



**BASELINE STUDY: Basque Country**  
**Innovation Policy Mix for advanced manufacturing**

ORKESTRA, Basque Institute of Competitiveness

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## Innovation policy mix for Advanced Manufacturing

### Baseline study: Basque Country

## 1. Introduction

This report has been elaborated as part of Manumix Interreg, a project that aims at strengthening and improving the effectiveness and efficiency of innovation policy-mixes for Advanced Manufacturing (AM) at regional level through evaluation. The project is developed in partnership by governments and institutions in the Basque Country, Lithuania, Piedmont and Wales. Specifically, the consortium of the project is composed by the Basque Government, MOSTA – Lithuanian Higher Education Monitoring and Analysis Centre, FinPiemonte and Welsh Government.

The first phase of the project includes the development of a baseline study to analyse the innovation policy mix of partner regions, its governance and evaluation practices. One report has been developed for each region, as well a general comparative study. These documents have been elaborated by Orkestra with active collaboration and involvement of partner regions, by providing the core information that is summarized in the baselines studies. The studies have been elaborated based on secondary sources, interviews with partner regions representatives and/or other stakeholders, a survey filled by policymakers and a survey filled by beneficiaries of programs (in Piedmont and Basque Country). In the case of Basque Country, an additional workshop with beneficiaries has been carried out.

This report presents the main features of the innovation policy mix for AM in Basque Country. The report is structured as follows. Section 2 presents a general overview of the regional innovation and institutional context. Section 4 defines the scope and challenges of Basque Country's AM strategy and Section 5 provides an overview of its governance. Section 6 delves into the innovation policy mix for AM and the selected policy-mix for Manumix. Section 7 withdraws evaluation practices for AM strategy and the policy-mix. Finally, Section 8 concludes with a summary.

## 2. Basque Country Regional Context

The Basque Country is a region of 2 million inhabitants, located in the northeast area of Spain, in the South of Europe. It is an autonomous region which possesses exclusive and strong competences for designing and implementing different policies, including scientific, technological and innovation policies since the late 1970s (Bilbao-Osorio, 2009). Moreover, the region has become an interesting area for policy analysis due to holding a multilevel policy system where the regional policy system coexists with the European, national and sub-regional levels (Valdaliso, 2015; Magro and Wilson, 2017). The region has a long old tradition of industrial development in which manufacturing has the main emphasis (Magro et al., 2016) and it is a good example to analyse because of its positive economic transformation path followed after being affected by the crisis of the 1970s (Valdaliso, 2015).

Regarding its economic development, the Basque GDP has experimented an annual increment of 1.3% in 2014, as same as the European average, where services represent 62.4%, industry and energy 21.5%, construction 5.7% and agriculture, livestock and fishing 0.7% (Eurostat database). According to the Eurostat Regional Yearbook 2016, the employment share of the industrial economy (% of the non-financial business economy) is 29.7% in the Basque Country which means that there is a level of specialisation higher than the media in European regions (24.9%). Moreover, Basque manufacturing is specialised in medium to high technology industries and its main competitiveness strengths come primarily from production and export of basic metals, metal products, machinery and equipment (Magro et al., 2016).

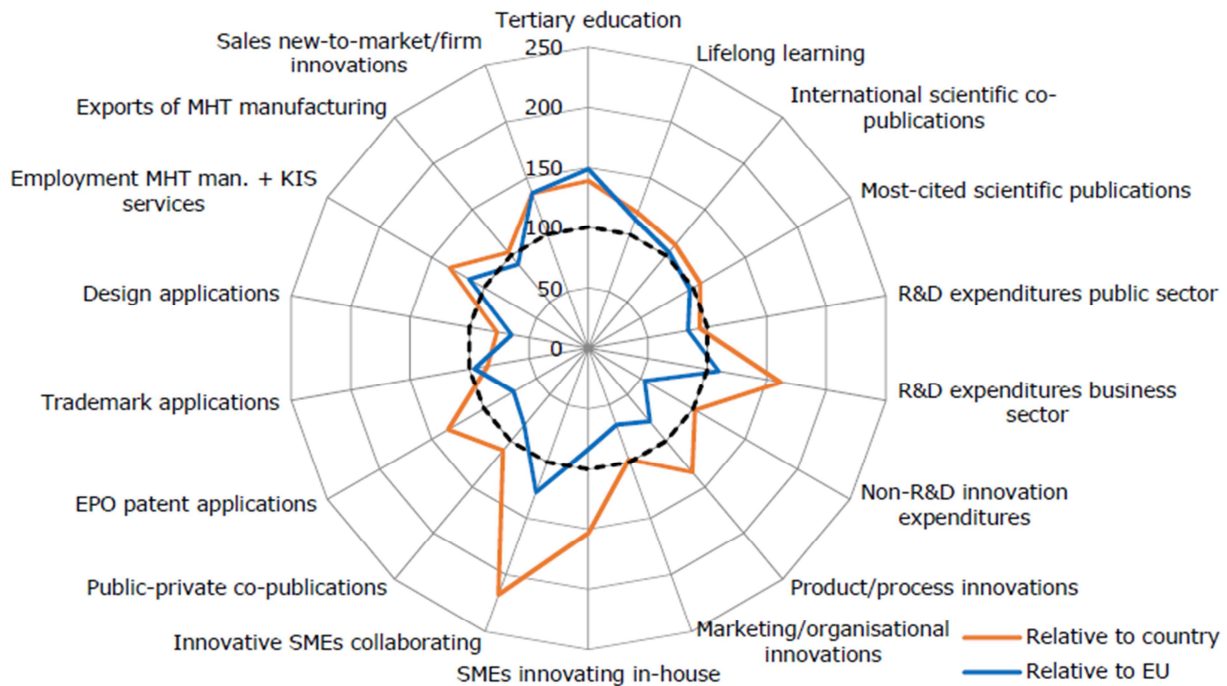
In relation to the innovation performance, the Basque Country is considered as a strong innovative region according to the Regional Innovation Scoreboard 2017; however, its performance has slightly decreased over time (European Commission, 2017). As shown in table 1, the R&D expenditure as percentage of the GDP is led by the business enterprise sector, followed by the higher education and government sector. Some strengths of the region in comparison with the EU28 are identified in the pillars tertiary education attainment, innovative SMEs collaborating with others, sales of new-to-market and new-to-firm innovations as well as lifelong learning (Figure 1). On the other hand, relative regional weaknesses are related to non-R&D innovation expenditures, European Patent Office (EPO) patents, marketing or organizational innovations as well as design applications (Figure 1). Some economic and innovation features are presented in the following table and figure.

