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for all Europeans through a
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I. Introduction

The benefits of innovation have become well understood: solutions are developed for difficult and complex problems, economies are improved and further than that, new jobs are created. When innovation is associated with healthcare – which is the case for the Medical Imaging market – innovations result in a healthier population, better life and finally to a reduction of socio-economic costs.

However, the Medical Imaging market is very diverse and consists of various stakeholders from very different origins. Not acknowledging their different standings and orientations and disrespecting the need to bring them together might hinder the effectiveness of new innovation or, at worst, new innovation altogether.

And as competition on and for markets has started to grow, one might ask the question how organizations working in Medical Imaging, e.g. SMEs and research institutions, can line up strategically together. An organization cannot only rely on its operational day-to-day business: Wide-ranging strategic decisions have to be made and opportunities such as collaborating with other partners have to be seized for maintaining or increasing competitive advantages.

Bringing them together, encouraging communication amongst them and bringing them strategically in line, could forward the development of new innovations with great prospects. The term cluster comes to mind:

From an economical point of view, a cluster describes a network of a variety of (regional close) stakeholders that have a certain interexchange- or intercommunication relationship about a specific topic – often along the value chain.

One prospect of the AMI-4Europe Project is therefore the setting-up of two research driven clusters, one in the North-East Region in Romania and one in the Republika Srpska in Bosnia & Herzegovina (WP7).



The main objective of this deliverable is to identify a standardized roadmap as well as to give recommendations for setting up and developing research driven clusters in respect of Advanced Medical Imaging.

In Chapter II, a definition of a cluster and its advantages is provided. Chapter III describes a roadmap for the setting up of a cluster, including questions and decisions that need to be taken into account. In the sub-chapters, we explain what steps need to be taken to fully understand a market, what important stakeholders there are, what it means to set up a cluster's strategy and what possibilities of financing a cluster exist. Chapter III is about the operational management of a cluster, meaning measures and activities that its management office should offer in order to ensure a fruitful outcome. The most important steps and activities are marked with checkpoints throughout the whole document.



II. Cluster Definition

A cluster is an accumulation of a certain number of organizations and stakeholders that are (regionally) close to each other and have a content-wise and a structural relation to each other as their activities follow along one or several value chains. Its members often come from different disciplines and backgrounds but work together on the same core topic: Their activities either complement each other or are related to each other, conditions which could lead to the generation of growth.¹

The advantages of a cluster are mainly based on its strategic coordination of division of businesses and responsibilities, in the meshing of different orientations and disciplines as well as on the resulting pool of a huge variety of consolidated expertise and common goals. This and a resulting attraction of additional experts, like companies, researchers etc, that could farther improve the cluster by contributing their expertise, gives its members relevant competitive advantages in finding and distinguishing common bottlenecks that need to be overcome as well as identifying new innovation opportunities and targeting them.²³

Developing a strategically well aligned cluster with engaged members and a comprehensive and thoughtful management gives the chance to boost the economic strength not only for the members themselves but for the whole region on the (inter-) national market.

¹ <http://wirtschaftslexikon.gabler.de/Definition/cluster.html>

² https://de.wikipedia.org/wiki/Cluster_%28Wirtschaft%29

³ <http://www.research-in-germany.de/apa/de/dokumente/4730/dbj-cluster-report.pdf>



III. Setting-up a Cluster

The setting-up of a cluster might most definitely be the biggest step to do within the whole lifetime of the cluster itself. Certainly, one can raise the question “What and who comes first and what follows?” and even though a simple formula including a “Who has to be contacted when” would be a nice thing to have, the reality shows a different picture. The range reaches from clusters that derived throughout the years from partners just working loosely together at first, through to state-initiated competitions for a projected development of a cluster within a region. What needs to be acknowledged at this point is that the first way is considerably easier for the establishment and the financing of a cluster. It is vital to have strong partners “on board” who see the necessity of a cluster from the beginning.

However, even though the chronological order of steps to be taken might differ, there are certain aspects that need to be considered in every case: the topic and its market, the stakeholders, the strategic approach and the financing of the cluster. In this deliverable, we propose major steps that need to be taken for the setting-up of a cluster.

1. Advanced Medical Imaging and its Market

Before setting up a cluster it is necessary to fully understand the market that is supposed to be targeted in depth. Besides the identification of relevant stakeholders and key-players for the actual cluster, which will be evaluated in the sub-chapter 2, an in-depth analysis of the market structure, including a first visualization of its value chain, its barriers, its potential and its most promising technologies, is essential.

a. Defining a Value Chain

We propose the first step in setting up a cluster therefore to be:

- ✓ **Defining a value chain of the market in the region**

The following model value chain is an example for the Medical Imaging sector. It was developed for deliverable D2.1 of this project.

