

Interreg
Sudoe



EUROPEAN UNION

ADDISPACE

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INTRODUCTION

The Work Package 5 (WP5) of the ADDISPACE project with Title: *Towards a SUDOE platform of additive manufacturing technologies transfer in the aerospace sector* has the aim to create a stable platform that sustains the diffusion and transfer of technology to SMEs in order to advance and converge between countries that are in different level of maturity of AM and to create and consolidate an AM sector in general and particularly aerospace sector in the SUDOE, and a Policy and Strategic brief to be shared. In the Activity 5.2: *Policy & Strategic Brief*, recommendations that contribute to the global positioning of the SUDOE by a progressive specialization on these fields have been made.

OBJECTIVE

The main objective of this document is to compile **recommendations about:**

1. Learnt lessons to create favorable environments for the technology transfer between centres and industry.
2. Recommendations to advance on the new quality standards of metallic components made by AM.
3. Recommendations on the prioritization of the research agendas and capacities on AM technology transference in the aerospace sector as proposal for the Research and Innovation Strategies for Smart Specialisation (RIS3) in the SUDOE.

Learnt lessons

Aligned with the main objectives of the ADDISPACE project, the creation of favorable environments for technology transfer and especially of Metal Additive Manufacturing between SMEs and centres, are of high importance for the develop of the technology in the SUDOE and concretely in the aerospace sector.

During the length of the project several types of events have been celebrated as stated in the proposal, as conferences and workshops. According to these experiences, conclusions have taken into account from the feedback of the partners and associated partners.

The main recommendations have been collected attending to the main points that have to be taken into account for a transference zone creation between SMEs and centres.

1. Importance of communication spaces between centers and companies
2. How to interest SMEs about the work performed in R&D centres
3. Concern about the transference of technology
4. Creation of favorable environments for technology transfer
5. Importance of not staying behind
6. Events for transference
7. Identification of SMEs interest
8. Attention caption before the event
9. Benefits for SMEs from collaboration with centers
10. Advertisement and promotion
11. Promotion from public institutions
12. Attention caption during the event
13. Financial model for the celebration of events
14. Help for attendants
15. Aware of public institutions
16. Support from public institutions

Importance of communication spaces between centers and companies

Sometimes the companies do not know about the activity of the centers so it is very important to create communication spaces between centers and companies. Communication is important because the companies and the centers have different scopes, goals and work patterns. Sometimes is difficult to reach a mutually beneficial

agreement for both sides. A way to get this purpose is presenting previous development results of the companies:

- Indirect positive impacts obtained after collaboration/communication.
- Achievements of the companies from other countries where collaboration between SMEs and research centers are common.

Due to a proper communication technology transfer could be done in an easy way and SMEs can stay competitive in a global market.

It is important to use channels that link the society, for instance, news and social media, to show the activities done in research centers in order to understand how they work and how they can take advantage to improve the competitiveness.

How to interest SMEs about the work performed in R&D centres

SMEs have to understand the benefits of collaboration with Research centers in knowledge transference. For this purpose, clusters and public institutions should promote the collaboration and financial programs between SMEs and centers.

There are different ways to attract the attention of SMEs like showing products in stands at conferences with presentations of centres (produced parts, presentation flyers, videos of technologies in production, etc.). Additionally, it is important to invite the SMEs to the centres and show them in-situ the technology progresses, results of different projects and the capabilities of each R&D centre. Providing help to the company identifying new business possibilities or product or production improvements using that new technology performed by R&D center is an interesting way to achieve interest from SMEs.

From the side of research centers it is important to ensure that the work performed meets the real industry challenges and hence involve the SMES from the beginning.

Concern about the transference of technology

In a global market it is important to be competitive and being updated in the latest technologies and its advantages is mandatory.

Technology centers are involved in the development of disruptive technologies as MAM. SMEs can access to the expertise, knowledge and know-how of technological centers without having to start from the “scratch”.

In order to attract their attention and help them on understanding the importance of being updated, real cases and tangible evidence of the potential gains from these technologies have to be shown.

Creation of favorable environments for technology transfer

In order to conduct the technology transfer, it might be considered the following actions:

- Training sessions for SMEs: personal training or group classes.
- Events like workshops
- Specific projects with close collaboration from SMEs, i.e., project performance in the research centres' facilities (close working relationship between SME and research centre staffs).

In these environments, the main objective is that SMEs feel involved in an exchange and communication with centres.

“Industry days”, workshops, experts round tables, networking, B2B, etc. are some of the events we consider a favorable environment to promote collaborations between SMEs and research centres. A combination of these activities avoids people just listening and can create a free exchange zone where SME can express itself as a trust relationship.

First of all, the transference and level should be adapted to different knowledge levels of the interested companies. Information and background regarding the technology should be accessible in the transfer zone.

B2B format, celebrated at the end of the event, also creates a favourable space for relaxed and direct conversations which can drive to possible collaborations between SMEs and centres.

Importance of not staying behind

The constant technological evolution forces new technologies integration and business adaptation in tight time. To be leaders, recognized or competitive, companies must be the first interested in the advanced technologies and have to be immersed in a network of knowledge of the field. Staying behind while the technology develops will turn in a slow and disorganised knowledge acquisition and hence not being competitive.

