Euskadi 2030 Science, Technology and Innovation Plan

EUSKADI 2030 STIP

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Presentation

The new "Euskadi 2030 Science, Technology and Innovation Plan" (2030 STIP) represents Euskadi's strategic commitment to Research and Innovation. This commitment has been maintained over the last three decades and now, with 2030 as the horizon, we are presenting this new Plan to drive R&D&I as a lever for the Basque economy to improve its competitiveness and make progress on the path of sustainable growth.

We have carried out an intense public-private consultation process to share the key local and international elements of the current context, going into detail on the socioeconomic and competitive situation of Euskadi. Following this process and an analysis and evaluation of the results of the "Euskadi 2020 STIP", we approved the basis of this new Plan. This analysis has enabled us to assess the current situation of the Basque Science, Technology and Innovation System, evaluating both its achievements and the challenges it is still facing.

Our vision is that Euskadi should take its place among the most advanced regions of Europe in Innovation by 2030, with the objective of improving our people's standard of living and the quality of their jobs. This is a shared strategy, involving public bodies, companies, universities, research centres, technology centres and socioeconomic stakeholders. The Basque philosophy of "*auzolana*" (community work) is also necessary to drive the "knowledge+innovation" tandem, at the service of development and the improvement of overall competitiveness.

The presentation of this Plan signals the start of the decade, and above all, a new phase. We are learning many lessons from the Covid-19 crisis; one of them is the need to strengthen investment in science, technology and research in a sustained manner over time from a perspective of cooperation. Advances in biosciences and genetics, micro- and nano-technologies or the digital revolution propitiate a scenario of progress that we had known previously. We consider the crisis caused by Covid-19 as an opportunity, and we need to join forces to successfully undertake the triple global transition: technological-digital; energy-climate and social and health. We have an opportunity because emerging from this crisis will lead to an in-depth transformation and a better future for countries, businesses, industries, societies and individuals.

The new 2030 STIP is part of the Agenda Euskadi Basque Country 2030, which contains our commitment to the Sustainable Development Goals of the United Nations. This new Plan falls within a General Strategy for the next decade under four main references. First, the Horizon Europe Framework Programme, aimed at strengthening the innovative capacity and the scientific and technological base of Europe while also improving its competitiveness. Second, the Digital Europe Programme, which supports the digital transformation of the economy, industry and society. Third, the European Green Deal, which responds to the challenges related to climate change and environmental degradation. Fourth, our *Berpiztu* programme for kick-starting the economy and employment, which focuses on dealing with the socioeconomic consequences of the crisis caused by Covid-19 in Euskadi.

Through this new Plan, Euskadi is defining and building a new future from a shared perspective. We have selected three strategic pillars: "Scientific Excellence", "Technological Leadership in Industry" and "Open Innovation". We have also defined "Talent" as the core of this strategic architecture. We have set ourselves four main operational objectives: "Focus on Results", "Development of Innovation", "Internationalisation", and "Promotion of talent and women researchers". The Plan is evolving, and focuses on the "RIS3 Euskadi" smart specialisation strategy, driving the implementation of "Cross-Cutting Tractor Initiatives" and defining a map of "Core Technologies". Given the circumstances, the health challenge has acquired particular importance. This, together with the digital and ecological transitions, make up the investment horizon of the Next Generation EU Programme for recovery and resilience.

This new "Science, Technology and Innovation Plan Euskadi 2030" reflects and represents the commitment of Basque society to ensuring a better future. Our commitment is to drive science, technology and innovation to speed up the transition to a digital, green and inclusive Euskadi.

Iñigo Urkullu Renteria
Lehendakaria (President)

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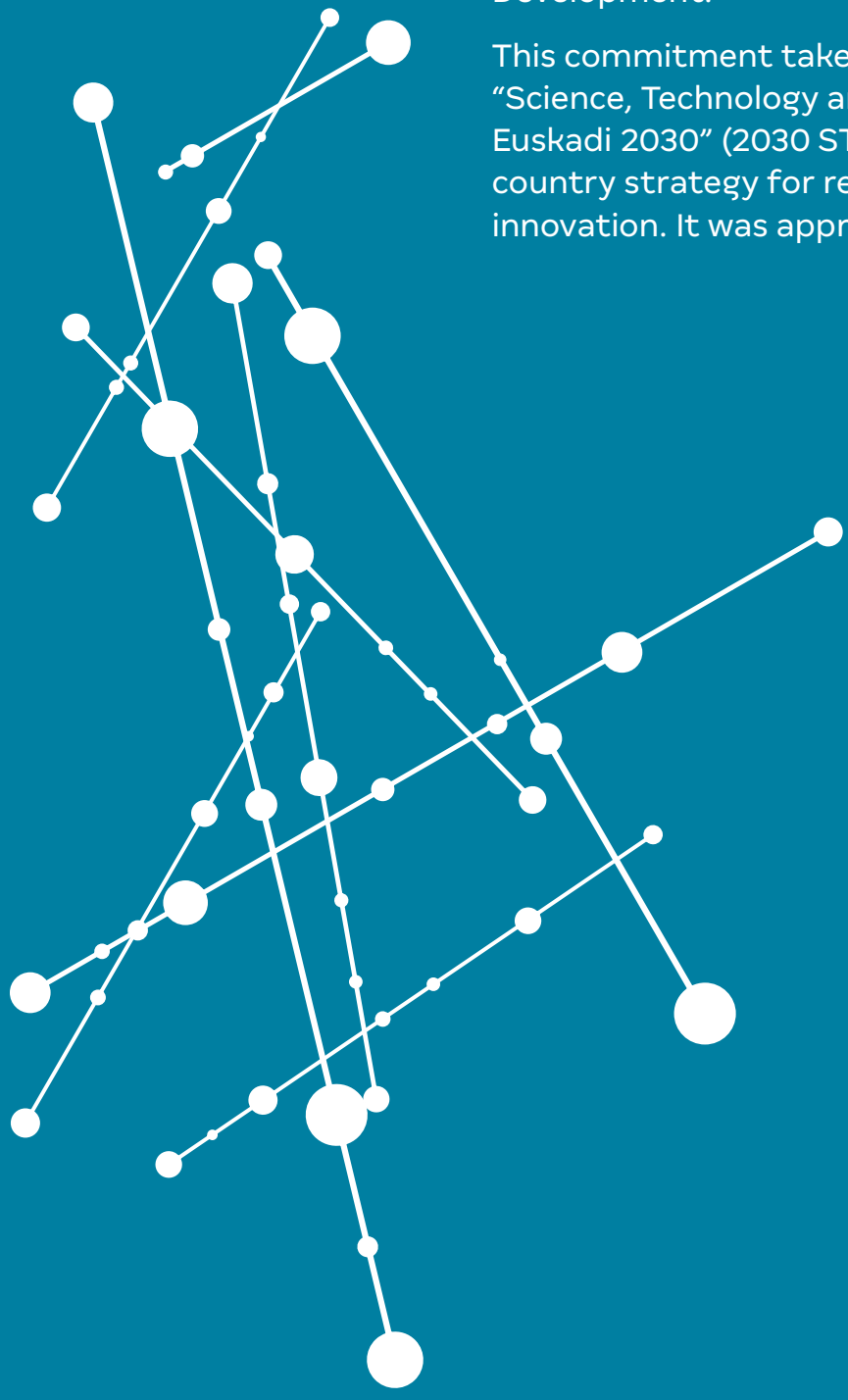
Introduction

The Basque Government has maintained a strategic commitment to research and innovation for several decades. This has led to a new boost to its R&D&I policy, which acts as a lever for the Basque economy to improve its competitiveness and make progress in terms of Sustainable Human Development.

This commitment takes the form of the new "Science, Technology and Innovation Plan Euskadi 2030" (2030 STIP), which establishes a country strategy for research, development and innovation. It was approved in December 2019.



The situation arising from Covid-19, a health crisis that has led to a socioeconomic crisis that cannot be compared to previous ones due to its speed and extent, is a global crisis that has triggered a radical change worldwide in both the present state of the economy and its future prospects. According to forecasts by the OECD, the world economy will suffer a sharp contraction of 4.2% in 2020, much worse than during the 2008–09 financial crisis (-1.7% of the world's GDP). The impact and extent of the crisis caused by Covid-19 will be greater in Europe (-7.5% of GDP) than in the rest of the world, with special impact on the Spanish State (-11.6% of GDP). The Basque economy will also be strongly affected by the crisis, both in terms of economic activity -with an expected fall in GDP of 9.4% in 2020- and the effect on employment, with a forecast increase in the unemployment rate up to 10.3%.

The crisis caused by Covid-19 has occurred in an international context marked by a series of mega-trends that, far from disappearing, will be accentuated and represent a challenge at both the global level and at our regional level. In this respect, Euskadi summarises these mega-trends in a triple transition: technological-digital, energy-climate and social-health, one that has the ability to transform the future of countries, businesses, industries, societies and individuals.

This new context has highlighted the need to be able to call on health research capabilities in order to understand the behaviour of Covid-19 and define the most suitable measures and treatments to combat it or find a cure or vaccine. It has also highlighted the need for collaborative work among different stakeholders to respond to the needs generated during the pandemic, with the consequent impact on a range of socioeconomic sectors.

In the economic field, drastic measures are being designed and combined to try to minimize this impact, especially those related to maintaining employment and ensuring company liquidity, in the form of reactivation (kick-start) measures. The launch of new products and services, access to new market niches or new ways of organizing work will be key factors in positioning Basque companies in the new value chains.

For Basque society to emerge from the health crisis stronger, ambidextrous strategies need to be developed that combine short-term measures with other long-term ones. Science, technology and innovation is one of the vectors of these strategies, both in the field of health and in the economy.

The 2030 STIP is the basic tool of the Basque Government to drive R&D&I policy in Euskadi. It is not a one-off plan, but part of a series of plans and strategies that make up the context of reference: the 'Agenda Euskadi Basque Country 2030', which contains Euskadi's commitment to the Sustainable Development Goals; the new 'Horizon Europe' European framework programme, focused on strengthening the capability to innovate of Europe, giving priority to strengthening the scientific and technological base and driving innovation, competitiveness and employment; the 'Digital Europe' Programme, which supports the digital transformation of the European economy, industry and society; the 'European Green Deal', to overcome the challenges related to climate change and environmental degradation; and the Berpiztzu programme of the Basque Government for kick-starting the economy and boosting employment, addressing the socioeconomic consequences of the health crisis that Euskadi is experiencing.

The 2030 STIP plan sets out to drive science, technology and innovation to speed up the transition to a digital, green and inclusive Euskadi. It is a long-term plan covering a decade, a timeframe that gives certainty to the Basque Science, Technology and Innovation System so that it can undertake ambitious projects that respond to the transitions Euskadi is facing, and achieve tangible results for Basque citizens, companies and society in general.

However, due to the seriousness and extent of the health and economic consequences of the pandemic, a shorter timeframe is also needed in which science, technology and innovation will play a key role in overcoming the problems.

1.1. Preparation process of the 2030 STIP

The preparation of the new Science, Technology and Innovation Plan started in early April 2019 when the *Lehendakaritza* (Governing Council) set up an Operational Working Group charged with preparing a first draft of the 'Strategic and Economic Basis of the Euskadi 2030 STIP' document. In the fifth year of implementation of the 2020 STIP, once the deployment of the RIS3 Euskadi strategy had been completed, it was considered appropriate to lay the groundwork for the strategic plan for 2021-2030 in the field of science, technology and innovation.

As a starting point, the team can call on a series of monitoring and evaluation reports that have been prepared over the five years of implementation of the previous STIP, following its approval in 2014. These internal and external reports include the main successes achieved and the elements to be improved, a comparison with the situation in the rest of Europe, and the contribution of the instruments and programmes in the policy mix to the achievement of the objectives set. This information is complemented by the preliminary design of the new European framework programme on research and innovation, Horizon Europe, as well as an outlook report drawn up by Innobasque (the Basque Innovation Agency) containing the main global mega-trends and their potential impact on Euskadi.

A first draft was drawn up containing the economic and strategic terms of the new 2030 STIP, the result of the work done by the Operational Working Group with input from the Steering Groups responsible for the deployment of the RIS3 Euskadi strategy. After analysing the content with the Advisory Scientific Committee and the Inter-Departmental Committee -two of the governing bodies of the STIP- a preliminary presentation of the document was made in the Basque Council of Science, Technology and Innovation meeting of 25 June 2019. The Council issued a favourable opinion on this preliminary document and requested its analysis and enrichment with the main stakeholders in the Basque Science, Technology and Innovation System prior to submitting it for definitive approval. The Council also recommended that the Basque Government should consolidate the budgetary effort made to support R&D&I and, if possible, increase it in the 2030 STIP with the aim of placing Euskadi among the most advanced regions of Europe in the field of innovation.

The next step was a process of analysis of the strategic and economic lines of the new Plan in the preliminary document, which lasted several months. It contains input from the Basque Science, Technology and Innovation Network (universities, research centres, technology centres and health research institutes) as well as from some companies and the Steering Groups. More than 200 individuals from 157 scientific, technological and business organisations have participated in the process in 18 working meetings. On 10 December 2019 the Basque Council of Science, Technology and Innovation approved the definitive document, titled "Economic and Strategic Lines of the Euskadi 2030 STIP" (for more details see Annex 1: "Process of Analysis of the 2030 STIP").

Starting from the basis approved by the Council, the process of preparation of the definitive document of the new Science, Technology and Innovation Plan EUSKADI 2030 started in January 2020. As a result of the arrival on the scene of the Covid-19 pandemic, the process was temporarily halted to focus efforts on combating the resulting health, economic and social crises. This was also done to calibrate the extent and duration of these crises better, together with their possible impact on the terms and lines of work of the STIP.

With the latest information available on the socioeconomic effects of the crisis, work on the 2030 STIP restarted in September 2020. A review of the economic scenarios was incorporated, together with some short-term lines of action aimed at combating the impact of Covid-19. The long-term vision, the strategic pillars and the RIS3 areas of specialisation established in the background document were maintained, as was its orientation towards solving the main social challenges. The health challenge acquired particular importance, as did aspects related to the digital and ecological transitions, which is where Europe will dedicate a large part of the funds in the Next Generation EU programme to recovery and resilience.

The process of analysis of the content of the new 2030 STIP continued in the final months of 2020 and early 2021. It was then presented to the stakeholders of the Basque Network of Science, Technology and Innovation (BNSTI) and to companies, the Steering Groups, the Advisory Scientific Committee and the Inter-Departmental Committee (for more details see Annex 1: "Process of Analysis of the 2030 STIP").

Once this second process of analysis was completed and the contributions received incorporated into it, a final consensus document was drawn up for presentation in the meeting of the Basque Council of Science, Technology and Innovation on 16 February 2021. This document incorporating the recommendations of the Council was sent to the Governing Council on 23 February for its definitive approval and referral to the Basque Parliament for its information.

1.2. Content of the document

The document titled "Science, Technology and Innovation Plan EUSKADI 2030" develops the following content:

- First, in the "Evaluation of the results of the Euskadi 2020 STIP" section of the plan, the current situation of the Basque Science, Technology and Innovation System is evaluated through a dual process of evaluation (internal and external) based on the implementation and results of the previous Plan. To do this, the level of budget implementation and fulfilment of operational objectives are taken into account, together with the evolution of the RIS3 areas of specialisation and the contribution of other support programmes and instruments ('policy mix'). The process ends with a summary of the main achievements made during the six-year period of the previous STIP, as well as of the main challenges still pending.

- Next, the socioeconomic and competitive situation of Euskadi is described in the section titled "Context and diagnosis of the situation", plus the local and international context in which the plan is designed. First, the global mega-trends and the three transitions that will have an impact on Euskadi in the medium and long term are described. Second, a description is made of the socioeconomic and competitive situation of Euskadi. Finally, the strategic context in which the plan is located is described. To do this, a brief review of the main strategies and associated plans is made: on one hand, the strategies and plans at the local level, and on the other, European strategies and programmes such as the new Horizon Europe programme.

- Based on this information, the "Strategic lines of the Plan" are developed. They include a vision for 2030, the 3+1 strategic pillars that will help to achieve it, and the four main operational objectives, each with its respective indicators and targets for the years of implementation of the Plan.

- The next step is the definition of the basis of the new 'RIS3 Euskadi' in the section "Basis for smart specialisation RIS3 Euskadi 2030". Specifically, the evolution of the areas of specialisation is described, leading to the establishment of 3 strategic priorities and 4 areas of opportunity. A new instrument is also introduced to strengthen the collaborative work among the RIS3 areas, called 'Cross-Cutting Tractor-Effect Initiatives'. Finally, a Map of Basic Technologies required to take on future challenges is presented; it is common to all the areas.

- In the "Support instruments for R&D and innovation" section a description is made of the future orientation of the policy mix that supports the deployment of the Plan. An overview is provided of the support instruments and programmes currently applied by the Basque Government and the Territorial Administrations, as a starting point for the evolution.

- Finally, in the section titled "Governance of the Basque Science, Technology and Innovation System" the model of internal governance and international cooperation is described, as well as the system for the monitoring, follow-up and evaluation of the Plan. In the section titled" Economic fundamentals of the 2030 STIP", the economic basis that will guide the implementation of Plan throughout its term of validity are described, including the budget allocation to research and innovation by the Basque Government.

2.

Evaluation of the results of the Euskadi 2020 STIP

The Euskadi 2020 STIP set out to "improve well-being, sustainable economic growth and employment in the Basque country through a research and innovation policy based on smart specialisation and improving the efficiency of the Science, Technology and Innovation System".

The implementation process takes two European references as a starting point: the Europe 2020 strategy and the RIS3 smart specialisation strategy approved by the European Commission as a compulsory requirement for access to European Regional Development Funds (ERDF). Following these guidelines, an "RIS3 Euskadi Strategy" was drawn up as an integral part of the 2020 STIP, defining three strategic priorities and four areas of opportunity. This was the result of an analysis made with the different stakeholders in the Basque Network of Science, Technology and Innovation and the business sector, based on the methodology established by the European Commission.

