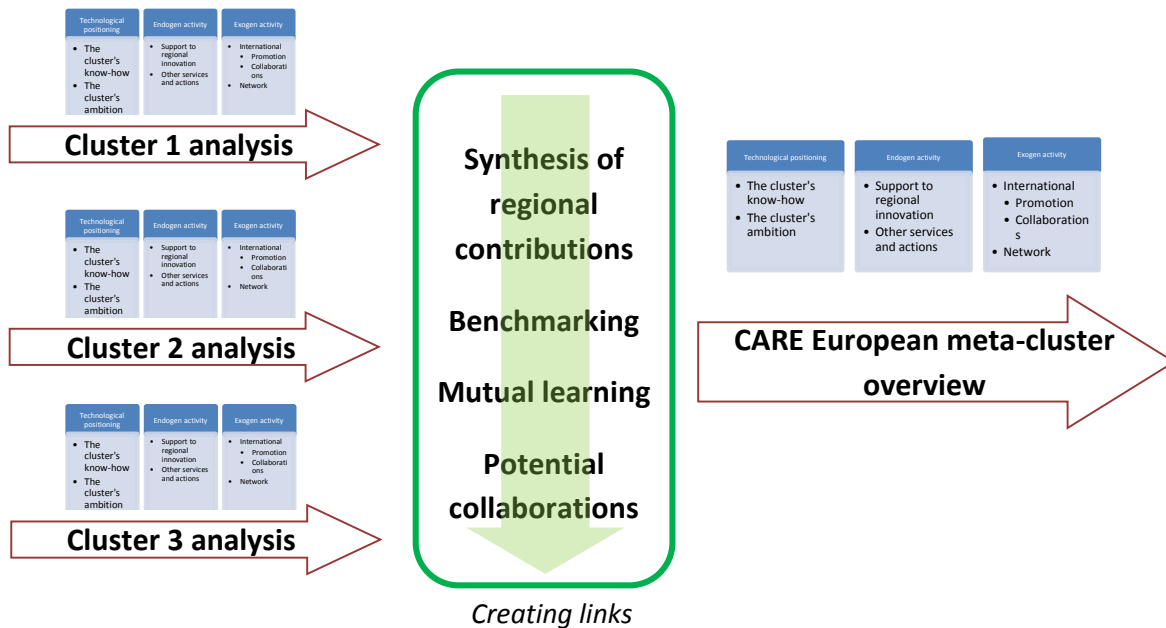


Figure 11: Analysis of CARE cluster

A methodology open to new clusters

As mentioned above, the methodology was successfully experimented among the CARE clusters. In consequence, the CARE group is convinced of the benefits of such a line and is highly interested in welcoming new partners and clusters to adopt this methodology.

Indeed, the method highlighted, among other results, several needs for engaging new partners in the cross-border, cross-sector collaboration dynamics. CARE is now open to actors and clusters from Europe or the world to complete some major deficiencies or to collaborate on common opportunities.

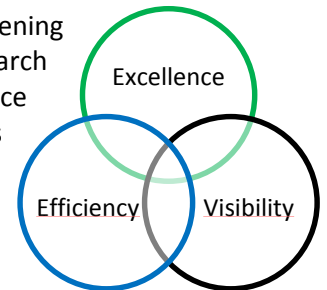
Another ambition of this methodology is to support emerging clusters in their setting-up and accelerate their evolution from the status of emerging cluster to more mature clusters. To do so, using the CARE methodology can be a very useful tool allowing a relevant diagnosis in line with green aviation context and challenges, as well as a fast access to the experience of mature clusters of the CARE group.

This methodology is an important end result that will probably be valuable to other clusters than the CARE ones. It is also the cornerstone of the Joint Action Plan design described in the following chapters of the present document.

The Joint Action Plan and its implementation

Overview of the Joint Action Plan

As a result of the previous study, the Joint Action Plan (JAP), aiming at strengthening the competitiveness of SMEs, is supported by the setting up of synergies with research laboratories and local authorities, using the natural role of clusters in the emergence of triple helix collaborations. The objective is to federate 9 pioneering clusters under a common banner of a European CARE meta-cluster, synonym of **excellence**, **efficiency** and **international visibility**. The 21 actions constituting the JAP are listed here-below.



ACTION # 1 USING THE CARE RESEARCH AGENDA TO SCREEN HORIZON 2020
ACTION # 2 THE CARE COMMON RESEARCH AGENDA, A TOOL TO COORDINATE AND PROMOTE THE CARE PRIORITIES
ACTION # 3 WORKSHOPS AND “TIGERS”: THE CREATION OF A CARE COMMUNITY
ACTION # 4 THE CARE TECH PLATFORM
ACTION # 5 A MORE EFFICIENT COORDINATION MECHANISM: THE CARE ERA-NET PROPOSAL
ACTION # 6 A SPECIFIC ACTION ABOUT INTELLECTUAL PROPERTY RIGHTS MANAGEMENT WITHIN THE PROPOSED CARE ERA-NET
ACTION # 7 CROSS SECTOR ACTIVITIES
ACTION # 8 EDUCATION ON MATERIAL SCIENCE
ACTION # 9 INFORMATION FOR SMEs ON REGULATION AND STANDARDS
ACTION # 10 INFORMATION FOR LOCAL ACTORS ON RECYCLING REGULATIONS
ACTION # 11 INVESTIGATION OF BUSINESS OPPORTUNITIES IN AIRCRAFT RECYCLING
ACTION # 12 ENVIRONMENTAL BALANCE OF ALTERNATIVE FUELS
ACTION # 13 FOSTERING OF COLLABORATIONS WITH OEM
ACTION # 14 CROSS SECTOR APPROACH FOR RAW MATERIALS MANAGEMENT
ACTION # 15 DEVELOPMENT OF A BETTER UNDERSTANDING OF RAW MATERIALS MANAGEMENT
ACTION # 16 POTENTIAL COLLABORATION OF GERMAN AIRPORT R&D PROGRAM
ACTION # 17 BUILDING THE EUROPEAN VISIBILITY THROUGH COORDINATION WITH OTHER NETWORKS
ACTION # 18 BUILDING THE INTERNATIONAL VISIBILITY THROUGH COORDINATION WITH OTHER NETWORKS
ACTION # 19 A GREEN CARE LABEL FOR AIRPORTS
ACTION # 20 A CARE MENTORING ACTION
ACTION # 21 INTERNATIONAL PROMOTION OF THE CARE KNOW-HOW

CARE – Actions for Excellence

The CARE Common Research Agenda

In order to structure the previously mentioned technological key-challenges of CARE, the Common Research Agenda is a document that represents the main technological issues top-rated by the CARE partners. This Common Research Agenda is a research agenda built through a bottom-up approach. Based on the mapping of competencies made at regional level in each of the 13 key-challenges, the agenda is composed of several research axes driven by the future needs of green aviation. The purpose is also to open doors where regional actors are ready to enter, thanks to their cutting-edge know-how and highly competitive competencies. **Contrarily to the usual research agendas like ACARE, the CARE Common Research Agenda is the intersection of green aviation research axis and several priority topics for the competitiveness of CARE actors mapped in the regions. It does not aim at being exhaustive and covering all the aviation topics, but aims at concentrating on several key topics of importance for the regional development.**

In order to illustrate the vision of the agenda, the chart presented below is an extract of the CARE Common Research Agenda where the topics are refined from left to right.

