Strengthen Cluster management excellence along the industrial new materials value-chain

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Sustainability strategic paper

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Executive Summary

In this report, the conclusions raised during the MATERIALIX project will be analyzed in order to define and validate the viability of the Strategic Plan for the formal constitution of the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to support Advanced Products".***

With this purpose in mind, along this report we will synthetize:

- Training sessions in excellence management. It has offered the partners a high-level instrument of analysis that has been used for open discussion sessions. It has also given specific knowledge about existing Meta-Cluster experiences.

- Study visits organized to other excellence Clusters. They have offered a real opportunity to personally discover other Cluster experiences, thus having the chance to have one-on-one sessions in order to deal with the common problems faced by Clusters and Meta-Clusters.

- Final conference conclusions. It has offered the partners the chance to validate and share their learning experience with a wide range of entities, all of them involved in the Meta-Cluster ecosystem at a European Level.

- Brainstorming sessions among partners. Once the methodology is introduced in the training sessions, the open discussion forums created among the partners have the ideal environment to promote their analysis and agreements.

- Previous conclusions on deliverables. The well-organized work done during the project process has resulted in clear structured information collected and analyzed.

All these inputs have allowed the consortium to follow a deep analysis of the major barriers and difficulties and now need identification to develop a consistent and implemented plan.

The goal will not only be to clearly define the Strategic Plan but also to identify the potential risks and the financial plan to cover the viability dimension as a necessity.

1. Introduction

The purpose of this MATERIALIX Project Report is to present how the project partners envisage working on Cluster excellence after the end of the project and which local, regional or European funding programs can be used to support future activities in this area.

To develop **Task 4.4 – Sustainability strategic reflexion and study**, to the importance of considering the long-term sustainability of the collaboration between partner Clusters is a key aspect of the MATERIALIX project and the consortium's main motivation to apply for Community funding. The consortium partners have a long-standing history in working with and providing services to innovative companies in the new materials area, issues they wish to develop further.

MATERIALIX project partners have long-term relationship cooperation, considering their previous participation is common European projects (from the COSME Programme), to promote Clusters international cooperation, establishing a strategic value-chain in the domains of *Clean Technologies & Green Materials*. Those experiences expanded the confidence and the capacity for cooperation between these Clusters (from Portugal, France, Spain and Italy), to support their own industries (Molds & Plastics).

2009-2011

ACTION N° : 3/ENT/CIP/11/C/N04C011

2011-2013

In this context, the consortium has a strong interest in growing and maintaining a permanent collaboration under the form of a new transnational "***European market Cluster in clean technologies and green materials***" in order to build their knowledge and network within this crucial area. Therefore, the consortium pursues the development of a long-term business strategy that will allow the continuation of this new transnational Cluster, in the certitude that it will be sustainable only if its services can attract SMEs to join it after Community funding ends. To achieve this, the partners need to successfully build and maintain a pan-European community of SMEs; and continuously exchange knowledge to expand the repository of best practices and services.

As such, the **MATERIALIX** project (nº 696673) - Strengthen Cluster management excellence along the industrial new materials value-chain – has been founded by the European Commission (Call: COS-CLUSTER-2014-3-04-02: CLUSTER EXCELLENCE PROGRAMME), with the starting date of 01-01-2016), involving partners from four Clusters from four different countries: Coordinator - **Cluster Engineering & Tooling/POOL-NET (Portugal)**, **PLASTIPOLIS (France)**, **AVEP (Spain)** and **PROPLAST (Italy)**. The global budget is **€ 245.515,15€**.

Being a part of the EU strategy to push Clusters as geographic concentrations of interconnected companies or institutions working in a field or industry, MATERIALIX has dealt with the excellence in managing these particular structures and identifying the optimum way to define a long-term

collaboration strategy among Clusters project partners. This analysis may allow other Clusters groups to establish a more sustainable approach to their collaborative strategy.

MATERIALIX intends to strengthen Cluster management excellence in the field of industrial new materials as a way to provide more professional business services to European industrial SMEs through Clusters and, therefore, contribute to the development of world-class Clusters in the EU in this field.

For this purpose, **MATERIALIX** brings together a group of Cluster management organizations from 4 different countries covering the entire value-chain for the area of "***clean technologies and green materials***", which is a key strategic area of Europe's policy of smart and sustainable growth. Through the combination of these 4 Clusters, **MATERIALIX** covers hundreds of SMEs in the fields of New and renewable materials, Recycling/re-used materials, Renewable energy systems, High efficiency building and construction, Green transportation systems & components, Water and air treatment systems and Waste management & recycling, that will receive more professional business support services from their respective Cluster organizations.

During the project, partners received training on "*Excellence Clusters Management*" and performed international benchmarking visits and analysis, in different countries (*Austria, Germany, Ireland and Denmark*), involving Clusters of Excellence and Gold Label, to enhance the development of a **Sustainable Business Model** for the **transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products"** .

Considering the work done by the **MATERIALIX** partners**,** their experiences and learning process, performed during the development of the project, it is very important to consolidate a common vision regarding a "***Sustainable Business Model for the*** **transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products"**, as an output of this partnership (MATERIALIX project deliverable).

During the learning process of this project, it has shown that the ongoing activity of Clusters as entities that push the growth of a region is in a developing status, as it has old references and very recent examples, but the complexity of the Clusters as entities and the interaction among Clusters result in a serious difficulty when defining simple conclusions to extrapolate from case to case. For that reason, the ongoing learning process regarding Clusters and Meta-Clusters experiences and examples become a major concern.

Considering all of the above, the aim of this document is also to present a vision for the future development of Clusters Policy and international cooperation, considering that these are strategic fields of economic development to Europe and especially to Industrial SMEs.