In these terms, showing the real potential achievable by keeping up to date on technologies is very important and can be supported by demonstrations of real examples and results.

Events for transference

For transferring the AM technologies advantages and skills, and to connect to the interested SME companies, **workshops and conferences** demonstrated to be the best way. Selected topics and agenda are of great importance in order to attract the attention of the SMEs. Hence, round tables, sharing of related project results and expert presentations can be combined in order to define a full view of technologies.

In the nearby of the conference and workshop, stands for parts exhibitions and explanations can be distributed. Breaks between sessions can be useful in order to see real parts and discuss or solve doubts with the developers.

An interesting activity can be also visiting the AM facilities of a technologic center in-situ. There SMEs have the opportunity to see a practical demonstration, different facilities, parts and experts in those topics to solve doubts and provide useful information.

B2B short meetings would be arranged at the end of the conferences in order to discuss specific topics previously shown in the workshop/conferences and think possible projects between centers and SMEs. This kind of activities can attract the interest of SMEs.

Identification of SMEs interest

To make a good transfer of the metallic additive manufacturing it is crucial to identify exactly the interest and/or necessities of the SMEs. There are several strategies to reach this goal.

One of the ways can be passing out **surveys** among the attendants during the events or through newsletters, so the SMEs can mark their main interests and also specify what their goals are or even what type of event they would like to attend. Another way can be setting up a questionnaire on the registration website so that the SMEs can express their interests in advance.

Other way, is by directly asking to the companies through clusters or associations via enquiries or phone calls about their interests and explaining them about new technologies or new results.

Capturing attention before the event

Before the transfer events, vast publicity has to be done. For that purpose, invitations to the conference can be sent to the companies highlighting the project possibilities in order to study complex problems with a wide range of skills (advanced manufacturing, programming, non-destructive testing...).

In the invitations the attention has to be focused on practical applications of new technologies and their results. According to this, some successful SME companies which are working around AM technologies can be shown, giving a more detailed description of a real case explaining the complementarity of AM technologies and milling or machining processes. Finally, information about the speakers and the field where they are relevant should be provided.

To distribute the event information, different ways can be used: via e-mailing, via sector clusters, via phone calls, via social media (LinkedIn, Instagram, twitter, FB...)

Benefits for SMEs from collaboration with centers

The R&D centers should support the development of new processes and technologies based on the industry needs. Collaboration or partnership help sharing the generation of this knowledge and hence the investment. Direct collaborations can be driven by public funds and financial models adapted to the SMEs possibilities.

Main benefits affect the competitiveness of the companies directly, as they will obtain knowledge from the last developments and also time to define their strategy.

Collaborations can be conducted by partnership in public or partially public funding.

Accompaniment of the SME with a development for a customer could be a way to obtain benefit and create trust in the innovation potential of the company.

Advertisement and promotion

Making a good advertising and promoting campaign of an event is crucial for the success of it. For that purpose, the following channels can be used in order to send the invitations:

- Mailing
- Personal phone calls
- Previous similar events
- Social media (LinkedIn, Instagram, twitter, FB...)
- Clusters
- Associations
- Platforms
- National/regional media
- Websites
- Representative organisms

Regarding to the material used for the promotion catalogues and videos could be an effective method to attract the attention.

The information and registration method of the event should be clear.

A modality of the organization of these events can be Industrial Brach Supported Events for end users attraction.

Promotion from public institutions

The involvement of the public institutions can be interesting in order to add value or promote these events.

Local public institutions can be directly contacted by reinforcing the importance of the technology transfer/sharing. A visit of a politician could attract the attention of the media and hence to the event and technologies.

The public entities to contact would be the ministries of industry and economy, regional development commissions, city halls, Technological Centres supported by State financing, regional development associations, etc.

Capturing the attention during the event

During the event, one of the most important things is to capture the attention of the SMEs. For that purpose, it is necessary to show them the real advantages of Metallic Additive Manufacturing. The goal is to make SMEs understand that the transition to the AM can be supported all the way by centres.

To get the above purpose, presentation of real cases (business cases or successful SMEs), live performing and lab-experience would be very interesting for the attendants. Use cases comparing all data about conventional and AM processes to build the same part. Using high quality audiovisual material and carrying real parts are recommended. Examples of successful SMEs working in other European AM advanced countries (Germany, UK and France) can result interesting for the attendants. Also attention has to be paid to the complementarity between AM and other manufacturing processes in order to attract the attention.

The event sequence must be properly organized, avoiding very long sessions or too theoretical themes. The content should be adapted to the different knowledge levels of the public, because in the sector there are players with no knowledge at all, some that have some knowledge and other that already are familiar with the technology.

It is also important to think and offer training on the different technologies.

Social events (coffee breaks, lunch, time for visiting the stands, B2B, etc) are important in order to create a comfortable space to interact and solve doubt or share experiences.

Financial model for the celebration of events

As it was mentioned above, the organization and celebration of these events has a cost that can be financed using regional, national and European funds with the aim of transfer knowledge from centers to companies.