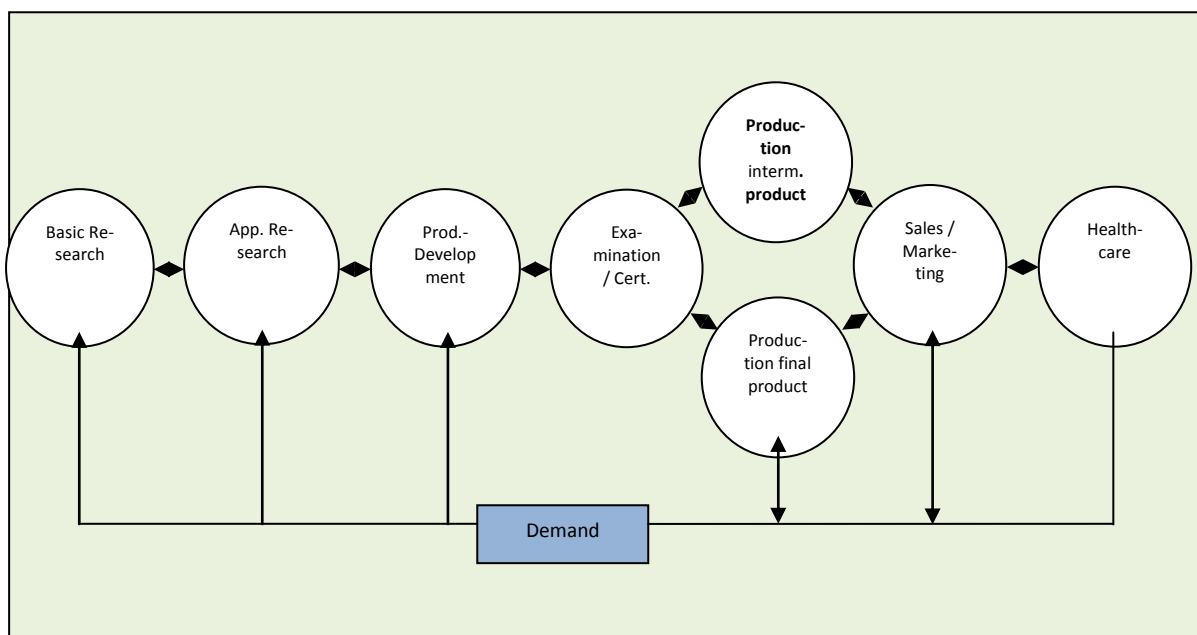


Figure 1: Model value chain for the Medical Imaging market

The individual circles represent single steps where value is added to an innovation. In general, research institutions and universities can be found in the beginning of the value chain, since they are the ones that engage foremost in basic research. While some, especially big companies, have their own R&D division, companies are often found in the following circles. The arrows represent the connections between the respective steps. It is reflected in Figure 1, for example, that the demand for new innovations could origin in everyone of these circles. It becomes obvious that for the purpose of an efficient innovative culture, collaboration between two, three or even more stakeholder from not only the same circle, but rather from different circles, is an essential goal to reach.



The Medical Imaging market itself is dominated by three major companies: GE, Siemens and Philips. This takes effect for almost all Imaging technologies.

While this goes for the general Medical Imaging market, each cluster management should do the following comprehensive analyses:

- ✓ ***Identification of key players in the respective field (in their region and on the world market)***
- ✓ ***Identification of SMEs engaged in the topic***
- ✓ ***Identification of research institutions related to the topic***
- ✓ ***Identification of the connections between them***



b. Analysis of Challenges

To fully understand a market and to avoid drastic downfalls, it is important to have a picture of the barriers that might hinder successful business and efficient innovation. Market entry barriers shall prevent competing companies to enter a certain market. For already established firms they constitute competitive advantages. They can be based on general framework conditions as well as on market- or operational conditions. For the development of a cluster, the question if there are relevant hurdles that might discourage entrepreneurs from entering the market of Medical Imaging (in the respective region) is crucial. Therefore, we propose the following step:

✓ *Analysis of market barriers and challenges*

This analysis should be done with desk research *as well as* field research, meaning questioning relevant stakeholders. While an inventory of those factors should be done beforehand, it is also essential to always keep track of them and of changes that might affect the success of the cluster. It should be noted furthermore that the presence of some of those barriers is indicative for the establishment of a cluster. On the basis of this inventory, strategies and actions that can help to face those hurdles must be defined and implemented by the cluster management.

Admission restrictions for example are rigorous for medical devices like Medical Imaging technologies. This is good in order to prevent developments in wrong directions and harm for the population. However, it makes the market introduction of innovative products more complicated on the other hand.

Economic and political aspects could be problematic for start ups in the Medical Imaging sector, as well as the fact that Medical Imaging is just getting into the focus of funding bodies and other supporting organizations. Therefore it is not easy to get funding for work in this field. But a sector as innovative as the Medical Imaging sector needs support through funding in order to be able to strengthen itself and to develop further. Cluster representatives should take this into account when it comes to the question how the cluster can be financed.