2. Sustainable Business Model for a Transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products

2.1 – Definition of a Cluster

One can identify several definitions for CLUSTERS. Nevertheless, we can take advantage of the Cluster definition from **Prof. Michael Porter** (*Harvard Business School, USA*), namely:

"*Clusters are geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialized inputs such as components, machinery, and services, and providers of specialized infrastructure. Clusters also often extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related by skills, technologies, or common inputs. Finally, many Clusters include governmental and other institutions—such as universities, standards-setting agencies, think tanks, vocational training providers, and trade associations—that provide specialized training, education, information, research, and technical support. (...) A Cluster allows each member to benefit as if it had greater scale or as if it had joined with others without sacrificing its flexibility.*"

Considering this Cluster definition, it is important to look on the basis that **Prof. M. Porter** sustains a Cluster strategy to increase Competitiveness:

"*Today's economic map of the world is dominated by what I call Clusters:* ***critical masses****—in one place—of unusual competitive success in particular fields. Clusters are a striking feature of virtually every national, regional, state, and even metropolitan economy, especially in more economically advanced nations. Silicon Valley and Hollywood may be the world's best-known Clusters. Clusters are not unique, however; they are highly typical—and therein lies a paradox: the enduring competitive advantages in a global economy lie increasingly in local things—knowledge, relationships, motivation—that distant rivals cannot match.* ***Clusters represent a new way of thinking about location, challenging much of the conventional wisdom about how companies should be configured, how***

institutions such as universities can contribute to competitive success, and how governments can promote economic development and prosperity."

Finally, **Prof. M. Porter** states that Clusters are key elements to promote industrial growth through Innovation:

"In addition to enhancing productivity, ***Clusters play a vital role in a company's ongoing ability to innovate.*** *Some of the same characteristics that enhance current productivity have an even more dramatic effect on innovation and productivity growth. Because* ***sophisticated buyers are often part of a Cluster, companies inside Clusters usually have a better window on the market than isolated competitors do.****"*

Nevertheless, the dimension and the requirements of the acting markets are crucial for SMEs and sometimes, in order to achieve critical mass, **Clusters are pushed to integrate larger value-chains, promoting META-CLUSTERS** due to the cooperation or activities integration between Clusters (at a national or international level):

"Cluster development is often particularly vibrant at the intersection of Clusters, where insights, skills, and technologies from various fields merge, sparking innovation and new businesses. ***At the intersection of Clusters, insights and skills from various fields merge, sparking new businesses.***

But, ***Prof. M. Porter*** *highlights that:*

"In the new economics of competition, what matters most is not inputs and scale, but productivity and that is true in all industries. The term high tech, normally used to refer to fields such as information technology and biotechnology, has distorted thinking about competition, creating the misconception that only a handful of businesses compete in sophisticated ways. The term high tech has created the misconception that only a handful of businesses compete in sophisticated ways."

Considering all of the above, one has to admit **that the economy is a living system** in which competitors are always fighting to survive, and that **new realities come periodically, changing the nature of forces and competition in the global market**. ***Sometimes, this evolution creates barriers to sustainability and can even destroy the so-called "sustainable collective strategies***":

"However, ***Clusters can and do lose their competitive edge due to both external and internal forces. Technological discontinuities are perhaps the most significant of the external threats*** *because they can neutralize many advantages*

simultaneously. A shift in buyers' needs, creating a divergence between local needs and needs elsewhere, constitutes another external threat. Clusters are at least as vulnerable to internal rigidities as they are to external threats. If companies in a Cluster are too inward-looking, the whole Cluster suffers from a collective inertia, making it harder for individual companies to embrace new ideas, much less perceive the need for radical innovation. Such rigidities tend to arise when government suspends or intervenes in competition or when companies persist in old behaviours and relationships that no longer contribute to competitive advantage."

2.2 – Definition of a Meta-Cluster

The Globalization process increased world networking and, more and more, connections expanded and distance shortened. Teamwork and collaborations became a "necessity" in the international business world, because **a global customer wants the whole service, normally using a "one-stop-shop".**

In this context, Cluster phenomena starts to increase, involving the support of Governments, bringing new competitive factors to their markets.

Notwithstanding**, industry is becoming more and more capital intensive and Industry Digitizing is pushing for new business models, where cooperation without frontiers assumes a new key-work - COPETITION (Cooperation & Competition).** This aspect is more relevant in the area of specific technologies/market niches, because it helps to develop the market faster and because it promotes the needed scale economies that SMEs cannot reach on their own.

The Connection between Clusters (creating META-CLUSTERS) start out being a natural process, because Clusters are network organizations engaging several partners that can offer a wider range of services than only one company. Clustering models are in progress, but without a doubt, the interaction within META-CLUSTERS networks has become one of the most relevant developing steps that Clusters organizations follow in their growing strategy.

META-CLUSTERS are very difficult to replicate, just as Clusters are, because they depend on the structure, partners, market, culture, opportunities, etc. Nevertheless, one can identify different examples of this new movement and connectivity in the world.

The traditional development of a **META-CLUSTER** can be associated with different approaches or opportunities, namely:

a) **National Initiatives** – (Some are pushed by the national government, involving different complementary Clusters, to increase global dimension and critical mass, their national offer; or, promoting by national Clusters in a natural way, trying to increase the dynamics of the competitiveness of their products and services on the international market);

b) **International/Regional Initiatives** – (Some are pushed by taking advantage of a specific project/program, to enlarge the competitiveness of specific sectors, like Aeronautics, Defence, etc. Others are pushed by multinational companies that control Clusters, trying to control their influence market or their value-chain in order to protect their business, within niche fields like Medical Devices, Advanced Technologies, Agro-Food, etc.);

Experiences and examples of META-CLUSTERS are really easy to find and learn on the Internet, and all of them are promoted by connected people presenting a specific Business Model, to promote their products and services globally, like the following examples:

a) *The project* ICT Meta-Cluster

(http://twitter.com/ICTMetaCluster)

This Meta-Cluster has been developed under the scope of the INTERREG CENTRAL BALTIC program, which aims to create a complete value-chain offering ICT-oriented companies in Estonia, Latvia and Sweden resources to generate first sales of their products and services in new markets, to expand their sales within respective countries and regions and, finally, to prepare for further expansions of their business activities. By the end of 2018, the ***ICT Meta-Cluster*** *will be a validated ecosystem in the* **Baltic Sea Region** *for the establishment and further business expansion into new markets. The participating SMEs will have access and be familiar with the target markets, export analysis, will have received match-making results for their product in the target markets, will have performed the necessary adaptations to their products and services as well as received support with regard to export/import regulations.*