SBA : Strategic Business Area	Research sector	Research axis	List of relevant actors, projects, research units.
Aircraft Recycling	Composite materials	MRO for Composite materials	
		Valorisation of short and medium recycled fibers	
		Valorisation of rare materials or systems components	<i>Cluster 1: SME 1, SME2, Project A</i> <i>Cluster 2: SME 3, SME4, Univ X</i>
		Resin recycling : Solvolyse, thermolyse processes	
	Recycling process	Innovative and optimized recycling processes	
	Business model	Economics Research has to be done in order to reach a circular aerospace economy	

Figure 12: Structuration of the CARE Common Research Agenda

The following table details what are the final CARE topics that compose the strategic business areas and their associated research topics.

CARE theme	Strategic Business Area	Research sector
More efficient Airborne systems	Biofuels	Biofuel industry
		Biofuel market
		Biofuel chemistry
	Aerostructures and cabin weight reduction	Functionalities of composite materials
		Modelling of complex composite parts
		Process simulation for complex parts
		Honeycomb structure
		Thermoplastics / composites / Multimaterials technologies
	Safety / Standards of materials	
	Stripping, painting and MRO	Aircraft stripping and painting
	Engines / propulsion	Improved engines
		Innovative ground propulsion
	Aerodynamics	
	Onboard Energy Management	Electrical battery systems
Energy harvesting in A/C		
Fuel Cell		
Eco design	Aircraft Recycling	Composite materials
		Recycling process
		Business model
	Industrialisation processes	Factory of the future
		Innovative assembly and MRO processes
	Surface treatment	Clean metal surface treatments
	Environmental impact	Modelling
Safety and standards	Interiors standards	
Greener ATM	More efficient trajectories	Management of weather conditions
		4D Trajectory
		Performance Based Navigation (PBN) and Continuous Descent Operation (COD)
	New ATM concepts	Formation flight

		Triggering innovative ideas from non ATM world
		Human factor
Intermodal transport	Land-side management of aircrafts	Re-design / or re-thinking of handling and servicing of AC in airports
		Re-design / or re-thinking of aircraft ground operations
	Efficient management of flows (passengers and freight)	Unique ticketing
		Seamless checkin processes
	Better inclusion of Air transport in multimodal transport	<i>see HIT conclusions</i>
	Cleaner Airports	Noise reduction VS CO2 reduction VS Pollution reduction

Figure 13: Overview of the CARE Common Research Agenda topics

The Emergence of RTD projects: CARE Tigers

The dispersion of the aerospace industry across many separated locations in Europe is a key competitive factor as companies have to tie up with each other in an effort to build up on common synergies in a fast globalizing world. That is why the CARE project has created effective collaborations between clusters 'members through stimulating joint R&D proposals.

The CARE approach was based on a bottom-up dynamics whereby topics of interest emerge from the CARE clusters eco-system of regional SMEs and laboratories. In order to foster the emergence of R&D projects among this eco-system, CARE aimed at creating a community of stakeholders interested by brainstorming on clean aviation technologies. This led to the creation of Topic Interest Groups for the Emergence of Research (TIGERs). The underpinning idea of the CARE project was the creation of an extensive framework to foster trust and familiarity toward cooperation between stakeholders which are not used to work together. The TIGERs that have been launched during the last period of CARE project are the following: Coating & Stripping, Aircraft Recycling, Additive Manufacturing, Industrialization Processes, Production of Composite Parts, Green Factory of the Future, Green Multimodal Airport, Engines: Critical Gearbox. This framework was incrementally built through the organization of 3 events teamed up with B2B meetings all along 2014 (Technical Forum of Arcachon, 2014 AIRDays in Lisbon and the Green Mobility Conference in Hamburg), thereby enabling efficient collaborations to start and project ideas to emerge.

During the Final CARE event in Aeromart, 12 speakers from SMEs and research centers participated in the Pitch session and presented 15 cross-sectoral projects ideas at different level of development and related to industrialization processes, Factory of the Future, Additive Manufacturing, Air Traffic Management, Coating and Stripping, Green Taxying and materials (cf: chart below). This session made the TIGERs attractive toward new stakeholders, and we expect newcomers to join the TIGERs and new consortium to be created beyond the end of CARE. The CARE Venture Academy which took place during the Aeromart

event was also the opportunity to upstream the TIGERs project ideas towards European, National and Regional representatives in order to highlight R&D funding bottlenecks and opportunities.

PROJECT LEADER	TOPIC
Stéphane BASCOBERT <i>InnovATM, Chairman</i>	<i>“SkyKeeper Surface Manager : Improve aircraft ground movements with artificial intelligence”</i>
Konstantin SIPOS <i>RESCOLL, Head of R&D Unit</i>	<i>“Active coatings for instruments or structures de-icing, Fire protection coatings, Coatings for thermal depainting”</i>
Roman NEVSHUPA <i>CSIC, Researcher</i> Amaya IGARTUA <i>IK4-Tekniker, Researcher</i>	<i>“Self-healing nanostructured INtelligent tribological Coatings for vacuum and Aerospace applications”</i>
Rafael LIZARRALDE <i>Ideko/Danobat, Research and Technological Development Director</i>	<i>“Industrialization processes: automated manufacturing and validation of CF components”</i>
Unai MUTILBA <i>IK4-Tekniker, Researcher</i>	<i>“Latest trends in volumetric error mapping and compensation of machine tools”</i>
Faruk DEMIR <i>TEI, Lead Engineer</i>	<i>“Post process development after SLM for aero engine components”</i>
Jose AMORES <i>DMP, Chief Innovation Officer</i>	<i>“Critical Gearboxes”</i>
Pilar DIEZ MORENO <i>Talleres Alot, Engineering Manager</i>	<i>“Eco operation of towing tractors”</i>
Cenap ASAN <i>Turbomak (EJS), Business Development Manager</i>	<i>“Material Removal Rate Improvement”</i>
Fernando SANTOS <i>IK4-Azterlan, R&D and Metallurgical Processes Department</i>	<i>“BestINC-High performance precipitation hardening superalloys for high temperature, pressure and agresive environments”</i>
Andrea ROMITI <i>APR, CEO</i>	<i>“Smart and additive manufacturing technologies”</i>

Some of these projects ideas were just the initial shape of future R&D projects with neither consortium nor funding identified (“SkyKeeper Surface Manager : Improve aircraft ground movements with artificial intelligence”, “Active coatings for instruments or structures de-icing, Fire protection coatings, Coatings for thermal depainting”, “Latest trends in volumetric error mapping and compensation of machine tools”, “Eco operation of towing tractors”, “Material Removal Rate Improvement”, “Smart and additive manufacturing technologies”).