- The attendance to the events can have an admission fee
- Rent stands
- Sponsors and advertisement
- Public support

Help for attendants

The objective of these events is to contact SMEs to let them know the advantages and the opportunities of the AM and create favorable spaces for technology transfer between centers and SMEs. For that aim, it is important to support SMEs to attend to these events. Some actions to ensure that the SMEs can attend the events can be the following:

- Assume the travel cost in case it is necessary. Even though the nature and the impact of the event should be enough attractive for companies in order to dedicate time and effort to attend to the events and learn.
- Organize B2B meetings to improve their network and organize round tables to justify the traveling costs and the entrance at the conference.
- Free participation if they are speakers / participants

If the events are locally organised the transport costs are avoided or reduced.

Aware of public institutions

Public institutions have to understand the benefits and necessities of creating favorable spaces for technology transfer in several events. In order to achieve the interest of public institutions data has to be provided about the number of collaborations obtained from the previous events between SMEs and technologic centres. Making questionnaires of satisfaction to the attendants, especially to SMEs, and share obtained data with the public institutions, is relevant.

Support from public institutions

The success in the organization of this kind of events needs a support from public institutions which can be offered in different ways:

- Economical funding
- Through regional and national programs
- Promotion and dissemination (nationally and internationally)
- Attract potential customers and sponsors
- Promote training programs
- Provide comfortable facilities
- To be present at the events

New quality standards

Necessities for aerospace sector to fabricate components by AM

AM is more present in the aerospace sector but still is considered in development. For this reason, there are some needs that have to be covered.

The first need to be covered is the certification and the standardization of the processes, the material, the suppliers and the manufacturers.

In aerospace sector standards for each step in the MAM value chain shall be covered:

- Raw material
- Machines
- Process
- Materials processed (mechanical, chemical and physical properties)
- Post – Processing (heat treatments and surface technique)
- Qualified personnel and facilities
- Quality assurance according part requirement according to part criticality

That standardization should be accomplished by official committees, as well as the EOMs, which must be aligned with the technology development.

OEMs are a crucial part in the development of new quality standards as well as the consolidation of processes and agreements to facilitate the inclusion of the MAM technologies within the sector. From an OEM's point of view, NDT are key technologies for AM safety and reliability improvement. In this connection, NDT-related Technology Gaps have been identified which establish some necessities:

- In-situ monitoring to improve feedback control and obtain certified final parts
- Develop and refine NDT of as-built and post-processed AM parts
- Consensus standards for NDT of AM parts
- Use NDT to develop better physics-based process models
- Use NDT to create database with process-structure-property correlation
- Fabricate AM physical reference samples to create defectology portfolios by using
- Use NDT to identify effect-of-defect, and establish acceptance criteria for specific defects
- Develop NDT-based qualification and certification protocols for flight hardware

Other areas for improvement may be the following:

- Mass optimisation
- Reduce the Buy to Fly ratio
- Lower the price of parts production
- Gain on Delivery Time / Time to Market
- Have gain on tools
- Reduce the value chain
- Allow faster component certification
- Part qualification / assure metallurgical health
- Make the process viable / reliable and repeatable

Aerospace sector requires: high quality of parts, technologies that can work with specific materials, high complex geometries and in general advanced manufacturing: use of advanced materials and reparation of damaged parts among others. Technologies that are in the group of DED (Directed Energy Deposition) and PBF (Powder Bed Fusion) meet these requirements.

It has to be taken into account that Additive Manufacturing is part of bigger manufacturing process which is formed by different steps such as: design, material reception, manufacturing, post-processing, inspection, etc. Also, Metal Additive Manufacturing gathers different technologies, so it is not a unique process. Up to now, the leading technology is SLM (Selective Laser Melting).

Along the list of challenges that MAM have to come up are:

- Many parameters and variables (machines, configurations, calibrations, operation conditions...)
- Quality management, traceability, inspection and verification.
- Certification and qualification require experimentation and evaluation in specific conditions.
- Acceptance by the industry and market.
- Between manufacturer and customer (roles and responsibilities)
- Regulatory requirements
- Need of higher automatization
- Intellectual property
- Taxes

Currently few standards are available. Standardisation is needed for:

- Requirements specification
- Guide for a proper communication (nomenclature)

- Documentation of best practises
- Definition of tests and protocols
- Documentation of technical data
- Acceleration of new technologies

The structure for standards on Additive Manufacturing is as follows:

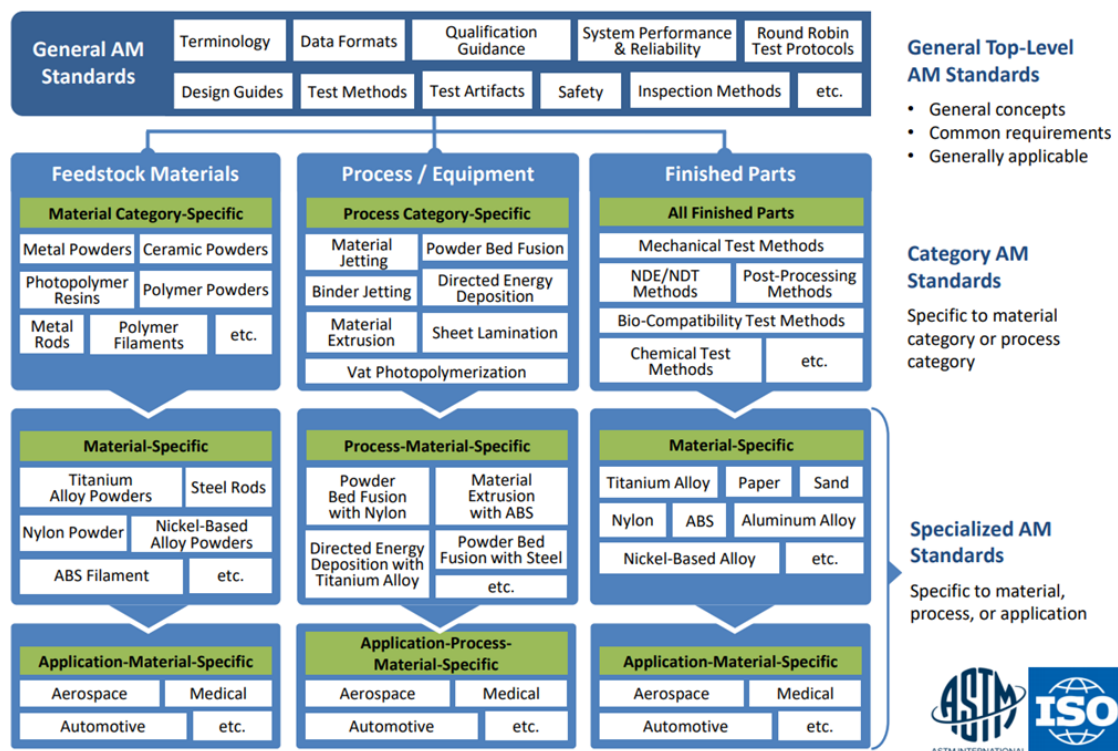


Figure 1 https://www.astm.org/COMMIT/F42_AMStandardsStructureAndPrimer.pdf

The current status of standards is as shown in Figure 2:

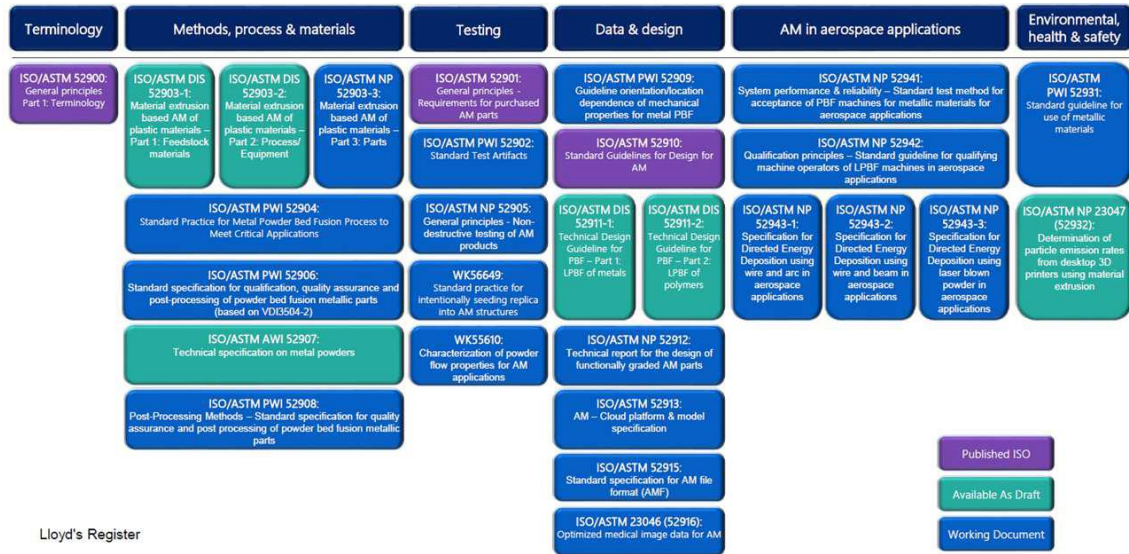


Figure 2 Andrew Imrie, “How Standards, certification and assurance are needed to bring AM parts to market”, 23th October 2018, AMEF 2018-Final conference

According to this, in aerospace sector there is no standardization published yet. New quality standards for the manufacturing of metallic parts by AM have to be accelerated in order to advance in the standardization and certification of the processes that are involved.