Products / Services to offer:

* Export Market Analysis
* Matchmaking
* Business Counselling
* Product Development
* Testbed
* Coaching
* Export Readiness Services
* Marketing Support for Export

b) Agrofood Technology, Equipment and Machinery Cluster of the Murcia Region, Spain

(http://www.metacooperation.org)

This META-Cluster is comprised of important institutions and companies in the **Agro-Food Technology**, Equipment and Machinery Sector. It involves a total of 3,200 companies in the **Agro-Food Technology**, equipment and machinery sector operating in the **Murcia Region**, with a turnover of 730 million Euros

and creating jobs for over 20.900 people. The strategic objectives that will guide the efforts of member organizations for the benefit of each and every one, are:

- To develop top-quality products and services for competing in the global market.
- To create a recognizable corporate image so that worldwide clients can identify the **Agro-Food Technology, Equipment and Machinery Cluster** with quality, design and innovation.
- To find new business opportunities, anticipating market needs and adapting products and services.
- To move towards business specialization and customization, supplying tailor-made market solutions.
- To strengthen production and design know-how, thus contributing to integrate technology into current and future services and products.
- To ensure the availability of technological, financial and human resources with the necessary managerial and technical expertise.

The main subsectors involved are:

- **Phytosanitary agricultural machinery** - these include farming switchgear and machinery, greenhouse structures, environmental control systems, irrigation systems and cultivation substrates.
- **Packing, packaging and handling equipment** - these include plastics, wood, cardboard, product labelling, thermo-retractable film, single supports (trays...) and meshes, among others.
- **Agrofood machinery** - these include equipment for the agrofood sector such as handling machinery: automatic sorting lines, semi-automatic sorting lines, handling machinery, as well as systems for task automation, weighing, waste treatment and environmental management. Conservation equipment - these include refrigeration chambers and pre-cooling lines.
- **Stockbreeding equipment and machinery** - these include tanks and silos, quartering and abattoir equipment, cattle-raising equipment and machinery, animal feed preparation equipment and machinery, purine treatment devices, environmental protection equipment, crushing machines, boilers, extruders and other equipment for feed factories.
- **Advanced services for the agrofood sector** - companies specialized in agricultural training, IT applied to agro-industrial applications, agronomic engineering, labs, etc.

c) Business Upper Austria, Linz, Austria

(www.biz-up.at/vernetzung/unserecluster/)

Business Upper Austria is a network of different sectoral Clusters operating in Upper Austria that has a long history in Cluster activities. All the MATERIALIX partners had, in the past, contacts with the Plastic Cluster that is part of the network of Business Upper Austria and know it very well, so the aim of the visit was to test the design of new business-oriented services through a self-learning process guided by the Business Upper Austria experience.

The main service areas offered by Business Upper Austria are:

- Collecting and preparing information relevant to different business sector
- Press and public relations - Knowledge transfer through hosting events, seminars and workshops

- Demand-oriented qualifications and training with specific courses and training
- Cooperation projects
- Sales and internationalisation activities

Actually, being member of one of the different sectoral Clusters in Upper Austria has different advantages and is in line with the "classical" offer of being a member of a Cluster:

- Contacts with a number of companies belonging to the Cluster landscape and direct access to national and international R&D facilities
- Tailor-made support: finding suitable cooperation partners and the right national and international funding. In addition to the project management, through special interest groups, they also offer attractive platforms for specific technology and product developments
- Media presence: the association of different Clusters is able to offer the promotion of the company's presence in print media and online, both at national and international levels (this service is very difficult to offer if a single Cluster is acting on its own)
- Competitive advantages: forums, industry-specific training and workshops, experience exchange meetings and exclusive insight into partner companies
- Discover trends and developments in the sector

Business Upper Austria plays a crucial role in the lobbying for industrial policies, through a strategic forum (Advisory Board), which integrates distinctive national participants on the policy side. This is a strategic service that is offered to its members, bringing their needs to the decision makers and offering new opportunities to its members, in line with the new concept of CLUSTERS 4.0.

d) Welfare Tech Cluster, Odense, Denmark

(http://en.welfaretech.dk/)

Welfare Tech is a Danish national Cluster, gold labelled and a hub for innovation and business development in healthcare, homecare and social services. Welfare Tech is a membership organisation with members from the private industry, public organisations and research and education institutions. Welfare Tech has a broad knowledge regarding the Danish market through their members and operates as a national entry point for international companies who want to enter the Danish market.

Welfare Tech was established in 2010 with funding from Syddansk Vækstforum (Growth Forum of Southern Denmark), the European Regional Development Fund and funding from private companies, Odense Municipality and University of Southern Denmark. The core of Welfare Tech comprises innovative Danish companies and public institutions. Welfare Tech conveys new ideas and insights into demands and requirements pertaining to hospitals and municipalities.

Welfare Tech is supported by the European Regional Development Fund, the Syddansk Vækstforum (Growth Forum of Southern Denmark) and The Danish Agency for Science, Technology and Innovation under the Danish Ministry.

At the same time Welfare Tech set up an association for members: private companies, public institutions, and research and education institutions, working with the development, sale and implementation of health and welfare innovation. The association is financed by the members and has a

board representing the shareholders. The board plays a key role in overseeing the organisation and ensuring that Welfare Tech operates in the best interests of its shareholders.

Welfare Tech uses this platform for business development and business growth by creating active networks, dialogue between companies and links between companies and public stakeholders.