**Table 1. Economic and innovation features**

Indicator	Basque Country		European average
	2011	2015	
Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions	31,500	34,400 (2015)	28,900 (2015)
Regional gross domestic product (PPS per inhabitant in % of the EU28 average) by NUTS 2 regions (EU28 = 100)	121	119 (2015)	100 (2015)
Total R&D expenditure (GERD) (% GDP)	2.01%	1.84% (2015) (p)	2.03% (2015)
Research and development expenditure business enterprise sector (% GDP)	1.64%	1.54% (2014)	1.3% (2014)
Research and development expenditure government sector (% GDP)	0.13%	0.14% (2014)	0.25% (2014)
Research and development expenditure higher education sector (% GDP)	0.38%	0.38% (2014)	0.48% (2014)

Source: Eurostat, Basque Statistics Institute. P= provisional

Figure 1. Economic and innovation features



Source: European Commission, Regional Innovation Scoreboard, 2017

As mentioned previously, the region has been implementing innovation policies since the end of 1970s as a result of two main factors: (i) the considerable autonomy given to Spain's autonomous communities, included the Basque Country, as well as; (ii) the needed response to a difficult economic and business environment faced by the region among those years (Valdaliso, 2015). A relevant aspect about Basque innovation policy is the continuity and political consensus in order to support industrial development as the basis of its competitiveness performance (Magro and Wilson, 2017). Furthermore, this has allowed the long-term regional envisioning of the different policy plans, programmes or institutions and strengthened crucial aspects as coordination and policy learning practices among public, private and socio-economic agents (Valdaliso, 2015). According to the European Quality of Government Index (EQI) (2013) the Basque Country holds the 100th position among 206 European regions.

Previous to the current innovation policy embedded in the Smart Specialisation Strategy approach, different stages can be identified: (i) during the 1980's the main focus was to overcome the economic crisis and look for industrial restructuring, so that, resources were allocated for technology infrastructure and offer development among other policies; (ii) in the 1990s period, new offer and demand policies were implemented, based mainly on a cluster development strategy looking for enhancing regional competitiveness; (iii) from the 2000s onwards, a long-term continuous strategy was carried out looking for promoting business internationalisation and science-driven economic diversification in industry through innovation (Valdaliso, 2015; SPRI, 2016).

### 3. Basque Country RIS3

RIS3 strategy is a natural extension of Basque historical policies in this area. Basque Country has a long history defining economic development strategies over the last 35 years, where consecutive plans and strategies, responding to specific needs of each stage, have progressively sought modernization, competitiveness, specialization, diversification and sophistication of regional economy. In this context the design of a RIS3 in the form of a new Science, Technology and Innovation Plan (STIP) 2020 came to be seen as an opportunity: (i) to work on existing weaknesses; (ii) to improve the efficiency of the Basque Science, Technology and Innovation Network<sup>1</sup>, and; (iii) to 'lead the way' in Europe with regards smart specialisation.

The focus of the Basque RIS3 is towards R&D&i and the process of setting the priorities considered different factors as the existence of a solid business base with capabilities to pull and / or exploit innovations, the presence of significant scientific and technological capabilities, the applicability to areas with the greatest (global) potential opportunity and the existence of instruments and support tools to implement each priority (SPRI, 2016).

The STIP 2020 that was published at the end of 2014 set out the RIS3 of the Basque Country, or at least the starting point for the RIS3 of the Basque Country. The centrepiece of the plan is the identification of three strategic priority areas: Biosciences-Health; Energy and Advanced Manufacturing.

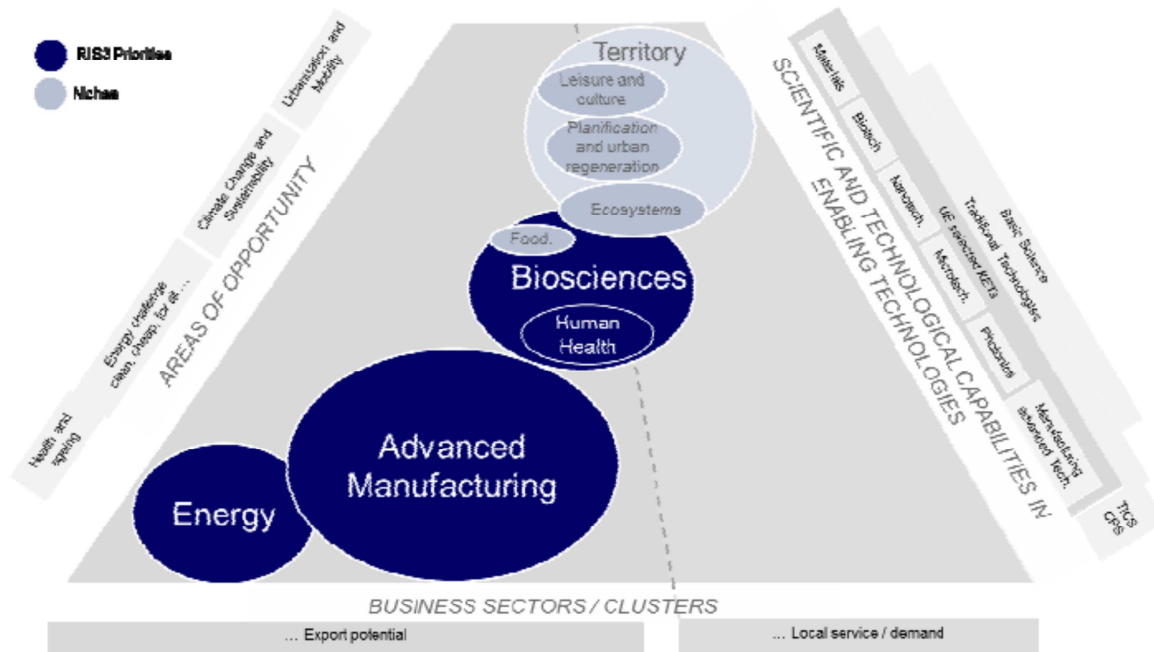
Alongside these three strategic priorities the RIS3 also identifies four opportunity niches that are strongly linked to the territory (urban and rural development): Food; Creative and Cultural Industries; Urban Habitat and Environmental Ecosystems. The Basque RIS3 has mixed both, vertical and horizontal priorities. The Basque RIS3 has mixed both, vertical and horizontal priorities since its design. The horizontal approach has been included after the identification of key cross-cutting aspects that required an intervention (Aranguren and Wilson, 2015). Therefore, these horizontal priorities are present as 4 strategic lines: smart specialisation, industrial leadership through public-private partnerships, excellence of the basque sciences, technology and innovation system, human capital development in science, technology and innovation (STI); and two transversal actions: internationalisation and innovation (SPRI, 2017).

Figure 2. Basque Country RIS3

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<sup>1</sup> The Basque Science, Technology and Innovation Network is composed by the Science System, the Technology System and Innovation Support System. The Network covers practically all organisations and institutional agents that carry out activities related to the creation and spread of information in the Basque Country, in particular those that support the business enterprise processes which later drive forward a large part of the country's economic and social development.





Source: SPRI/ Basque Government as illustrated in Aranguren et al. (2016a)

These priorities shape a complementary approach - formed by different specialization areas considering their history, relative strengths and maturity level - focused on present and thinking on future. Basque Country RIS3 has two “balanced” priorities: Advanced Manufacturing and Energy, with solid business base and significant science - technology capabilities. Both traditional activities with promising future developments. Biosciences (mainly Human Health), counts with sound science & technology capabilities and an emergent business base. Results of a diversification strategy. Finally, some science-technology niches, with small business base (and focused on internal demand).