In order to accelerate it:

- Agencies must consult with voluntary consensus standards bodies, and must participate with such bodies in the development of voluntary consensus standards when consultation and participation is in the public interest
- If development of a standard is impractical or infeasible, the agency must develop an explanation of the reasons for impracticality and the steps necessary to overcome the impracticality
- Any standards developed must be necessarily non-duplicative and noncompetitive

RIS3 prioritization

FRANCE

Axis and priorities RIS3 from France linked with Addispace:

Nouvelle Aquitaine:

- Chemistry and industrialisation of materials;
- Laser systems, photonics and imaging;
- Embedded software expertise and connected objects;

Occitanie:

- Energy transition, including the development of renewable energies and the modernisation of industries
- Smart systems and digital block-chains;
- Materials and processes for advanced manufacturing;

In term of specialization:

- **Certification:** we need to edit standard documents for the certification of all processes (LBM, WAAM, LMD-P, etc.) and possible types of parts. Indeed, the major contractors are interested, the certified parts are very watched by the national authorities. There is a great effort to be made on the qualification of processes and parts, and thus to prove the repeatability of the process. If a process is certified, parts certification is much simpler (ETI and large groups).
- **Control of material health:** For the subcontractors, it will be necessary to concentrate on the control of the material health, and to control the quality of the parts (test specimens, controls, etc.). The question that must be asked is how to master the processes and how to ensure the quality of the parts?
- A major point that has been raised is the lack of **linkage between technology platforms and SMEs**. Indeed, it is usually the large groups that collaborate with the platforms and the SMEs do not dare to cross the line. These bridges need to be improved.
- Another point that has been addressed is the **parallel** that we can make **between additive manufacturing and foundry**. Indeed, at the beginning of the foundry, the ways of thinking, the design of the pieces, etc. as was additive manufacturing. We must take the same way

Recommendations in the areas of research:

- Mechanical characteristics of the parts according to the processes
- Control of material health
- Drastic reduction of cost and cycle time of finishing operations.

SPAIN ALIGNED WITH ADDISPACE OBJECTIVES

ANDALUSIA

As it was described on the document of diagnosis (*E1.1.1*), in the frame of RIS3 the European Commission has identified the known Key Enabling Technologies (KETs) which are in close connection with R&D activities. The MAM (Metallic Additive Manufacturing) technologies are part of the most thriving ones in Spain, and especially in Andalusia. The objectives of RIS3 connected with this kind of technologies, that can be orientation for the country and the region's industrial development in the sector, are specified. Among the six priorities defined by RIS3, which are presented in Figure 3, priority 2 has been selected as the most applicable for MAM.

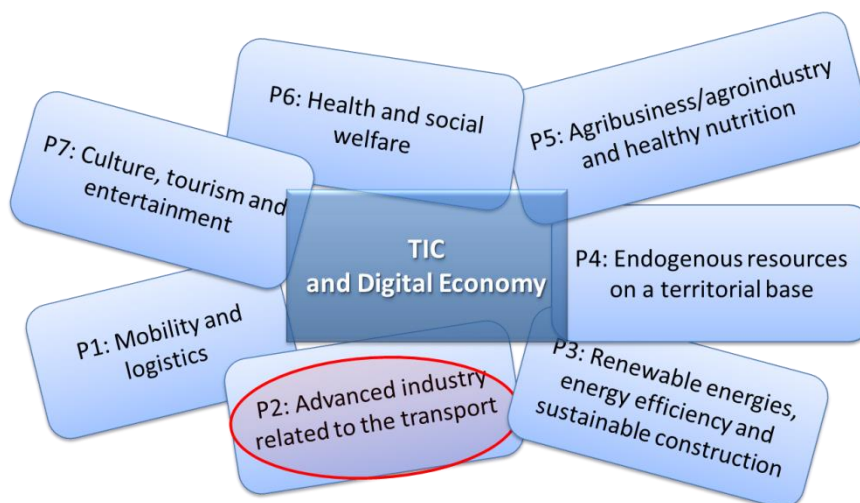


Figure 3. Specialization priorities: scheme of eight selected fields.

The priority *P2: Advanced industry related to the transport* specifies four lines of action to improve different aspects primary field of interest P2. These lines (L21-L24) are included in Figure 4.

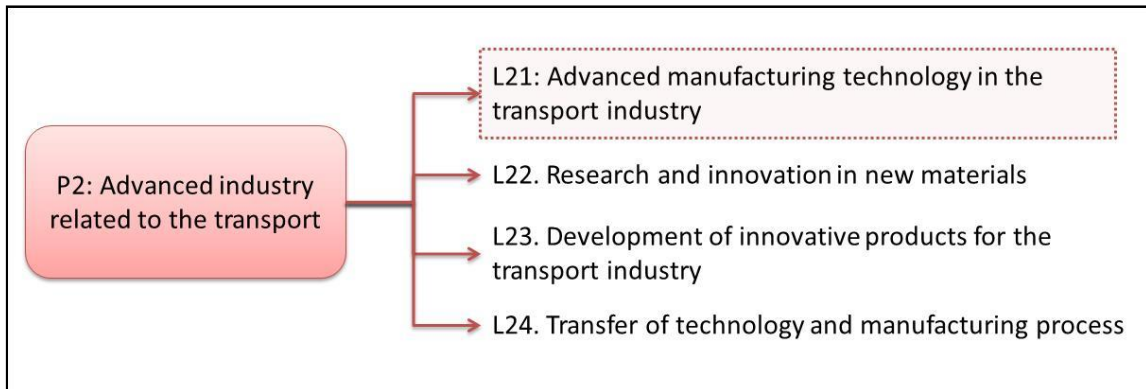


Figure 4. Action lines established for the specialization priority “Advanced industry related to the transport”.