The main services offered from Welfare Tech to member companies are related to:

- Market Knowledge
- Matchmaking
- Network
- Collaboration

In the following focus areas:

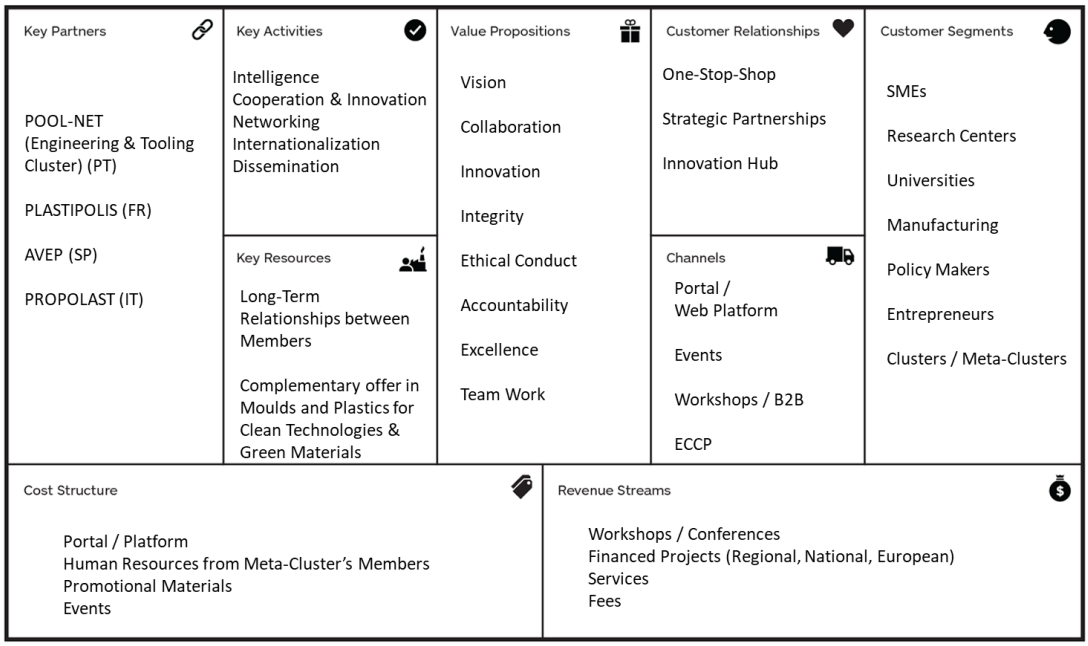
- Preventive Health Innovation
- Hospital & Health Innovation
- Rehab Innovation
- Social Services
- Healthy Ageing

2.3 – Transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products

The **MATERIALIX** Clusters Consortium represents a critical mass of stakeholders from **Moulds & Plastics Industries** (particular SMEs from different countries, like Portugal, Spain, France and Italy), which are complementary, and face similar challenges to meet industrial transformation, circular economy and societal challenges. Furthermore, smart specialization strategies and Key-enabling technologies (e.g., advanced manufacturing and materials) provide new opportunities in a broad range of manufacturing fields (automotive, packaging, aeronautic, healthcare, and medical applications). However, it also requires a significant investment and new business models, particularly for SMEs, to overcome innovation and joint-collaboration barriers. To this respect, the excellence in managing the Cluster activity is a requirement that will enable such a strategic approach in the context of SME companies.

The main goal of transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products", is to strengthen the Cluster management excellence specifically in the field of industrial new materials, as a way to provide more professional business services to Cluster members and therefore contribute to the development of world-class Clusters in the EU in this field, with the focus on SMEs who are the key actors in the European economy.

Transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products
(Canvas Model)



2.3.1– Organization Structure of Meta-Cluster

MATERIALIX Partners identify the need to establish the organization structure of the Meta-Cluster at the beginning of the Meta-Cluster. To settle this action, MATERIALIX Partners identified and discussed the different possibilities of legal forms for the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products***" (considering the normal legal forms used in Europe to support these kinds of entities), namely:

- Limited Liability Company
- Co-Operative
- Joint Stock Company
- Foundation
- MoU – Memorandum of Understanding

Considering the long-term partnership of the Meta-Cluster Members, it was decided that in the short term, the legal form for the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products***" will be a MoU- Memorandum of Understanding, signed by all the original Members and the new members (since they integrate the Meta-Cluster). In the medium term, considering the main activities and the integration of the consortium, the Meta-Cluster Members should decide the most suitable legal form to be developed, considering the sustainability of the Meta-Cluster.

In this context, the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products***", should be developed within a structure that includes:

- Steering Committee (all the original members);
- General Assembly (all Members);
- Advisory Group (by invitation: Companies, Research Centres, Policy Makers).

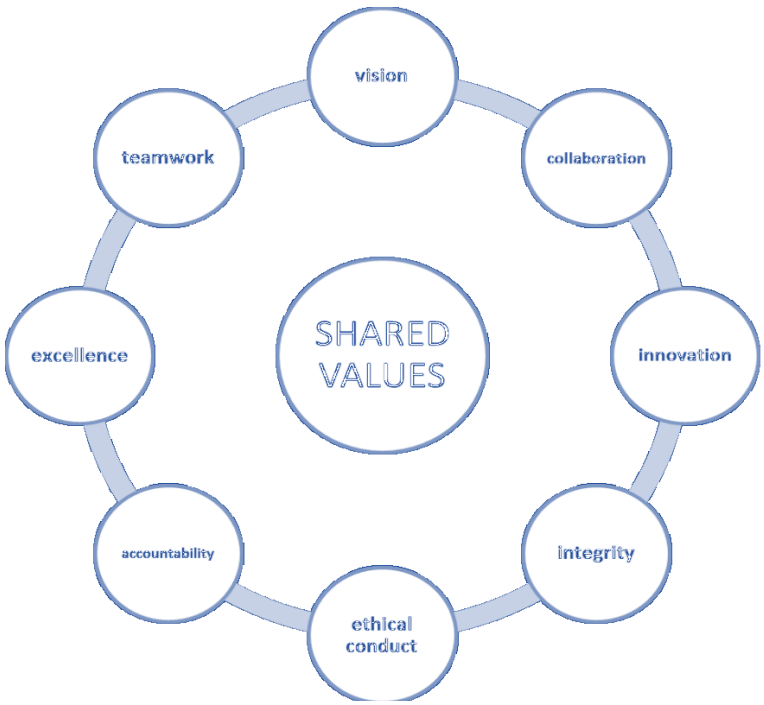
As such, the Steering Committee will take the responsibility to propose the Annual Plan and control/monitor its implementation. The General Assembly is responsible for establishing the strategic vision for the Meta-Cluster, to approve the Annual Plan proposed by the Steering Committee, and also, to approve the integration of new members. The Advisory Board is responsible for the follow-up of the main activities of the Meta-Cluster, make proposals to improve the management excellence and the value offered by the Meta-Cluster (open opportunities).