Other project ideas were roadmaps related to companies wishing to identify new partners for their business development strategy (“Critical Gearboxes”).

One of the project ideas had already been through a development phase but it needed relevant testing before any launch onto the aeronautics market (“Industrialization processes: automated manufacturing and validation of CF components”).

The last project ideas needed one or two additional partners or an appropriate funding scheme (“BestINC-High performance precipitation hardening superalloys for high temperature, pressure and aggressive environments”, “Self-healing nanostructured INtelligent tribological Coatings for vacuum and Aerospace applications”, “Post process development after SLM for aero engine components”).

CARE partners have decided to continue with TIGER activities in the next years, due to we see clearly the great benefit of this kind of networking on R&D for our companies and aerospace sector, and for the industry in general and with the premise that our TIGERs intend to submit cooperation projects during 2015/2016. We will maintain the most active TIGERs, through the CARE LinkedIn Platform and contacts among clusters. Furthermore, we will open TIGERs to other regions out of CARE, through EACP network (40 Aerospace Clusters) and articulation with other working groups such as the European Technology Platforms (ETP).

Focus on Co-modality

As the CARE clusters are Aeronautics and Aviation industry oriented projects, this study has been subcontracted to a specialized centre of research. A call for tender has been launched, stipulating the needs, requirement and budget of the work. A selection has been done based on the best value for money criteria and HIT – Hellenic Institute of Transportation has been selected.

The study “Recommendations for the regional land side management of air transportation” has been delivered.

To assist the CARE Project in setting-up regional research- oriented clusters, the study examined the complex interrelations between involved actors in relation to airport co-modality with an overall objective to provide policy implementations to key regional authorities and airports, highlighting the critical role of SMEs and research centres. Specifically, the objectives of the study were the following:

1. Provide a short but comprehensive state-of-the-art on the main issues concerning airport co-modality for the transport of passengers and goods.
2. Propose a new definition for co-modality in airports, capable of taking into account environmental objectives, the ‘Airport Environmental Co-modality - AEC’ framework.
3. Suggest specific indicators for assessing the ‘Airport Environmental Co-modality - AEC’ of European and international airports, leading to benchmarking possibilities and comparisons.
4. Use the proposed indicators to assess the AEC performance of the International Airport of Athens (EL. Venizelos) in order to validate the methodology.
5. Identify the relevant actors for promoting airport co-modality, emphasizing the potential involvement and role of SMEs and research centres.
6. Conduct a qualitative actor analysis of the air transport environment in order to map the complex interactions and interrelationships among the various actors in terms of interest, power and objectives.
7. Propose policy measures and suggestions for improving airport co-modality.

For addressing the aforementioned issues, three methodological pillars are considered, to examine the different perspectives of Co-modality:

- I. **How is Co-modality implemented?**
- II. **How is involved in Co-modality implementation?**
- III. **Where should Co-modality be implemented?**

As an output of this study, a list of recommendation involving the entire aviation community has been therefore developed and proposed, in the frame of the Joint Action Plan. The study also paved the way for the emergence of several RTD proposal in the scope of CARE clusters.

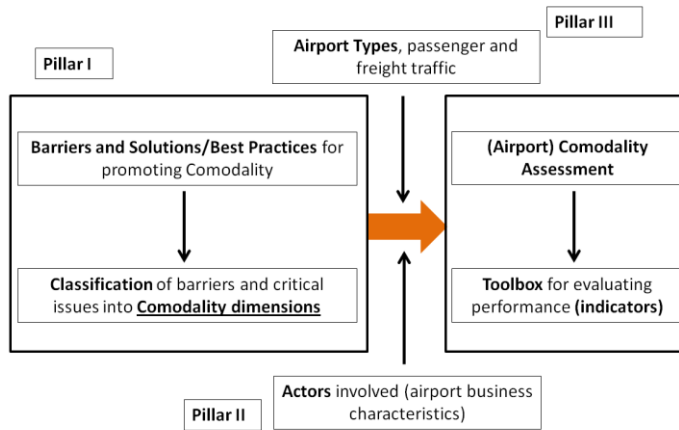


Figure 14: Study concept

The CARE Tech Platform

The CARE Tech Platform was a digital multi-level network designed to support the CARE community to brainstorm on project ideas, share information on aeronautics event and cooperation opportunities. Thanks to a sound IT architecture, a constant moderation activity and a user-friendly community management, the whole CARE community was able to structure its interactions in a dynamic and attractive way. The CARE Tech Platform was created in January 2014 and the first CARE Training Webinar took place in April 2014 with all partners via GoToWebinar and this led to the creation of all the subgroups constellation in Mai-June 2014 as the TIGERs started their networking activities.

The functional and technical specification initially outlined that the platform should:

- Ensure updated dissemination on the CARE project progress;
- Increase awareness on Regional, National and European funding opportunities while advertising new project ideas generated by the TIGER groups;
- Increase the networking processes through setting up an online forum while guaranteeing direct contact between the stakeholders;
- Enable an easy sharing of ideas and documents while ensuring restricted access when necessary.

This network took the shape of a main LinkedIn Group coordinated by a community manager on behalf of Ceipiemonte. This LinkedIn Group was subdivided in 16 thematic and technical subgroups managed and animated by two moderators belonging to CARE consortium:

- 4 Key challenges subgroups: More Energy Efficient Airborne Systems, Eco-Design, Air Traffic Management and Multimodal Transport System;
- 10 TIGER groups;
- An extra-group dedicated to Fundraising Opportunities and Project Ideas sharing;
- A member support group dedicated to LinkedIn tech support.

In order to make the best use of this online platform in terms of dissemination and networking, the several groups had different levels of confidentiality:

- The main group and the four “key challenges” subgroups were opened to selected stakeholders interested in supporting the project and participating in conversations.
- The TIGER groups were restricted to CARE members.