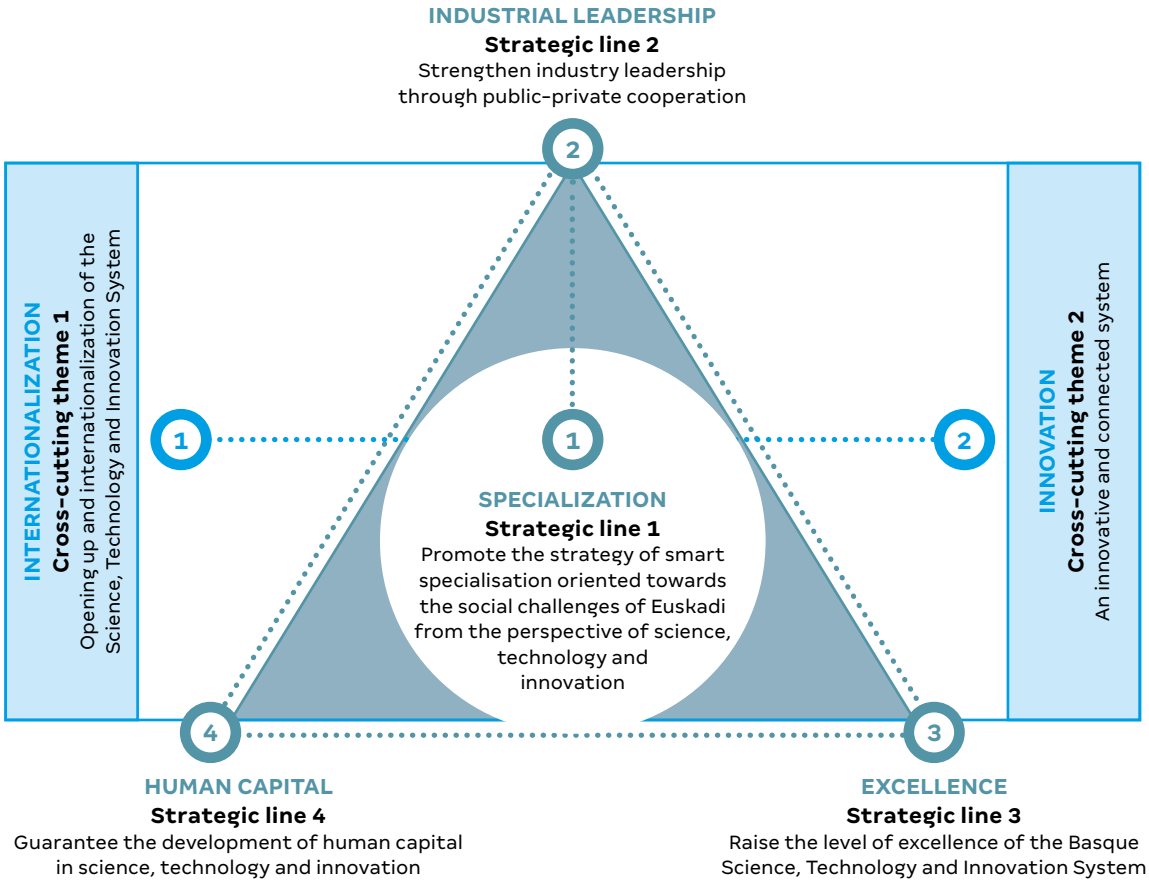
The Euskadi 2020 STIP, in line with the RIS3 methodology, not only constituted a Plan but also a process of collective construction that -during its implementation- combined the establishment of objectives and budget allocations by public bodies (top-down policies) with the contribution of the stakeholders in the System to define the specialisation priorities (bottom-up policies).

The architecture of the 2020 STIP was developed through four strategic lines and two cross-cutting themes (see Figure below), specified in six operational objectives:

1. Concentrate resources and investments in R&D&I in the areas of specialisation.
2. Strengthen basic research and experimental implementation.
3. Make the Basque Science, Technology and Innovation System results-focused.
4. Increase fund-raising for R&D&I on the international level.
5. Increase the number of companies that carry out innovation.
6. Improve the expertise of researchers.

A series of indicators is linked to each objective to assess the level of compliance with the targets for 2020. Other indicators of effort are added to make up the dashboard of the Plan.

Figure 1: Strategic lines and cross-cutting themes of the Euskadi 2020 STIP



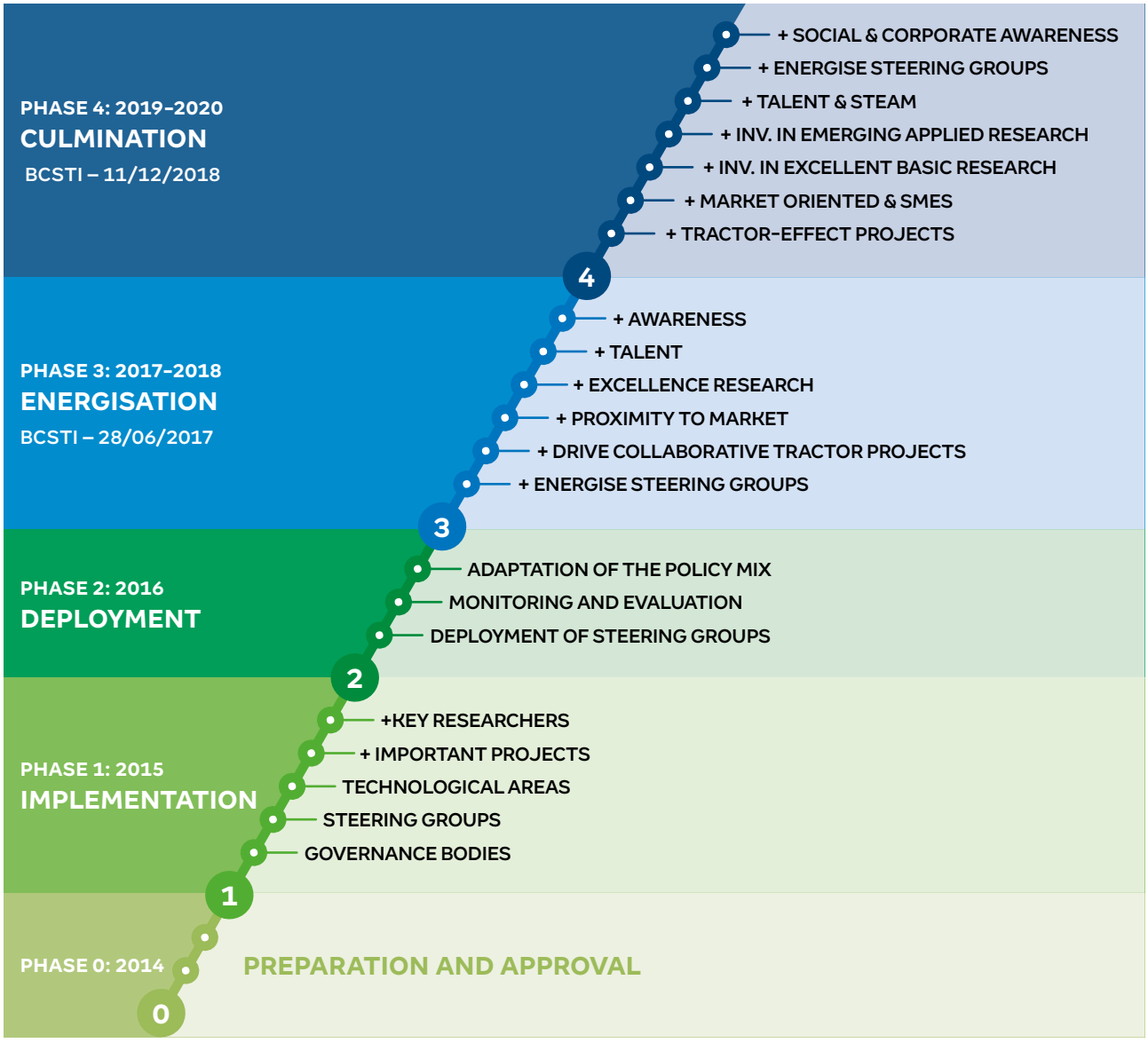
Source: *Lehendakaritza* (Governing Council), Basque Government.

The sections below include a description of the process of implementation of the Euskadi 2020 STIP together with an evaluation of the main results obtained, i.e. the result of the monitoring and evaluation of the activities carried out. To do this, the latest information available at the time of preparation of this document has been used. In most cases, it corresponds to 2019, prior to the appearance of the Covid-19 pandemic.

2.1. Process of deployment of the RIS3 Euskadi strategy

Once the Plan was approved in late 2014 (Phase 0), the RIS3 Smart Specialisation Strategy for Euskadi was deployed in four phases: 1) Implementation: the governing bodies and the Steering Groups that will drive the strategy are set up; 2) Deployment: the thematic working groups are created and the monitoring and evaluation of the Plan begins, as well as the adaptation of the instruments of the policy mix; 3) Energisation: the work of the Steering Groups is supported and a series of additional objectives is established by the BCSTI. Among these, socialisation and communication to SMEs, and 4) Culmination: the deployment of the strategy is completed and further work is done on the additional objectives established, driving -among other things- applied research in emerging areas and a STEAM strategy to develop careers in science and technology.

Figure 2: Deployment of the RIS3 strategy



Source: *Lehendakaritza*, Basque Government.

2.2. Budget implementation of the 2020 STIP

The Euskadi 2020 STIP needed a strong allocation of financial resources, both public and private, to achieve the objectives set. The initial estimate of the Plan meant the availability (between 2014-2020) of more than 11,000 million euros for investment in activities of research and technological development (R&D).

Taking into account the latest information published by Eustat, real investment in R&D in Euskadi in 2014-2019 was 8,122 million euros, compared with the 9,910 million initially forecast. This is equivalent to an overall level of compliance of 88% (90% if we account for items of support for innovation and entrepreneurship by the Territorial Administrations as investments[1]). Analysing the behaviour of the different sources of funding, we would highlight the investment effort by the Basque Government, which stands at 106% against the planned figure. International funding also, which reached 100% thanks, above all, to the funds raised under Horizon 2020, the European framework programme for research and innovation. However, investment by companies has not reached the initial level forecast; it stands at 82% against the planned figure (see Table 1).

Table 1: Budget implementation scenario 2014-2019 of the Euskadi 2020 STIP

Investment in R&D (figures in million euros)	Initially forecast 2014-2019	Advance on implementation 2014-2019	% Compliance
Public finance	**3,088**	**2,980**	**97%**
Basque Govt.	**2,304**	**2,442**	**106%**
Territorial Administrations	334	122 *+150*	36% *81%*
Central Govt.	450	417	93%
Company finance	**5,442**	**4,477**	**82%**
International finance	**662**	**664**	**100%**
TOTAL	**9,191**	**8,122**	**88%**
TOTAL + Territorial Administration budgets **Support for innovation and entrepreneurship**		***8,272***	***90%***

Source: *Lehendakaritza*, Basque Government with data from Eustat and the Territorial Administrations

The data projection prior to 2020 would imply a level of budget implementation for the full period of implementation of the Plan of 87% (89% if we count investments by the Territorial Administrations). However, this projection does not include the impact of the Covid-19 pandemic on investments in R&D for 2020. As in the case of GDP, the impact will be considerable.

[1] These items are not part of the expenditure on R&D accounted for by Eustat, but they were taken into account to calculate the initial forecasts of the Euskadi 2020 STIP.

2.3. Compliance with the operational objectives

Below there is an assessment of the evolution of the indicators linked to the operational objectives of the Plan. These make up the governance dashboard of the Plan, designed for decision-making purposes. To do this, the present situation of each indicator is compared with the latest value available for it on the date this report was prepared, bearing in mind the target value established for 2020 (see Table 2). In some cases the overall evolution of the indicator worldwide is taken into account when it is considered that it affects the evolution in Euskadi.

Table 2: Compliance with targets within operational objectives

Operational objectives	Indicator		Source	Initial situation	2014	2015	2016	2017	2018	2019	Meta 2020	State of progress
1. Concentrate resources and investments in R&D&I in the areas of specialisation	1.1	% research of the multi-focused TTCCs and CRCs aligned with the RIS3 strategic priorities	BNSTI	94.52% 2014	94.5%	93.9%	94.9%	95.6%	97.1%	98.0%	90.0%	
2. Strengthen fundamental research and experimental development	2.1	R&D&I activity mix (% Fundamental research/ % Industrial research/ % Experimental Development)	Eustat	14/47/39 2012	15/44/41	17/44/39	16/44/39	15/42/43	16/41/43	15/42/42	15/30/55	
3. Make the Science, Technology and Innovation System results-oriented	3.1	Indexed scientific publications	Ikerbasque	5,028 2013	5,669	5,649	5,962	6,092	6,264	6,657	7,500	
	3.2	% of scientific publications indexed in the first quartile	Ikerbasque	53.17% 2013	54.6%	56.4%	5.7%	56.9%	59.0%	59.3%	55.0%	
	3.3	EPO patent applications	European Patents Office	195 2014	195	192	209	212	220	194	270	
	3.4	% of sales new products in turnover	Eustat	12.73% 2010	14.7%	18.7%	18.5%	19.1%	14.9%	18.3%	15.0%	
4. Strengthen the capture of international funds for R&D&I	4.1	% of foreign financing of R&D	Eustat	5.2% 2012	7.7%	7.8%	7.4%	8.4%	9.0%	8.7%	8.0%	
Promote Basque participation in H2020	4.2	% of Basque funding on the total funds from the framework programme	Innobasque	0.89% 2013	1.7%	1.3%	1.2%	1.3%	1.1%	1.3%	1.0%	
Attract international private investment in R&D	4.3	Annual international private R&D financing	Eustat	6 M€ 2012	20M€	15 M€	12 M€	14 M€	19 M€	16 M€	18 M€	
5. Increase the number of innovative companies	5.1	Innovative companies with more than 10 employees on the total	Eustat	46.1% 2012	45.0%	45.6%	44.1%	44.2%	40.7%	42.2%	50.0%	
6. Improve the skills of researchers	6.1	% of doctors on the total of research personnel	Eustat	29.0% 2012	29.4%	30.4%	31.0%	32.4%	31.2%	30.9%	35%	
	6.2	% of doctors on the total of researchers in companies	Eustat	8.6% 2013	7.4%	8.7%	8.1%	10.4%	8.6%	8.9%	10.0%	

Source: *Lehendakaritza*, Basque Government. Follow-up reports of the Euskadi 2020 STIP[2].

[2] Latest data available at the time of publication of the Plan. Indicators 3.4 and 5.1 show a break in the historical series due to the implementation of the new Oslo Manual 2018.

In summary, the main conclusions are shown below:

- In general, 9 of the 12 indicators have evolved positively during the 2014-2020 period, and 6 indicators have surpassed the target set for the last year of the STIP.
- As regards **specialisation**, investments have been increasingly concentrated in the priorities defined in the RIS3 Euskadi strategy, reaching 98% in 2019 (above the 90% that had been set as a target)[3].
- With regard to the **activity mix**, the weight of basic research was 15% in 2019, meeting the target set. The weight of experimental implementation, linked to business research close to the placing of its results in the market, stood at 42%, below the established objective of 55%.
- As for the **results** of the Basque Science, Technology and Innovation System, we would highlight the percentage of **sales of new products** on turnover, which measures one of the main aims of business-based innovation. This indicator stood at 18.3% in 2019, easily passing the set target of 15%.
- In the scientific results, the volume of **indexed scientific publications** per annum rose by over 30% to 6,657 in 2019. This growth has taken place in a context of a slowing down of world scientific production. Moreover, the percentage of scientific publications in journals in the first quartile stood at 59.3%, exceeding the target of 55%, which reflects their level of excellence.
- Furthermore, the **industrial property** of the results of research, measured against the number of European patent applications, grew slightly during most of the period of implementation of the Plan, although it fell back strongly in 2019, practically returning to its initial 2014 figure (194 applications). Historically, Basque industrial companies have not tended to apply for patents, preferring other protection modalities such as trade secret.
- With regard to the **internationalisation** of the system, the weight of foreign financing in R&D has increased considerably, reaching 8.7% in 2019 to pass the set target of 8%. This increase has mainly been based on higher international public funding, with private funding showing a more irregular evolution.
- In relation to the percentage of **companies that innovate**, this figure fell during the implementation of the Plan to 42.2% in 2019, well below the target of 50%. The methodological update of the new Oslo Manual 2018 negatively affected the figure for 2018.
- Finally, regarding the **expertise of research personnel**, the percentage of doctors on the total of researchers grew slightly to 30.9% in 2019, below the target of 35%. In companies this percentage has hardly grown over the period, and it has varied quite considerably over the years.

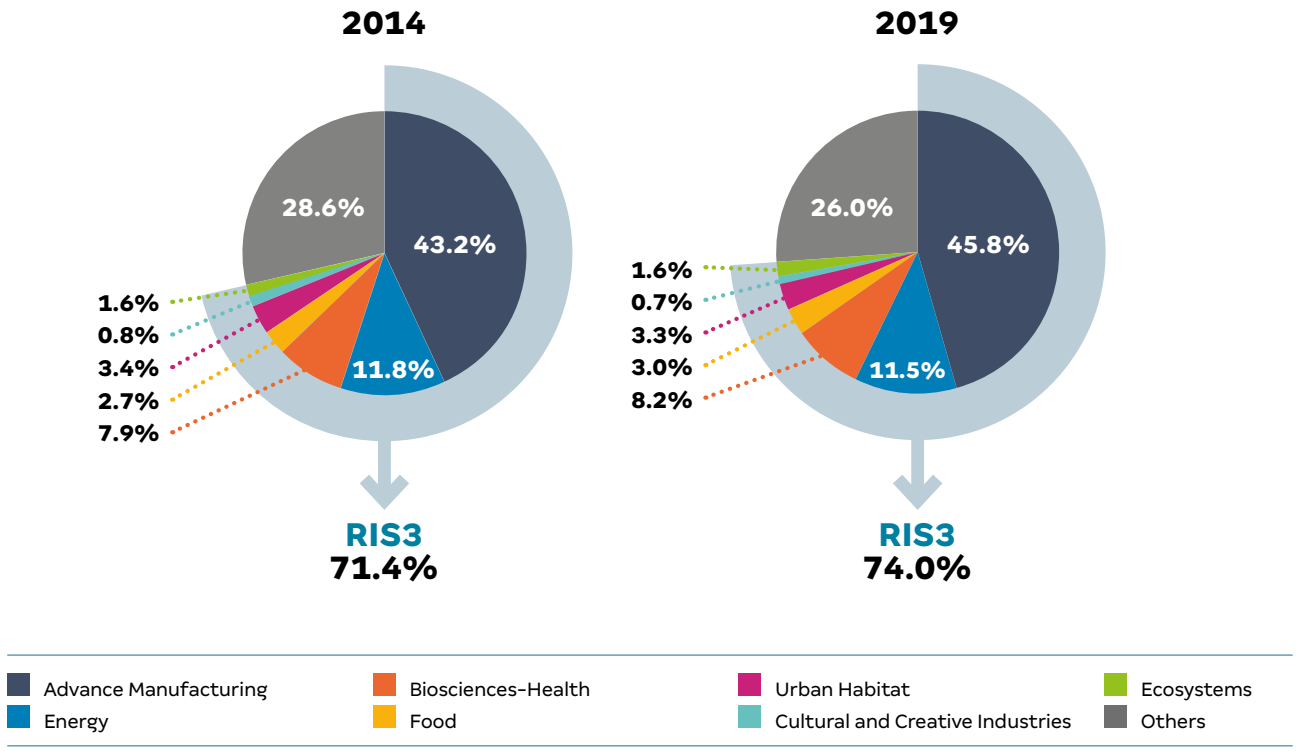
[3] The initially established indicator covered the entire BNSTI. However, a lack of information has meant that it can only be calculated for certain stakeholders in the BNSTI.