2.3.2 – Meta-Cluster Vision, Mission and Share Values

As a Vision, the Meta-Cluster foresees the exploring of the opportunities for SMEs in the area of ***Clean Technologies and Green Materials for Sustainable Manufacturing to Support Advanced Products***.

As a Mission, the Meta-Cluster sees itself to be an international hub of different networks, acting as an open hub to Clusters and Partners, providing intelligence services at an international level (e.g. data, studies, information, opportunities, roadmaps, partnerships), and promoting international projects (R&D to support its value-chain involving members from different regions and countries).

The Meta-Cluster partners share several common values, creating a robust value-chain, namely:



2.3.3 – Meta-Cluster SWOT Analyse

MATERIALIX Partners discussed and analysed the main collaborations they have been developing and identified future opportunities for Collaboration to reinforce the Meta-Cluster, to better attend their member's needs. To define the Business Model for the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products",*** partners defined the **SWOT analysis**, considering the different cooperation models (Past and Future), namely:

Meta-Cluster Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products

Table 1. Clusters Collaboration Mode - Pros and Cons.

	Pros	Cons
Project Based Collaboration	- Consolidated model with multiples good examples and with good results - New projects can follow previous partnerships - Good results in previous projects promote good assessment by funding organisation (Regional, National, EU) - Good knowledge between partner can promote good projects (task distribution) - Definition of specific goals and definition of tasks (defined by calls for projects) - The project will be implemented only if funded (low risk)	- All the projects are limited in time - Few flexibility regarding task (have to stick to the proposal) - Difficulties to implement long term goals or partnerships - No real sustainability for collaboration
Transnational Network of Clusters	- Open model that can be evolutionary/adaptive, depending on the politics defined by the network - A collaborative community creates more value by enabling members to realize activities development that each single could not achieve with its own efforts - Supported by long term relationships of the members - Freedom to organize the network - Possibility to create evolution in the consortium - Possibility to postpone activities if there is a raise of activities in the network (goals and task defined in an annual or biannual base) - Activities defined by network members and not on a specific frame (defined by calls for projects) - No time limit	- Not yet a consolidated model and some lack of knowledge about the way to manage the inter-organizational relations - Difficulties to manage the transition process and to create permanent resources and to support the non permanent resources (financial and permanent people) - Lack of financing can imply the lack of activities - Difficulties to stablish a real scheme with controlling processes - Management issue if some partners are not well motivated or committed

Table 2. Clusters Collaboration Mode - Strengths and Weakness

	Strength	Weaknesses
Project Based Collaboration	- Implementation only under a proposal approved - Complete definition of the goal, the activities, the timeline and the partners - Based on tasks, milestones, deliverables and a specific budget	- All the projects are limited in time (under a specific call) - Very low flexibility under implementation (approved proposal) - Impossible to change the objectives throughout the project (approved proposal) - No possibility to incorporate new partner throughout the project (approved proposal)
Transnational Network of Clusters	- Collaboration stablished by initiative of the members and for a long term period - More visibility at an international level (comparing to the clusters) - Agreement based on existing network and consolidated relationships - Flexibility according to the commitments assumed by the members - Possibilities to define short, medium and long term activities - Possibilities to select priorities, not constrain by calls - Flexible mode of government and possibility to integrate new partners - Concept supported by the European Commission under the European Cluster Collaboration Platform (European Strategic Cluster Partnerships)	- Need to define resources/budget to support the network first activities (no existing resources at the start point) - Need to maintain resources/budget to support the network activities in time - Collaboration supported by shared resources - Collaboration need motivated and participative partners -

This was a very relevant step as it becomes the high impact decision regarding the META-CLUSTER strategic approach. Considering the great differences observed in other Clusters and Meta-Clusters case studies, it is important to highlight that the conclusions raised in this SWOT analysis are applied specifically to the MATERIALIX partners group and it would need to be adapted to any other group of Clusters in order to evaluate their particularities.

2.3.4 – Meta-Cluster Future Services

In line with the objectives of the project partners, these discussed, designed and defined the future services and instruments that the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products"*** may offer to their members. Thus, to achieve the design of the future service offer to the Clusters members, the partners have previously carried out the following two steps:

1. Extensive analysis of the services currently provided by each Cluster organization involved in the project: in this task, the partners reviewed the portfolio of services currently available within the MATERIALIX Consortium;

2. Organization of study visits: four visits to top Cluster organizations, in four different EU member states, were organized to learn by example and to gather a set of good management practices to subsequently implement;

Both the study visits and the services benchmarking offer the possibility to look for new services to provide by the MATERIALIX network in addition to the current portfolio, within the future **transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products"**, giving an additional point of view to highlight the added-value new services. As a result, 23 services have been selected covering the services in specific key-areas and a common view has been found among the MATERIALIX partners regarding the category/type of new services to be offered and could mainly fit into three key areas:

- **innovation and improvement capacity;**
- **new business opportunities and training;**
- **competence development**.

Clusters organisations are focal points, and in that way, they can play a crucial role in identifying the innovation and research topics opportunities for a region, a value-chain and its potential to tap into new and emerging market niches. Thus, Cluster Organisations take an active role in connecting the right stakeholders and reduce the barriers to joint innovations.
Clean Technologies & Green Materials meta-Cluster will satisfy a global industry and its companies (in their majority, SMEs), and are part of a global value-chain which acts at an international level. Thus, the international business opportunities are a priority area, also to be taken into account to identify new business opportunities for the Cluster/network members (namely, SMEs).