In addition to a commitment to focus on these vertical priority areas and opportunity niches, the STIP 2020 also sets out five axes for transversal (or horizontal) actions:

- Guarantee the development of human capital in science, technology and innovation
- Ensure excellence in the science, technology and innovation system
- Promote social, business and public innovation as the key to the process of transforming the Basque Country
- Use public-private collaboration to promote a business ecosystem with high value-added
- Open the science, technology and innovation system to promote the uptake and generation of new knowledge not existing within the Basque region

The plan also sets out five operative objectives that seek to take advantage of the main opportunities and respond to the main weaknesses that were detected in the science, technology and innovation system:

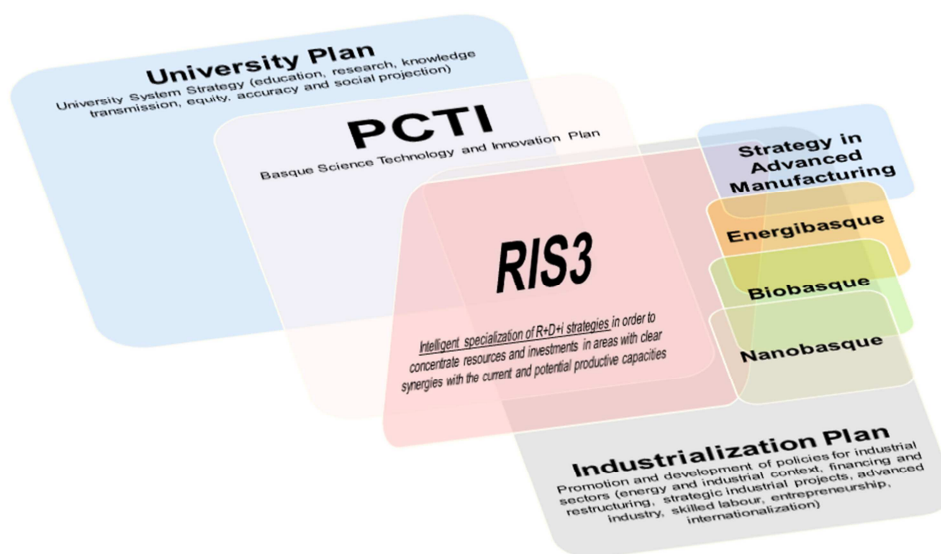
- Concentrate research, development and innovation resources and investments in the priority areas
- Strengthen basic research and experimental development
- Orientate the Basque Science, Technology and Innovation Network towards results
- Strengthen the capacity to capture international research, development and innovation funds
- Increase the number of firms that innovate



The live process for the development of the priority areas provides the foundations for the Basque RIS3 set the scene for the entrepreneurial discovery process in and across the priority areas in order to refine priorities and shape the evolution of the overall strategy. Spaces for different agents from across the quadruple helix have been created through a steering group model. Specifically, seven steering groups have been established since the approval of the STIP 2020, corresponding to the three priority areas and the four opportunity niches.

The main objectives of the STIP 2020 are: (i) Concentrate the expenditure on R&D&I to boost job creation and economical reactivation; (ii) Balance the research activity in order to overcome the relative competitive disadvantages compared to other countries; (iii) Increase the efficiency level of the Basque Science, Technology and Innovation system through the development of an integrated evaluation and monitoring system; (iv) Internationalise the R&D&I activity to capture and generate new knowledge; (v) Increase the number of companies with innovation activities to improve their competitiveness and sustainable development. The Basque RIS3 coexists and is intimately related with other plans and strategic documents in the region as seen in the Figure 3.

Figure 3. Basque RIS3 relation with other economic and scientific / technological development strategic plans



Source: Spri (2016)

## 4. Governance

Basque RIS3 presents an open and participatory model of multilevel governance; it has been implemented through soft and hard governance mechanisms.

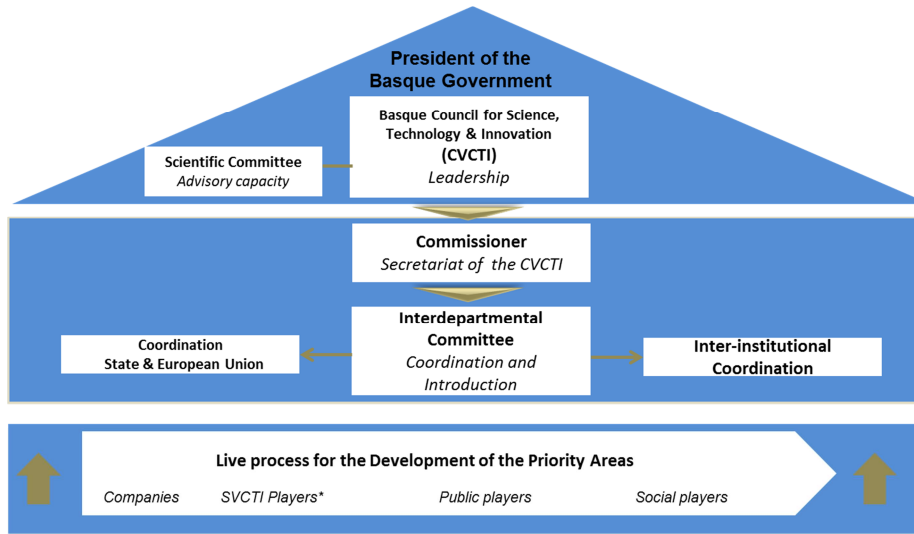
The process of developing the Basque RIS3 was led by the Presidency Department (PD) which established a core group (hard governance mechanism) formed by representatives from key government departments (economy, education, health, treasury) and from relevant regional organisations such as SPRI (the Basque Development Agency), Ikerbasque (Basque Foundation for Science), Orkestra (Basque Institute of Competitiveness) and Innobasque (Basque Innovation Agency).

The governance of the Basque RIS3 is presented in Figure 4 and it is led by the Basque Science, Technology and Innovation Council (BSTIC), and finally by the President of the Basque Country. The mission of this council is to strategically assess and orientate science, technology, research and innovation policy in the Basque region.

In addition, in order to facilitate interdepartmental coordination within the Basque Government in the STI field, an interdepartmental STI Committee has been created. Alongside this, an inter-institutional committee with the inclusion of representatives from the three Provincial Councils has also been created in order to coordinate activities across these administrative levels, with the aim of avoiding duplicities and uncovering synergies.

Moreover, a consultative space as the Basque Science, Technology and Innovation Advisory Group (BSTIAG) was formed in order to advise the BSTIC and the President in respect of the RIS3 design and implementation.