Another challenge is that most of the Imaging technologies are mainly used for diagnosis, and even though this is changing at the moment, health insurance funds often do not pay for high cost



investigations for diagnosis processes. High cost therapeutic approaches are incurred but not pure diagnosis examinations and procedures.

The two biggest barriers for Medical Imaging startups to enter the market is the lack of capital and industry connections. Capital limitations can be overcome by the choice of strategic investors who are knowledgeable about medical entrepreneurship. Partnerships like those in a cluster are therefore very useful to distribute risk and financial burden.

The strength of already established firms could be a barrier as well. They often have a better access to needed resources such as raw materials, human resources, and capital. Furthermore they often have an advantage in know-how in research, development, financing, or marketing. Moreover, if long-established firms own patents of important technologies in the sector, newcomers have to use older technologies and/or have to employ high capital for procedures or technologies. Another factor which might prevent newcomers from entering the market is the realization of economies of scale. Because of a bigger market-share, the acquisition of input factors, the production, and the marketing of products is more cost-efficient than for small companies. For SMEs, it could therefore be very useful to be a part of a cluster in order to use magnitude effects.

As emerging markets have gained a significant amount of market shares and huge industries like the USA and European countries remain strong on the world's Medical Technology market, the inclusion of the question about strong foreign competition in the cluster's analysis and its handling is important, since the Medical Imaging market is characterized by internationalization and globalization.

A crucial weakness of some countries (e.g. of Germany) is seen in the high level of regulations and application/approval procedures and requirements. The cost-cutting measures that have resulted from health reforms are mostly seen as restraints for the development for new innovations by having a significant influence on the image of the country's market. Directives and laws have to be followed concerning the safety, functionality, classification, and labeling of the devices.

As even small and medium sized businesses in the field of Medical Imaging are involved in international relationships and exchange goods and commodities, trade policies of both the origin countries and the international partners might generate possible market entry barriers.



c. Technologies and Patents

The Medical Imaging market is constantly in a mode of change and improvement. Before setting up a cluster and defining a strategy, an analysis of the latest technologies and their development possibilities is essential.

✓ *Analysis of relevant technologies and future niches*

On the Medical Imaging market, technologies are constantly improved and new upgrades appear on the market. A lot of innovation potential lies especially in the fields of molecular imaging – the marker and tracer market is in a constant transition – and the hybridisation of modalities. Additionally, technological integration has been a major driver with the advent of hybrid imaging modalities such as PET-CT and SPECT-CT. According to experts that were asked for deliverable D2.1, the combination of MRI and PET seems to be the most ideal hybrid, which would enable true simultaneous image acquisition rather than sequential imaging, which is the case with PET-CT. In order to have a full overview of relevant technologies and potential niches for the Medical Imaging market, we suggest Deliverable 2.1 from the AMI-4Europe project.

Also it is relevant to study the patent situation of the respective (regional) market. Who are the carriers of which patents.

✓ *Analysis of the patent situation of a (regional) market*

Surely, the results of this analysis would not only tell something about the innovative success of the region but also be the basis for the stakeholder approach (following).

2. Important Stakeholders

As it was stated already in Chapter II “Cluster Definition”, a cluster comprises of a variety of actors involved in a specific topic which either complement each other or are related to each other. In a cluster for Medical Imaging, those actors should be of scientific as well as of non-scientific nature. An interdisciplinary approach along the value chain, including its general framework and conditions, is aspired and almost mandatory to strive in order to build up an efficient and comprehensive profile.



The size of a cluster certainly depends on the market sector itself and on the willingness of the stakeholders to be engaged in an accumulation like that and furthermore, if a fee for being a member is required, to pay it.

In the following, the sizes of the clusters from the AMI-4Europe Project are presented. Furthermore it is stated if they pay a fee.

Madrid Network:

Companies	25
Research Institutions	8
Patient Associations	5
Do the members pay a fee?	yes

FILAS:

Companies	1986
Research Institutions	13
Universities	8
Do the members pay a fee?	no

Pharmapolis:

Companies	23
Research Institutions	2
Universities	1
Others, namely: Chamber of Commerce and Industry	1
Do the members pay a fee?	yes

IMAGO-MOL

Companies	1
Research Institutions	
Universities	3
Others, namely: Regional Development Agency, Science and technological park, hospitals, county council	5
Do the members pay a fee?	no



BioRegion

Companies	206
Research Institutions	34
Universities	21
Others, namely*	
Do the members pay a fee?	no

* The BioRegion is active in the field of Life Sciences. Every association, development agency, ministry etc. that has to do something with this sector is a (potential) contact of the cluster

a. Scientific Stakeholders

The next step in the setting-up of a cluster would then be:

✓ *Identification of regional scientific stakeholders*

For the Medical Imaging market in general, scientific stakeholders can be defined as actors, institutions and companies active in the following fields:

- Imaging Hardware Suppliers
- Imaging storage (PACS) Companies
- Analysis and Visualization Companies
- Academic & Research Centers
- ETPs and JITs' representatives
- Medical Practitioners
- Hospitals & Delivery Services
- EU's Medical Imaging, Nanotechnology and Biotechnology Sector
- MI infrastructures and available facilities

The following categories of scientific stakeholders have been identified:

- **End user:** Clinicians who use Medical Imaging to make treatment decisions with patients. The following professionals fall under this category:
 - Physicians



- Interventional radiologists and endoscopists
 - Surgeons (ENT, OBGYN, general surgery and all the specialties)
 - Dermatologists
 - Ophthalmologists
 - **Intermediate user:** Professionals who use images to diagnose and identify diseases and support a clinician's decision-making. The following professionals fall under this category:
 - Radiologists
 - Nuclear medicine physicians
 - Endoscopists
 - Pathologists
 - Microbiologists
 - Immunologists
 - **Opinion leader:** Prestigious and respected professionals who lead regional, national or international organizations, and whose professional ideas serve as a model to others.
 - **Hospital:** Institution where healthcare delivery takes place.
 - **Researcher:** Scientists with an specific expertise, developing projects related to Medical Imaging in any of its various fields, including radiology, ultrasound, MRI, nuclear medicine, optical imaging, ICT, nanotechnology, biotechnology.
 - **Research center:** Research institution with a specific interest in any of the field of medical imaging.
 - **Academic center:** Teaching institution devoted to educate and train healthcare professionals.
 - **Service provider:** Entity with scientific know-how that provides MI services to others.
 - **Manufacturer / Original Equipment Manufacturer (OEM):** Entities that produce equipments and/or software for MI with a combination of scientific and technological know-how, raw materials, components or assemblies.
 - **Scientific society:** Group of medical specialists with a specific interest in the science and technology development of Medical Imaging.
-



- **Technology platforms (TP):** Multidisciplinary networks bringing together researchers, industry and other stakeholders in order to promote research and technology development in fields related to MI.
- **Technology Joint Initiatives (TJI):** Public-private technology platforms, involving industry, the research community and public authorities, proposed to pursue ambitious common research objectives at European level.
- **Technology Assessment Agency (TAA):** Official agencies created to provide the authorities and citizens with objective and authoritative analysis of the complex scientific and technical issues.

b. Non-Scientific Stakeholders

For the Medical Imaging market, the identification of those actors who are not directly involved in the scientific field is especially necessary, since interactions and cooperation with them are groundbreaking factors which can either inhibit or upgrade the success of a cluster.

The next step should therefore be:

✓ ***Identification of regional non-scientific stakeholders***

These stakeholders are very important for reaching the objectives of a cluster within a region, as they define and regulate regional funding schemes, systems and programs. However, it has to be noted that the inclusion of some of the following stakeholders within the inner frame of the cluster is questionable if not undoable. This, of course, has to be evaluated for each single case.

Non-scientific stakeholders for Medical Imaging come from the following categories:

- Regional authorities / Governments
- Financial public and private actors
- Public-private partnerships
- Associations
- Health delivery system managers
- Consumer / patient advocates



Those stakeholders should be related in any way to the topics of innovation, research and health.

c. The Management Office

Essential for the well-being and the success of a fruitful cluster is – beside its engaged members – the management institution that holds its strings together. Here, too, we propose a interdisciplinary approach: The workforce should have a diversified background, covering the particular technology field as well as economics, administration and marketing.

Furthermore, especially for the chief executive of the institution, a background that makes it possible to have an efficient and respectful eye-to-eye contact with executives and professors from the companies and research institutions – meaning to have a wider understanding of the sector – is essential.

- ✓ ***Recruitment of staff for the cluster's management office that is able to cover the wide range of services that the cluster is offering***



3. Strategy

Necessary for a fruitful and sustainable cluster is a strong strategy that comprises guiding principles for its management office as well as for the cluster's members. The strategy of the cluster should include long-term behaviors to reach certain goals that should be defined beforehand. A development of a strategic "route" that the cluster management and its members step on as well and its controlling should be self-evident.

However, by defining the strategy of a cluster, it is important to note that its development and its execution varies in certain ways from a company's strategy, as its members indeed have to be included, but remain their own legal entities (with their own strategies) throughout the whole time. Taken this into account, it becomes clear that while it is the job of the cluster's management to hold the strings together, a lot of talks and coordination is necessary with its members to put together a common strategy. Furthermore, it should be noted that even though a strategy encompasses guiding principles, a healthy flexibility should be a given in case the environment changes in any way and makes it necessary for the cluster to adapt to those changes.