In this graphic, although only one line has been highlighted two lines of investigation might be considered:

- L21: Advanced manufacturing technology in the transport industry
- L22: Research and innovation in new materials

The focus of the priority 2 is on industry specialized on transport, thus main subsectors in the transport may be analysed and identified which are most favourable for MAM applications so MAM technologies might contribute to development of new methodologies and to delivering process improvements. As it was presented, the following transport sectors are considered:

- Aeronautics
- Aerospace industry
- Automotive industry

These are interesting regarding specific requirements such as the weight reduction and the increase of the strength-to-weight ratio. In this regard, in the frame of ADDISPACE project multiple MAM technologies and associated methodologies have been studied. In Andalusia the emphasis has been set in aeronautics and aerospace sector.

The large companies in automotive, aeronautics and aerospace, who seek the support of R&D centers and universities, contribute to the development of these technologies and to the research of new materials. Institutions and public organs may be the additional pillar to overcome the disadvantages and difficulties on the way to more advanced technologies, procedures and applications.

Nevertheless, a third group of participants shall also be considered, these are the SMEs. Although individually they lack the economic support or the necessary means to

develop new technologies, in conjunction among them and with universities and R&D centers advanced progresses may have been achieved. In other words, the expertise of each SME, R&D center or university in their specific fields might reach higher levels of development fruit from the synergy among them.

The described synergy is one of the main objectives of the ADDISPACE project and it is presented in this document as the most favourable enforcement arm for the consolidation of advanced industry on transport field. Though this action has been implemented in the aerospace sector, it can be extrapolated to other ones as the automotive sector, the railway industry, the shipbuilding industry and even the tourism associated to transport.

Bearing this in mind, down below recommendations for a progressive specialization in the SUDOE in the field of MAM applied to transport priorities will be outlined. The actions and work lines from ADDISPACE project will be related to targets and lines of actions established in Spain and particularly in Andalusia by the RIS3, to deal with P2 priority.

RIS3 DEFINITION		ADDISPACE RECOMMENDATION
Lines of action	L21: Advanced manufacturing technology in the transport industry	Close collaboration between R&D centers and companies of the sector
	L22: Research and innovation in new materials	Companies and research centers should identify the main requirements and necessities of the transport industry and work closely: cooperative work R&D centers/universities and companies
	L23: Development of innovative products for the transport industry	Companies and research centers should identify the main requirements and necessities of the transport industry and work closely: cooperative work R&D centers/universities and companies
	Transfer of technology and manufacturing process	Conferences in universities and public institutions, workshops and open days in companies and R&D centers, meetings, round tables etc.
Target group	Agent of the Andalusian Information System related to the advanced transport industry.	Clusters and public institutions should promote the collaboration and financial programs between SMEs and centres.
	Research groups of the Andalusian Universities related to the transport.	Promote by regional and national programs the integration of new technologies to Andalusian Universities, SME's and research centres.
	Transport industrial companies.	Workshops, seminars, open days and other events to promote the synergy between companies of the same sector
	Companies from other sectors which would present potential linkages with the transport industry.	Open days, dissemination events and other events to promote the synergy between different sectors

Table 1. RIS3 challenges in Spain and Andalusia aligned with ADDISPACE objectives and action plan.

BASQUE COUNTRY

In the Research and Innovation Strategy for Intelligent Specialisation (RIS3) defined by the Basque Government, Advanced Manufacturing has been defined as one of the THREE META-PRIORITIES, together with Energy and Bioscience. It is a commitment to research focused on the incorporation of intelligence into production means and systems, the use of emerging technologies and capabilities in new products and processes, the integration of advanced materials into solutions with greater added value, or improved processes, the efficiency and sustainability of the resources used and the integration of high added value services.