Figure 4. The Basque RIS3 Governance House

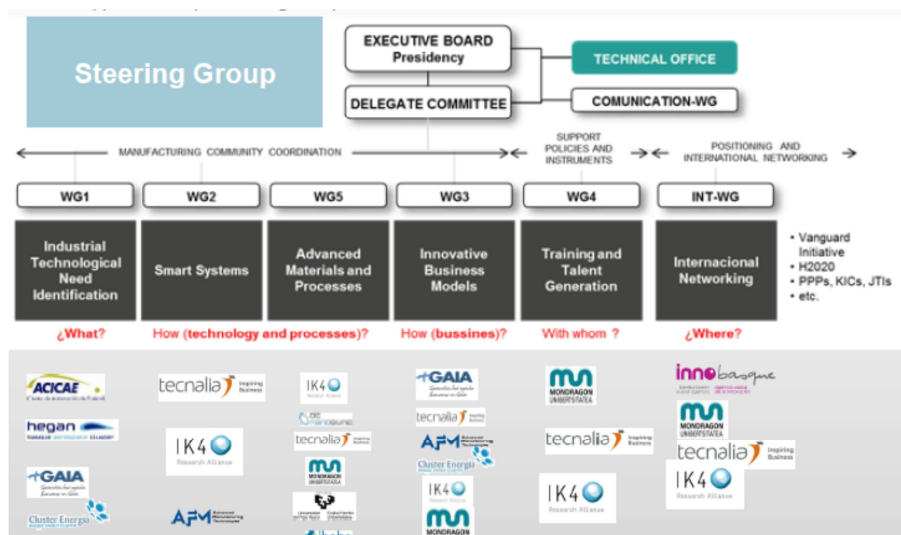


Source: Science, Technology and Innovation Plan (STIP) 2020

One important aspect is the creation of steering groups for each of the strategic priorities and opportunity niches, which count with the participation of representatives of the quadruple helix. These steering groups represent the RIS3 entrepreneurial discovery process in the region (Magro et al., 2016).

Linked with the Basque Country RIS3, the Advanced Manufacturing steering group was the first to be constituted as a soft governance instrument. More than 50 people and 21 organizations have participated with a very high intensity of work. The aim is to define and implement an orderly action plan aimed at respond in the short and medium-term to technological, business, organization and talent development priorities established by tractor industrial sector in the Basque Country for increase their competitiveness and take advantage of future opportunities presented globally.

Figure 5. Advanced Manufacturing Steering group



Source: Spri (2016)

The number and characteristics of formal coordination mechanisms denote the governance complexity in the Basque region. Even though these mechanisms are established and functioning, coordination gaps (intraregional and interregional) are still present (Magro, 2014). The intraregional gaps can be concretized in coordination gaps between the different regional government ministries and between the regional government, the provincial councils and the main or most active city councils and counties (i.e. Bilbao).

According to Magro et al. (2016) and Magro (2014), the main challenges associated to science, technology and innovation in the Basque Country are:

- The need to translate R&D investments into innovation outputs in a more effective way. While the main efforts have been focused on R&D development it is required to improve innovation performance in terms of, for instance, patents indicators.
- As a result of having a long trajectory in the implementation of innovation policies and strategies, the Basque regional innovation system is composed by a complex network of actors (research centres, agencies, clusters, etc.), however, it is still a challenge achieving a closer effective cooperation among the knowledge subsystem, firms (especially small and medium enterprises) and other agents in order to increment innovation outputs and performance.
- To promote knowledge internationalization and collaboration with foreigners. Despite the efforts to attract and retain talent it is needed to increase the ratio of foreign researchers in the region and promote external mobility and co-invention with international networks.

To conclude, main features of regional context are summarized in Table 2.

Table 2. Features of regional context

Feature	Description
Degree of general regional autonomy and innovation policy	High level of autonomy in regional policy, including innovation policy design and implementation.
Set-up of regional governance system (centralised/decentralised/fragmented)	Decentralised governance system with participation of other territorial levels in innovation policy (European, national, regional, sub-regional). Multilevel policy space. Still some challenges in coordination mainly between Basque government and sub-regional levels.
Nature of the process of RIS3 development (top-down/bottom-up/participatory)	Mixture between top-down and bottom-up/participatory process developed.
Intra and inter-regional cooperation	Still some challenges in intra-regional cooperation in an effective manner (knowledge subsystem and firms-SMEs) and with other regions

Source: Own elaboration

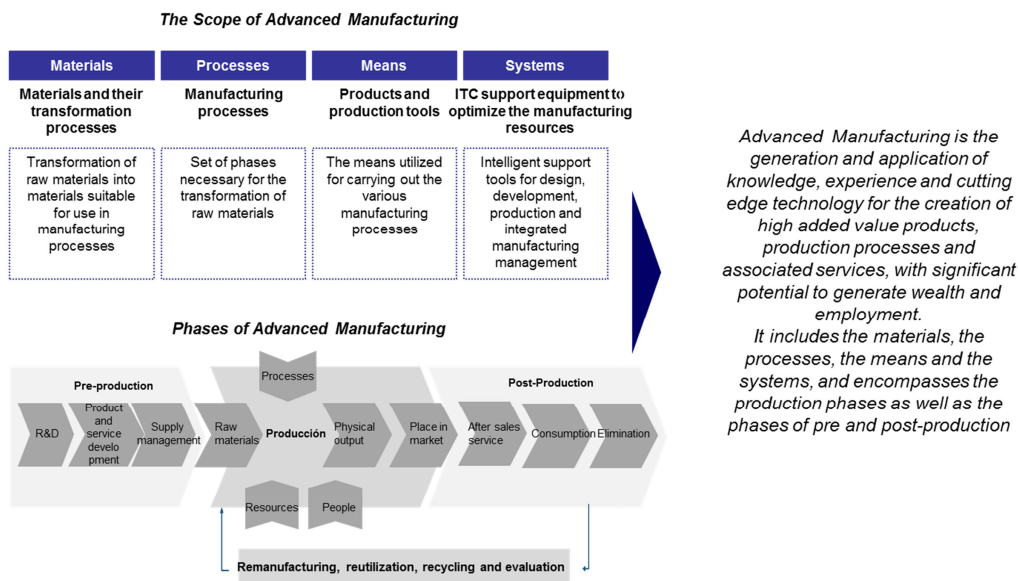
## 5. What is Advanced Manufacturing in the regional context?

The Advanced Manufacturing Strategy 2020 (AMS) is a multi-technological and cross-sectorial strategy that pursues strengthening Basque companies' competitiveness through innovation, both technological and non-technological, and improvement of the efficiency and sustainability of their manufacturing activity.

It defines Advanced Manufacturing as the generation and application of knowledge, experience and cutting-edge technology in the creation of high value added processes, products and related services with great potential for wealth and job creation. It includes materials, production processes, production means and production systems and it covers pre-production, production and post-production stages.

**Figure 6. Advanced Manufacturing Concept**

### Definition and scope of the concept of Advanced Manufacturing within the context of the Strategy

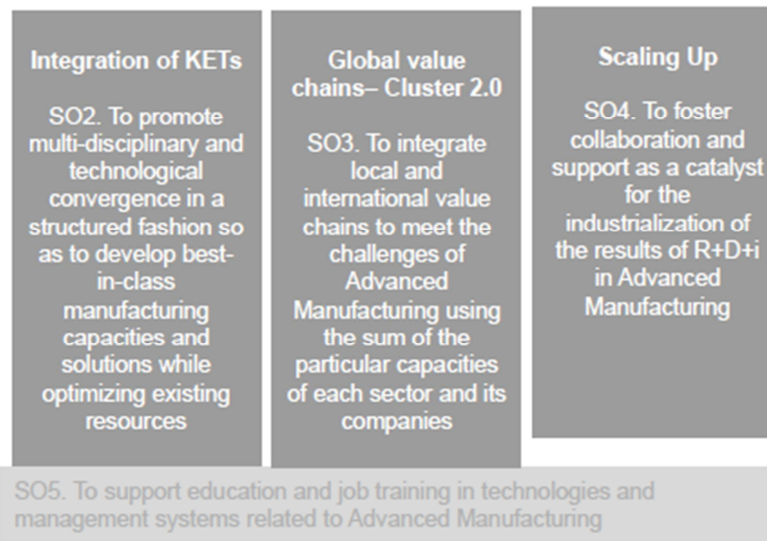


Source: SPRI-Basque Government (2014)

The main focus of AMS is maintaining the industrial character of the Basque economy by fostering higher value-added manufacturing activities. Within this framework, helping Basque companies move towards more knowledge- and technology intensive activities is at the heart of the strategy. The AMS has five strategic objectives.