For developing a common strategy we propose the next step to be:

✓ ***Identification of a common mission statement, values and goals***

The mission statement of the cluster is a short sentence about its self-conception and its principles. It should explain to its members as well as to the external society what the cluster stands for. Internally it functions as a leading principle and motivator. For a cluster in Medical Imaging the mission statement should reflect its ambition to be the best in boosting the development of Advanced Medical Imaging within this region.

Moreover, it is useful to define certain values under which the common work should be done. For a cluster in the field of Medical Imaging, those values could be for example "Performance", "Integrity", "Responsibility", "Transparency", "Excellence" or "Legal standards" as they make a sufficient, valuable and sustainable teamwork possible.

The goals represent a more focused direction of the cluster. They are very much intertwined with the alignment of the thematic focus (following) of its work and constitute the basis of the operational



management (Chapter IV. Operational Management of a Cluster) that the cluster management engages in.

In the following, the major goals of the clusters active in the AMI-4Europe project are shown as examples.

Major goals of the cluster management of “Madrid Network”, Madrid, Spain:

- Be representative of the health and welfare sector collecting actors along the entire value chain, companies of various sizes, public and private organizations and other relevant organizations, such as universities, research centers, associations, end users associations, etc.
- Be an engine of economic development and innovation generation, helping to improve the competitiveness of health and welfare sector.
- Be a permanent forum for exchange of ideas, experiences and knowledge for those who offer products and services as well as support agencies.
- Be the connecting link between all partners to reduce the need for paperwork, share administrative burdens and costs, streamline projects and facilitate access to grants and financial tools for development of R+D+I
- Cooperate in the development of new technology-based companies and support them in their first steps and projects.

Major goals of the cluster management of “Imago-MOL”, North-East Region, Romania:

- The development of the structural, functional and molecular imaging sector in the North-East Region of Romania.
- Supporting the growth of scientific competitiveness of its members through better cooperation.

Major goals of the cluster management of “Regional State Initiative for Life Sciences in Lower Saxony - BioRegioN”, Lower Saxony, Germany:

- Strengthening the network structures in the markets.
- Enhancing the competitive market position of companies.
- Establishment of networks across technologies and markets.



- Mobilization of existing innovation potentials and the development of new potential.
- Increasing the focus on markets and applications in the field of research.

Major goals of the cluster management of "Pharmapolis Klaszter Ltd.", Debrecen, Hungary:

- Strengthen the less developed elements in the innovative chain of the Hungarian pharmaceutical industry as it is required by the export interests of economic stakeholders.
- Contribute to the improvement of European innovative capacities
- Establishing an outstanding pharmaceutical cluster that considerably contributes to the intensification of economic achievements as well as to the further improvement in the field of employment.

Major goals of the cluster management of "Lazio Region Bioscience Technology District (DTB) FILAS", Lazio Region, Italy:

- Strengthen the competitiveness and visibility of the bioscience sector at the international level and spur the qualitative and quantitative growth of enterprises and know-how
- Promote technical and scientific collaboration between industry and research
- Facilitate members' cooperation through European, national and regional opportunities
- Facilitate collaborative enterprising by integrating bioscience value chain from R&D to market
- Facilitate the access to public and private funds for R&D, from the European Commission National programs, and private financial funds (seed and venture capital).

In order to establish a strong and unique profile it is vital to define the thematic alignment that the cluster stands for and is able to engage in.

- ✓ ***Definition of the cluster's thematic alignment***



Questions like

- Is the cluster focused on specific sectors within the wide field of Medical Imaging? If yes, what focus is that?
- What are the current competencies within the cluster? Is it necessary to get more members on board?
- What are the business areas?

should be answered.

Those decisions should be based on the analyses that were done beforehand.

For example, the cluster IMAGO-MOL from North-East Region in Romania is active in the sector molecular imaging and the cluster Pharmapolis from Debrecen, Hungary covers the pharmaceutical sector. They are therefore narrower than the cluster BioRegion from Lower Saxony in Germany which encompasses the whole sector of Life Sciences or the cluster FILAS that is active in the bioscience sector. Even wider is the cluster Madrid Network from Madrid, Spain, which covers the whole health and welfare sector.

For the definition of the range of the cluster's topic(s), it comes at the end of the day down to the questions:

- What is the need within the region?
- What stakeholders with which competencies are located within the region and are interested to establish or develop a cluster?
- What is the management institution able to perform with a certain given financing?

Further topics that need to be included in the strategy of a cluster are related to the internal processes of its management. Following topics should ensure an efficient management for the cluster:

- Administration



- Finances
- Human Resources
- Controlling

It is vital to include those factors even though they are not directly related to the R&D of the cluster's members but rather make a sustainable management of the work of its members and a commercialization possible.