2.4. Evolution of the RIS3 areas of specialisation

The RIS3 Euskadi strategy was born in 2014, based on a recognition that its territories needed to create development strategies focused on the construction of sustainable competitive advantages based on their resources, powers and functions and capabilities. In the case of Euskadi, the application of the RIS3 methodology took into account its scientific-technological capabilities, its strategic sectors and activities and its orientation towards local and international markets. This led to the identification of three strategic priorities (Advanced Manufacturing, Energy and Health) and four areas of opportunity (Food, Urban Habitat, Cultural and Creative Ecosystems and Industries), where the aim was to concentrate of research, development and innovation resources and capacities.

Based on these premises, in recent years -and as a result of the changes introduced in the programmes and instruments of the STIP (the so-called policy mix)- the level of concentration of investments in R&D in the 7 areas of specialisation went from 71.4% in 2014 to 74.0% in 2019, the last year when information is available.

Figure 3: Internal expenditure in R&D in Euskadi per RIS3 area (% - 2014 and 2019)



Source: *Lehendakaritza*, Basque Government. RIS3 Report 2014-2019.

Investment in R&D in the RIS3 area grew by 19.1%, in comparison with a 14.9% increase in total investment in R&D in Euskadi, as shown in in Table 3. In percentage terms, the increase in investments in the fields of food and advanced manufacturing stands out, with a reduction in Cultural and Creative Industries (CCIs). Three strategic priorities concentrate 88.5% of total investment in the RIS3 areas in 2019 (to be considered a strategic priority, a minimum annual expenditure of 100 million euros on R&D is required).

Table 3: Evolution of internal expenditure in R&D per RIS3 area (000 euros at current prices, %; 2014-2019)

RIS3 Areas	2014	2015	2016	2017	2018	2019	Evolution
TOTAL RIS3	**920,843**	**915,293**	**949,400**	**1,006,118**	**1,037,998**	**1,096,671**	**+19.1%**
Advanced Manufacturing	556,698	539,514	555,584	602,786	631,238	678,100	+21.8%
Energy	152,629	158,103	165,890	163,993	168,549	170,599	+11.8%
Biosciences-Health	101,285	105,975	115,282	122,397	115,687	121,377	+19.8%
Food	35,403	38,566	37,316	39,025	40,520	44,106	+24.6%
Urban Habitat	44,442	43,502	44,398	48,449	50,052	48,359	+8.8%
CCIs	10,250	9,939	8,793	8,219	9,644	10,203	-0.5%
Ecosystems	20,136	19,694	22,137	21,249	22,308	23,927	+18.8%
Others	368,910	357,914	341,511	357,058	385,368	384,733	+4.3%
TOTAL - EUSKADI	**1,289,753**	**1,273,207**	**1,290,911**	**1,363,176**	**1,423,366**	**1,481,404**	**+14.9%**

Source: *Lehendakaritza*, Basque Government. RIS3 Report 2014-2019.

2.5. Evolution of the policy mix

The volume of funding mobilized by programmes linked to the STIP was 322 million euros in 2019, an increase of 31% against 246 million in 2015 (see Table 4). This increase was distributed among the different lines of the Plan, although it had a greater impact in percentage terms on line 5 (management of talent), and on lines 2 and 3 (support for business-based innovation ecosystems and R&D in cooperation).

Table 4: Evolution of the number of supporting programmes and their budgets per line of support in the Euskadi 2020 STIP

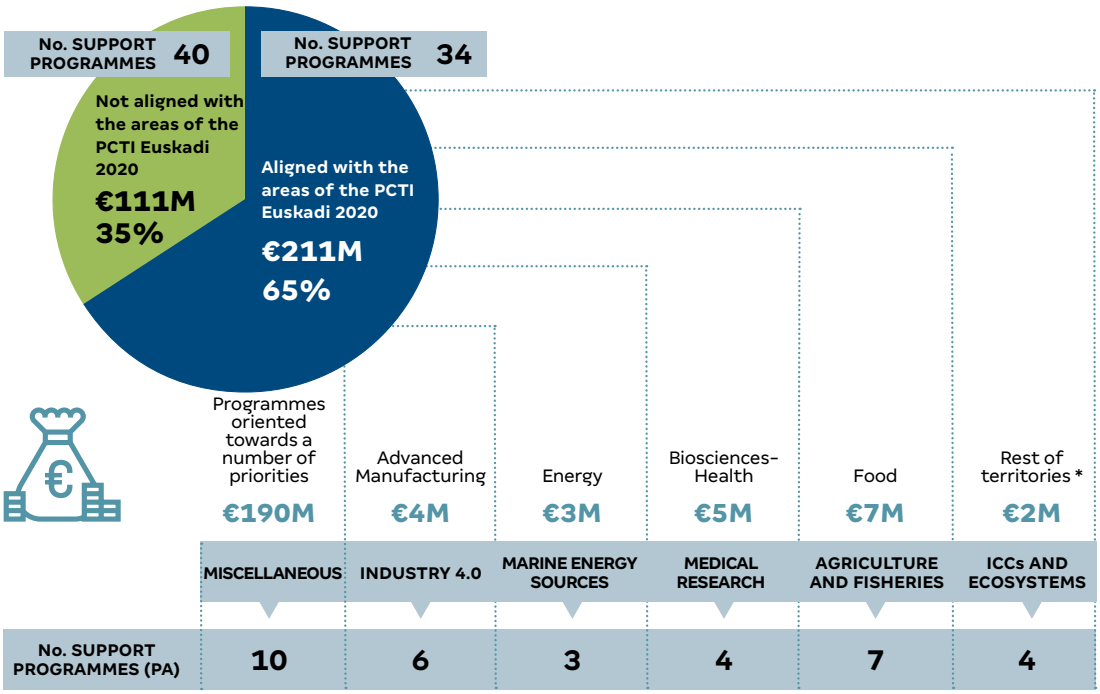
2020 STIP lines		Budget (€M)			Funding programmes (#)		
		2015	2019	Δ 15-19	2015	2019	Δ 15-19
1.	**Technological training and promotion of business R&D**	**73**	**86**	**+13.5%** +19%	**6**	**4**	**-2**
2.	**Support for the business innovation ecosystem**	**26**	**44**	**+18.6%** +72%	**17**	**34**	**+17**
3.	**Convergence of skills and promotion of cooperative R&D**	**20**	**36**	**+15.5%** +77%	**3**	**4**	**+1**
4.	**Generation of scientific and technological skills**	**113**	**127**	**+13.8%** +12%	**21**	**16**	**-5**
5.	**Management and promotion of scientific, technological and business talent**	**13**	**28**	**+14.7%** +114%	**6**	**10**	**+4**
6.	**Opening up and internationalisation of the R&D&I system**	**N/A**	**N/A**	**N/A**	**6**	**6**	0
	TOTAL	**246**	**322**	**+76.7%** +31%	**59**	**74**	**+15**

Source: *Lehendakaritza*, Gobierno Vasco. 5th Monitoring Report of the 2020 Euskadi STIP.

This increase in the budget was mainly driven by the growth of programmes that were already in existence in 2015, and to a lesser extent by newly-created programmes. Parallel to the budget increase, the number of programmes that make up the policy mix also grew, reaching 74 in 2019 against 59 in 2015.

The specialisation of the policy mix, i.e. the number of programmes aligned with the priority areas defined in the RIS3 Euskadi Strategy, grew slightly and remains stable at 65% (measured in budgetary terms - see figure below). The principal reason has been the alignment of existing programmes, and also that of newly-created programmes, largely promoted from the departments and areas of the Basque Government most closely linked to the areas of opportunity of the STIP.

Figure 4: Distribution of the budget and the number of supporting programmes per area of specialisation (€, #; calls in 2019)



(*) Includes Ecosystems, Cultural and Creative Industries and Urban Habitat.
Source: *Lehendakaritza*, Basque Government. Instruments of the policy mix of the Euskadi 2020 STIP: Published 2019.

2.6. Internal evaluation of the results

Having described the process of implementation and assessed the level of compliance of the operational objectives and the level of budget implementation, plus the evolution of specialisation and the policy mix, Table 5 (below) shows the main achievements and pending challenges of the Euskadi 2020 STIP. These can be generalised as the successes and challenges still pending for the Basque Science, Technology and Innovation System.

Table 5: Balance of the 2020 STIP and of the Basque Science, Technology and Innovation System

	MAIN SUCCESSES ACHIEVED		SOME PENDING CHALLENGES
1.	**Deployment** of the **RIS3 strategy completed.** Science, technology and innovation system aligned around a single strategy.	1.	**Increase investment in R&D** above the European average, to close the current gap.
2.	**Budget implementation** close to **90%.** The investment effort of the Basque Government is above 106%.	2.	**Promote business investment in R&D,** which has not yet recovered from the crisis.
3.	**Improvement of the overall efficiency** of the system, measured in terms of results: • **Increased sales** of **new business products.** • **Increased exports** of **medium and high technology products.** • **Growth** of indexed scientific publications and their impact.	3.	**Overcome SMEs' weak points in innovation** • In **non-technological innovation:** organization and marketing. • In **technological innovation** (non-R&D)
4.	**Growth of international funding** of R&D.	4.	**Promote women** in the field of science, technology and innovation.

Source: *Lehendakaritza*, Basque Government.

The achievements made will be analysed in greater detail below:

1. After completion of the deployment of the RIS3 Euskadi strategy

As described in section 2.1 of this document, the RIS3 Euskadi smart specialisation strategy has been deployed in five phases: 0) Drawing up and approval of the STIP in 2014; 1) Implementation of the governing bodies and creation of 7 Steering Groups in 2015; 2) Deployment of the Steering Groups in more than 30 thematic working groups in 2016; 3) Energisation around 6 further challenges in 2017-2018 and 4) Culmination of the deployment in 2019-2020. These phases, together with other actions and milestones included in each one, were not planned from the outset; they have been built from a living RIS3 strategy that has evolved in a collaborative manner, with contributions by the different governing bodies in the Plan as well as by the Steering Groups.

2. Budget implementation of 90%

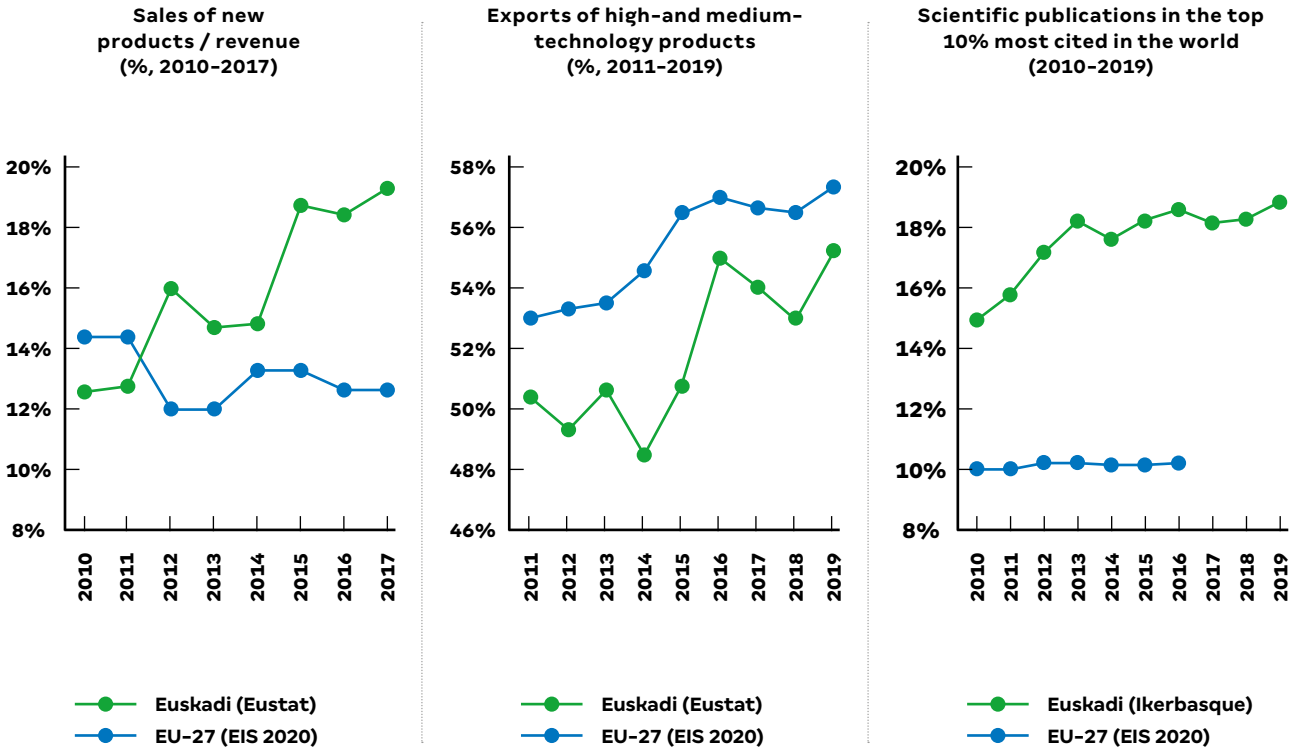
As shown in section 2.2 of this document, the current level of budget implementation of the Euskadi 2020 STIP is close to 90%, so it can be considered a success in terms of the ambitious initial estimates. These envisaged annual growth rates of 7% for private investment, at 3-4% for public investment and over 10% from international funds. Based on the real implementation data for the 2014-2019 period, the investment effort by companies reached 82% of the initial forecasts, with public administrations at 97% (106% in the case of the Basque Government), and international funding at 100%, driven by funds from the European framework programme Horizon 2020.

The projection of the above figures onto the entire period of the STIP (2014-2020) would give a level of budget implementation of 89%, without taking into account the impact the health crisis is having on investments in R&D in 2020. This impact, as is the case with GDP, will be considerable.

3. Improving the efficiency of the Basque Science, Technology and Innovation System

The Basque Science, Technology and Innovation System has improved its efficiency as a result of better results (at a higher level than growth in investments) when both are compared with those in the European Union. This is seen in the evolution of the results of business-based innovation, the technological results and scientific results measured, through sales of new products, exports of products of middle- and high-range technology and scientific publications most cited internationally. In the first of the challenges shown below (see figure 7), it is seen that, in contrast, investments in R&D have grown less in Euskadi than in the EU-27.

Figure 5: Evolution of some indicators o results of the Basque Science, Technology and Innovation System (2010-2019)

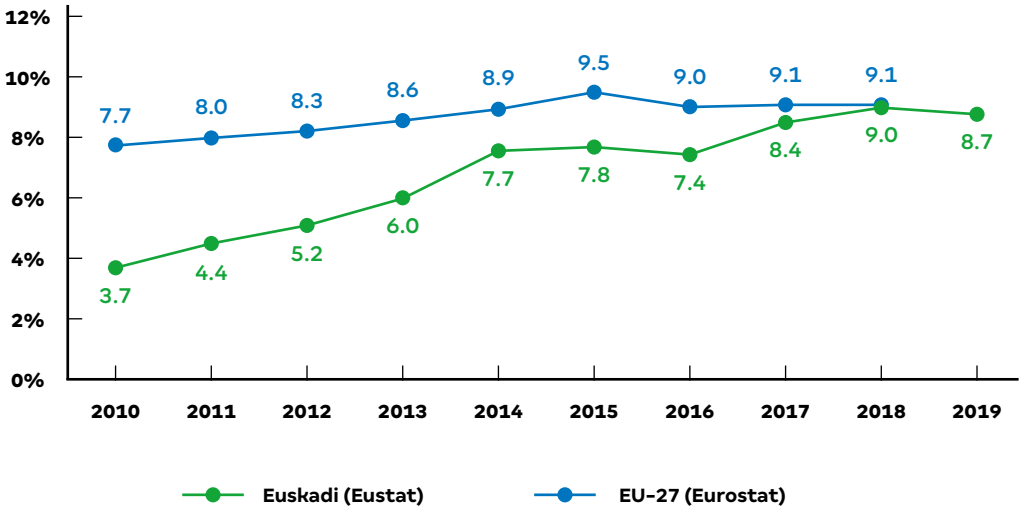


Source: Eustat (EIS 2020) and Ikerbasque

4. Growth in international funding of R&D

International funding of R&D grew in Euskadi over the 2014-2019 period to 128.4 million euros, mainly driven by the competitive funds obtained from the European framework programmes of research and innovation. In percentage terms, this growth has meant that the weight of international funding has reached almost 9%, a comparable figure to the EU-27 average.