Figure 7. Advanced Manufacturing Strategy 2020 Strategic Objectives

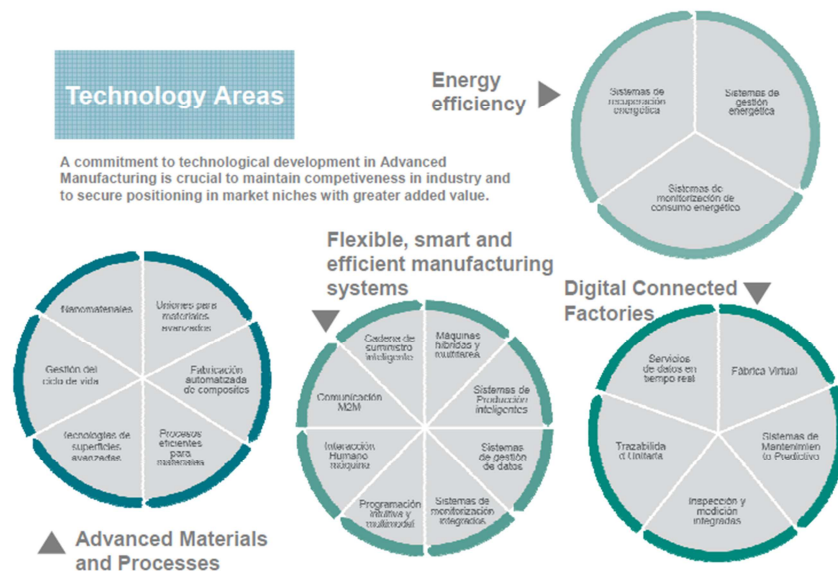
SO1. To help and guide Basque companies towards more knowledge intensive manufacturing activities which have greater added value



Source: SPRI-Basque Government (2014)

The AMS is committed to technological development in advanced manufacturing, and identifies four main working areas:

Figure 8 . Advanced Manufacturing Strategy 2020 technology areas



Source: SPRI 2016

### Advanced Manufacturing Stakeholders

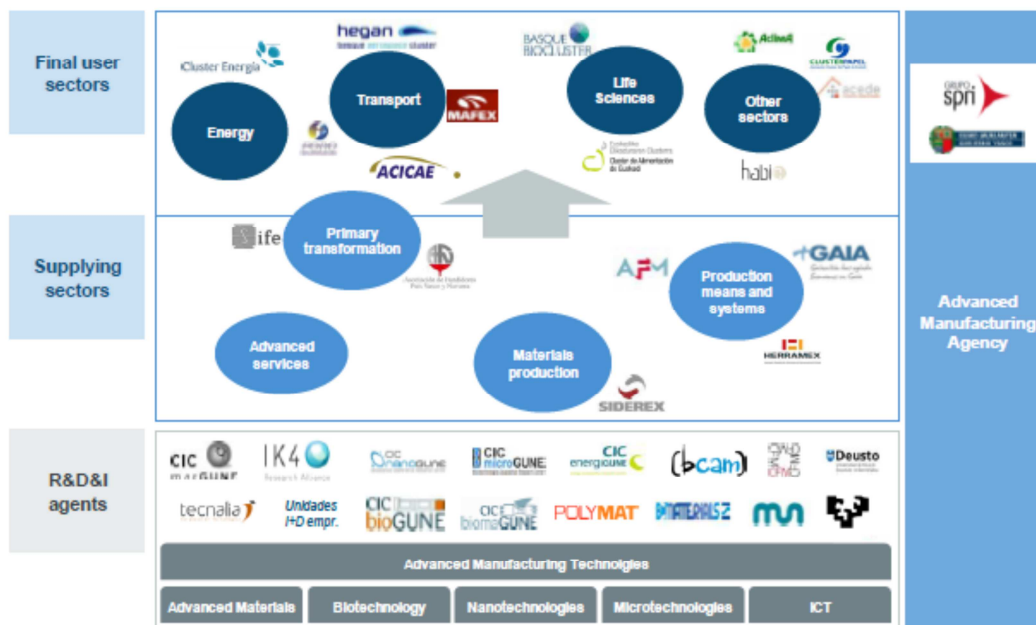
The most important agents of Advanced Manufacturing are classified by their profile:

- **Manufacturing industry.** It includes private companies and sectoral cluster associations. The strategy identifies two kind of sectors:



- Final user sectors. Final product or final product's pieces and parts manufacturers: OEM, Tier 1 and Tier 2 companies.
- Supplying sectors. Companies whose mission is to supply the final user sectors. They comprise materials and processes suppliers (e.g. metal, chemical, casting, forge and stamping enterprises), generally Tier 3 manufacturers; production technologies suppliers (e.g. machine-tool manufacturers or ICT system developers); as well as advanced services purveyors (e.g. engineering and consulting firms).
- **R&D&I agents.** It includes the members of the Basque Science, Technology and Innovation Network that range from university departments, research and applied research centres to units, laboratories, etc. According to their specialisation in different Key Enabling Technologies (KET), AMS establishes two type of R&D&I agents:
  - Specialists in advanced manufacturing technologies. Their activity has a relatively high specialisation in this KET or shows an excellent performance in some of the related areas. They provide knowledge and innovative solutions related to materials, production processes, production means and production systems all of which have direct application in manufacturing activities.
  - Specialists in other KETs from which R&D&I activities on advanced manufacturing technologies can benefit. This is the case of research centres for advanced materials and ICTs, and research centres in emerging fields such as biosciences, nanosciences and microtechnologies.

Figure 9 . Advanced Manufacturing Strategy 2020 stakeholders



Source: SPRI-Basque Government (2014)

## 6. Innovation Policy Mix for advanced manufacturing

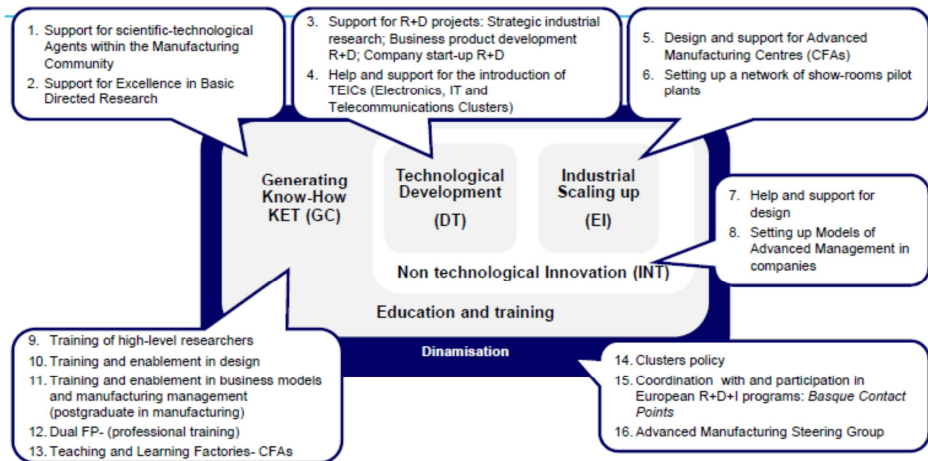
The action lines that AMS comprises in order to build capacities, develop cutting-edge products, processes and services, and to effectively coordinate and manage the activity in Advanced Manufacturing are grouped into six action principles:

- Knowledge generation on KETs.
- Technological development.