Therefore, one of the steps should be

- ✓ ***Definition and establishment of internal processes of the management institution***

4. Legal Forms and Funding

In chapter “III. Managing a Cluster” it becomes clear at the latest that it takes a lot of work to set up and to manage a cluster successfully. The personnel costs of the management institution as well as possible material costs stemming from services for its members must be covered. Two very important questions must be answered against this background:

- ✓ **Definition of the legal form of the cluster**
- ✓ **Identification of financing possibilities in relation to the cluster’s legal status**

This topic certainly has to do a lot with the fact which legal form the cluster has. Madrid Network, FILAS and IMAGO-MOL for example are Non Profit Organizations, whereas Pharmapolis is a company with limited liability (Ltd.).

For a cluster in the form of a company with limited liability (Ltd.), a way to ensure sustainability is the following:

Foundation of the Ltd. with two shareholders/associated partners:

1. Registered association with e.g. 75%: The members of the cluster are the members of the registered association and pay a certain fee
2. A public institution like the city, the commune or the state with 25%.

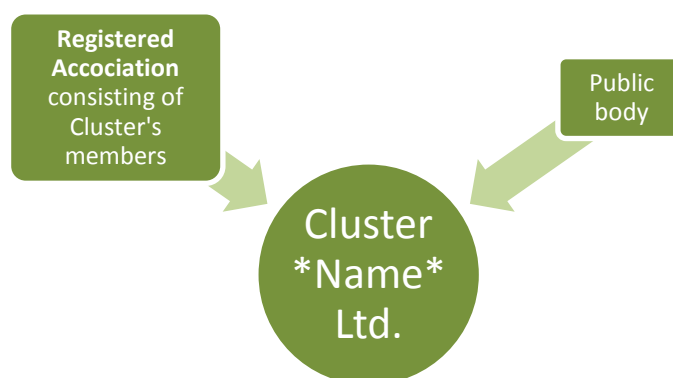


Figure 2: Structure of a cluster as a company with limited liability

The BioRegion does not have a legal form itself but is rather a state initiative that is run by a registered association (BiomeTI e.V.) and gets funded by the Ministry of Economy, Labor and Transport for a defined period of time. Figure 3 displays the connections:

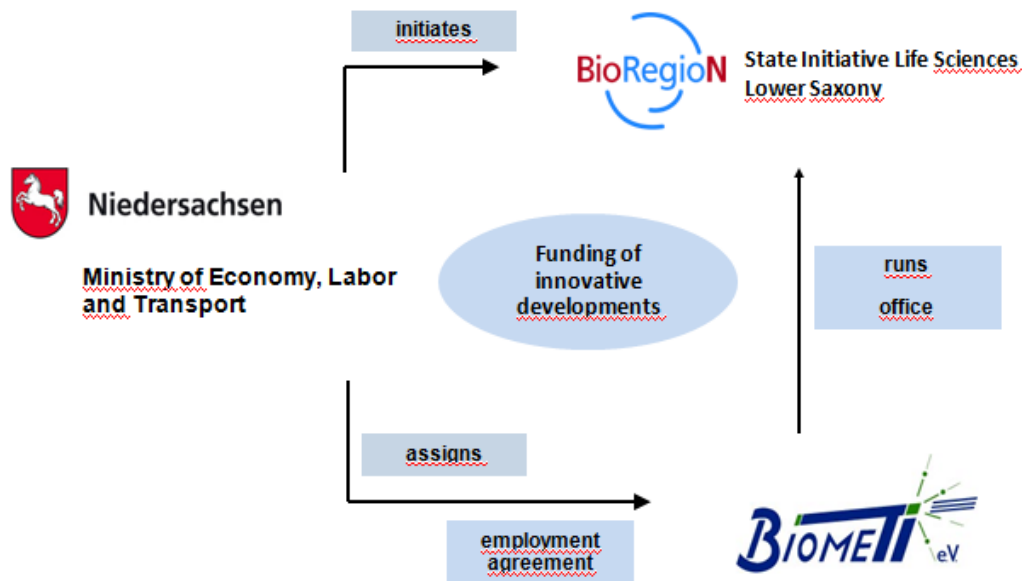


Figure 3: Legal structure of the cluster BioRegion, Germany.

Having one or the other structure result in different financing opportunities regarding:

- Member fees
- Public funds
- Public service contracts
- Industrial projects with third-party funding

As for the BioRegion, stakeholders working in the fields of Biotechnology and Biomedical Technology from Lower Saxony do not pay member fees for the services of the management institution. Anyhow, having this structure, it could easily raise issues with the stakeholders' sense of belonging to the cluster. Madrid Network (Spain) and Pharmapolis (Hungary) both have established member



structures that allow them to charge a fee for their services. Both clusters don't get any funding by the government of the respective regions. For determining the height of a fee it is almost mandatory to differ between research institutions, SMEs and big companies.

Since Medical Imaging is not yet in the focus of regional authorities in a lot of regions, finding possibilities for public funding could be a hard task to do. The topic is most of the time included in wider topics such as "medical devices", "health", "technology" etc.