Figure 6: International funding of internal expenditure in R&D (%; 2010-2019)



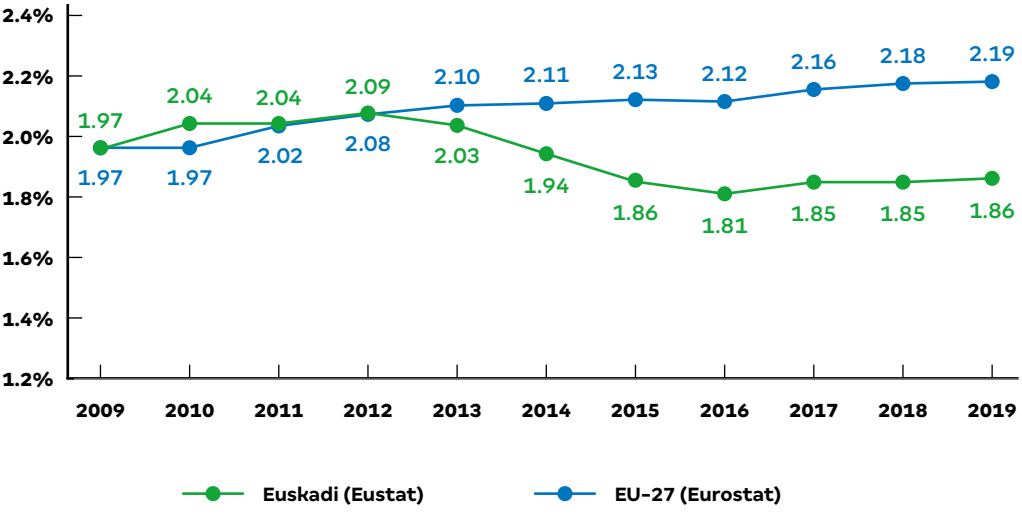
Source: Eustat and Eurostat.

The **main challenges pending** for the Basque Science, Technology and Innovation System are described below:

1. Increase investment in R&D

The impact of the financial crisis of 2008 and the slow recovery of companies afterwards affected investment in R&D in Euskadi. From 2009 to 2012 investment in R&D over GDP reached levels above the European average but then fell back, and a gap opened up vis-à-vis the EU-27. According to the latest official Eustat statistics, internal expenditure in R&D in Euskadi went from 1.94% of GDP in 2014 to 1.86% in 2019, compared with 2.19% in Europe in the last year.

Figure 7: Evolution of internal expenditure of R&D over GDP (%; 2009-2019)

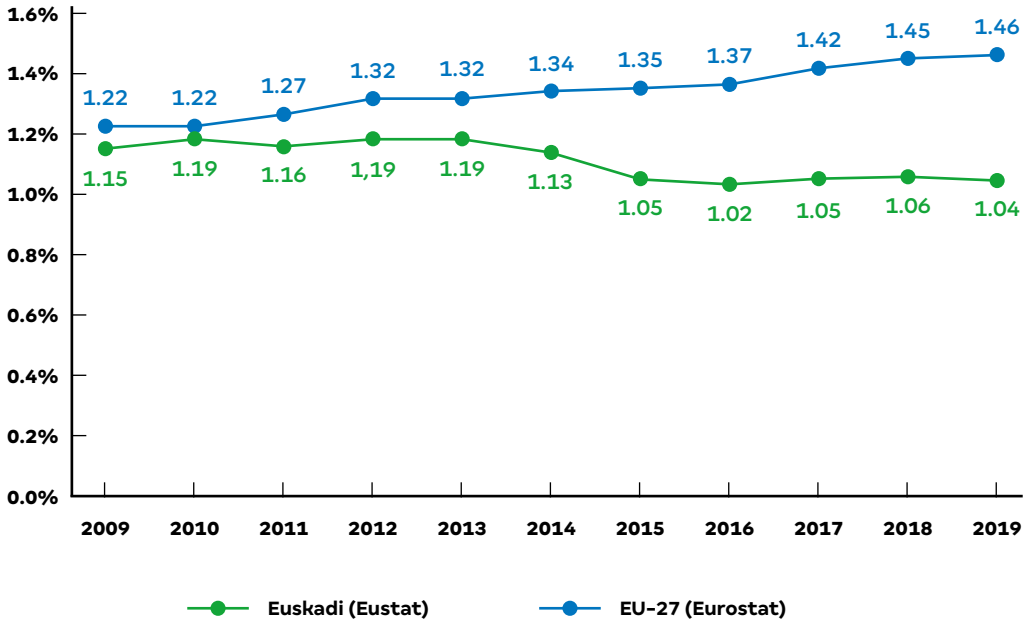


Source: Eustat and Eurostat.

2. Driving business investment in R&D

The impact of the financial crisis of 2008 also affected business investments in R&D. In this respect, the figures show that internal expenditure on R&D by companies in Euskadi has gradually fallen away from the EU-27 average.

Figure 8: Evolution of internal business expenditure in R&D[4] over GDP (%; 2009-2019)



Source: Eustat and Eurostat.

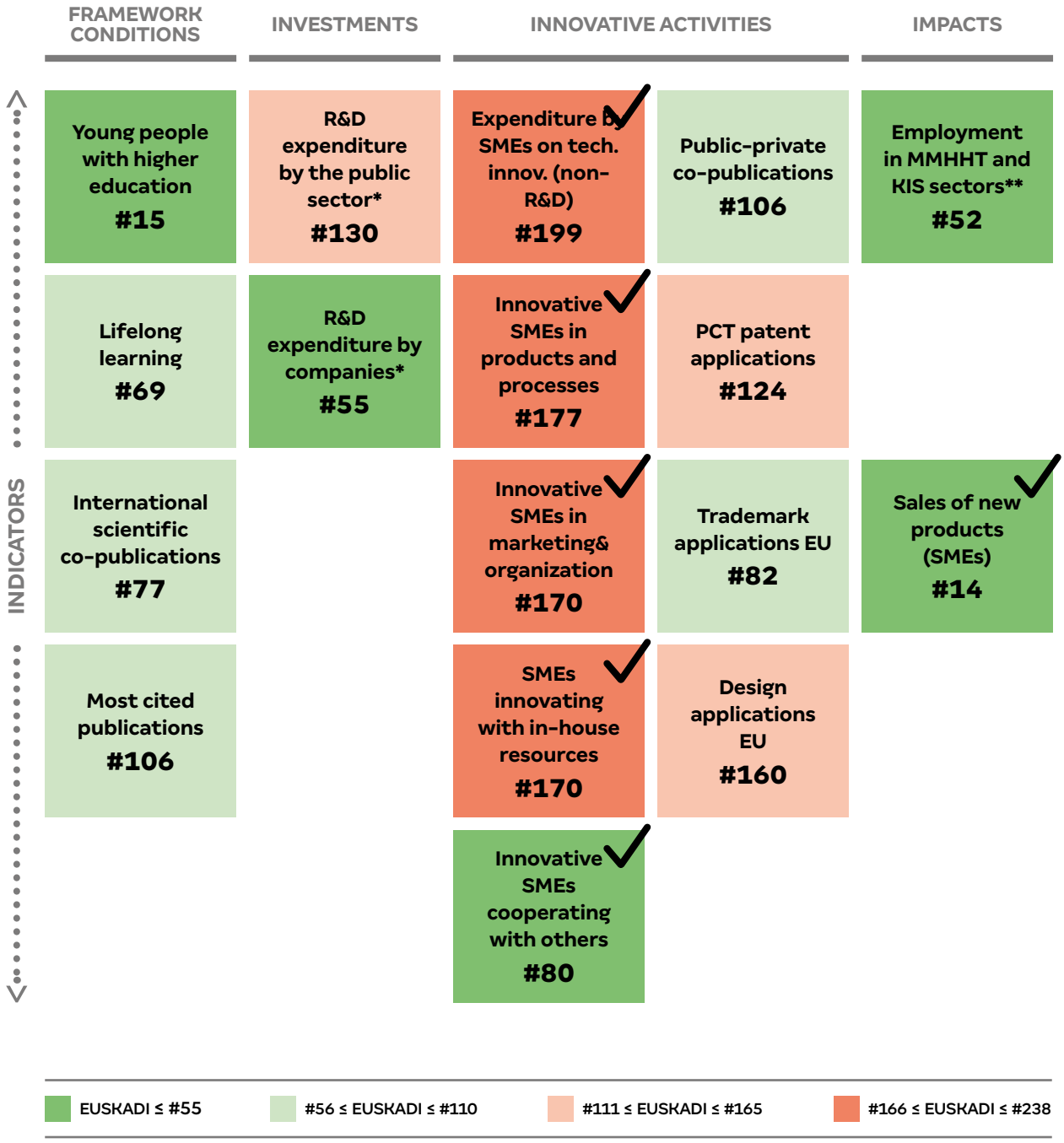
3. Overcoming weaknesses of SMEs in Innovation

According to the European Commission's Regional Innovation Scoreboard (RIS) for 2019, which compares the performance in innovation of 238 European regions, Euskadi is in position 132.

Following an analysis of the different indicators that make up this summary indicator, it can be said that Euskadi is among the leading regions in terms of the educational level of its young people, and also in the impact indicators related to the sale of new products and employment in technology- and knowledge-intensive sectors. However, it shows weaknesses in the indicators linked to innovation in SMEs, according to sample surveys by the INE (Spanish Statistics Institute) collected by Eurostat.

[4] In Euskadi planned internal expenditure on R&D only includes that carried out by companies and their R&D units that belong to the Basque Science, Technology and Innovation Network (BNSTI). To ensure a homogeneous comparison of business R&D in Euskadi with the EU-27, the analyses exclude private Technology Centres and the Cooperative Research Centres of the BNSTI, because their equivalent European entities are usually publicly-owned and belong to the Administration.

Figure 9: Position of Euskadi among European regions per indicator of the Regional Innovation Scoreboard (RIS) 2019[5]



(*) In Euskadi planned internal expenditure on R&D only includes that carried out by companies and their R&D units that belong to the Basque Science, Technology and Innovation Network (BNSTI). To ensure a homogeneous comparison of business R&D in Euskadi with the EU-27, the analyses exclude private Technology Centres and the Cooperative Research Centres of the BNSTI, because their equivalent European entities are usually publicly-owned and belong to the Administration.
(**) Manufacturing sectors of medium-high/high technological intensity: aeronautics, electronics, chemical industry (including pharma), automotive, railway, machinery and capital equipment (electrical equipment, machine tools, etc.), etc. KIS are knowledge-intensive services: transport, professional services, ICTs, R&D, etc.

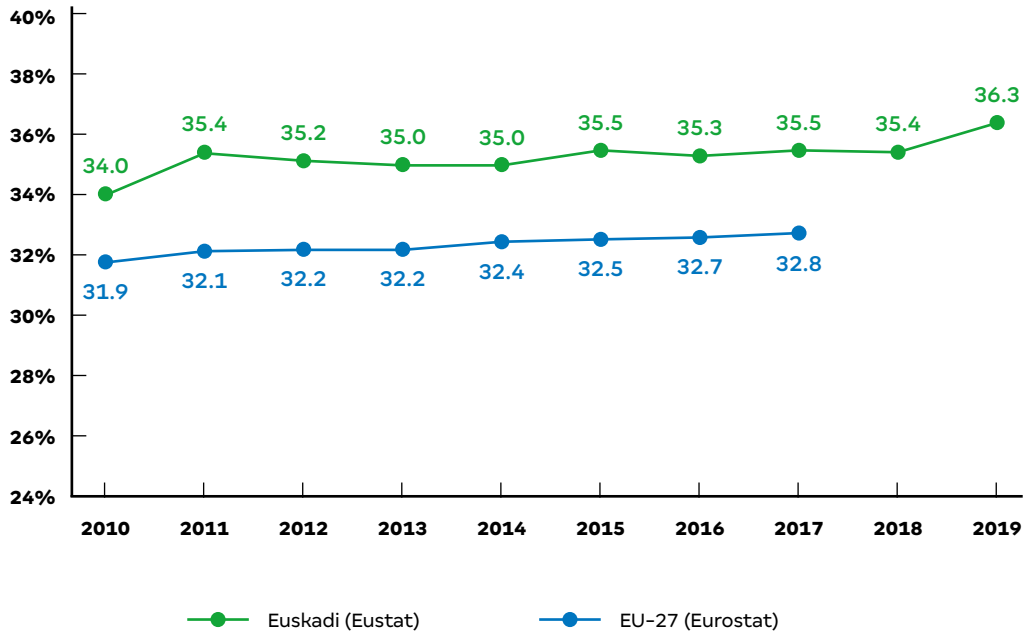
Source: Innobasque, with data from the European Commission's Regional Innovation Scoreboard (RIS) for 2019.

[5] Note: The indicators taken from sample surveys are marked.

4. Strengthening women's presence in science and technology

In Euskadi the presence of women among research personnel stood at 36.8% in 2019, above the European average according to the latest available statistics. Nevertheless, there is still a long way to go to improve women's presence in science and technology, especially in the business field[6], as only 27.2% of people working on R&D activities are women.

Figure 10: Percentage of women among research personnel (%; 2011-2019)



Source: Eustat and Eurostat.

2.7. External evaluation of the process

To complete the internal evaluation (see above) of the quantitative results of the Euskadi 2020 STIP, an external evaluation of the process of deployment of the RIS3 Smart Specialisation strategy has been made. This qualitative evaluation was carried out in two phases, both led by Professor Kevin Morgan, an expert evaluator of the European Commission, with the cooperation of Orkestra, the Basque Competitiveness Institute, based on interviews with 28 key stakeholders in the Basque RIS3 process. An initial study was carried out in 2016 to analyse the first phase of implementation of the RIS3 strategy, and a second report was issued in 2019 to evaluate its evolution.

In general terms, this evaluation concludes that, although Euskadi has promoted the implementation of industrial and innovation strategies for over thirty years, the introduction of the RIS3 process has represented a novelty and a challenge, despite the existence of a mature system of science, technology and innovation.

Specifically, the analysis made identifies major changes in the governance of the process of discovering entrepreneurs in the three priority areas and the four areas of opportunity. These changes are observed in both the involvement of stakeholders and in the strategy pursued, and lead to the conclusions shown in the table below:

[6] Only considering female R&D personnel in companies and their R&D Business Units that belong to the Basque Science, Technology and Innovation Network (BNSTI). To ensure a homogeneous comparison of R&D in companies in Euskadi with the EU-27, the analyses exclude private Technology Centres and Cooperative Research Centres (CRCs) of the BNSTI, given that the equivalent European entities are usually publicly-owned and belong to the Administration.

Table 6: Summary of external evaluation of RIS3 Euskadi

	MAIN SUCCESSES		AREAS FOR IMPROVEMENT
1.	Creation of **spaces for long-term** cooperation.	1.	Greater integration of **social challenges** into the strategy.
2.	**Greater awareness in Basque society** in favour of innovation.	2.	Greater **cooperation** between strategic priorities and areas of opportunity.
3.	**SMEs more integrated** in the Basque RIS3 strategy.	3.	Greater drive for **innovation in SMEs.**
4.	Development of **projects that are closer** to the market.	4.	New instruments to support **strategic projects.**
5.	Greater commitment and alignment by universities.	5.	Strengthen **presence in Europe** and inter-regional cooperation in RIS3.

Source: Profesor Kevin Morgan y Orkestra (2019). Playing the long game: Experimenting Smart Specialisation in the Basque Country 2016-2019.

Among the main successes, the analysis highlights the consolidation of the Steering Groups as flexible areas for experimentation and change that feed strategic governance more generally. It also points out a notable trend in the greater involvement of companies in working groups and projects, together with a greater capillarity of the strategy to bring it closer to SMEs through local development agencies and greater proactivity of universities in the strategic priorities and participation in specific projects related to areas of opportunity.

However, the analysis indicates that, similarly to what happens in other European regions, major progress has not been made in the integration of social challenges and civil society stakeholders in the RIS3 process. In this respect, Agenda 2030 could be a window of opportunity to reflect on how social challenges can be integrated into RIS3.

Among these challenges, the evaluation also highlights the need to implement more integrated projects that would emerge from cooperation in the strategic priorities and the areas of opportunity, and those of greater scope (country projects). In this respect, the implementation process and the policy mix need to adapt to facilitate these projects. To do this, it will be necessary to experiment with new funding instruments and mechanisms, including public-private formulas.

While it is recognised that the Basque Country is generally well positioned in the European Union, the study points out that it should continue to strengthen its position, despite the fact that a general perception exists that having a good position in certain European initiatives does not generate very tangible effects, mainly due to the regions' difficulties when it comes to participating in initiatives at the European level. In this sense, a reflection is needed on the extent to which the regions can have an influence on the dynamics of the EU, as most of the decisions are taken at the Member State level.

Furthermore, the study underlines the importance of coordination of regional initiatives and the promotion of innovation in inter-regional value chains, although it also highlights the need to apply financial instruments that facilitate inter-regional investments in research and innovation.

As a conclusion, the evaluation highlights the fact that the evolution of the process observed in the Basque Country to find entrepreneurs contributes to some of the key aspects of the development of RIS3 in Europe. Among these, it underlines the experimental nature of the policy, the necessary reform of research and innovation systems research, the importance of monitoring and evaluation as a tool for strategic diagnosis, and the need to strengthen synergies between the policy instruments of the EU and the European regions.

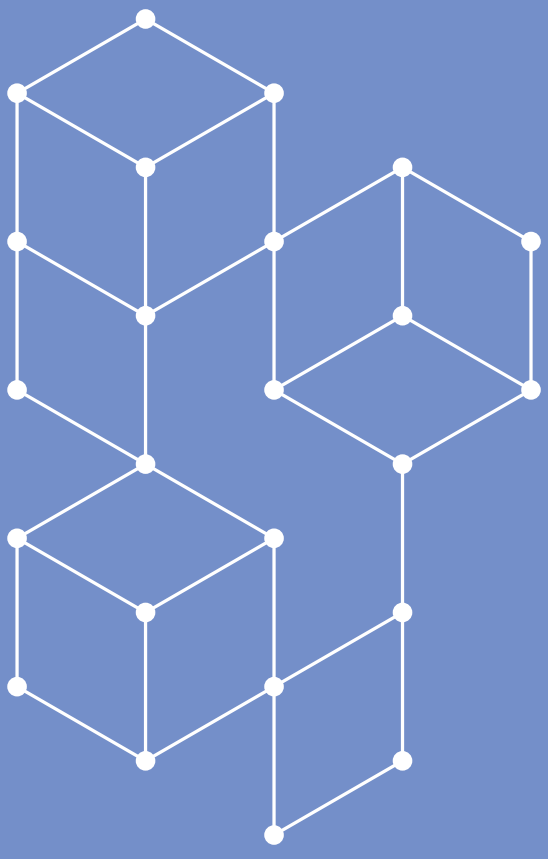
3.