- Industrial scaling-up.
- Non-technological innovation.
- Education and training.
- Networking and coordination

These action principles are disaggregated into 16 action lines that are implemented through different instruments, applying a transversal approach involving various institutions, departments and public companies to undertake responsibility for the programmed actions.

Figure 10 . Policy mix for AM



Source: Spri (2016)

Within this framework, the Basque Country has selected three different instruments for the Manumix project.

Name of Instrument	Policy Objective	Objective	Target group	Geographical scope	Sectoral Scope	Year of Launch	Annual Budget
<b>Hazitek</b> <i>Collaboration &amp; R&amp;D investments. Grants</i>	Technological training and promotion of business R&D.	To support the development of industrial research or experimental development projects in the Basque Country's business sector, both of competitive or strategic nature, and in fields of specialisation defined in the (Science, Technology and Innovation Plan 2020).	Companies (large companies, SMEs and micro-companies); sectorial or business associations organised as cooperative consortia; and also members of the Basque Science, Technology and Innovation Network in the case of start-up launching projects.	Basque Country	Horizontal	2016	68M€
<b>Basque Industry 4.0</b> <i>Investments. Loans</i>	Technological training and promotion of business R&D.	Support for Industrial Research and Experimental Development Projects that involve technology transfer from technology suppliers to industrial companies, in the realm of Electronics & ICTs	Industrial manufacturing companies	Basque Country	A.M.	2015 (only A.M)	2,1M€

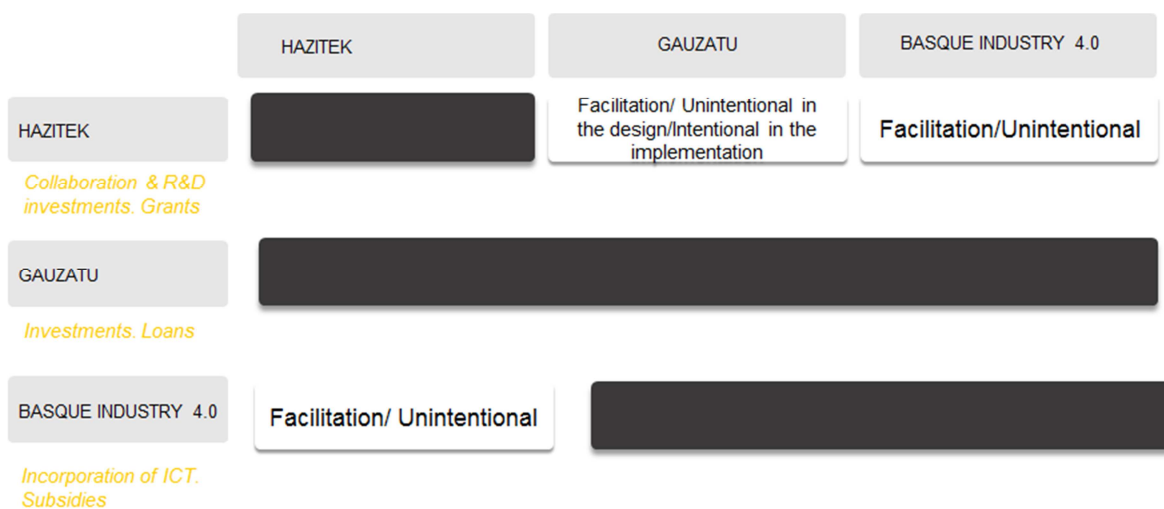
		applied to Advanced Manufacturing, which have a demonstrative effect and make it possible to accelerate the transfer of results from R&D projects on Electronics & ICTs into the market.					
<b>Gauzatu</b> <i>Incorporation of ICT. Subsidies</i>	Subsidies for the creation and development of SMEs with a Technology and/or Innovation Basis	Support for new investments in the following categories: Industrial Property and Patents, Computer Applications, Land and Natural Assets, Buildings, Technical Installations, Machinery, Tools, Equipment for information processing.	Industrial SMEs in extraction, transformation, production, technical services (linked to the product process) and related with the aforementioned.	Basque Country	Horizontal	2000	26M€

### Practical Combination of instruments

The characteristics of the selected policy mix are:

- Large portfolio of instruments from different levels
- Business-oriented policy-mix but also emphasis on R&D collaboration
- Predominance of direct instruments (e.g. grants for R&D projects) and economic instruments (complementarity with other policies (i.e. cluster policies))
- Some instruments implemented through Ministerial Agreements (multi-level approach)
- Instruments directed to Advanced Manufacturing also at sub-regional level
- Strong focus on direct measures (grants and loans) targeting firms (mainly SMEs)
- Instruments have different and complementary objectives, covering a whole range of Technology Readiness Level (TRL) from TRL 3 to TRL 7)

Figure 11. Basque Country minimix combination



### Policy mix responding the regional challenges

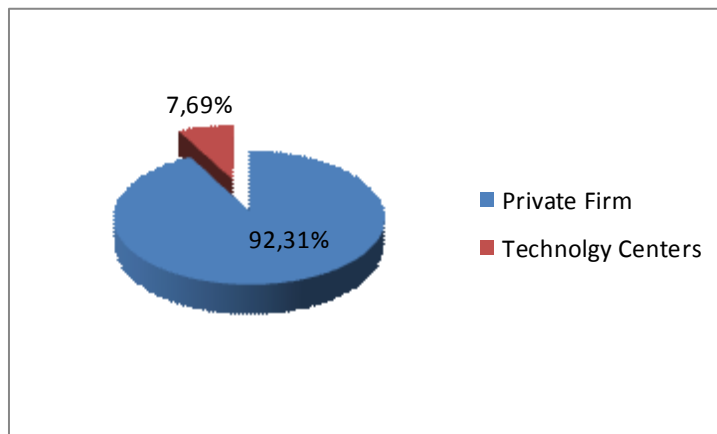
The Basque Country challenges addressed by the selected policy mix are:

- To coordinate business sector, scientific and technological agendas.
- Technology transfer R&D in Electronics & ICTs towards Industry
- To develop the means to produce and industrialize products and services based on emerging technologies.
- To shorten the deadlines from knowledge generation to the market.
- To industrialize in large scale products and processes based on emerging technologies.