Over 6 months of activity, the CARE Tech Platform gathered over 270 memberships (across all groups) and generated over 110 discussions topics. These statistics were processed through the LinkedIn Statistics Tool. Due to the difficulty to launch some of the TIGER groups, some subgroups statistics were incomplete. After the end of the CARE project, the main group (CARE – Clean Aerospace Regions) and the four “key challenges” subgroups shall stay open in order to ensure long-term dynamics towards cooperation and to continue developing synergies between the CARE community and external stakeholders.

During the month following the end of the CARE project, around 10 conversations were launched on the CARE Tech Platform showing its adoption by a large group of users. Join the group : https://www.linkedin.com/groups?home=&gid=7435850&trk=anet_ug_hm

CARE – Actions for Efficiency

The CARE ERA-Net proposal. The JAP business plan source of opportunities for SMEs

The CARE JAP is a collaborative action plan, implemented from the month 18 to the end of the project. It also has the ambition to guide the collaborations between clusters even after the end of the project. Therefore a business plan has been established to propose sources of funding for the support of these actions. The JAP activities handled from Month 18 to 36 are partly funded by the CARE project as described in the following chart, but a business plan has been designed to propose a sustainable funding mechanism to follow the project.

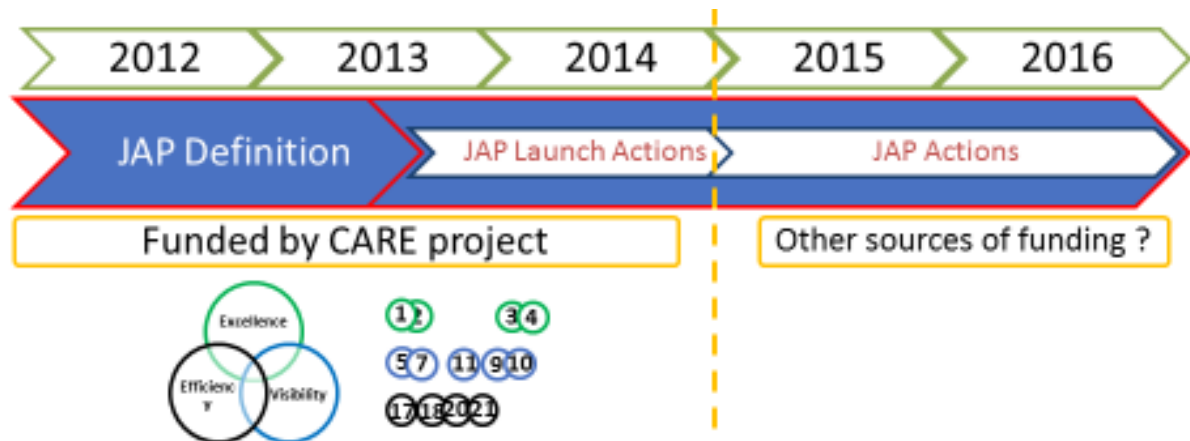


Figure 15: CARE JAP funding timeline

Several funding opportunities have been mapped and analysed, but the final result of this business plan setting up consisted in proposing the creation of a new ERA-Net mechanism, dedicated to Green Aviation. In this context the deliverable D4.2 JAP Business plan proposes details on a dedicated ERA-Net to finance both collaborative projects of SMEs and support actions of CARE clusters. The ERA-Net has the following characteristics:

- Principle of funding model:
 - Real common pot : Countries fund / Commonality / Successful proposal funded
 - Virtual common pot: Each funding organization funds its own successful participants
 - Mixed-mode pot: Each country funds its participants, and can also fund other countries' participants

It was also the object of the following SWOT analysis:

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> No other Research funded ERANET in green aviation Scheme adapted to transnational coop Mutual trust between CARE members Work organised and shared effectively Consortium flexibility High success rate Low administrative effort → SMEs oriented Attractiveness for other EACP members 	<ul style="list-style-type: none"> Need of national/regional authorities Difficulty for combining different sources of funding. Green aviation = widespread thematic Need to investigate more: <ul style="list-style-type: none"> ✓ private entities integration ✓ Cluster status = out of eligibility
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> Possible international extension for several key challenges airTN → launch joint actions Combine ERANET with risk-sharing facility finance (EIB mechanism) Diversify funding sources Coordination with JTI, other clusters and networks 	<ul style="list-style-type: none"> Cluster role to be defined (coordinator?) CLEANSKY + SESAR already cover aeronautic airTN= transnational calls financial solvability (ERANET participants) Thematic overlaps → CE Respect work schedule Public tenders

Figure 16: Building a CARE ERA-Net: SWOT Analysis

Finally, even though a tough effort has been dedicated to this effort and ambition, it has appeared that building such a mechanism could not be done before the end of CARE project. Several reasons were identified:

- Difficulties to synchronize CARE actions with prevised EU calendar
- Some local / regional financing bodies' lack of will to collaborate with other regions
- Difficulties to involve some regional actors for the Eranet
- Difficult to commit private funding in the CARE ERA-Net approach

Nevertheless, this feasibility study and its related dissemination and promotion permitted to the CARE regions to better appreciate the necessity and opportunity for funding regional or cross regional R&D in the field of green aviation as well as to better understand how to build or join an ERA-Net.

Involving the financial community

A thorough investigation into the matter showed that the most appropriate instrument in Europe to coordinate actions between regional-level stakeholders while taking into account SMEs constraints was the well-disseminated ERA-Net scheme. The idea was just to set-up of a "CARE ERA-Net". This approach had several advantages:

- The Regions could be directly involved as partners for the network, incorporating their local policies into a European vision of the sector, thus avoiding duplication of efforts on some topics while increasing the technical and scientific level of companies towards excellence: the higher number of actors from different countries increases the number of opportunities;

- Other actors, such as the European Investment Bank or other funding institutions (e.g. venture capital...) interested in innovation could take part at different levels of R&D projects maturity (TRL);
- SMEs would find an appropriate framework to transform innovation projects further than the R&D phase – the only phase which is relatively easily funded through regional, national or European mechanisms.

This methodology fostering the co-creation of projects takes time, but it has been demonstrated as most efficient to lead to excellence, through the experience of several research networks (e.g. AirTN). This bottom-up approach is much different from the Clean Sky demonstrators, for example, that are imagined and led from the top partners distributing down the work, eventually to SMEs. We expected the structuration of the CARE ERA-NET during the year 2014 and its implementation in 2015.

Despite the attractiveness of the idea, the establishment of the CARE ERA-NET before the end of the project proved impossible owing to coordination and scheduling issues:

- Interactions with the AirTN ERA-NET were impossible as the second phase of the latter (until the end of 2015) made the merger of the two ERA-NETs impossible the merger of the two ERA-NETs;
- Most of the regions represented in the CARE project couldn't take decision to engage before the second semester of 2014 which did not ensure sufficient negotiating time;
- For administrative reasons, some of the regions represented in CARE could not subcontract the clusters to manage and coordinate the activities of an ERA-NET.