Transnational cooperation through the Cluster-to-Cluster approach can help to increase the internationalization of companies and their access and facilitating the entry into new regions and markets (namely, niches). In that way, meta-Clusters will provide services to promote international contacts and partnerships, which can be triggered by the cooperation with other Clusters. This activity will support Cluster members with high interest-focused information that is not available in the market, helping the SMEs strategic decision-making process to be much more efficient.

Training and competence development should meet the needs of meta-Cluster members and contribute to the industry's sustainability, regional smart specialisation and strategies, innovative learning systems, jointly developed at a transnational level, so it can assist to improve new competences and skills.

Considering the current industrial ecosystem, it is known that the companies' competences and skills will become one of the most relevant competitive elements for SMEs.

The new services focused on the SMEs' needs will support the structure of the future transnational Cluster. This analysis, in its entirety, will conclude the implementation of the newly selected services that have been designed to increase the competitiveness and cooperation of the European SMEs that participate in the Meta-Cluster.

These three key areas corresponded to different topics:

ESCA KEY AREAS	TOPICS
Innovation and capacity improvement	→ Intelligence → Cooperation & Innovation
New business opportunities	→ Networking → Internationalization
Training, competence development	→ Dissemination

In this context, the MATERIALIX Consortium permits the discussion and selection of services and instruments that will be offered to the future meta-Cluster structure in order to support transnational cooperation.
Within the specific topics, services will be mainly focused on :

INTELLIGENCE

- connect the Meta-Cluster members with other external SMEs, institutions or Clusters;
- promote networking among Meta-Cluster members to share experiences (e.g. best practices) through seminars, workshops, cross-Cluster initiatives;
- technology scouting to identify the technological and economic trends.

Instruments that would support this, could include the:

→ Dissemination of data members;
→ Access to open innovation platforms;
→ Contribution to Technological Roadmaps;
→ Dissemination of statistics, data and platforms (e.g. Vanguard Initiative; Watify Initiative).

COOPERATION & INNOVATION

- support the Meta-Cluster members to access public R&D and innovation calls, namely in European programmes;

- organize networking and social events to inform Meta-Cluster members about specific research topics;
- organize thematic events, brainstorming workshops and roundtables to create possible project ideas between the Meta-Cluster members;
- support Cluster participants to implement smart specialization strategies from an internal perspective.

Instruments that would support this could include:

→ Organising Innovation days (and other events);
→ Access to innovative hubs;
→ Screening of funding opportunities and disseminatiom to members (mainly SMEs);
→ Exploring transnational cooperation by a Cluster-to-Cluster approach, so that ClusterMeta-Cluster members can start strategic development partnerships (e.g. Cross-industry cooperation projects);
→ Promoting the exchange of market needs and technological potencial cooperation needs in order to facilitate the partners' search within ClusterMeta-ClusterMeta-Cluster members.

NETWORKING

- support access to public innovation finance (e.g. European Investment Bank);
- support Cluster participants to implement smart specialization strategies, driving the S3 design process in cooperation with policy makers and other stakeholders, in particular by fostering an interegional exchange of best practices and identify opportunities to address through collaboration projects;
- organize networking and social events (worshops, roundtables, working groups, etc) concerning specific topics.

Instruments that would support this could include:

→ Promoting Cross-Cluster demand-oriented study visits;
→ Cross-Cluster and/or cross-industry personalised Matchmaking events in relevant areas for ClusterMeta-Cluster Members;
→ Supporting Cluster Members to search for the right partner.

INTERNATIONALIZATION

- organize a ClusterMeta-Cluster or inform the Meta-Cluster members about entrepreneurial events related to new applications of technologies, services, process, design or the evolution of business models;
- collect and share information about new businesses of Cluster members;
- technology scouting to identify the technological and economic/market trends;
- Management Consultancy;
- Exchange and dissemination of international information regarding market conditions, Import/export, international markets' sectorial opportunities, market barriers and regulation conditions;

Instruments that would support this could include:

→ Mapping of SME service providers for technology and sector-specific applications;
→ Cross-Cluster and/or cross-industry personalised Matchmaking events in relevant areas for ClusterMeta-Cluster Members;
→ Promoting Cross-Cluster demand-oriented study visits;
→ Supporting Cluster Members to search for the right partner;
→ Identifying sectorial market opportunites to promote colaborative market actions for MetaCluster members;

DISSEMINATION

- Training for entrepreneurial mind-sets and in view of industrial transformation, sustainability, multidisciplinary requirements of market niches and chances of KET (e.g. training modules/voucher schemes/pitch trainings);
- Build-up dedicated international cross Cluster training for their members (acting as a "cross-knowledge hub");
- Training in innovation management techniques such as roadmapping;
- Incentivating apprenticeships and non-formal learning certification;
- Relevant Inteligence and updated sectorial reports.

Instruments that would support this could include:

- Demand-oriented qualifications and competences to specific courses and training (tailor-made training);
- Technology scouting to design specific courses and training;
- Applying better training practices learned or developed for traditional training formats. Promoting activities such as Erasmus+ calls for sectorial advanced and innovative training;
- Developing a platform for the exchange of relevant inteligence and updated sectorial information.

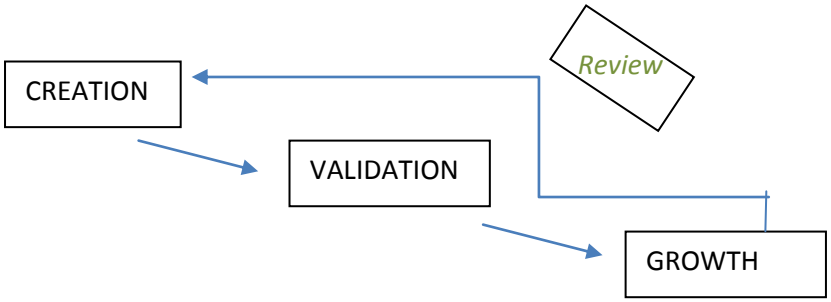
The MATERIALIX Consortium intends to create a web-based cooperation Platform structure to gain visibility and provide tools and instruments to achieve the future goals of the transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to support Advanced Products."