A good way to get funding, – at least for a defined period of time – are EU tenders which cover the topic of Medical Imaging. Horizon 2020 will open its first calls in the beginning of 2014. Specific calls haven't been announced as of May 2013, when this report was written.

For a broad overview of existing programs, we suggest deliverable D3.3 by the AMI-4Europe project.

To have the cluster's work up and running, it is always useful to be engaged in industrial projects, meaning letting big companies pay for certain services and/or getting third party funding.



IV. Operational Management of a Cluster

In this chapter, an extract of the activities and measures done by the management office that stimulate a sustainable and successful cluster is presented.

1. Meeting the Members

The most important factor in managing a cluster is meeting the members and getting to know them. It is crucial for the management to know the area of activity and the competencies of each member in order to be able to build up linkages between the members and to know whom to contact if a request from another member or from “outside” comes in. Furthermore, it is essential to have a trustful relationship with the members. This is, too, very important when it comes to innovations and the topic of intellectual property rights, but – first and above of all – it simplifies the general processes within the cluster considerably. In regard to this fundamental activity, a thorough recruiting of qualified personnel of the management office (concerning professional *as well as* social competence) is absolutely inevitable. Furthermore, we propose to raise regularly surveys of the needs the members have, preferably in the form of qualitative analyses, in order to align the management’s work if necessary.

The clusters within the AMI-4Europe Project state to have conversations with their members regularly, averagely two to three times per month, sometimes even more, depending on the issues that need to be arranged. In bigger clusters, like e.g. Madrid Network, it certainly depends on the individual member. Some of them are contacted weekly, others monthly. Every member gets contacted at least once a year. As vital, continuous activities we propose therefore:

- ✓ ***Getting to know each member and build up a strong relationship***
- ✓ ***Routinely survey of needs and requirements***



2. Networking and Building a Knowledge Pool

Most of the time, companies and research institutions are keen to be a member in a cluster since they ensure a constant sharing of expertise and give them furthermore the opportunity to have relationships with other experts from different areas. This networking and sharing of knowledge can be done in a lot of ways so the management institution can certainly chose what works best with its members. For the activities

- ✓ ***Continuous sharing of expertise for the members and***
- ✓ ***Providing an efficient networking***

we propose the following measures:

- Scientific conferences
- Small workshops
- Events with socially and economically relevant topics
- Training, further education
- Promotion of younger people
- Staff exchange
- Publications
- Set up of working groups
- “Get together”- Events for a non-formal exchange
- Company missions in other regions or countries

Having build up strong relationships from the activities from “IV. 1. Meeting the Members” and having a huge pool of shared expertise, it is the purpose of the cluster management to progress and evaluate current R&D fields and to evolve and initiate future fields together with experts from the member institutions. Consequently, the resulting activity would be:



- ✓ *Evaluation, progression and initialization of current and new R&D fields*

3. Marketing and Communication

In this sub-chapter, we would like to present activities and measures for a marketing that is based on a relationship-orientated definition, which purpose it is to build, maintain and strengthen relationships with stakeholder and target groups and establish a visible distinctive profile. Marketing as a process of planning and implementation of the concept of price management, and distribution of ideas, goods and services is excluded.

The Marketing activities of a cluster, offered by its management institution, should cover different levels in order to reach a variety of target audiences. Dividing the audience roughly, there are three major groups that have to be reached by the marketing activities:

1) The internal group

This group comprises the members of the cluster. They have to be targeted with marketing measures to ensure their engagement and motivation within the cluster and – if they pay a fee – to legitimate it. Having that in mind, this group profits from all measures that are about to be presented even though they might not be the main target group for some, since it is mostly their (research-)work that is being presented and displayed through the different marketing measures.

An efficient internal communication, preferably with the aid of appropriate software is a very important factor to keep this group engaged.

2) The specialized community

This group consists of experts of science or the industry related in any way to the field – regional, national or international – are another rough target audience. Since they constitute potential new members, partners and supporters, it is valuable to keep them informed about the work and the profile of the cluster.



3) The regional society

Even though the general public is not one of the most important target groups that have to be reached by the marketing activities and measures of the management office, it should not be left out. Non-scientific stakeholders (see Chapter III.2.b) are part of this group and are often valuable for the success of a cluster. Furthermore, as a cluster embodies a huge “job-pool” and the search for new talents is crucial for innovation processes, it is always relevant for young people within the region to get informed about its work.

It is important to note that these three groups are just roughly divided and a further fragmentation is necessary in order to reach everybody with the appropriate measures. For the field of Medical Imaging, the fragmentation should be based on the stakeholder list from Chapter III.2. To reach new talents, a sub-category within the individual groups including young people could be sufficient.