Context and diagnosis of the situation

In an increasingly globalized world, it is necessary to identify the mega-trends that will have a greater impact on Basque society, i.e. forces that act globally and can transform the future of countries, businesses, industries, societies and individuals. They are forces that evolve over time and develop in a relatively stable manner, so their impacts can be anticipated if they are suitably addressed. These mega-trends will affect Euskadi to a greater or lesser extent, and will be opportunities or threats that require a response through policies for science, technology and innovation.

There are four mega-trends that will have a clear impact on Euskadi[7]: demographic and social changes, climate change, the technological-digital revolution and the growing presence of China in a globalized world.

These mega-trends are causing transitions at the global level. A transition is the process and the result of going from one mode of being to another that is qualitatively different, with non-linear changes between the states. It requires radical, deep and transformative changes to round off systems, so the approach requires different forms of innovating.

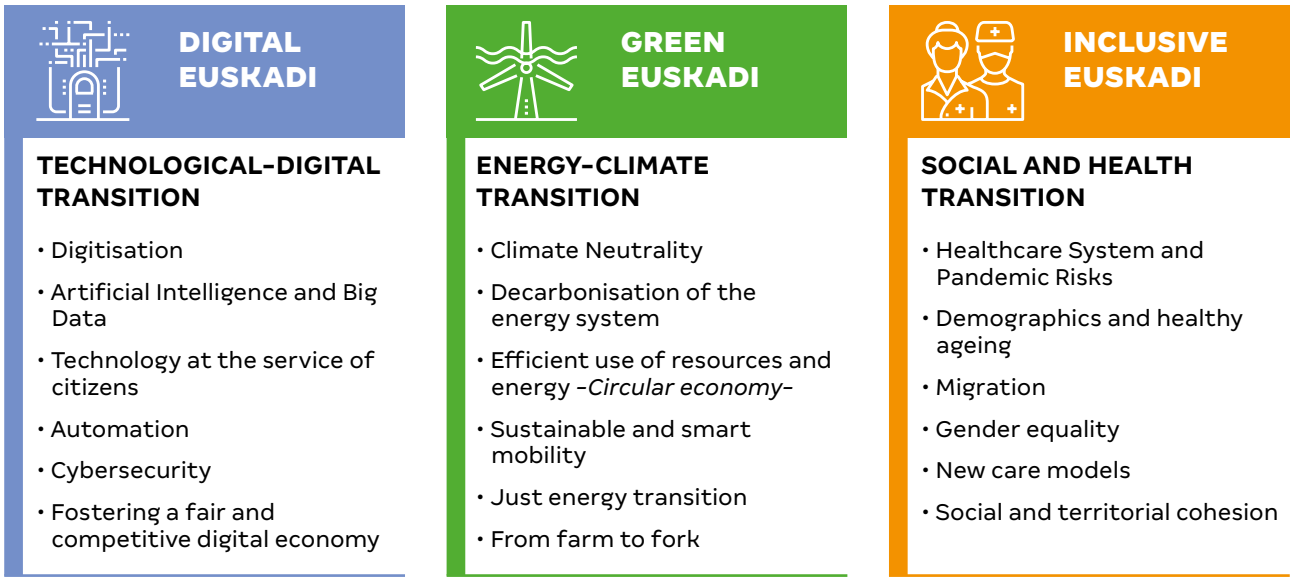


[7] According to the Innobasque Foresight Report 2020.

3.1. The three transitions in Euskadi

The 2030 STIP assumes a triple transition: technological-digital, energy-climate and social-health, as a result of the impact of the mega-trends identified worldwide on Euskadi. A triple transition that, if undertaken correctly, should lead to a greener, more digital and more inclusive Euskadi.

Figure 11: Three transitions in Euskadi



Source: *Lehendakaritza*, Basque Government.

The three transitions in this framework are described below:

• Technological-digital transition:

The technological-digital revolution will affect all industrial sectors, some of them key elements in the economic reality of Euskadi, e.g. those related to transport, capital goods, machine tools, or the iron and steel industry. These sectors are undergoing a process of transition from traditional methods of organisation to an organisation based on digitisation. In order to do this, they are making progress in the automation and improvement of their processes and incorporating flexible solutions and robotic technologies, additive manufacturing or connectivity between machines and equipment, the basis for the application of Artificial Intelligence and Big Data.

The technological-digital transformation is not exclusive to industry, it affects all sectors and levels of society. Digital technologies are changing products, services and processes in public and private organisations, but they also affect our way of life in general. This is addressed in the Strategic Foresight Report 2020 of the European Commission as a need to ensure that the way we live, work, learn, interact and think in the digital era should preserve and improve human dignity, freedom, equal opportunities, security, democracy and other basic European rights and values.

In order to take on the technological-digital transition, there needs to be a commitment to R&D&I oriented towards the incorporation of intelligence in means and systems of production, the exploitation of emerging capabilities and technologies in new products and processes, the integration of advanced materials into higher added-value solutions or improved processes, the efficiency and sustainability of the resources used and the integration of high added-value services. Another associated challenge is that of technological-digital talent, understood as competent digital operators that can feed the business fabric and scientific and technological stakeholders.

• Energy-climate transition

The energy-climate transition revolves around concern for climate change and the environmental and social problems associated with the generalisation of a production and transport model based on fossil fuels. The disadvantages of this model, such as air pollution, the excessive consumption of energy, the effects on people's health or overcrowded roads, have triggered off a general will to find alternatives that help to offset these effects and achieve a carbon-neutral Basque economy in the future. This would be an economy that would create new 'green' jobs and serve, in turn, as a driver of sustainable economic growth.

The European Parliament has declared a climate emergency and has launched the Green Deal as a new strategy for growth in Europe and one of its main lines of action in the next few years. The strategies and actions linked to the Green Deal will make Europe a climate-neutral territory by 2050. There is growing awareness about the need for a systemic change that is far-reaching and quick. It will not be possible to make progress if we continue with a 'business-as-usual' approach.

This is reflected, for example, in the Foresight Report referred to above. It identifies (among others) the "green dimension" as essential if we are to achieve a resilient Europe. The European Industrial Strategy published last March is also oriented towards achieving a sustainable, competitive and digital industrial sector that can address the energy-climate and technological-digital transitions. Finally, a Strategy for SMEs for a sustainable and digital Europe based on this has been published.

Euskadi is internationally positioned as a knowledge and industrial development hub in the field of energy and clean mobility. It can also call on the presence of major tractor-effect companies that are leaders in international markets, as well as a large group of SMEs with a high profile in innovation. Moreover, other factors are helping to contribute solutions to the global challenge through sustainable human development from a territorial perspective: the institutional commitment to make progress in environmental sustainability, the transition towards a low-carbon Basque economy through the incorporation of energy efficiency, the circular economy, the efficient use of materials and eco-innovation as an integral part of its sectoral plans and strategies, and a commitment of the territory to take on the challenge of aligning efforts with the Sustainable Development Goals (SDG).

• Social-health transition:

This transition is related to achieving a cohesive society that is involved in the implementation of the above-mentioned transitions in an inclusive and fair manner, putting people at the heart of the effort.

It is a transition towards a society in which inter-generational challenges are addressed and in which diversity is fostered and taken advantage of in all respects (gender, race, etc.), creating a society with a culture and values that plays a greater role in innovation systems.

Population ageing is a great challenge, and also a great opportunity. Healthy ageing, understood as the process of optimizing physical, mental and social health

opportunities that allow older people to play an active part in society, takes shape through notions like Personalized Medicine, Healthy Eating or Sustainable Cities.

Euskadi is characterized by a Healthcare System with the capacity to incorporate the latest technological and medical advances that emerge from research and innovation. This means better patient care and management of health and care services, as has been demonstrated during the Covid-19 crisis.

In an attempt to make the most of the potential of these technological and medical advances, the health transition in Euskadi represents a major boost and transformation of the Basque Healthcare System. The aim is none other than prevention and being ready to provide a quick and efficient response to possible new health crises or pandemics through a sustainable healthcare system that can attend the needs of an increasingly older society.

3.2. Situation - diagnosis of Euskadi

3.2.1. Socioeconomic situation

The population of Euskadi peaked at 2,199,711 in 2020; it is one of the societies with the highest life expectancy (86.3 years for women and 80.4 for men). This means a demographic structure with more people aged 65 or above (22.2%) than under 21 years of age (18.4%). This trend is accentuated year on year.

Another structural component is the improvement of the state of health and well-being of the population. According to data from the latest survey on perception of well-being by Eustat, Euskadi scored 7.4 in 2019 for satisfaction with the way of life in general, 0.3% up on the score in 2014. We would highlight an improvement of 0.5 points in people's domestic economies in the same period.

In the field of the economy in general, the effects of the Covid-19 pandemic have begun to make themselves felt in the Basque economy. On one hand, a fall of 9.5% in Gross Domestic Product (GDP)[8] is expected in 2020, after a year (2019) in which Euskadi grew 2.2% in a context of worldwide uncertainty. In 2021 GDP is expected to grow 8.6%, although the third wave of the pandemic could reduce expectations to a certain extent. Furthermore, the unemployment rate stood at 11.2% in the fourth quarter of 2020, compared with 9.6% in the fourth quarter of 2019. It is estimated that the unemployment rate for 2021 will be around 9.8%.

3.2.2. Competitive situation

Below we present a comparison of the position occupied by Euskadi in terms of competitive performance and factors. Specifically, the comparison is based on the analysis of indicators of results and intermediate performance, as well as determining factors of competitiveness. The position of Euskadi is compared to: (1) all the 218 European regions[9]; (2) the 30 reference European regions (those with similar structural characteristics to Euskadi), and (3) the 17 Spanish regions.

[8] Inter-annual variations in real Gross Domestic Product (GDP). This does not include price variations (deflator), as in nominal GDP.

[9] NUTS1 or 2, depending on the level of powers and functions exercised by the Regional Administration.

Table 7: Ranking of the Basque Country in competitiveness indicators

Indicator		Year	Ranking in comparison with ...				Difference in ranking, compared to the previous year, for...		
			...all European regions	...comparable regions	...Spanish regions	value	...all European regions	...comparable regions	...Spanish regions
			Most recent	Most recent	Most recent	Δ	Δ	Δ	Δ
Outcomes	GDP per capita (PPP)	2018	29	4	1	↑	2	0	1
	Household disposable income per capita (PPP)	2017	25	6	1	↑	0	0	0
	Long-term unemployment (% lab. force)	2019	162	29	6	↑	4	1	-1
	NEET rate (% pop. aged 15-24)	2019	78	9	1	↑	22	5	5
	Population at risk of poverty or social exclusion (% total pop.)	2019	26	3	2	↓	-16	-1	-1
Intermediate performance	Employment rate (% pop. aged 15-64)	2019	131	27	7	↑	-6	-1	-1
	Female employment rate (% pop. aged 15-64)	2019	119	26	4	↑	-5	0	0
	Unemployment rate (% lab. force ≥ 15 y.o.)	2019	164	28	2	↑	2	0	1
	Youth unemployment rate (% lab. force aged 15-24)	2019	147	26	1	↓	-10	-2	0
	Relative net migration (% total pop.)	2018	40	9	9	↑	31	6	-3
	Apparent productivity per employee (thousands, PPP)	2018	7	2	1	↑	-1	0	0
	PCT patents per million inhabitants	2017	96	30	4	↓	-2	-2	-1
	Publications (WoS) per million inhabitants	2019	72	20	7	↑	7	1	0
	Publications in Q1 (% publications)	2019	26	6	5	↓	-12	-2	-1
Determinants of competitiveness: Firm performance	Firm R&D personnel (% employment)	2018	14	4	1	↑	-1	0	0
	Firm R&D expenditure (% GDP)	2018	44	14	1	↑	-4	-2	0
	PCT patent co-invention (4-year window) (% patents)	2017	79	18	5	↑	25	3	2
	PCT patents with foreign collaboration (4-year window) (% patents)	2017	164	25	11	↑	10	4	-1

Indicator		Year	Ranking in comparison with ...				Difference in ranking, compared to the previous year, for...		
			...all European regions	...comparable regions	...Spanish regions	value	...all European regions	...comparable regions	...Spanish regions
			Most recent	Most recent	Most recent	Δ	Δ	Δ	Δ
Determinants of competitiveness: Specialisation	Employment in high- and medium-high-tech manufacturing (% employment)	2019	31	4	2	↑	2	0	0
	Employment in knowledge-intensive services (% employment)	2019	113	25	4	↑	-1	0	0
Determinants of competitiveness: Business environment	Human resources employed in science and technology (% total pop.)	2019	112	28	3	→	-2	-1	-1
	Population aged 25-64 with upper secondary or tertiary education (% pop. aged 25-64)	2019	156	27	2	↑	-3	0	0
	Tertiary education students (% pop. aged 20-24)	2018	23	3	5	↑	-1	0	0
	Overqualification index (%)	2019	215	31	18	↓	-1	0	0
	Vocational education and training students (% pop. aged 15-19)	2018	48	8	4	↓	-3	1	-1
	Population enrolled in continuing education (% pop. aged 25-64)	2019	71	26	1	↑	3	0	1
	Public R&D personnel (% employment)	2018	69	13	5	↑	3	0	0
	Public R&D expenditure (% GDP)	2018	113	19	11	↓	-6	0	-2
	Total R&D personnel (% employment)	2018	22	4	1	↑	-3	0	0
	Total R&D expenditure (% of GDP)	2018	57	12	1	→	-2	0	0
	Publications with international cooperation (% publications)	2019	97	22	3	↓	-23	-4	0
	Publications with industry cooperation (% publications)	2019	163	30	11	↑	-3	0	-1
	Households with broadband access (% households)	2019	64	20	7	↑	-13	-6	-3
	Individuals that make online purchases (total pop.)	2019	159	31	17	↑	1	0	0

Source: Orkestra. Competitiveness Report on the Basque Country 2020: Diagnosis of competitiveness.

The main conclusions that can be drawn from this comparison are:

- Most of the indicators of the final results for Euskadi, both economic and social, have improved and generally reflect a good position.
- In the determinants of competitiveness, Euskadi's strong points lie in its business environment indicators and the level of training of individuals.
- In recent years the consolidation of the internationalisation of Basque companies has continued. This is shown in the positive evolution of the technological results, the average value of technological results per company and the percentage of regular exporters. However, 2019 saw a fall in the percentage of exporting companies and the value of technological results, as a result of the fall in prices of energy commodities such as oil and its by-products.
- In terms of business performance, the productivity indicators show positive results and the strong performance of Euskadi in the indicator of sales of new products stands out, despite the modest result in some indicators of innovation in SMEs, especially in smaller companies. This is reflected in official surveys on innovation based on the collection of data from a sample of companies.
- Among the challenges Euskadi should address, one of the most important is unemployment, accentuated by the economic consequences of the pandemic. This challenge mainly lies in the level of unemployment among young people and long-term unemployment. Furthermore, the quality of new recruitment (in aspects such as temporary contracts or part-time work) still needs considerable improvement, especially related to women.

3.3. Basque strategic context

The Science, Technology and Innovation Plan is not a one-off phenomenon; it is part of a series of plans and strategies that it both feeds and feeds off. Below we show the most important long-, medium- and short-term Basque plans and strategies for the 2030 STIP.

3.3.1. Sustainable Human Development

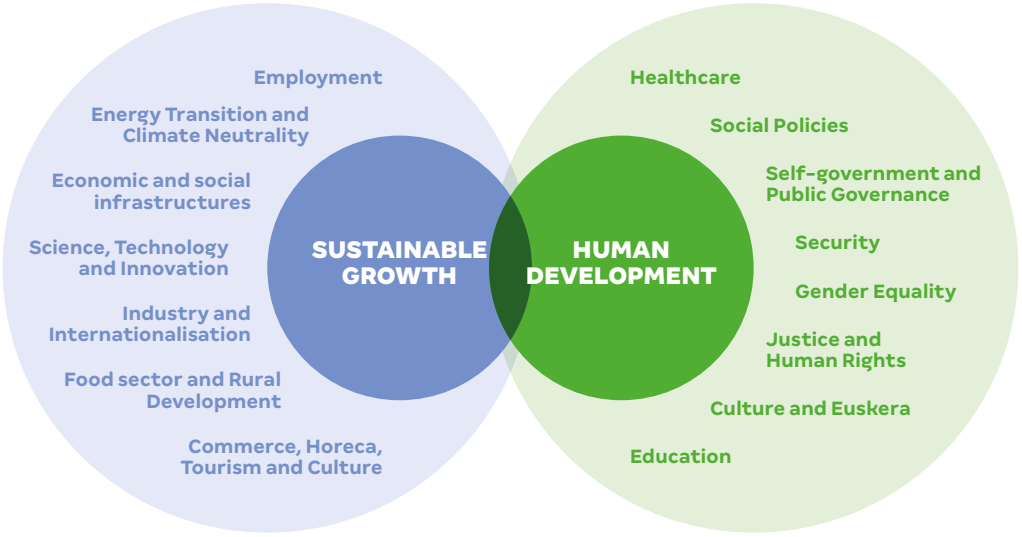
The Science, Technology and Innovation Plan is part of a global country strategy: "Sustainable Human Development". The economic and social growth of Euskadi is based on a model of "Sustainable Human Development", which implies greater territorial competitiveness with the ability to foster the viability and development of companies and generate quality employment, guaranteeing essential services to all citizens and improving their quality of life.

In this context, Euskadi is facing the challenge of placing all its experience and knowledge in public policy-making at the service of "Sustainable Human Development", plus the good practices and technical, scientific and social solutions implemented in the territory.

"Sustainable Human Development", the driver of Basque development cooperation, involves a firm commitment to Human Rights and to carry out each action with a focus based on the Sustainable Development Goals of the United Nations Agenda 2030. This is a universal, comprehensive and transformative action plan aimed at promoting sustainable human development in the social, economic and environmental areas.

The Basque perspective on "Sustainable Human Development" can be translated into two dimensions: "Sustainable Growth", which includes fields related to growth, the reactivation of the economy, sustainability and the creation of quality employment, and "Human Development", with the focus on areas linked to health, education, culture and social policies; basically, people's quality of life.

Figure 12: A global country strategy, "Sustainable Human Development"



Source: Gobierno Vasco.