The platform aims to provide expertise and intelligence services regarding broad-based innovation and collaboration among its members and contribute to the competitiveness of businesses and face the challenges of the industrial transition. So, the objective of the MATERIALIX Platform is to provide services such as data and statistics, connecting Cluster members with more ease with other external entities in order to be involved in new-shared R&D and innovation projects and/or cross-Cluster networks, new business opportunities and competence development.

The MATERIALIX Consortium also intends to integrate and develop information for the ***ECCP – Europen Cluster Collaboration Platform*** about the Meta-Cluster services and activities, to expand visibility and awareness, at a global level.

2.3.5 – Implementation & Financial Plan

As regards the development of a ClusterMeta-Cluster structure, MATERIALIX partners defined three different phases to establish it: **1. Creation (short term); 2. Validation (short/medium term); 3. Growth (medium/long term)**.



Meta-Cluster Clean technologies and green materials for sustainable manufacturing to support advanced products

Table 3. Action Plan

Implementation Process	List of actions: (to identify as potencial actions in a cenario of the implementation of the meta-cluster)	Short/Medium/Long Term Action (time to implement)	Responsible (Meta-cluster coordinator / Cluster manager / Action coordinator / Other)
Phase 1 Formation (Mission > Vision > Strategy)	Cooperation agreement (final seminar) and Proposals for a Strategic Plan	2017	Clusters managers (Founders)
	Meta-cluster establishment (sign MoU)	2018	Clusters managers (Founders)
	Meta-cluster Legal Form	2018	Clusters managers (Founders)
Phase 2 Validation (Minimun viable / Performance indicators)	Definition of financial model	2018 - 2020	Meta-Cluster Coordinator and Clusters
	Monthly Online Conference	2018 - 2020	Meta-Cluster Coordinator
	Logo and Web page	2018 - 2020	Meta-cluster Coordinator
	Definition of common services	2018 - 2020	Meta-cluster Coordinator
Phase 3 Growth (Stablish and Stregthen)	Join collaboration project ideas	2020 - 2025	Action Coordinator
	Start the 1st common service	2020 - 2025	Action Coordinator
	Meta-cluster enlargement	2020 - 2025	Action Coordinator

With this is mind, the Implementation phases for the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to support Advanced Products"*** should be developed in a consistent manner.

In the short term (to be concluded during the first Semester of 2018), the main agreement lines between the Cluster Founders is represented by this document as the main drivers for the future formalization of the Meta-Cluster. The MATERIALIX Partners expect to sign the MoU – Memorandum of Understanding and conclude the legalities for the Meta-Cluster in 2018. This period is very important and also represents the communication and involvement of their own Members and Stakeholders. This step can be considered as the main short term goal of the Materialix project as far as the conclusions raised during

the project analysis will be the ones taken into account to consolidate the short terms decisions such as legalities and main drivers.

In the medium term (to be developed during the next two years), it will represent the launching period of the Meta-Cluster supported by the definition of the financial business model for the Meta-Cluster (involving Founders and Managers), periodical management meetings, the implementation of the Web/Meta-Cluster Platform, the definition and promotion of the Meta-Cluster "identity" and the definition of the common services to be offered. In this phase, the involvement of the Regional, National and European Authorities will be very critical to establish instruments that can be used and promoted to support the Meta-Cluster Action-Plan.

In the long term (to be developed between two and five years), partners expect to promote the growth of the Meta-Cluster, with an active involvement of their Stakeholders and Members, promoting joint collaborative project ideas, selling common services and enlarging the value-chain of the Meta-Cluster, with the integration of other complementary Clusters. In the long term, the best practice learning process is also expected to be kept active in order to update the Cluster services and may introduce new drivers to keep the Cluster activity in a high-level position.

The Meta-Cluster members have to define how to finance their activity and the portfolio of services. The sustainability of the Meta-Cluster is a crucial point to achieve. A different means to finance the activities can be used, namely:

- Internal contributions: member's contributions (member's annual fee payment, contributions in kind, own human resourses, etc); considering each temporal scenario, it seems clear that own human resouces could be the most relevant internal contributions in the short term phase and other internal contribturions could be the most appropiate ones for the medium and long term phases.

- External contributions: financed projects, fee services, European/Regional contributions. These external contributions will be duly evaluated in each period scenario and each activity, as the different activities may require the most suitable finance instrument.

To ensure the sustainability of the ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to support Advanced Products",*** the business model discussed needs to be in line with the European Common Business Model for Clusters Sustainability bases in a consistent approach to distribute the main activities (in terms of receipts/costs) oriented to:

- 1/3 Services/Fees;
- 1/3 Own Resources/ contributions In-Kind
- 1/3 Financed Projects;

Considering the exploration of financed projects, Meta-Cluster Partners will continue to explore new programmes that will allow to combine Meta-Clusters and Smart Specialization Strategies (***European, National and Regional***), to implement the Strategic Plan. In the short term (**8th March 2018**) there is a new call from **COSME Programme** (e.g. Call: **COS-CLUSTEPARTNS-2017-3-02: European Stratégic Cluster Partnership for Smart Specialization Investments**), as an excellent opportunity to be explored, because

its overall objetive is – "**to *boost industrial competitiveness in the EU via cross-regional cooperation and networking***" – in line with the Meta-Cluster's Action Plan.