It is for these reasons in particular that the CARE ERA-NET could not be created. However, the partners made the best possible use of the CARE project budget to develop links with the "Financial world" through the organization of an event (the CARE Venture Academy in December 2014) aiming at exploring how to ease access to funding and investment opportunities for innovative SMEs in the field of Aeronautics, Space and embedded systems. This event was made of 2 sessions:

- Leverage session: Key speakers presented Funding and Investment opportunities at European, National and Regional levels;
- Pitch session: Innovative SMEs will have the opportunity to present their R&D project in a 10mn time in front of Regional, National and European investors and funding bodies.

CARE – Actions for Visibility

Internationalizing CARE

After the definition of the Internationalization action plan, see [D3.4 Possible routes for European based cooperation and opportunities for international cooperation](#), and the creation of contacts with the international actors targeted, 2014 permitted to implement the actions previously defined with these actors. These actions are described and summarized in the deliverable [D6.6 Internationalisation report](#) and can be categorized in two kinds of actions: the actions aiming at promoting the know-how of European CARE clusters know-how abroad, and the actions aiming at finding complementarities in other fields of activity or in other countries, beyond CARE.

For instance, in terms of complementary sectors, CARE launched concrete actions with the community of **Aircraft Recycling, Materials Efficiency** and **Multimodality**. Considered as key topics where internationalisation activities bring added value, these topics have been tackling in the frame of the

geographical collaborations mentioned below. An important interest on **processes and Factories of the Future** has also be detected and explored, as proven by the creation of dedicated TIGERS, but also by the project ideas received by the CARE clusters members, some of them targeting collaborations with Canada. (see section The Emergence of RTD projects: CARE Tigers)

Taking into account this technological context, two major programmes were launched or supported with **Mexico** and **Canada**, via the exchange of research agendas, networking, and the support to the emergence of trans-atlantic R&D projects or mentoring sessions. The following two charts summarize the first actions handled in the frame of EU-Canada and EU-Mexico collaborations:

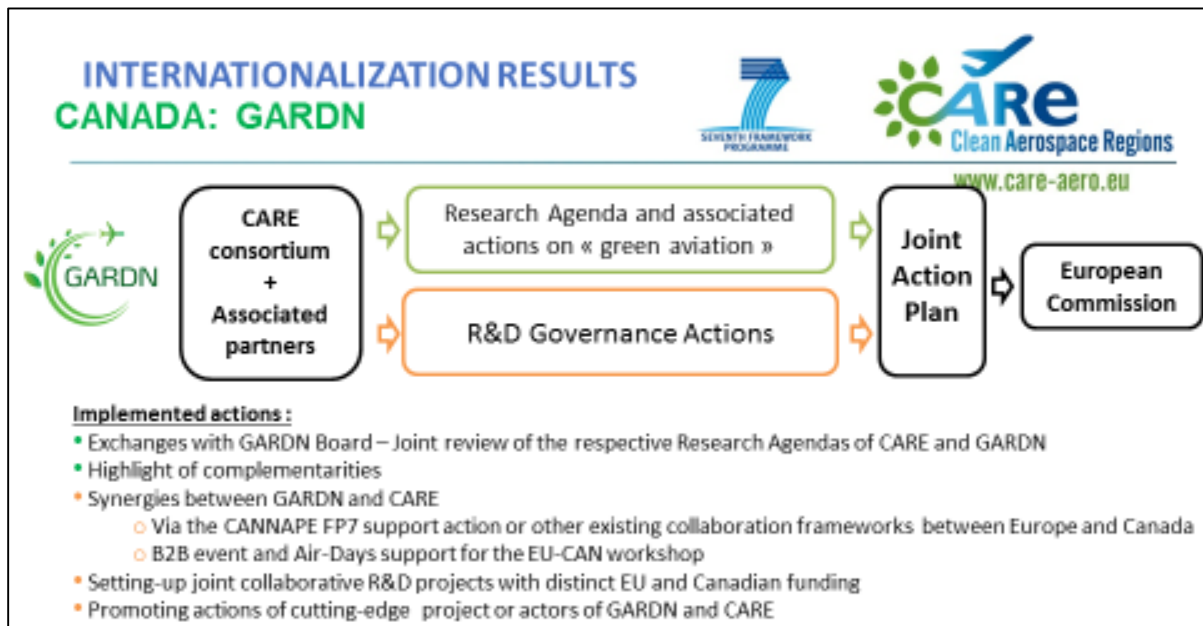


Figure 17: CARE - GARDN collaborations

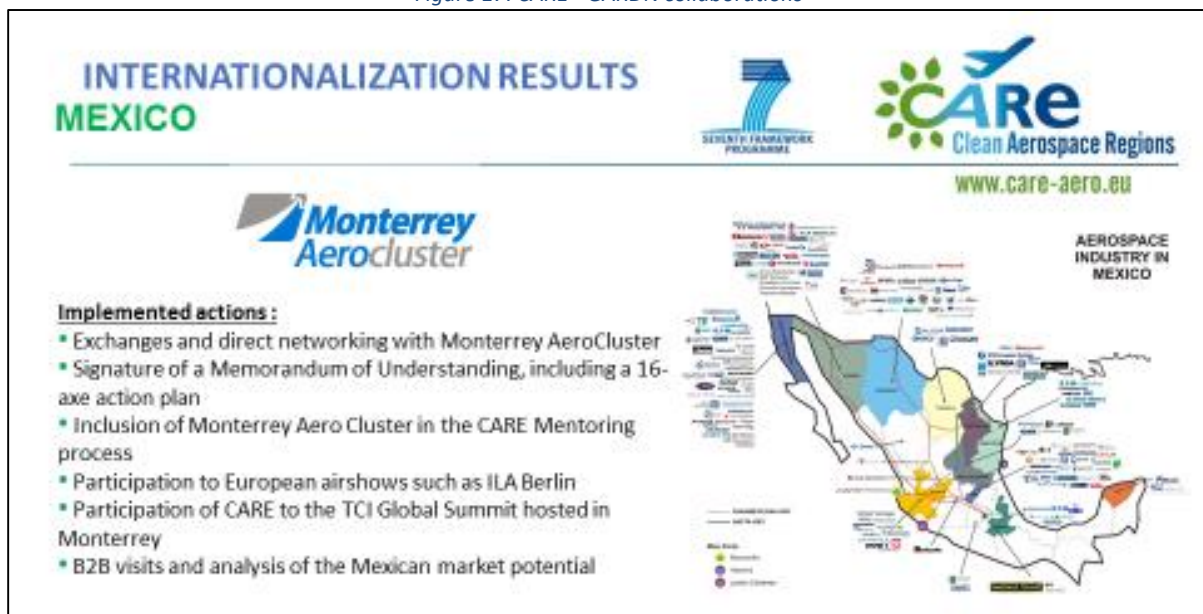


Figure 18: CARE - Monterrey Aerocluster collaborations

This task was also an opportunity for the various CARE clusters to share their contacts and view in terms of internationalization, and paves the way for future collective actions such as European delegation visits or bilateral collaborations beyond CARE.