3.3.2. Agenda Euskadi Basque Country 2030

On 25 September 2015 the United Nations General Assembly unanimously approved the Agenda 2030 for Sustainable Development. Consisting of 17 objectives and 169 targets, it is a universal, comprehensive and transformative action plan aimed at promoting sustainable human development in the social and economic areas and preserving the environment for future generations.

Euskadi undertakes a commitment to align with the Sustainable Development Goals (SDG) and incorporates it into the Agenda Euskadi Basque Country 2030. In the words of Lehendakari Iñigo Urkullu:

"It is an opportunity for Euskadi because it ties in fully with our priorities: human development that guarantees essential services to everyone and sustainable growth that creates opportunities for higher quality employment. This is the Basque model of growth and social well-being that is now being strengthened with the presentation of this Agenda Euskadi Basque Country 2030."

Figure 13: Sustainable Development Goals

Source: United Nations Development Programme.

In this framework, the SDGs most closely related to the 2030 STIP are the following:

3. Good Health and Well-Being

5. Gender Equality

7. Affordable and clean energy

8. Decent work and economic growth

9. Industry, innovation and infrastructure

11. Sustainable cities and communities

13. Climate action.

The 2030 STIP is an instrument that helps to materialise Euskadi's contribution to the Sustainable Development Goals, and in particular to SDG 9: Industry, Innovation and Infrastructure, which states that investment in infrastructure and innovation are fundamental drivers of growth and economic development.

3.3.3. Government Programme for the 12th Legislature

The Government Programme 2020-2024 for the 12th Legislature is based on three underlying principles: guaranteeing healthcare, kick-starting the economy and employment, and not leaving anybody behind. It is structured around the four themes of Prosperity, People, Planet and Self–government. Prosperity, understood as jobs and economic reactivation; People, with health, education, public services, equal opportunities, social and cultural policies, harmonious coexistence and human rights as basic challenges; Planet, with the aim of advancing towards a just energy and climate transition; and Self-government, defined as more and better self-government.

The 2030 STIP is a strategic country plan that covers the entire Basque Science, Technology and Innovation System. It is a Plan that guides the long-term research and Innovation policies of the Basque Government, going beyond the timeframe of the 12th Legislature. However, it is also a key instrument that will help towards the achievement of several of the objectives of the Government's Programme for the 12th Legislature, particularly those linked to area 3 -"Research and Innovation"- within theme 1 (Prosperity).

As a result, the 2030 STIP is consistent with the Government Programme and will contribute to the achievement of the following objectives contained in it:

- **Country Objective 3:** Bring about convergence in R&D with the European average and Commitment 22: Increase investment in research and innovation (related to Objective 2 of the STIP).
- **Commitment 19:** Smart Specialisation and new Strategic Science, Technology and Innovation Plan up to 2030 (related to the STIP and the section on RIS3 smart specialisation).
- **Commitment 20:** Improve the results and excellence of the Basque Science, Technology and Innovation System (related to Objective 1 of the STIP).
- **Commitment 21:** Internationalise the Basque Science, Technology and Innovation System (related to Objective 3 of the STIP).
- **Commitment 23:** Strengthen strategic R&D projects, innovative public procurement and industrial cybersecurity (related to the instruments and programmes in the policy mix of the STIP).
- **Commitment 24:** Increase innovation in small- and medium-sized companies (related to Objective 2 of the STIP).
- **Commitment 25:** Develop and recruit technological talent (related to Objective 4 of the STIP).
- **Commitment 26:** Support innovative entrepreneurship (related to the instruments of the policy mix).

3.3.4. Berpiztu: Economic Reactivation and Employment Programme

Within the framework of the overall country strategy of Sustainable Human Development, policies on science, technology and innovation contribute to the sustainable creation of economic wealth and quality employment. This is why the policies of the 2030 STIP come within the timeframe of *Berpiztu,* the "Economic Reactivation and Employment Programme for Euskadi (2020-2024)".

Berpiztu is a comprehensive and shared response by Basque institutions to overcome the economic and employment crises created by the Covid-19 health pandemic, a situation in which inter-institutional cooperation and coordination are more important than ever. The joint objective, stated in the commitment presented by the Government and the three Territorial Administrations last September 29, is to recover all jobs lost and ensure that the unemployment rate falls below 10%.

Berpiztu is structured in two major vertical axes of action that are deployed in 12 policies and 60 courses of action that make up the reference framework of different measures and instruments in the field of recovery and stimulation of employment and the economy, to be implemented during the period covered by the Programme. A third theme or cross-cutting area related to improving the quality of employment is also defined, constituting the thirteenth policy in the Programme. The gender perspective is incorporated into all the above policies, courses of action and programmes and measures, to ensure that the different starting situations and needs of women and men are taken into account.

Figure 14: Vertical axes of action in the *Berpiztu* Programme

berpiztu

AXIS I		AXIS II	
ECONOMIC REACTIVATION		JOB CREATION	
TRACTOR-EFFECT POLICIES		TRACTOR-EFFECT POLICIES	
1.	Investment in public, economic and social infrastructures	7.	Entrepreneurship New companies
2.	**Research, Innovation and Digital Transformation**	8.	Training for work
3.	Energy and Environmental Transition	9.	Insertion in the labour market. Local and district employment plans
4.	Industry and SMEs, Advanced Services, Creative Industries and Internationalisation	10.	Renewal programmes. Rehabilitation of buildings
5.	Food sector	11.	Public Job Offers
6.	Tourism and Culture companies and industry	12.	Action plan for youth employment
AXIS III			
CROSS-CUTTING AREA: IMPROVING QUALITY OF EMPLOYMENT			
13. Improving Quality of Employment and Gender Equality			

Source: *Berpiztu.* Programme for Economic Reactivation and Employment in Euskadi (2020-2024)

Berpiztu contributes to compliance with the "Sustainable Development Goals 2030" of the United Nations. The Programme also aligns with the "Next Generation EU" European fund (see section 2.3.3.2), a global reference framework to align and orientate public and private resources towards the construction of an ecological, digital and resilient Europe through sustainable and integrating growth that strengthens social and territorial cohesion.

3.4. European strategic context

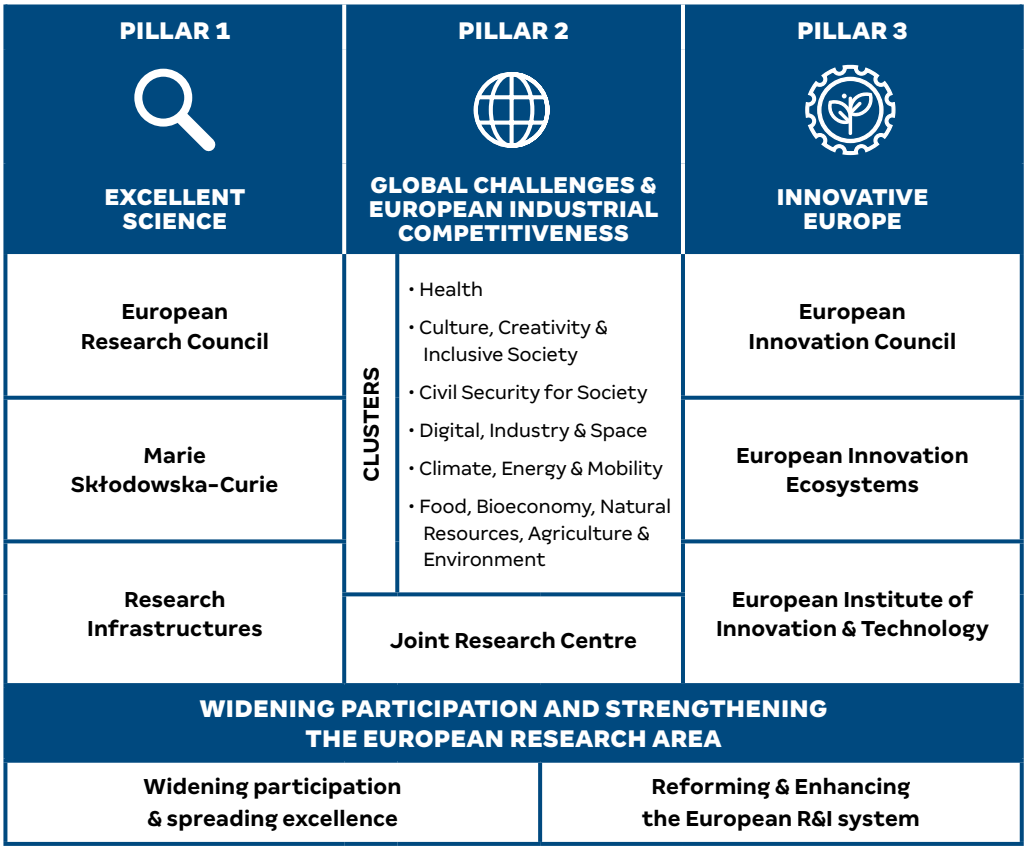
3.4.1. Horizon Europe

The European Commission has raised expectations around the new Research and Innovation Framework Programme aimed at strengthening Europe's capacity for innovation, providing long-lasting prosperity and maintaining overall competitiveness. With the biggest budget in history -approximately 90,000 million euros over seven years (2021-2027)- Horizon Europe prioritizes:

1. Strengthening the scientific and technological basis of the EU.
2. Boosting innovation, competitiveness and employment capabilities in Europe.
3. Satisfying citizens' priorities and supporting the European model of socioeconomic values.

On 17 April 2019 the European Parliament ratified the provisional agreement reached with the European Council in March and April of that year. Under the agreement, the Horizon Europe programme is based on three pillars: P1) Excellent Science; P2) Global Challenges and European Industrial Competitiveness and P3) Innovative Europe.

Figure 15: Structure of the Research and Innovation Framework Programme - Horizon Europe



Source: European Commission.

Horizon Europe is an evolution, not a revolution. It has been built on good practices and lessons learned from the previous framework programme, Horizon 2020, among them the 3-pillar organisation shown above. Horizon Europe also has some new features:

- Some high-level missions are created in strategic areas for Europe. The approach consists of establishing well-defined objectives and specific targets, so that citizens can visualise the value of investments in research and innovation and their enormous impact on their everyday lives.
- The European Innovation Council is set up to drive a new approach in the form of support for the creation and acceleration of innovative companies, based on results of research excellence that help to create wealth for the economy and quality jobs.
- Multidisciplinary skills and cooperation among stakeholders are promoted through a new approach of public-private partnerships, particularly industrial.
- The intention is to extend participation and synergies with other European funding programmes, and to strengthen the European Research and Innovation Area.
- Greater participation by citizens is also sought.

3.4.2. Digital Europe Programme

In a context of the digital transformation in all areas of society, including the economy, and aligning with the sustainability objectives, the European Commission has set up the Digital Europe 2021-2027 programme through a Proposal for a Regulation of the European Parliament and the European Council.

The general aim of the programme is to drive investments by the EU, Member States and industry to support the digital transformation of Europe's economy, industry and society and thereby improve its competitiveness, narrowing the digital gap and strengthening the strategic autonomy of the EU.

The programme consists of the following five objectives, which are closely linked and interdependent:

1. High-performance IT. The objective is to develop and strengthen the EU's capabilities in the field of high-performance IT and data processing, guaranteeing its application to both the private and public sectors.
2. Artificial Intelligence. The objective is to develop and strengthen essential capabilities in Europe, in particular data resources and repositories of artificial intelligence algorithms so that they can be accessed by all companies and public administrations.
3. Cybersecurity and trust. The objective here is to foster the development of basic capabilities to guarantee and underpin the digital economy, society and democracy in the EU with a view to improving its competitiveness and industrial potential in the area of cybersecurity.
4. Advanced digital skills. The programme will focus on the development of suitable skills in the citizens of today and tomorrow in areas such as high-performance IT, artificial intelligence and cybersecurity.
5. Deployment, better use of digital skills, and interoperability. This objective consists of extending the use of digital skills to the economy and society as a whole, particularly high-performance IT, artificial intelligence and cybersecurity.

Specifically, the Digital Europe programme will be structured around two main types of activity:

- **Development and reinforcement of basic skills** in the three digital technologies identified (high-performance IT, cybersecurity, artificial intelligence) and the advanced digital skills required.
- **Deployment and better use of digital technologies** throughout the economy and society. Digital Innovation Hubs will play a key role in the deployment of digital technologies in the field of business.

As it is an integral programme, the European Commission also aims to facilitate -both to SMEs and Public Administrations- access to the latest digital technologies through the creation of a network of digital innovation centres.

3.4.3. Green Deal

In the framework of the energy-climate transition, the European Commission presented the European Green Deal in December 2019, a plan to overcome the challenges faced by Europe and the world related to climate change and the degradation of the environment. It is a new growth strategy designed to transform the European Union aiming at a fair and prosperous society, a competitive modern economy that is efficient in the use of resources, with no net emissions of greenhouse gases by 2050 and economic growth disassociated from the use of fossil-fuel resources.

As well as supervising the integration of sustainability into all the policies of the European Union, the Green Deal includes a series of transforming objectives:

1. A higher level of climate ambition by the EU for 2030 and 2050.
2. A supply of affordable and secure clean energy.
3. The mobilisation of industry towards a clean and circular economy.
4. The efficient use of energy and resources in the construction and renovation of buildings.
5. Speeding up the transition to sustainable and smart mobility.
6. From the farm to the fork: designing a fair and healthy food system that cares for the environment.
7. The preservation and regeneration of ecosystems and biodiversity.
8. Zero pollution for an environment free of toxic substances.

Research and innovation will play a key role in speeding up the fulfilment of the objectives in the Green Deal, and also in the transition to compliance with it, in the implementation, demonstration and elimination of hazards in the solutions implemented and in the involvement of citizens.

3.4.4. Next Generation EU

On May 27 this year the European Commission presented its proposal for the creation of a new instrument, a recovery fund called "Next Generation EU", a temporary fund for the 2021-2024 period with a budget allocation of 750,000 million euros. The aim is to ensure a sustainable, just, inclusive and equitable recovery for all the Member States.

"Next Generation EU" contains three pillars, with the common objective of investing in an ecological, digital and resilient Europe.

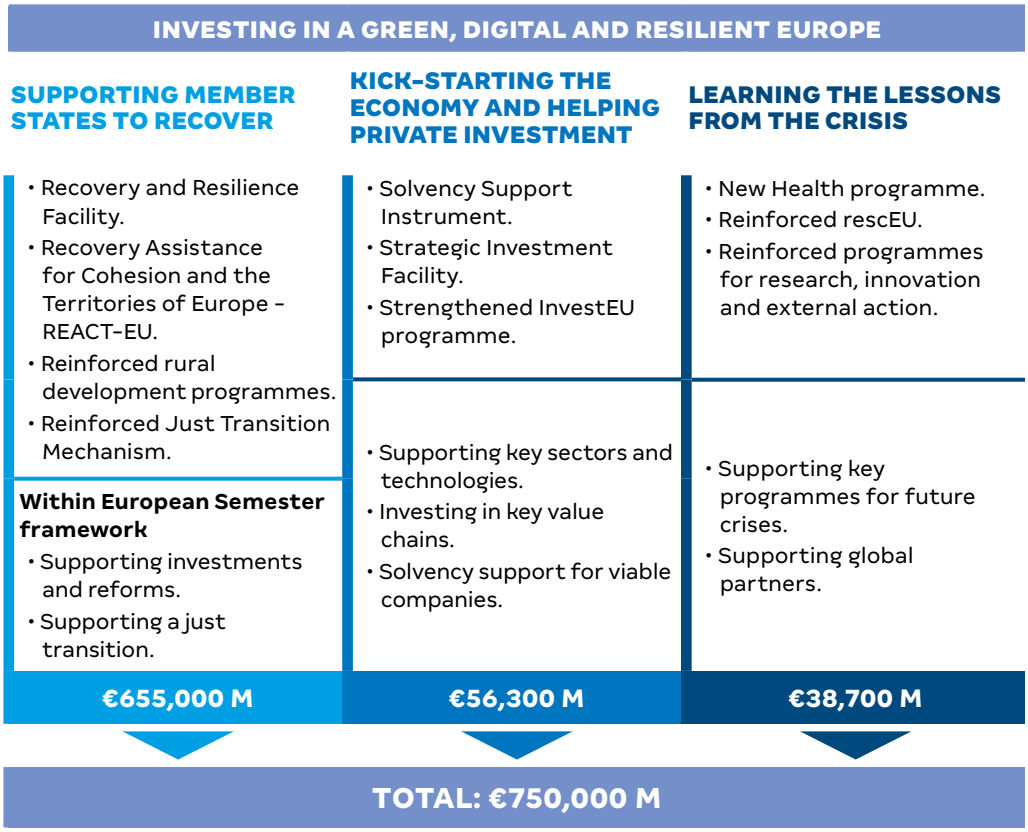
The first pillar, "Supporting Member States in their recovery", accounts for 87% of the funding planned and is focused on investments and reforms by the Member States, which will follow the recommendations and policies of the Commission. It is structured in several instruments, the most notable being a new Recovery and Resilience Facility (RRF) to support investments and reforms related to the ecological and digital transitions and the resilience of national economies, linking them to the European priorities. An add-on the current cohesion policy programmes has been designed called "REACT EU", together with a boost for the Fair Transition Fund and the European Agricultural Fund for Rural Regional Development.

The second pillar, "Kick-starting the economy and helping private investment", focuses on boosting investment in the private sector. The funds will be managed by the European Investment Bank (EIB) and will be structured via a new solvency support instrument, another for strategic investments, and an increase in the budget allocation for the "InvestEU" European programme.

The third pillar, "Learning the lessons from the crisis", is aimed at supporting investments based on the lessons learned from the crisis. The instruments for its implementation include a new programme -"EU4Health"- to strengthen health security; a reinforcement for the European civil protection mechanism called "rescEU"; an add-on for the "Horizon Europe" programme aimed at strengthening research in the fields of health, resilience and the ecological and digital transitions, and support from the global partners of Europe for external action.

Of these pillars, the instrument with the greatest volume of Next Generation EU funds corresponds to the Recovery and Resilience Facility (RRF). To receive financial support in the framework of the RRF, the European Commission has established a number of strategic guidelines. To access these funds, the Member States must draw up National Recovery and Resilience Plans that establish a programme of investments and reforms for the 2021-23 period.

Figure 16: Next Generation European Fund



Source: European Commission.