We propose the following activities as vital for the success of the cluster:

- ✓ ***Development of a marketing strategy relative to the respective target group(s)***
- ✓ ***Development of internal communication processes for group 1***

An extract of measures is presented in the following table:

Measure	Target Group 1	Target Group 2	Target Group 3
Presentation of the cluster on special fairs	+++	+++	+
Publications in scientific magazines	+++	+++	
Logo Placement	++	+++	+
Media coverage with advertisement and articles in scientific magazines	+++	+++	+
Media coverage with advertisement and articles in regional newspapers	+++	++	+++
Social Media coverage	++	++	++
Sponsoring	+	++	++
Homepage	+++	+++	+++
Newsletter	+++	+++	+
Promotional material (leaflets, pins, notepads, pens...)	+++	++	+++
Online Database with members	+++	+++	+

Figure 4: Marketing measures

+ good to have, ++ important, +++ very important

Vital for the relationship of the members and the management office, are efficient communication processes. The establishment of the following measures could support this activity:

- **Intranet:** meaning an online platform for the exclusive use of the cluster’s management office and its members, where valuable information and common documents, such as brochures, leaflets etc. can be shared and an online interexchange is possible. The inclusion of a wiki is also very useful.
- **Regular member meetings:** In order to keep a good bond to the members, regular meetings where all members are invited are crucial.
- **Surveys:** Analyses among the members regarding their needs, demands etc. support the relation to them and reveal further development potential for the cluster.
- **Internal newsletters:** Invitations to events or important information should be done over an internal newsletter via email. This measure helps to actively “push” certain information to the recipient whereas the Intranet is rather passive.



4. Consultation

Being the regional contact point for SMEs and research institutions active in the field of Medical Imaging, it is vital to offer consultant advice and support in regard to acquiring funding, setting up cluster intern projects and working groups, helping spin-offs etc. The interdisciplinary approach regarding the personnel structure of the management office becomes clear at this point once again.

For the activity

- ✓ ***Being the contact point for the cluster's members and offer them consultation***

the following areas need to be covered:

- **Access to funding:** It could be valuable to work together with regional financing institutions and Business Angel Networks as well to provide an all around and qualified service.
- **Partner search:** For ongoing or future projects, the search for a partner within the cluster seems (thanks to the activity "Site Mining" easy to do. When it comes to a partner search outside the cluster, organizations like EEN (European Enterprise Network) are good partners that the cluster management could work with.
- **Applications:** The support in writing applications for tenders or coordinating an application by a group of cluster members is a very valued measure to do.
- **Business plans:** Business plans are always relevant when it comes to attracting financing from third parties, e.g. for spin-offs. Since most researchers are not familiar with those kinds of documents, it is helpful to have a cluster management that can provide support in writing them.



V. Conclusion

The goal of this deliverable is to provide a roadmap for the set-up and the development of clusters in the field of Medical Imaging. Throughout the whole document, individual steps are provided that have to be taken when setting up a cluster. In order to provide a sustainable success of the cluster, those steps should be chronicled, controlled, and – if necessary – done again and revised through the whole being of the cluster.

Furthermore, this document includes activities and single measures that provide good surroundings for the work of each individual member and thereby enhance the clusters profile altogether.

To sum up, the most important checkpoints for a cluster set-up are:

- **Advanced Medical Imaging and its market (page 4)**
 - ✓ *Defining a value chain of the market in the region*
 - ✓ *Identification of key players in the respective field (in their region and on the world market)*
 - ✓ *Identification of SMEs engaged in the topic*
 - ✓ *Identification of research institutions related to the topic*
 - ✓ *Identification of the connections between them*
 - ✓ *Analysis of market barriers and challenges*
 - ✓ *Analysis of relevant technologies and future niches*
 - ✓ *Analysis of the patent situation of a (regional) market*



- **Important Stakeholders (page 9)**

- ✓ *Identification of regional scientific stakeholders*
- ✓ *Identification of regional non-scientific stakeholders*
- ✓ *Recruitment of staff for the cluster's management office that is able to cover the wide range of services that the cluster is offering*

- **Strategy (page 15)**

- ✓ *Identification of a common mission statement, values and goals*
- ✓ *Definition of the cluster's thematic alignment*
- ✓ *Definition and establishment of internal processes of the management institution*

- **Legal Forms and Funding (page 20)**

- ✓ *Definition of the legal form of the cluster*
- ✓ *Identification of financing possibilities in relation to the cluster's legal status*

Activities that should be done in order to have a successful cluster are:

- **Meeting the Members (page 23)**

- ✓ *Getting to know each member and build up a strong relationship*
- ✓ *Routinely survey of needs and requirements*



- **Networking and Building a Knowledge Pool (page 24)**
 - ✓ *Continuous sharing of expertise for the members and*
 - ✓ *Providing an efficient networking*
 - ✓ *Evaluation, progression and initialization of current and new R&D fields*
- **Marketing and Communication (page 25)**
 - ✓ *Development of a marketing strategy relative to the respective target group(s)*
 - ✓ *Development of internal communication processes for group 1*
- **Consultation (page 28)**
 - ✓ *Being the contact point for the cluster's members and offer them consultation*