The CARE Mentoring action

After the mentoring activities of year 2013, which mainly included a SWOT analysis and a study of mentored clusters, by the mentored clusters themselves (PEMAS and ESAC) with the assistance of Aviation Valley, the year 2014 consisted in the implementation of the mentoring action plan and the definition of a handbook.

Indeed, although PEMAS and ESAC are part of the mentored clusters but were involved as core partners in the CARE activities, the mentoring action had the ambition of supporting out of CARE group clusters in Europe but also abroad:

- Berlin-Brandenburg Aerospace Alliance
- AERA - Aragonian Aerospace Cluster
- Monterrey Aerocluster
- „Podkarpacie Country”

As detailed in D67 Report on Cluster Mentoring, the mentored clusters received support from the project partners and experts in optimising their activities, processes and performance in order to be better positioned on the market. Furthermore a great deal of best practice cases with a proven success in crucial categories of cluster development were presented during the CARE mentoring activities, either during a series of Best Practices Study Visits or during the mentoring workshops, or during individual bilateral consultations with representatives on the mentored clusters. Great mentoring effort was focused on the effectiveness of the cluster as well as on cluster management excellence, because they are vital for the clusters contribution to more prosperity for their regions, better competitiveness for enterprises and more return on investment for investors. Another mentoring priority was related to cluster effectiveness and its crucial role for obtaining EU funds for research and innovation.

Finally, a handbook on cluster mentoring has been published in order to summarize the best practices learnt during this process with the objective of helping clusters in or out of CARE to improve their own performances by conducting structural, organizational or managerial changes –see D61 Handbook for mentoring-.

IMPACT AND DISSEMINATION

Promotion and dissemination of CARE activities and projects concepts

Various international dissemination and networking activities have been handled during the CARE lifetime period, with an important focus in Europe, but also actions in Mexico for example. We have concretized several contacts to key stakeholder and international institutions as for example with Clean Sky, SESAR and AirTN Era Net, which permitted the building of collaborations during and after the CARE project. Especially we have agreed upon a Memorandum of Understanding with the Canadian aerospace network GARDN, aiming at strengthening mutual exchange and cooperation. Also we have signed a MoU with the Mexican Cluster, Monterrey Aerocluster. This MoU includes 16 concrete points of mutual interest in partnership. The implementation process has already started and shows first results. Thus is Monterrey Aerocluster one of the four Clusters that take part in the CARE mentoring program for developing aerospace Clusters.

Further to the networking and the promotion of CARE meta-cluster during the two first years of the project, the last year of the CARE project was devoted to the federation of a community around technical workshops and TIGERs dedicated events. Participation of actors mapped in the CARE database was encouraged as well as the participation of experts, large groups and other potential partners. The format of these conferences and think-tanks events were adapted to the audience: while regional topics and brainstorming sessions were the object of specific conferences and pitch sessions, the difficulty to make small-size actors participate in many events was overcome through associating events. This is how the 5 main CARE networking events took place during major aeronautics events: (ILA Berlin in May 2014, Aerospace Valley Technical Forum of Arcachon in June 2014, 2014 AIRDays of Lisboa in October 2014, Green Mobility Conference of Hamburg in November 2014 and the AEROMART 2014 Toulouse event in December 2014.

The ILA Berlin meeting was the first TIGER groups review meeting. The TIGER presidents were invited to share their recent experience, to present the constraints they would have to overcome and to harmonize the different positioning of the TIGER groups. It was highlighted that the TIGERs project' ideas could be eligible for different and complementary funding schemes (H2020, Clean Sky, multi-regional co-funding opportunities). A coordinated mobilization of regional funds was presented as the preliminary stage toward integrated funding mechanisms such as the CARE ERA-NET.

Owing to the geographic proximity between HEGAN and Aerospace Valley, it was decided to organize the first CARE B2B event in June 2014 within the framework of the Aerospace Valley Technical Forum gathering every year hundreds of SMEs, large manufacturing groups, laboratories, engineering schools and funding organizations. This event was an excellent opportunity to attract a large audience (about 40 companies registered the event) and to advertise on the CARE project. Alongside the Technical Forum, a B2B was organized and 25 bilateral meetings were counted during this event.

The second CARE networking event took place in Lisbon in October 2014 within the framework of the Lisbon AIRDays 2014 in order to benefit from bilateral contacts with representatives from the NCP and EEN nodes as well as with the main European stakeholders of H2020 (JTI SESAR, JTI Clean Sky and DG RTD Transport). This 3 day event organized by PEMAS was focused on networking and brokerage among aeronautic industry, SMEs and research organizations from all over Europe but also from countries like Canada,

interested in cooperation opportunities for R&D aeronautics projects. The full event attracted 250+ participants from over 20 countries with more than 120 non Portuguese participants. The involvement of the Portuguese government and national authorities was of extreme relevance to the dissemination and the awareness of the matters dealt with in CARE project as well as the presence of some of the main European Networks as Enterprise Europe Network Aerospace Group (EEN ASSG), ETNA+ transport NCP network, COSMOS+ Space NCP network and CARE (Clean Aerospace Regions) Project. Turning the event into a unique opportunity for brokerage and international networking among industry and research centres from all over Europe. AIR DAYS 2014 took advantage of this unique gathering of more than 40 NCP, EEN members, EACP members and CARE members exploring synergies between national contact points and the aeronautic community coming from more than 20 countries. In parallel, the main European stakeholders of H2020 (JTI SESAR, JTI CLEAN SKY and DG RTD TRANSPORT) presented the main funding opportunities for 2015, allowing for the excellent opportunity for participants to have bilateral contacts with the European Commission and JTI personnel and update information.

The B2B attracted about 100 participants and an online B2B matching tool was build up to ensure a visual identity for the event, making it even more attractive. 149 bilateral meetings were counted during this event, and permitted the support to further Europe-Canada collaborations.”