The main Meta-Cluster activities should also be organized within a cross-combination of different financial sources as proposed in the next table:

Model to Finance Meta-Cluster Activities

Services / Financing	Member Fees	Income from own business activity	Self-funding Contributions In-Kind	Public Founds (Regional/Nacional/European)
PORTAL / SERVICES PLATFORM	✚	✚	✚	✚
INTELLIGENCE	✚	✚	✚	✚
- Technology Scouting to Identify the Technological and Economic Trends	✓	✓	✓	✓
- Networking intra Meta-Cluster Members (B2B, Seminars, Cross-Cluster Initiatives, etc)		✓	✓	✓
- Connect Meta-Cluster Members with other External SME's, Institutions, Clusters	✓	✓	✓	✓
COOPERATION & INNOVATION	✚	✚	✚	✚
- Support Meta-Cluster Members to R&D+Innovation Calls (European Programmes)		✓	✓	✓
- Networking & Social Events (Promote specific research topics)	✓	✓	✓	✓
- Promote Brainstorming and Thematic Events (Promote Common Project Ideas)		✓	✓	✓
- Support Cluster participants to implement Smart Specialization Strategies		✓	✓	✓
NETWORKING	✚	✚	✚	✚
- Support access to public innovation finance (e.g. European Invetment Bank)	✓	✓	✓	✓
- Supporting Cluster participants to implement S3 (Interegional Best Practrices, designing processes in cooperation with policy makers and other stakeholders, etc)		✓	✓	✓
- Organise Networking and Social Events	✓	✓	✓	✓
INTERNATIONALIZATION	✚	✚	✚	✚
- Organise Entrepreneurial events (business models, new applications of technologies, services or design)		✓	✓	✓
- Collect and Share information about new business of Cluster Members	✓	✓	✓	✓
- Management Consultancy		✓	✓	
- Technology Scouting to Identify the Technological and Economic Trends		✓	✓	✓
DISSEMINATION	✚	✚	✚	✚
- Training for Entrepreneurial mind-set and view of industrial transformation, sustainability, market niches, etc		✓	✓	✓
- Build-up dedicated international cross-cluster-training		✓	✓	✓
- Training in innovation management techniques (Roadmapping)		✓	✓	✓
- Incentive apprenticeships and non-formal learning certification	✓	✓	✓	

To sustain the development of the Meta-Cluster, a full control of its activity is fundamental. To do so, an annual budget should be prepared and approved through a detailed business plan (with a list of activities planned); it should be controlled twice a year, offering the Meta-Cluster the framework to execute the strategic plan for those activities. This split budget should not only be specified regarding type and amount but also in the temporal horizon, as mentioned before. A medium-term analysis could be presented to identify the best budgeting scheme for the collaboration of those which had been developed without suffering budgeting source problems.

With this in mind, an Excellence Management Performance should be implemented and controlled to reinforce the confidence between members and stakeholders, promoting a continuous risk analysis and obtaining feedback from clients/members and stakeholders in order to evaluate the quality and the value perception of the Meta-Cluster offer.

On the next table, we propose a very simple analysis for the evolution of the Meta-Cluster Business Plan, to be able to (re)act in time, avoiding major damages in case of market exchanges or other critical risks.

Meta-Cluster Clean Technologies & Green Materials for Sustainable Manufacturing to Support Advanced Products

Table 4. Action Plan + Financial Plan

	List of actions: (to identify as potencial actions in a cenario of the implementation of the meta-cluster)	Responsible (Meta-cluster coordinator / Cluster manager / Action coordinator / Other)	Potencial Financial Resource (Founder Clusters/Reg. or Nat. Public. Fund/EU Fund/Private/Membership Fees/Other)	Risk Assessment (Type: HR/Tech/Financial & Level:Low/ Medium/Hight)
Phase 1 Creation (Mission > Vision > Strategy)	Cooperation agreement (final seminar) and Proposals for a Strategic Plan (deliverable from Project)	Clusters managers (Founders)	Founder Clusters	HR - Low
	Meta-cluster establishment (sign MoU)	Clusters managers (Founders)	Founder Clusters	HR - Low
	Meta-cluster Legal Form	Clusters managers (Founders)	Founder Clusters	HR&Fin - Low
Phase 2 Validation (Minimun viable / Performance indicators)	Definition of financial model	Meta-Cluster Coordinator and Clusters managers (Founders)	Founder Clusters	HR&Fin - Low
	Monthly Online Conference	Meta-Cluster Coordinator	Founder Clusters	HR&Fin - Medium
	Logo and Web page	Meta-cluster Coordinator	Founder Clusters	HR&Fin - Medium
	Definition of common services	Meta-cluster Coordinator	Founder Clusters	HR&Fin - Medium
Phase 3 Growth (Stablish and Stregthen)	Join collaboration project ideas	Action Coordinator	Founder Clusters	HR&Fin - Low
	Start the 1st common service	Action Coordinator	Founder Clusters	HR&Fin - Medium
	Meta-cluster enlargement	Action Coordinator	Founder Clusters	HR - Low

3. Conclusions

This report offers a deep analysis with regard to the methological process to define, create and develop a Meta-Cluster strategy and its implementation. Based on the experience of the MATERIALIX project's partners, the lesson has been shown, applied and learnt during the training activities carried out in the project and how this learning in Cluster excellence management has been applied to create a Meta-Cluster strategy for ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to support Advanced Products".***

It is very relevant to value the need to implement this training activity when developing such a complex and international strategy at a sectorial level. Clusters are geografically located entities and for that reason, the success of their international projection needs to be supported by the excellence of a non-extended training as the one developed during the MATERIALIX project.

The conclusion of the analysis of a Meta-Cluster creation and the corresponding strategic implementation road map has been disaggregated in 3 temporary phases. This is presented in this report with details concerning the ongoing process of setting this transnational Meta-Cluster. The learnings from the MATERIALIX project will not only facilitate the execution of these next steps among project partners but will also offer the methodology and best practices that apply as orientation for other groups of Clusters aiming to step into a Meta-Cluster implementation.

During the MATERIALIX project, the Cooperation Agreement and Strategic Plan for ***transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to support Advanced Products"*** has been reached as far as the first goals in the short term scenario are concerned. The validated Strategic Plan will be implemented by the partners according to the financial scheme that is also defined in the report. Regarding the Financial Scheme, the most important conclusions are:

- Each activity will need to be analised individualy to garantee its financial viability.
- In the short term, Cluster partner's own resources (focused on Human Resources) seem to be the most relevant ones.
- In the medium and long term, economical internal and external resources seem to be just as necessary to complete the implementation of the Meta-Cluster.

According to these conclusions, we can consider that the viability of the transnational Meta-Cluster "Clean Technologies & Green Materials for Sustainable Manufacturing to support Advanced Products" can count on enough viability elements to guarantee the implementation and also its future development.

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