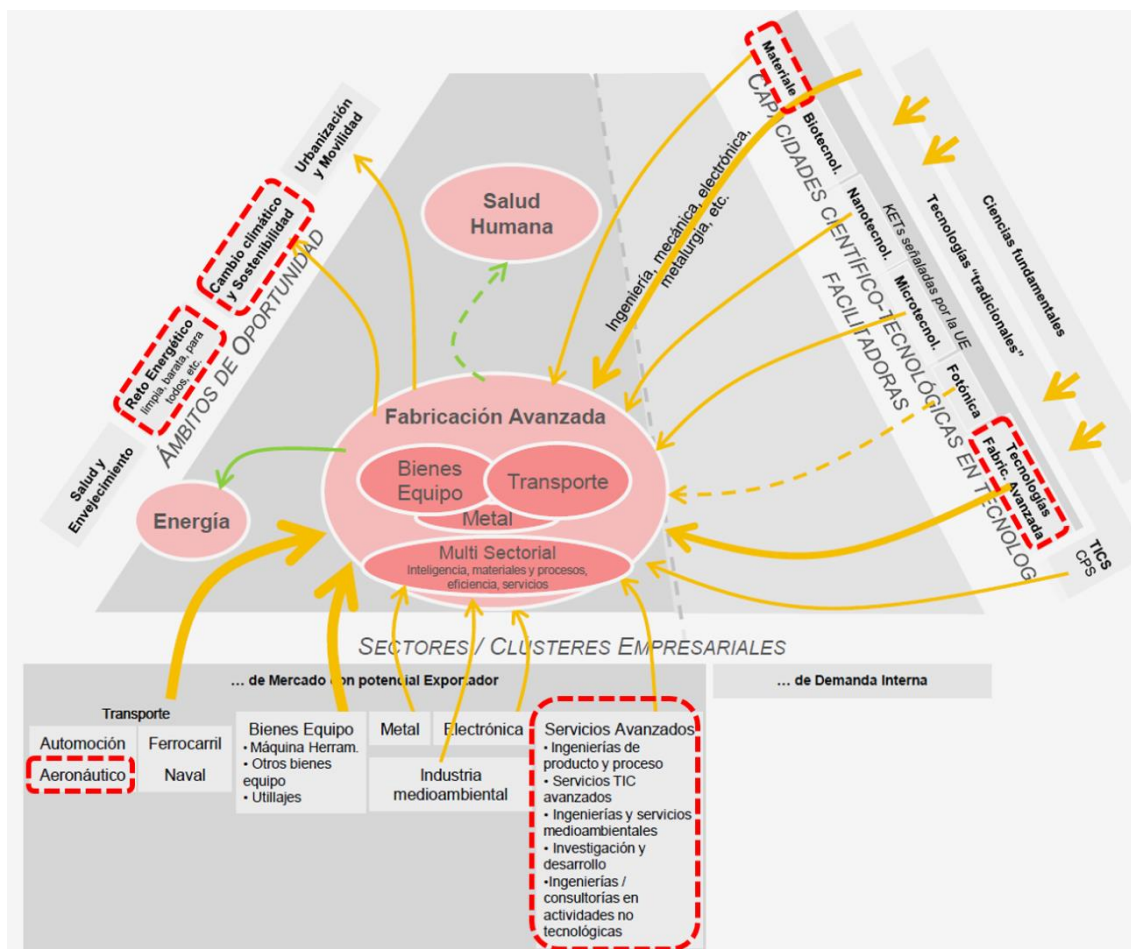
R&D on AM is oriented to industrial sectors like transport, new materials and metal, and specially oriented to the improvement of manufacturing processes.

The choice of “Advanced Manufacturing” as a Meta-priority of the Basque Country is based on its cross-cutting applicability, on the marked Basque industrial tradition, on the relative strength of a diverse business sector, as well as on the existence of important scientific-technological capabilities in facilitating technologies associated with manufacturing activities.

The priorities in Advanced Manufacturing is about the incorporation of intelligence to the production systems and media taking advantage of the capacities and emerging technologies in new products and processes, the integration of advanced materials in improved processes, efficiency and sustainability of resources and the integration of high value added services in activities related to transport industrial sectors like aeronautics among others.

The KETs or Key Enabling Technologies selected in the Basque Country and aligned with the objectives of ADDISPACE project are:

- **Advanced manufacturing technologies:** range of advanced technologies used in the manufacturing that achieve improvements in terms of new properties of products, manufacturing speed, cost, energy consumption and materials, accuracy, residues management and pollution, etc.
- **Advanced materials:** replace existent materials by less costly alternatives that add a new higher value to the products and services, reduce the dependence on resources and decrease the residues and environmental risks.



RIS3 specialisation areas related to the ADDISPACE Project with greater development potential in the Autonomous Community of the Basque Country, and ADDISPACE recommendations regarding its development and according to the experience obtained during the project is compiled in the Table 1:

Tabla 1. RIS3 challenges in Spain and Andalusia aligned with ADDISPACE objectives and action plan

	AREAS	ADDISPACE RECOMMENDATION
Lines of action	Development of advanced materials and processes for MAM aimed at the different transport subsectors, such as the aeronautical sector.	Companies and research centers should identify the main requirements and necessities of the transport industry and work closely: cooperative work R&D centers/universities and companies
	Development of MAM production means, studying scalable technologies at Machine-Tool level (LMD, WAAM technologies) and new machine concepts (process hybridisation).	Companies and research centers should identify the main requirements and necessities of the transport industry and work closely: cooperative work R&D centers/universities and companies
Target group	Transport industrial companies.	Close collaboration between R&D centers and companies of the sector
	Companies from other sectors which would present potential linkages with the transport industry.	Conferences in universities and public institutions, workshops and open days in companies and R&D centers, meetings, round tables etc.