Euskadi Next is the programme for investments in recovery and the transformation and resilience of Euskadi that the Basque Government, in coordination with the three Territorial Administrations and the City Councils of the three Basque capitals, is sending the Spanish Government for consideration in the framework of the allocation of 59,168 million euros to the Recovery and Resilience Facility (RRF) in Spain. It contains a coherent and consistent set of public and public-private initiatives designed to address the challenges arising from the energy-ecological and digital transitions and the effort to improve social cohesion. In this respect, it strengthens the commitment to Sustainable Human Development that the Basque Government has been carrying out in recent legislatures, reinforced in the last legislature by the Agenda Euskadi 2030.

The Euskadi Next Programme is structured around eight main elements:

1. Health and care of people.
2. Lifelong learning.
3. Power generation from renewable energies.
4. Sustainable mobility.
5. Digitisation and Innovation in Administrations, companies and value chains.
6. Urban habitat.
7. Natural habitat and the prevention of natural disasters.
8. Circular Economy.

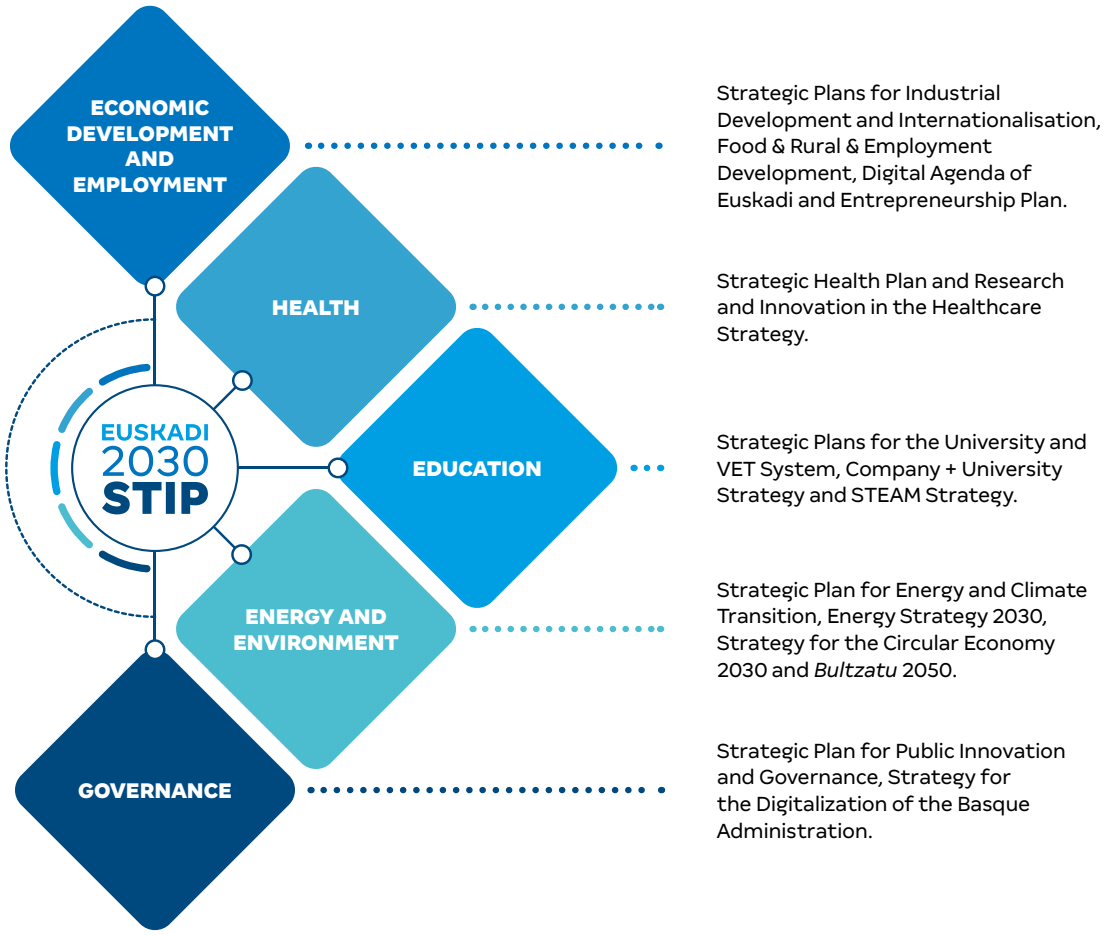
3.5. Basque Government policies linked to the 2030 STIP

The Science, Technology and Innovation Plan is the reference framework in which all the policies and support activities for R&D&I carried out by the Basque Government are integrated and coordinated.

From this perspective, it is the element that brings together basic research, industrial research and experimental implementation related to policies in the fields of Education, Healthcare, Energy and the Environment, Economic Development and Employment and Governance and Innovation in the Administration. Therefore, the deployment of the objectives and the monitoring of the R&D&I indicators in these plans needs to be linked and oriented towards what is defined in the STIP.

In turn, the 2030 STIP is part of the overarching "Sustainable Human Development" country strategy, as well as of the Basque Government's strategy for 2030 -Agenda Euskadi Basque Country 2030-, in which all the plans are embedded. Among these, some are closely linked to the 2030 STIP, such as Strategic Plans for Vocational Training, the Basque University System, Healthcare, Energy and Climate Transition, *Bultzatu* 2050, Industrial Development and Internationalisation, Food and Rural Development, Employment and Public Innovation and Governance.

Figure 17: Policies linked to the 2030 STIP



Source: *Lehendakaritza,* Basque Government.

4.

Strategic lines of the Plan

VISION 2030

Euskadi stands among the most advanced regions of Europe in innovation by 2030, with a high standard of living and quality employment.

4.1. Vision 2030

The ultimate aim of the Science, Technology and Innovation Plan is to improve the standard of living and the quality of employment in Basque society through a policy of innovation that would put Euskadi among the most advanced regions of Europe by 2030.

Therefore, science, technology and innovation are instruments for solving the main challenges we are facing, and to guarantee balanced and sustainable economic and social development in Euskadi.

In particular, the 2030 STIP will help to overcome the following five social challenges in Euskadi, aligned with the Sustainable Development Goals of the United Nations:

- **ENERGY AND CLIMATE CHANGE**
- **HEALTH**
- **EMPLOYMENT**
- **DIGITAL TRANSFORMATION**
- **GENDER EQUALITY**

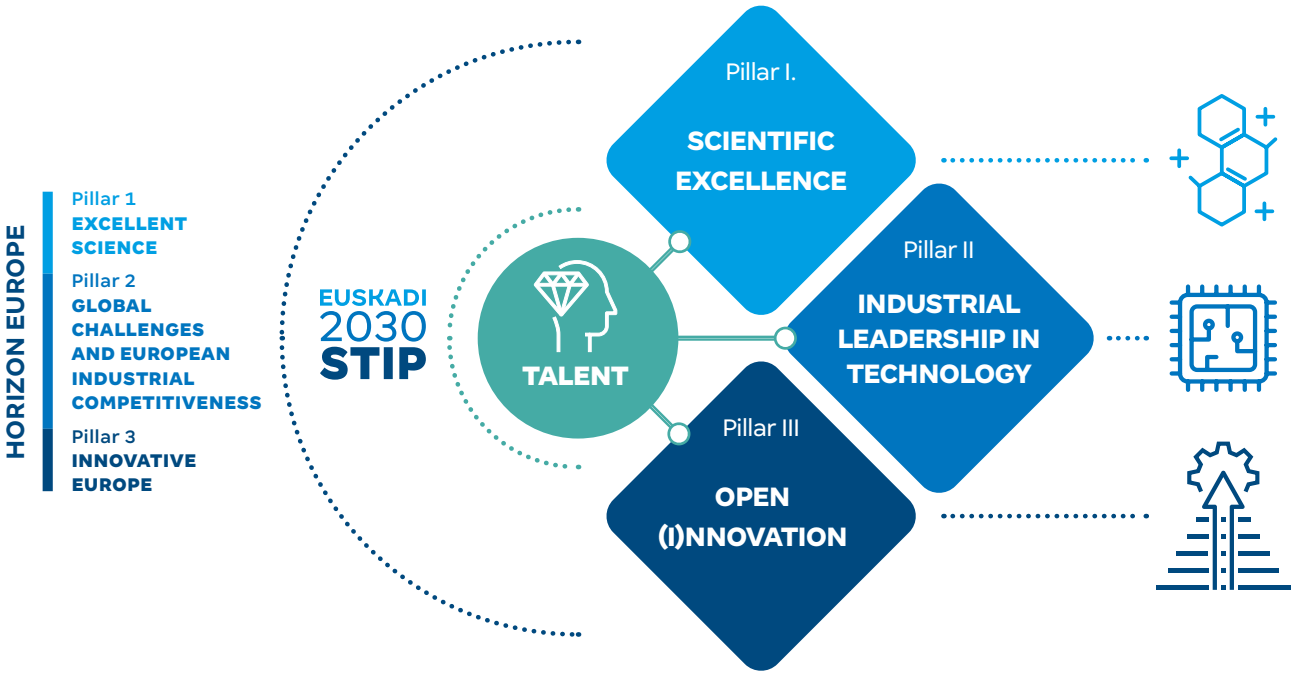
To turn this vision and contribution into a reality for solving the social challenges, the following strategic pillars and operational objectives are established:

4.2. Strategic Pillars

Taking the new Horizon Europe Framework Programme as a guide, and in order to turn the vision of the new Plan into reality, the following three strategic pillars and a core element are envisaged:

- **Strategic Pillar I: Scientific excellence.**
- **Strategic Pillar II: Technological Leadership of Industry**
- **Strategic Pillar III: Open (i)nnovation.**
- **Core element: Talent.**

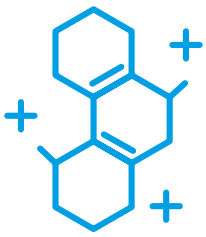
Figure 18: Strategic Pillars of the 2030 STIP



Source: *Lehendakaritza,* Basque Government.

These four elements are essential and should contribute to the achievement of the vision established in the 2030 STIP in a combined and balanced way, so that the results of research are turned into social and economic results. This approach therefore incorporates basic research (aimed at developing new cutting-edge knowledge), applied research and innovation (aimed at contributing to the leadership and improvement of the international competitiveness of the Basque business fabric), and to progress in areas such as healthcare, transport, the environment, etc., thereby covering the full range of the Technology Readiness Levels (TRLs). In this respect, the 2030 STIP will place the emphasis on fostering innovation in the widest sense of the word, from the most disruptive to the most incremental, both in large companies and -above all- smaller ones, while not forgetting other kinds of bodies such as the public administrations, healthcare bodies and cooperation with the stakeholders in the Basque Network of Science, Technology and Innovation.

People are at the heart of R&D and innovation activities. The talent of highly-skilled individuals working in the field of research, technological development and innovation will make the deployment of the different pillars of the 2030 STIP possible.



4.2.1. Pillar I. Scientific Excellence

The main objective of this pillar is to promote research excellence as a basis for creating and disseminating new knowledge, capabilities, technologies and solutions. It will, therefore, be a key element in cementing the basis and constructing Basque science and technology capabilities in the future, and will also contribute to increasing the attractiveness of the Basque Country as an international reference hub.

Furthermore, so that Basque science can make a contribution to Euskadi as it takes on the triple transition (technological-digital, energy-climate and social and health), it will be necessary to promote interdisciplinary work and to combine fields and technologies. Contributions from all fields of knowledge will be required, from the experimental sciences to the social sciences and humanities. Specifically, the last two will be a key factor in understanding human behaviour when it comes to undertaking the systemic transformations linked to the above-mentioned transitions.

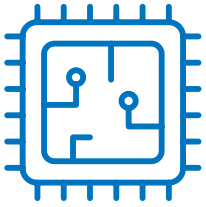
Moreover, the generation of knowledge should circulate between research/industry and education/training. Its dissemination should serve to maximize the results obtained from research and, above all, lead to their exploitation.

This pillar will be carried out based on the following themes:

- **Strengthen research excellence and the internationalisation of the Basque scientific system from a long-term perspective.** The progress of Basque science towards excellence with a long-term perspective has propitiated the generation and attraction of cutting-edge knowledge. This theme covers both the participation of the Basque scientific system in the European Research Area and the creation of international alliances in strategic fields.
- **Intensify cutting-edge research that pushes the boundaries of knowledge.** To do this, research excellence will be boosted in emblematic lines aligned with flagship European initiatives. Moreover, efforts will be made to attract top research profiles to Euskadi, plus the funds required to develop this state-of-the-art knowledge so that it can lead to innovations of a disruptive nature in the future. In the long term, this could also contribute to the creation of a new generation of highly-qualified researchers in Euskadi.
- **Strengthen scientific and technological capabilities and drive a Basque network of large-scale and singular research infrastructures.** The aim is to equip Euskadi with the capabilities and infrastructures for research, validation and testing required to undertake the challenges associated with the triple transition, and to help the Basque industrial fabric strengthen its knowledge base.

  A boost will be given to the acquisition of large-scale and/or singular infrastructures for reference research in Europe related to emblematic areas of research and other large infrastructures that can be used by the BNSTI. The basic objective of this network would be to leverage the generation of cutting-edge research and the creation and attraction of highly-qualified talent to the BNSTI, helping to consolidate the range of European infrastructures. The training and international mobility of researchers will also be supported, plus the improvement of careers in research, promoting the participation of non-academic sectors at the same time (e.g. SMEs).

- **Strengthen cooperation among the stakeholders that make up the BNSTI.** The combination of scientific and technological disciplines and capacities enacted by both the 2030 STIP and Horizon Europe means that cooperation among the stakeholders of the BNSTI needs to be intensified even more. This cooperation should also be a basic element in the structuring of a Basque network of large-scale and singular research infrastructures.
- **Continue making progress in the results-oriented aspects of research,** both scientific and technological, to ensure the efficient use of resources and investments. In line with the common European objective of driving a digital strategy up to 2030 and a climatically-neutral Europe by 2050, singular digitisation actions will be carried out. This will take the form of an Open Science strategy with its origins in Euskadi that seeks to create greater opportunities for international cooperation and to position the results of the research programmes. Moreover, the high-performance IT hub of Euskadi will be reinforced, based on the efficient use of the super-computing resources available and their dimensioning from the perspective of the needs of the BNSTI. Research excellence based on artificial intelligence will be strengthened in emblematic areas.



4.2.2. Pillar II. Industrial Leadership in Technology

This pillar sets out to consolidate and foster the technological and industrial leadership of Basque business groups and contribute to positioning them in international markets with high future growth potential. To achieve this, the focus will be on strengthening the interaction and convergence of the technologies in which Basque companies are international benchmarks, such as production processes or power electronics, and other emerging technologies such as artificial intelligence, cybersecurity or neutron physics. Their development for industrial purposes and for related high added-value services will also be promoted.

Moreover, this pillar also covers the global challenges linked to the Sustainable Development Goals included in the Agenda Euskadi Basque Country 2030, through the development of strategic R&D public-private cooperation projects integrated into the RIS3 areas of specialisation.

The effective integration and transfer of knowledge of excellence generated in pillar I will be particularly important, contributing to the strategic positioning of Basque companies in global value chains and addressing the global challenges referred to above.

The deployment of this pillar will be done based on the following themes:

- **Driving strategic projects that assist in the development and incorporation of new technologies,** particularly those linked to the RIS3 areas of specialisation, in leading tractor-effect companies and their supply chains. The objective of this theme is to promote the evolution of the niche industrial technologies on which Basque industry bases its international competitiveness.
- **Strengthen the development of strategic public-private cooperation projects, both international and local, to address the challenges identified in Agenda Basque Country 2030.** These initiatives, part of the RIS3 areas of specialisation, will also contribute towards consolidating Basque technological leadership and will be participated in by companies, entities in the Basque Network of Science, Technology and Innovation, public administrations and social organisations. The objective is to generate and develop new technologies through cooperation, which, as well as leading to solutions to the challenges faced by society, will help the Basque business fabric to be a leader in certain business niches.

Participation in missions and public-private partnerships sponsored by the European Commission will also be supported within the framework of the Horizon Europe programme.

- **Strengthen cooperation among the companies and stakeholders in the Basque Network of Science, Technology and Innovation (BNSTI).** Here, it is a case of strengthening the mechanisms that make the development of new knowledge possible, based on the challenges and needs of the productive fabric (market pull), and those that make the development of new market niches possible based on scientific or technological discoveries (technology push), making the processes of generation and transfer of knowledge systematic.
- **Attract investments and/or highly technology-intensive multinationals to Euskadi that could drive R&D.** To do this, it will be necessary to continue improving the factors that make Euskadi attractive in comparison with other regions and competing countries, as well as fostering cooperation among key stakeholders in Basque R&D and attracting direct foreign investment.
- **Promote the protection of the knowledge generated** in the form of patents, industrial designs and European trademarks, to guarantee associated use rights and a return on investment in R&D and innovation activities.

Through the development of the above-mentioned themes, this pillar can contribute to strengthening investment in R&D in the business sector to reach the European level.

4.2.3. Pillar III. Open Innovation

This pillar focuses on promoting innovation from a systemic and holistic perspective, covering the Basque Science, Technology and Innovation System as a whole and taking into account both the technological and the non-technological nature that innovation can have. Specifically, it sets out to strengthen and improve integration among companies, entrepreneurs, the Basque Network of Science, Technology and Innovation, the public sector and organisations with a social focus.

By concentrating activity in the RIS3 areas of specialisation, the objective is to promote the present and future competitiveness of the Basque business fabric and seek joint solutions to global challenges, exploiting the scientific and technological knowledge generated in connection with other international innovation ecosystems.

The pillar will place special emphasis on the aspects of innovation to be strengthened in the Basque ecosystem, with a focus on cooperation and outreach. Specifically:

- **Innovation in small- and medium-sized companies** where, according to official statistics and comparative reports drawn up by the European Commission, the main area of improvement for Euskadi lies in its ability to perform in innovation. Innovation in this type of company will be supported through cooperation as a way to remedy their deficiencies. To do this, as well as strengthening innovation through cooperation and the companies' relationship with the BNSTI, efforts will be made to take advantage of the tractor effect that benchmark Basque companies have on SMEs through the supply chain, supporting them in their efforts to enter international markets. This aspect not only helps to improve the competitiveness of Basque SMEs, it also generates an attractive business environment for capturing and anchoring high-value international industrial activity in the territory.