The third CARE networking event took place in November 2014 and was organized by Hamburg Aviation within the framework of the first Green Mobility Conference. The aim of the event was to explore how to match sustainable technologies with new business models while presenting current aeronautics advanced research projects from seven European nations. Moreover, the conference was organized in cooperation with the Logistics Initiative Hamburg as a cross-sector event exploiting synergies between aviation and logistics with special focus on green innovation. Alongside the addresses there were also matchmaking sessions, providing participants with the opportunity to establish contacts and to explore areas of future cooperation. 65 bilateral meetings were counted during this event.

Thanks to three well-organized networking events in Portugal, Germany and France, the CARE networking activities enabling to cover and to gather a large audience from the all European continent. Overall, around 250 bilateral meetings were counted during the CARE events.

Last but not least, the AEROMART event which took place in Toulouse in December 2014 was the opportunity to present the outcomes of the CARE project. The CARE project’ stand was located within the « Green Village » gathering stakeholders involved in the Greening of Aviation. Great attention has been paid to the dissemination of the CARE outcomes in order to ensure implementation of the project ideas presented during the CARE Venture Academy: all the communication and dissemination tools produced during the project (the CARE Flyers, the CARE movie, the CARE roll-up, the European Energy Innovation revue with the 2 page article on CARE) have been presented to continue attracting new audience and to involve new stakeholders in the TIGER groups.



Figure 19: Pictures from the CARE Venture Academy

The CARE impact and benefits

1. Contribution to Green Aviation science and increase of capacities

The CARE project addressed the issues of both the environmental impact of the global air transport system and the competitiveness of the European aeronautics industry. For this, CARE worked at two levels by fostering the emergence of technical solutions with companies and laboratories on one hand, and by supporting these actors by facilitating their access to funding and partnerships on the other hand. CARE has allowed the clusters to know in details their regional technical strengths and weaknesses, but also to learn more about the capabilities of other European regions. This is how the CARE project permitted the fostering of 15 innovative contributions in answer to these technological challenges. Materials, ATM systems, or coatings and stripping are example of topics where project concepts emerged. CARE has also been of great interest for clusters to improve their expertise and capacities in the accompaniment of cluster members toward the emergence of European collaborations.

2. The expertise of CARE partnership widely recognized

Thanks to the CARE activities and achievements, the clusters that formed the consortium now benefit from an increased visibility and recognition from the aviation communities in Europe and abroad. For example Aerospace Valley and other CARE partners are now approached by the JTI Clean Sky2 to act as regional dissemination relays via the organization of infodays or dedicated workshops. Memorandum of Understandings have also been signed, or are under preparation, between some of the CARE regions and the Clean Sky2 JU; while CARE achievements -in terms of regional RTD landscape analysis- might be an appropriate asset to these discussions. Furthermore, the CARE clusters have been recognized for their

expertise to act as catalyzers for ideas and businesses led by aeronautics SMEs and laboratories. As seen with the important attendance of the final “CARE Venture Academy”, or the number of B2B meetings organized in the frame of the project, we can state that the CARE consortium is today better identified in this position. In this context, Airbus recently entrusted Aerospace Valley in the management of a European-wide open innovation call for ideas on the environmental performance of civil aviation.

3. Coordination and liaison with structural and other funds

One of the ambitions of the CARE project has been to liaise CARE activities with other funding sources. In this context, CARE investigated the feasibility of building a new funding mechanism dedicated to the interregional collaborations on green aviation thanks to the preparation of an ERA-Net project. Yet, despite the interest of several regions, this initiative finally did not succeed in bringing together sufficient regions in this proposition. Nevertheless, the CARE clusters still worked in the positioning of green aviation topics in the smart specialization of the consortium regions. For instance, embedded systems or new aeronautics materials were therefore selected by the Midi-Pyrénées region in their Smart Specialisation Strategy; while green aviation was selected by the Podkarpackie region of Poland, around the Aviation Valley cluster or Wallonia in Belgium. Finally, CARE also worked in putting in relation the technical projects emerged in the frame of CARE with regional funding authorities, but also with private funding actors identified during the CARE Venture Academy in December 2014.

4. Airbus – Aerospace Valley : A joint European call for ideas for the environmental performance of civil aviation

During Aeromart 2014, which hosted the final conference of CARE project, Aerospace Valley and Airbus Group announced the launching of a major European call for ideas focusing on the environmental performance of civil aviation. In line with the effort given by CARE to emerge various European RTD collaborations, this call for ideas is a way for SMEs and labs to propose their innovative ideas to Airbus, and to be supported and catalyzed from a technical and business perspective. The following extract from the launching press release, describes in details the trust given by Airbus to this opportunity, and the context and ambition of this call for ideas that will last until 2015.

<< Airbus, which invests more than €2 billion a year in Research & Development, has been committed for many years to a far-reaching policy to improve its environmental performance through innovation. This is a comprehensive approach that not only covers an airliner’s complete life cycle – from its design through to the end of its life and recycling, and of course taking in its commercial operations – but also examines the solutions relative to air traffic management, and the use of sustainable fuels.

Airbus is therefore totally dedicated to implementing Flightpath 2050, a European roadmap aiming to achieve significant cuts in various types of emissions: 75% reduction in CO2 emissions per passenger/km, 90% reduction in NOx emissions, 65% reduction in the impact of aviation-related noise.

Furthermore, Airbus is committed to a collaboration effort with innovative SMEs and start-ups in order to capture the innovations developed in other industrial sectors. The logic underlying innovation is no longer based exclusively on in-house or external aeronautical research laboratories, but also on the potential contributions of players from every sector of activity, who can bring technologies that are useful for innovation not just in the area of products, but also of services.

In this context, the call for ideas launched by Aerospace Valley and Airbus aims to encourage the emergence of innovative projects and demonstrators addressing one of the following subjects: reduction of the impact of noise, fuel savings, cabin performance and efficiency, emission reductions or alternative sources of energy in the area of civil aviation.

“In 2014 Airbus launched its ‘Start-up Program’ which facilitates and supports the implementation of win-win partnerships with start-ups as the sources of innovative technologies and services, particularly those developed in other industrial sectors. In parallel, environmental performance has been at the heart of Airbus’ preoccupations for many years, and our researchers work on a daily basis to develop new solutions moving in that direction. We have therefore seized the opportunity of this call for ideas to give these initiatives a European dimension,” declared Yann Barboux, Airbus Chief Innovation Officer.

“Over the last two years Aerospace Valley has regularly been organising calls for ideas that have been arousing a great deal of interest with a broad range of the cluster’s members. This initiative meets a twofold objective. For major prime contractors it is a question of listening to new concepts and innovative ideas. As for the candidates, they will benefit from this opportunity to have the relevance of their innovative ideas assessed. I am convinced this new campaign that we are embarking on today with Airbus will be the source of promising cooperation projects for our SMEs,” added Agnès Paillard, President of Aerospace Valley.