PORTUGAL

Centre region

Adapted from: CCDRC, [no date]. RIS3 do Centro de Portugal [online]. [Accessed 25 March 2019]. Available from: <https://www.portugal2020.pt/Portal2020/Media/Default/Docs/EstrategiasEInteligente/EREI Centro.pdf>

The Central Region of Portugal intends to reinforce its living laboratory condition, focused on the needs and specific territorial bases, converging to Innovation Leader, achieving it by:

- Taking advantage of its multiple endogenous resources, infrastructure and territories and regional agents;
- Enhancing the capacity to create knowledge, based on qualified human resources, reinforcing the technological intensity in the production of goods and services oriented to global value chains and approaching the scientific system of economic, social and creative activities;
- Consolidating itself as an innovative, mobilizer, liberator of the individual and collective potential, and generating employment, economic social and territorial value;

Reinforcing productivity, territorial cohesion and affirming Responsible, Structuring and Resilient Competitiveness as a true Central Goal supported by the RIS3 dynamics. Regional agents were inquired, and this led to the identification of three differentiating areas: **sustainable industrial productivity, energy efficiency and rural innovation**. These three areas are transversal and correspond to the priorities of the Central Region which should be considered as a smart specialisation. Starting from these differentiators' domains, it was possible to reach **four priority areas** for interconnection of these domains, which will function as platforms of the RIS3 approach of the Centre of Portugal:

1. **Sustainable industrial solutions**
2. **Valorization and efficient use of endogenous resources**
3. **Technologies for quality of life**
4. **Territorial innovation**

In this context, the clusters (the regional but also the national ones, which will play an interregional articulation required in this type of dynamics) are particularly important, as the privileged drivers of this process.

Equally important is the role of other technology transfer entities, which can promote contact between promoters of different fields (such as the Technology Transfer Units of Higher Education Institutions, Technological Centers, Science and Technology Parks, Incubators and Business Accelerators).

Regional agents defined a set of guidelines – a total of 10 – from the main 4 priority areas above. Within those guidelines, the following one can be related to ADDISPACE project:

- **Innovation platform 1. Sustainable industrial solutions**
 - **Indicative action: 1.1. Sustained optimization of industrial productivity**
 - Optimization of industrial productivity through the adoption and development of advanced production technologies to support competitive manufacturing and added value, transfer of technology, adoption of the best available practices, efficient use of different types of resources and materials and decarbonisation of production processes.

The above action can be detailed, and each aspect can be related to the following ADDISPACE recommendations:

RIS3 DEFINITION		ADDISPACE RECOMMENDATION
Innovation platform Sustainable industrial solutions	Optimization of industrial productivity through the adoption and development of advanced production technologies	Companies and research centers should identify the main requirements and necessities of the transport industry and work closely: cooperative work R&D centers/universities and companies
	Support competitive manufacturing and added value	Close collaboration between R&D centers and companies of the sector
	Transfer of technology, adoption of best available practices	Conferences in universities and public institutions, workshops and open days in companies and R&D centers, meetings, round tables etc.
	Efficient use of different types of resources and materials and decarbonisation of production processes.	Close collaboration between R&D centers and companies of the sector
Target audience	Companies that produce components for the aerospace industry	Workshops, Conferences, B2B meetings that promote the transference of AM technologies advantages and skills

Table 1 - RIS3 challenges in Portugal aligned with ADDISPACE objectives and action plan

Alentejo Region

Adapted from: CCDRA, [Dezembro 2014]. RIS3 do Alentejo [online]. [Accessed 27 March 2019]. Available from: <http://www.alentejo.portugal2020.pt/index.php/documentacao/category/10-estrategia-regional-de-especializacao-inteligente>

The Alentejo's EREI resulted from an exhaustive process of listening and interacting with the agents that contribute, directly or indirectly, to the expected results for 2020, namely political agents, public administration, companies and business associations, regional SCT entities and citizens.

This process has also been developed in a framework of cross-border and transnational cooperation and supported in various forms and at different times of participation.

As a result, the differentiating domains were then identified in the Alentejo's' region:

Consolidated domains

- Food and Forest;
- Economics of Natural, Mineral and Environmental Resources;
- Heritage, Cultural and Creative Industries and Tourism Services.

Emerging domains

- Critical Technologies, Energy and Intelligent Mobility;
- Specialized Social Economy Technologies and Services

The aeronautics sector was considered in this analysis as one of the emerging sectors of the Alentejo's region, as at the date of the strategy development, new business dynamics related to the aeronautical industry were emerging. Consequently, aeronautics was included in "Critical Technologies, Energy and Intelligent Mobility" Domain", considering its' still very incipient representation.

Within those guidelines, the following one can be related to ADDISPACE project:

Critical Technologies, Energy and Intelligent Mobility

Below you can see how it can be related to the following ADDISPACE recommendations:

RIS3 DEFINITION		ADDISPACE RECOMMENDATION
Critical Technologies, Energy and Intelligent Mobility	Increase business investment in R&D by strengthening the link between companies and entities in the R&D system	Close collaboration between R&D centers and companies of the sector
	Transfer of technology, adoption of the best available practices	Conferences in universities and public institutions, workshops and open days in companies and R&D centers, meetings, round tables etc.
Target audience	Companies that produce components for the aerospace industry	Workshops, Conferences, B2B meetings that promote the transference of AM technologies advantages and skills

Table 2 - RIS3 challenges in Portugal aligned with ADDISPACE objectives and action plan

Considering that aeronautics is an emerging area in Alentejo's region, it is expected that the next EREI will create mechanisms to enhance its consolidation.



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