### How beneficiaries combine instruments

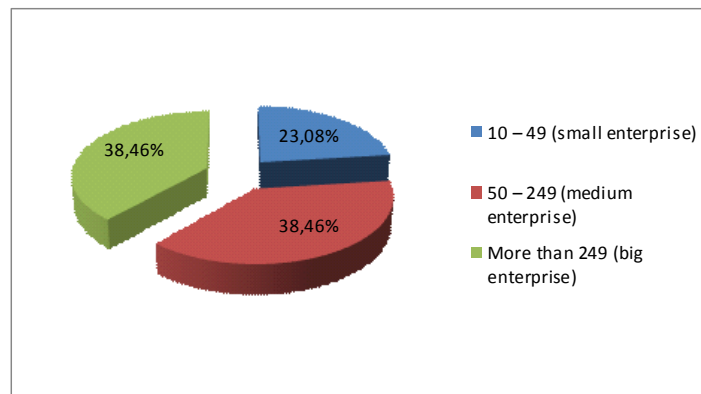
To analyse how beneficiaries combine the instruments, a focus group with six firms together with an exploratory survey (13 participants) has been conducted. 90% of the survey participants are companies; only one technological centre has participated. In the case of the focus group 100% of the participants were firms.

Figure 12. Type of organisation



More than two thirds of the participant's organisations at the survey are medium and big companies.

Figure 13. Size of organisation

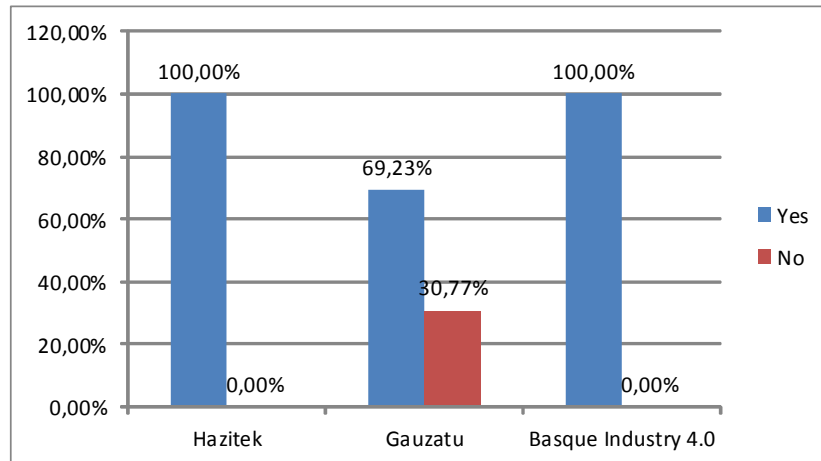


The three main challenges for these organisations in relation to innovation and advanced manufacturing (AM) in the last past three years are: lack of resources for research and development investments; lack of qualified workforce with required technical skills and the need of improving collaboration with universities and research centres. Other identified challenges are the increasing of global competition and the lack of qualified workforce with required technical skills.



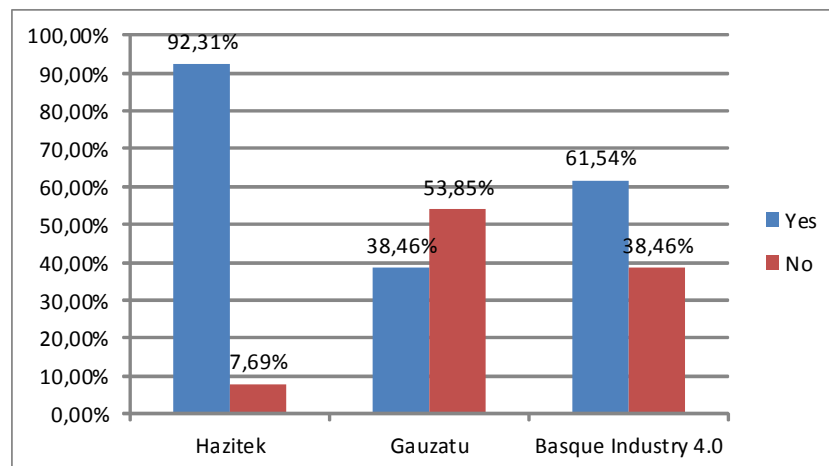
Regarding the knowledge about the instruments selected for Manumix project, both Hazitek and Basque Industry 4.0 are known by all the surveyed organisations; Gauzatu is known by almost three quarters of the participants' organisations.

Figure 14. Knowledge about minimix instruments



Talking about the use, Hazitek is the instrument that has been used more (92%); Basque Industry 4.0 has been used by 61% of the surveyed organisations, while Gauzatu has been used by 38% of the participants.

Figure 15. Use minimix instruments



The reasons to use the instruments have been mainly for financing the R&D and to collaborate with other organisations. The participants' combination of the instruments has been done intentionally for Hazitek and Basque Industry 4.0 and Hazitek and Gauzatu; the final aim of combinations is to fulfil their investments plans. They have declared the use in combination other programmes from the Spanish Government and the European Union.

The main results or benefits (real or expected) that the use of the selected instruments by the surveyed organisations have generated are: *to design new products and/or services and increase productivity of the organisation/firm.*

The main reasons for not using the instruments are: *instruments do not cover my specific needs or challenges; the mandatory monetary counterpart is too high and the ratio cost-benefit of the complete process is inadequate for my organization interest and the timetable for the call of the programmes/funds is inadequate regarding my interests.* On the other hand, the surveyed organisations have clear that the instruments have made possible to carried projects that without that support would not otherwise have the same scope or the same time frame.

The participant organisations have also stated the three main challenges that the organisation will face in the next 5 years related to innovation and advanced manufacturing: *Lack of resources for research and development investments, lack of qualified workforce with required technical skills and the increasing of global competition.*

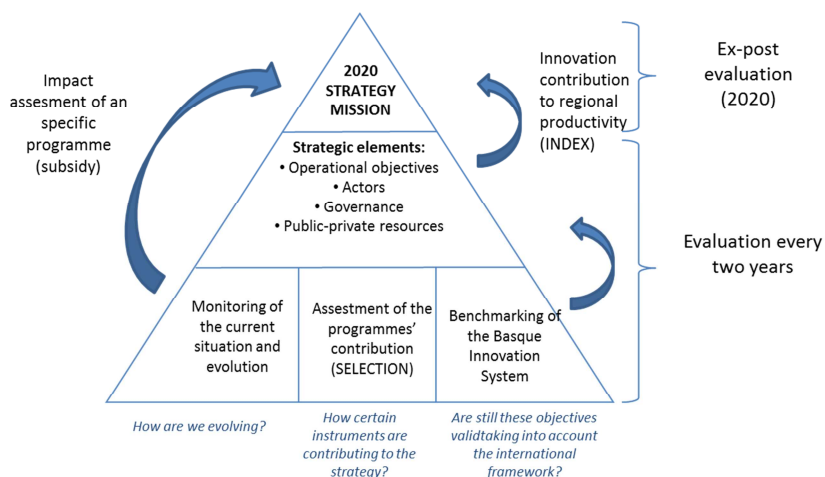
Talking about the future, suggestions about new program (s) /fund (s) that would contribute to organisations to face its main challenges in advanced manufacturing have been made: *to finance patents costs; synergies with European Framework programme and instruments oriented to technology innovation close to market.*

## 7. Evaluation

With regards to evaluation approach two different levels can be differentiated. First of all the evaluation model that has been implemented in the framework of the RIS3 strategy and led by Innobasque, the Basque Innovation Agency is represented in

Figure 16, and it is established in the framework of the Basque Science, Technology and Innovation Plan,. It proposes an integral evaluation and monitoring system of the regional innovation system, the strategy itself and some of the instruments that composed the innovation policy-mix. However, it doesn't incorporate the view of evaluating innovation policy-mixes and how this could contribute to the strategy-making process. Another area of improvement would also be the incorporation of more participatory evaluation processes, which includes different actors from the quadruple helix.