This call will be aired at the European level, as the companies and laboratories in the regions covered by the CARE – Clean Aerospace REgions – collaborative project will be able to take part in this initiative. >>

Regional impact, testimonies from clusters representatives

Aerospace Valley

“CARE had an important impact on the inclusion of Aerospace Valley members in European collaborative RTD. In a context where French SMEs were usually more attracted by regional and national funding incentives, the CARE project permitted to evangelize the benefits to be pulled out of European collaborations. Further to a simple better level of information, the local CARE team permitted to actively support consortia building and European networking; which was highly appreciated by the cluster members. In terms of regional strategy, the impact is also major as CARE permitted to support the position of green aviation in Midi-Pyrénées and Aquitaine regions in a period of Regional Smart Specialization Strategy.

The visibility of Aerospace Valley cluster and members also gained benefit from this project as Toulouse and Bordeaux regularly welcomed CleanSky and CleanSky2 infodays, while Airbus chose Aerospace Valley and the CARE network as coordinator of its European call for ideas on environmental performance of civil aviation. In 2015, the region Midi-Pyrénées and CleanSky2 JU signed a Memorandum of Understanding to work on the coordination of CleanSky 2 funding mechanism with regional structural funds.”

Thilo Schoenfeld – Deputy Director International Affairs Aerospace Valley

Aviation Valley

“The CARE Impact on Podkarpackie Region is important as Aerospace has been officially defined as a smart specialization of the region. Our regional authorities have been contacted and requested by Clean Sky 2 Joint Undertaking in Brussels to discuss perspective cooperation between the Clean Sky 2 Programme and regional R&D projects as well as investments that the Regions wish to support in the aerospace field. We are now in the process of identifying potential synergies and have already started discussion with relevant stakeholders who might play a key role in including the Podkarpackie Region into Clean Sky future calls with the combination of ESIF funding.

CARE project has significantly increased awareness among aerospace SMEs of Horizon 2020 and other EU programmes

Since the beginning of CARE project several foreign aerospace companies have invested in the Podkarpackie Region and the number of Aviation Valley members has increased from 95 to 125. Most of the new members are SMEs.”

Andrzej Rybka – Managing Director Aviation Valley

Bavaria

1. More international visibility of capabilities in our region
2. Good evaluation of existing capabilities in different axes
 - a. Corporate R&D
 - b. Universities and Research Centers
 - c. Development / -engineering companies
 - d. Aerospace relevant production expertise
 - e. Services to our market
3. Great international contacts through the CARE Projects
 - a. Within CARE Partners
 - b. With Partner members during CARE meetings
 - c. Visiting key players during CARE meetings in different countries
4. Building personal contacts / friends in European Aerospace environment
 - a. Building trust as base for future European projects
 - b. Lasting over end of Project
 - c. Base for working on future projects
5. Enhanced level of competence after this project by learning from best practice

Erwin V. Lauschner, Director Aviation bavAIRia

CIEPiemonte

ESAC – Eskisehir Aviation Cluster

“The aerospace industry needs to solve the problem of how to provide cleaner, quieter aircraft. It is something they will have to build into their technology, and the composites industry has the ability to contribute to those solutions. The aviation sector would achieve carbon-neutral growth from 2020, but strengthened European Union support for research and development (R&D) is vital to help

manufacturers deliver the green technologies required. In this concept, the CARE project worked on topics concerning the greener aircraft to reinforce the R&D networking already instigated at regional level through research-driven clusters and increased the competitiveness of the region in the field of Green Aircraft. In this sense, the unique impact of the CARE for ESAC can be summarized as following:

- Participating in the CARE database including almost 300 triple helix actors with the manufacturers and universities located in Eskisehir region
- Involving the JAP and Business Plan created by CARE which are the road maps for European aviation clusters
- Attending the first CARE Venture Academy with 2 projects which were developed by ESAC members during the project implementation with the supporting elements of the CARE
- Taking part the mentoring activities as a less-mature cluster with associated evaluation feedback
- Having assistance by active consultations and knowledge sharing to implement the mentoring plans and test the suggested measures in the practice
- Contributing the recognition and awareness of ESAC and its capabilities in European level
- Gaining entrance to a unique business network on specific thematic topics of the greening of the aviation and internationalization activities”

İsmail Öztürk – Deputy Secretary General ESAC

HEGAN - Asociación Cluster de Aeronáutica y Espacio del País Vasco

“CARE project had an important component of cooperation through Europe and outside, for HEGAN as a cluster, we think CARE partners have created an excellent team of trust. CARE has given us the knowledge of the industry, policy and way of doing of the rest of regions participants. For HEGAN members, is being an excellent way to initiate and keep contact with several entities around Europe and others (as Mexico or Canada), they are initiating some consortiums for projects in cooperation and some relationships for future cooperation. For the Basque Government has been a way for knowing other policies in European regions in terms of R&D and innovation promotion.”

Ana Villate - European Affairs HEGAN

Hamburg Aviation

“The CARE project first and foremost had great impacts on the internationalization of Hamburg Aviation and its members. It contributed significantly to put the internationalization strategy of HAV into practice and to develop very concrete cooperation with European Cluster partner. As a result of this, HAV also intensified the relation to European and international instructions, associations, R&D facilities and private companies. The experiences gained during the tree years of CARE helped to redefine and improve the internationalization activities not only of HAV but also of the member companies. In addition, Cluster members have been encouraged to get engaged in additional European projects. Especially SME and

laboratories have been encouraged to invest in green and sustainable innovations and to improve their products through cooperation at European level. In addition, the cooperation in the context of the EACP has been reinforced and the Cluster members are much more familiar with EU cooperation programs than before. Beyond CARE private research activities and have been initiated in the area of green and sustainable technologies.”

Carola Muschke – International Affairs Hamburg Aviation

Skywin

“First I think that the fact to be registered on the Care data base give the feeling to our company/Labs to be part of a great community dedicated to Care philosophy, they get the opportunity to find new partners, new ideas and new business. Through our contacts with the others partners, some SME from Wallonia have been put in relationship with companies/labs in the others Care regions.

The R&D projects with green objectives have been supported more and more and subsidized with higher rate. The smart and additive manufacturing process and all the composites development have been developed in many R&D projects supported by SKYWIN in Wallonia.

Our member, Liege Airport, has also obtained Certification ISO 14001 and an Airport Carbon Accreditation.”

Alain Moreau – SKYWIN Expert

CARE MATERIALS AND CONTACT DETAILS

CARE Project website:

www.care-aero.eu

CARE Tech Platform:

https://www.linkedin.com/groups?home=&gid=7435850&trk=anet_ug_hm

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