Figure 16. RIS3 evaluation and monitoring



Source: Innobasque

In addition to this, the Basque Government is currently implementing a new system to monitor and evaluate some support programmes. Specifically, these are the Basque Government's R&D programmes that are managed by SPRI. In particular, the definition of the programme monitoring system indicators (called SIME) focuses on those programmes that support the Basque Science, Technology and Innovation Network and the programmes to support business R&D.

The system concept is divided into three basic levels. The first one relates to the selection of the information (indicators) that is required to assure the development of the functions for monitoring and evaluating support for R&D. The second level defines the mechanisms for measuring the previously-defined indicators, and the third level defines a system for the periodic analysis and reporting.

Work is underway to implement into the system the elements needed to monitor and evaluate the programmes, based on their level of alignment and on their contribution to the strategic priorities defined in the STIP 2020 and the RIS3 of the Basque Country. A plan for implementing the defined system to evaluate advanced manufacturing strategy is also under way. This effort will require adapting the existing procedures and systems to accommodate the management of R&D support (i.e. new forms that include the new indicators, the recording and capture of information, etc.).

Figure 17. Programme monitoring system indicators (SIME)

Type of indicators	RESOURCES (mobilised resources)	RESULTS (achieved by the end of the projects)	IMPACT (achieved when results are put to use)
Programmes supporting the RVCTI	<ul style="list-style-type: none"> <li>• Subsidy granted</li> <li>• Mobilised R&amp;D expenditure</li> <li>• No. of supported projects</li> <li>• No. of researchers</li> </ul>	<ul style="list-style-type: none"> <li>• New knowledge</li> <li>• Patents</li> <li>• Publications</li> <li>• Employment in R&amp;D</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge transfer to companies</li> </ul>
Programmes supporting companies	<ul style="list-style-type: none"> <li>• No. of supported companies</li> <li>• Establishing partnerships</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Scientific-technological results (new or improved products/processes)</li> <li>• Improvements to the R&amp;D capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Employment</li> <li>• Turnover</li> <li>• Internationalisation</li> </ul>

Source: SPRI (2016)

Initiatives of monitoring and evaluation in the Basque region have been incorporated in the agenda especially by the SPRI and Innobasque at regional level, and the Provincial Councils. However, these initiatives remain isolated from each other and therefore there is a strong need of building a sound evaluation system from a holistic perspective, taking into account synergies within and across the region. This would mean establishing a system to monitor and measure not only the system and its agents' performance, but also to evaluate the existing policy-mix and its impacts, and to evaluate the development of the entrepreneurial discovery process, in order to learn and take decisions accordingly (Magro et al., 2016).

Table 3. Basque Country minimix evaluation features

Scope of the evaluation system	<ul style="list-style-type: none"> <li>-RIS3</li> <li>-Policy Instruments</li> </ul>
Purpose of the evaluation system	<ul style="list-style-type: none"> <li>-Obtaining data on instruments.</li> <li>-Impact assessment of specific programmes.</li> <li>-How certain instruments can contribute to the RIS3 strategy.</li> </ul>
Ex- ante evaluation	<ul style="list-style-type: none"> <li>-Yes</li> <li>--RIS3: monitoring of the previous situation and evolution</li> </ul>

<b>Monitoring</b>	- Instruments monitoring is run by SPRI  - Basque RIS3 monitoring is run by Innobasque
<b>Ex-post evaluation</b>	-Yes  -Innovation contribution to regional productivity



## 8. Conclusions

Advanced Manufacturing, along with Energy and Biosciences, has been defined as a priority area in which the Basque Government wants to specialise its research and innovation policy. This goal is explicitly included in the Basque RIS3 strategy.

Under the RIS3 framework, Basque region has developed a definition exercise for an advanced manufacturing strategy. The mission of the strategy is to strengthen the positioning of the Basque Country, as an industry-based economy, by boosting knowledge-intensive manufacturing, with a country perspective, with optimum conditions for manufacturing, thanks to the existence of a skilled industrial fabric, highly trained scientific and technological experts and highly qualified human capital.

It defines Advanced Manufacturing as the generation and application of knowledge, experience and cutting-edge technology in the creation of high value added processes, products and related services with great potential for wealth and job creation. It includes materials, production processes, production means and production systems and it covers pre-production, production and post-production stages.

The general policy mix it's a large policy mix from a multi-level perspective, since it presents 16 action lines to be implemented around six core themes: generating know-how; technological development, scaling up; non-technological innovation; education and training and dinamisation. It applies a transversal approach involving various Government levels and public companies to undertake responsibility for the programmed actions. The governance system is a mirror of Basque Country administrative complexity, and space should be adjusted to improve the coordination mechanisms among instruments from different levels.

The instruments selected for Manumix cover applied research transference to commercial exploitation and collaborative R&D instruments oriented to firms, going from TRL 3 to TRL9. The three selected instruments have been chosen as instruments that help firms to elevate their TRL, and although it has not been intentionally designed as an intended- policy mix; beneficiaries firms combine it intentionally, in addition to combination with other instruments at Spanish and European level.

Evaluation and monitoring, both instruments and strategies, is being improved during the last years; nevertheless it is necessary to evaluate synergies and instruments combination, in order to enhance decision-making by incorporating evaluation and data analysis. Likewise advances in evaluation governance should be done.

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## Annex 1. Types of relations among policy measures.

**Table 1.** Five types of relations among policy measures.

Relation	Description
Precondition (P)	Defined as a relation that is strictly required for the successful implementation of another policy measure. For instance, if policy measure B is a precondition to policy measure A, the successful implementation of policy measure A can only be achieved if policy measure B is successfully implemented beforehand. The precondition relation is a direct relation.
Facilitation (F)	In a case where a policy measure ‘will work better’ if the outcome of another policy measure has been achieved, the relation is considered as a facilitation relation. For instance, policy measure B facilitates policy measure A when policy measure A works better after policy measure B has been implemented; however, policy measure A could still be implemented independently of policy measure B. The facilitation relation is also a direct relation.
Synergy (S)	A special case of facilitation relation in which the ‘will work better’ relation is bidirectional (undirected relation). It can be argued that such a relation can be treated as a two-way facilitation; however, we believe that treating this relation as a separate type is advantageous, as it suggests a higher effectiveness of both of the policy measures having the synergetic relation vis-à-vis the overall policy.
Potential contradiction (PC)	A potential contradiction exists between policy measures if the policy measures produce conflicting outcomes or incentives with respect to the policy target under certain circumstances, hence the contradiction is ‘potential’. This relation is undirected.
Contradiction (C)	In contrast to the conditional nature of potential contradiction, the contradiction relation is defined when there are ‘strictly’ conflicting outcomes of incentives between policy measures. Similar to the potential contradiction relation, this relation is undirected.

Source: Araz Taeihagh, Moshe Givoni, René Bañares-Alcántara (2013)