- **Disruptive innovation, i.e. with the potential to create new markets.** It is a case of improving the ability of the Basque innovation ecosystem to exploit and participate in future creative and disruptive innovations in the market. By doing this, Euskadi will contribute to Europe leading the development of markets with a high impact on the future lifestyles and well-being of all its citizens. To do this:
  - New ways of transforming the cutting-edge research in innovation mentioned in Pillar I will be promoted, strengthening relations and synergies in the scientific, technological and business domains.
  - Greater efforts will be made to seek new niches of opportunity or entrepreneurial discovery areas through the RIS3 strategy, and the processes of creation of new technology-based companies in these areas will be promoted. Therefore, it will be necessary to intensify the interaction between the business fabric, entrepreneurs, the Basque Network of Science, Technology and Innovation, the Administration, entities with a social focus and, as the case may be, the citizens of Euskadi.
  - The connection of the most promising innovation projects that emerge from the above processes will be made to the appropriate European instruments, allowing inventors, innovators and investors to take ideas to market in a more agile and efficient way.
- **The role of the public sector in innovation.** The objective is dual. On one hand, the Administration should lead the implementation of collaborative innovation processes linked to the deployment of the RIS3 strategy. In this respect, the public sector should promote open and collaborative innovation in strategic fields, incorporating scientific-technological stakeholders and businesses as well as society as a whole (e.g. patients) and strengthening programmes and instruments that facilitate the joint development of the activities of research, validation and demonstration of new technologies and equipment. The aim is to cover all the phases of the process of innovation, from the conception of the idea to the public procurement phase.

  Furthermore, it is a question of driving public innovation with the aim of creating an Administration that is more open, transparent, renewed and digital that can undertake the transformation of services such as healthcare, education and justice and improve democratic governance and citizens' participation.
- **Cooperation with other regions and international innovation ecosystems.** The objective is to link all the elements that make up the Basque Science, Technology and Innovation System at the international level, to strengthen cooperation and investment capacity and make the best use of the resources and services created in the framework of the new Horizon Europe programme.

  The focus driven by the challenges posed are addressed by the Knowledge and Innovation Communities (KIC) of the European Institute of Innovation and Technology (EIT) and its portfolio of activities, which range from business education and training to innovation projects and activities to create companies and support services for start-ups and SMEs. They can also contribute to the objectives of Pillar II and complement its major activities to undertake the key cross-cutting priorities that are beneficial for society such as climate change, support for the digital economy, innovative energy, healthcare or the sustainable development of cities.

4.2.4. Talent

Talent assumes special importance in the Science, Technology and Innovation Plan; it is the key to the implementation of the other pillars.

Over the last decade, the science and technology community of Euskadi has grown, both in terms of the total number of researchers and those who work full-time. This sustained growth has been possible thanks to several factors, among them, a BNSTI that is capable of generating talent, the growing appeal of Euskadi as a research hub internationally, and the support programmes in place for training research personnel.

The promotion of scientific and technological research and innovation requires the development of projects, the funding of programmes, large-scale scientific infrastructures and encouraging talent. The last-named will contribute to high-level research and technological activity, maximising their impact to consolidate Euskadi as an attractive place for the production of benchmark science, technology and innovation.

It is a case of training, developing, promoting and attracting talent aligned with the priorities of Euskadi in the field of R&D and innovation.

This pillar is based on the implementation of the following lines:

- **Strengthen the mechanisms of generation, attraction and retention of talent in the Basque Network of Science, Technology and Innovation (BNSTI) and its mobility,** among other things, to generate, attract and retain state-of-the-art knowledge linked to Pillars I and II, which, in turn, can contribute to the creation of a new generation of highly-qualified researchers in Euskadi.
- **Promote the training, skills set and development of research and technological talent, strengthening the links between economic and social areas.** The objective here is to extend and transfer knowledge and talent to drive the dissemination and exploitation of the results of R&D in the territory.

  Emphasis will be placed on the link to the Basque business fabric, for companies to be able to attract new talent and undertake more ambitious and disruptive R&D and innovation projects.
- **Foster better Digital Skills and facilitate the way in which they can be acquired and updated,** particularly those applied to job profiles related to research and development activities in a disruptive social context of digital transformation.
- **Drive gender equality in the field of science, technology and innovation** to reduce the existing gap and promote equal opportunities, rights and obligations, and thus contribute to sustainable development and inclusive economic growth in Euskadi.

  It will also be particularly important to take the gender perspective into account in research and the design of innovative solutions in areas linked to global challenges such as climate change or healthcare, as it is a factor that can determine the quality of the results obtained.
- **Foster STEAM education and scientific and technological vocations among young people, and the popularisation of scientific and technological culture in society as a whole.** STEAM (Science, Technology, Engineering, Arts and Maths) integrates science, technology, engineering and mathematics with the Arts and Humanities, with the aim of leading to careers in science and technology, improving students' skills and empowering them to take an active part in the transformation of the world they live in.

Likewise, the incorporation of new state-of-the-art knowledge and the socialisation of scientific-technological culture helps to promote the dissemination of the results of research so they can reach society as a whole.

Therefore, the promotion of both aspects will be the basis for Euskadi to become a society based on knowledge and innovation in the future.

4.3. Operational objectives

The four operational objectives of the Science, Technology and Innovation Plan 2030 STIP are:

1. **(R)**esults-oriented.
2. Development and **(i)**nnovation.
3. **(I)**nternationalisation.
4. Promotion of **(T)**alent.

Each objective is measured through a limited number of indicators, selected according to the priorities established in the Plan and taking into account the main international reference indicators in the Regional Innovation Scoreboard (RIS). By doing this, the aim is to monitor Euskadi's progress in the ranking of regions according to their level of innovation. The indicators proposed can be modified depending on the evolution of the RIS over the next few years, and also on the modifications made to the R&D&I indicators of the official innovation surveys as a result of the application of the new Oslo Manual.

4.3.1. Objective 1. Maximize the orientation of Basque R&D&I to results

The Basque Science, Technology and Innovation System has gradually improved its results in recent years, showing itself to be increasingly efficient. The aim is to maintain this level of efficiency and establish ambitious objectives for improvement that are nevertheless achievable and can contribute to Euskadi taking its place among the European regions with a high level of innovation. The science, technology and innovation plans in recent decades, and particularly since 2005, have been clearly results-oriented. The 2030 STIP shares this approach and aims to maximize it, regardless of the type of activity i.e. basic research, applied research, experimental implementation, or innovation. The idea is that these results, a direct consequence of R&D&I projects, should have an impact on the economy and society over time.

From among the results of a socioeconomic nature, employment in knowledge-intensive sectors has been selected as the most representative. It is an indicator related to the impact that research and innovation have on the economy in the medium and long term. The participation of employment in the high- and medium-high technology manufacturing sectors and knowledge-intensive services is an indicator of an economy based on innovation that is capable of taking on the challenges related to the technological-digital and the energy-climate transitions.

From the results of a scientific and technological nature, scientific publications and exports of technology products have been selected. As for scientific production, and bearing in mind the positive evolution in recent years, the present Plan sets out to continue improving quality, seeking to maximize the impact on society and making a contribution from Pillar I (scientific excellence), for which it will base itself on strengthening international cooperation. International reference scientific articles give a good idea of the efficiency of the research system, as the most cited publications (in the top 10%) are internationally recognised as having the highest quality and excellence. Furthermore, the technological results of high- and

medium-high technology products measure the technological competitiveness and marketability of R&D&I results in international markets, thereby contributing to economic growth and well-being and to the creation of quality employment. This is why they are also considered an indicator of economic impact.

From among the results of innovation -and also within the category of economic impact- the sale of new products has been selected. It is one of the main objectives of companies, allowing them to renew their portfolio and remain competitive in local and international markets. By including both new company products and those that are new in the market, the indicator reflects both the creation of state-of-the-art technologies (new products for the market) and their dissemination (new products for companies).

The indicators of results selected as contributing to objective 1 are shown below:

Table 8: Indicators and targets of operational objective 1

Area measured	Indicator	Current situation 2019	Target 2023	Target 2026	Target 2030
Socioeconomic results	**Knowledge-intensive employment**	**17.7%**	**18.3%**	**18.6%**	**19.0%**
Scientific and technological results	**Scientific publications in the top 10% most cited internationally**	**18.8%**	**20%**	**21%**	**22%**
	Exports of high- and medium-high technology products	**55.3%**	**56%**	**57%**	**58%**
Results of innovation	**Sale of new products on total turnover**	**18.3%**	**19%**	**19.5%**	**20%**

Source: *Lehendakaritza,* Basque Government, with data from Eurostat, Ikerbasque and Eustat.

4.3.2. Objective 2. Drive R&D and innovation in companies, particularly in SMEs

Among the main weaknesses of Euskadi in innovation, as seen in chapter 2 of the evaluation of results in the 2020 STIP, is investment in R&D. This kind of investment is a key lever for growth in a knowledge-based economy and its trends are an indicator of the future competitiveness and prosperity of a territory. As a result, the aim of increasing investment in R&D in Euskadi above the European average has been set, to reduce the gap with the rest of Europe that emerged due to the financial crisis of 2008.

In the most advanced countries companies are the main funders of investment in R&D, as opposed to a public sector that simply acts as a lever that provides incentives for these investments. To grow in this area, therefore, investment in R&D by companies needs to be activated. On one hand, by driving the tractor effect of large companies in their commitment to technology and innovation throughout the supplier value chain, and on the other, providing incentives for SMEs to incorporate advanced technology and expert personnel into their workforces.

It is also necessary to overcome the weakness shown by Euskadi in the development of innovations, both in companies' products and their business processes. A focus is required on small companies that show greater weaknesses in this respect and have fewer resources to be able to undertake innovation. To do this, cooperation between companies and the ecosystem of intermediate stakeholders that supports the innovation efforts of SMEs (local development agencies, vocational training centres and consultancies in the field of innovation) needs to be strengthened, while at the same time reinforcing, simplifying and making support programmes for innovation for SMEs more accessible.

Specifically, these companies need support to be able to:

- Valorise the results obtained from their R&D activity.
- Carry out activities to develop innovation[10].
- Through these activities, innovation is seen as an essential element in improving competitiveness. It also provides a response to the new social, health, educational and environment challenges that our country needs to address.

Furthermore, while there has been a certain improvement in recent years in the protection of intellectual and industrial property, more efforts need to be made in this regard. International patent applications, which measure the capacity for the development of new value-added products, are one of the elements that determine the competitive capacity of companies. Registered trademarks are also an important indicator of innovation, particularly in the service sector, as they fulfil three basic functions: they identify the origin of the goods and services, they guarantee consistent quality through proof of the company's commitment to the consumer, and they are an effective form of communication and advertising. Finally, the protection of a product's design can round off the protection given by a patent, or even replace it in certain cases.

[10] The new Oslo Manual 2018 defines this as financial, development and marketing activities carried out by a company with the aim of leading to innovation in it. Specifically, these activities are:
- Experimental Research and Development (R&D)
- Engineering, design and other creative activities
- Marketing and brand image activities
- Activities related to intellectual and industrial property.
- Employee training
- Software development and database activities
- Activities related to the acquisition or leasing of tangible assets
- Innovation management activities.

The indicators associated with this objective are shown in the following table:

Table 9: Indicators and targets of operational objective 2

Area measured	Indicator	Situation in 2019	Target 2023	Target 2026	Target 2030
Activities and resources for innovation	Investment in R&D	€1,481M	€1,630M	€1,892M	€2,300M
	Investment in R&D financed by companies	€799M€	€810M	€920M	€1,100M
	Innovative companies in products and/or business processes	42.2%	50%	55%	60%
	Investment in innovation	0.68%	0.8%	0.9%	1.0%
Protection of innovation	Number of patent applications EPO	194	220	240	260
	Number of trademark applications EU	465	600	700	800
	Number of industrial design applications EU	125	155	185	225

Source: *Lehendakaritza,* Basque Government, with data from Eurostat and the European Patents Office (EPO).

4.3.3. Objective 3. Strengthen the internationalisation of Basque R&D&I

The objective of the internationalisation of R&D seeks to increase Basque participation in the European Research Area through leadership and cooperation in projects within the framework of the new Horizon Europe programme. It also sets out to strengthen links in the area of innovation, taking advantage of the instruments in the abovementioned programme as well as strengthening relations with other international innovation ecosystems. To achieve this, the participation of Euskadi in the new European Framework Programme should be focused on the major European initiatives, bringing SMEs into contact with tractor-effect projects, R&D and innovation instruments and inter-regional cooperation initiatives.

In parallel, efforts will be needed to continue to attract foreign investment in R&D to help with the launch or consolidation of new research and experimental implementation activities, and to create highly-skilled jobs by making the best use of the knowledge infrastructures developed in recent decades. Specifically,

attracting R&D activity of foreign multinationals and generating an attractive environment for Basque multinationals to focus their R&D activity in Euskadi, including that aimed at production facilities abroad.

The aim is also to drive Basque R&D&I that is aligned with global social and economic challenges to ensure a dynamic and sustainable Basque economy, and to boost the leadership of Euskadi in strategic and specific fields. To do this, international cooperation and the transfer of the strategic vision will be promoted in cooperation with the other stakeholders in the BNSTI, the starting point being excellent research.

Among the most representative indicators, those related to the international financing of investments in R&D have been selected. They include both public calls for tender under Horizon Europe and international private finance. Basque leadership of collaborative research and innovation projects under Horizon Europe will also be sought, to measure our international competitiveness and facilitate the programme's strategic orientation towards the needs of Euskadi. To orientate the results of projects towards the interests of Basque companies and involve them in cooperation with other European companies and research centres, the number of Basque companies participating in Horizon Europe has also been selected as an indicator. Finally, scientific publications in international cooperation have also been chosen. As well as measuring the extent of the outreach of Basque research and its integration into global knowledge networks, these are an enabling factor that improves scientific productivity.

The table below shows the indicators linked to this objective:

Table 10: Indicators and targets of operational objective 3

Area measured	Indicator	Present situation	Target 2023	Target 2026	Target 2030
International leadership and competitiveness	International funding of R&D	€128M	€145M	€170M	€200M
	Leadership of Horizon Europe projects[11]	27%	20%	20%	20%
	Basque companies participating in Horizon Europe (*)	77	100	110	120
	Scientific publications in international cooperation	1,651	1,920	2,220	2,560

(*) From 2028, companies participating in the next European Framework Programme of Research and Innovation.

Source: *Lehendakaritza*, Basque Government, with data from Eustat, Ikerbasque and Innobasque.

[11] The new Horizon Europe programme will drive larger and more complex R&D&I projects than in the previous H2020. This methodological change increases the requirements and the level of difficulty to lead these large projects, which has led us to recalculate the targets established for Euskadi.

4.3.4. Objective 4. Promote scientific-technological talent, particularly women

The generation, attraction, mobility and recognition of research and technological talent and of highly-skilled professionals in the priority areas of specialisation are a key element in the development of the Basque Science, Technology and Innovation System. The promotion of talent is not only focused on scientific and technological stakeholders but also on the business fabric, which needs to recruit research and technological talent to understand, absorb and industrialise local R&D and enable the implementation of strategies to develop in-house technology. Research personnel who carry out R&D activities are the main cost item in investment in R&D, as shown in objective 2 (above). This is why the indicator related to research personnel holding a doctorate has been selected among research personnel overall, as an indicator that measures the training and skills required to lead success-oriented research teams that will be able to apply research methods more efficiently.

While the presence of women among research personnel has increased in recent years, it is still necessary to persevere in this field as inequalities are still observed between their qualifications and access to posts of responsibility.

Access to qualifications in science, technology, engineering and mathematics (STEM) also depends on this. While the demand for these professions is growing as the Basque economy increases its level of sophistication, the number and percentage of enrolments in these degree courses is decreasing.

Therefore, an attractive and stimulating environment needs to be created that increases the motivation and the full career development of young people from an early age.

The table below shows the indicators linked to this objective:

Table 11: Indicators and targets of operational objective 4

Area measured	Indicator	Present Situation	Target 2023	Target 2026	Target 2030
Promotion of talent and new vocations	Doctorate research personnel	30.9% 2019	33%	34%	35%
	Access to STEM bachelor degrees	29.1% 2020	31%	33%	35%
Gender Equality and promoting women researchers and technologists	Women researchers	36.3% 2019	37.5%	38.5%	40.0%

Source: *Lehendakaritza*, Basque Government, with data from Eustat and the Ministry of Universities.

4.3.5. Summary of the Objectives

Having described the strategic pillars and operational objectives, we now present a table that reflects the relationships between them. Specifically, the contribution of the strategic pillars to compliance with the operational objectives can be seen, and this will facilitate the deployment of the present Science, Technology and Innovation Plan:

Table 12: Links between the strategic pillars and operational objectives of the 2030 STIP

Operational objectives	Pillar 1 Scientific excellence	Pillar 2 Technical-industrial leadership	Pillar 3 Open innovation	Talent
Operational objective 1 **Results-oriented**	■	■	■	●
Operational objective 2 **R&D and business-based innovation**	●	■	■	●
Operational objective 3 **Internationalisation**	■	■	●	●
Operational objective 4 **Talent**	●	●	●	■

■ **Direct contribution** ● **Indirect contribution**

Source: *Lehendakaritza*, Basque Government.

5.

Basis for Smart Specialisation – RIS3 Euskadi 2030

In line with the European process and methodology, the areas of specialisation that make up the RIS3 Euskadi strategy have been reviewed. There has been an evolution in relation to the previous strategy. Furthermore, and aligned with the content of Horizon Europe, the so-called Cross-Cutting Tractor-Effect Initiatives have been added. Moreover, a Basic Technology Map of cross-cutting technologies has been defined for all the RIS3 areas of specialisation.

These three elements are the basis of the new RIS3 Euskadi strategy for 2030 timeframe. The description that appears in this document constitutes, once again, the start of the process. They are living elements that will evolve based on the context and vision of the Steering Groups and the other governing bodies. These groups, made up of stakeholders from the 'triple helix' (companies, universities, technology and research centres and the Administration) aim to drive the deployment of the general strategy and participate in its design or revision, facilitating alignment with the strategies of each stakeholder.

This means that the process will be a living one, adapting to the evolution of priorities and circumstances. With the aim of ensuring the best possible alignment of these elements with reality, two comprehensive reviews will be made in 2023 -given the impact of the pandemic in this period- and 2026.

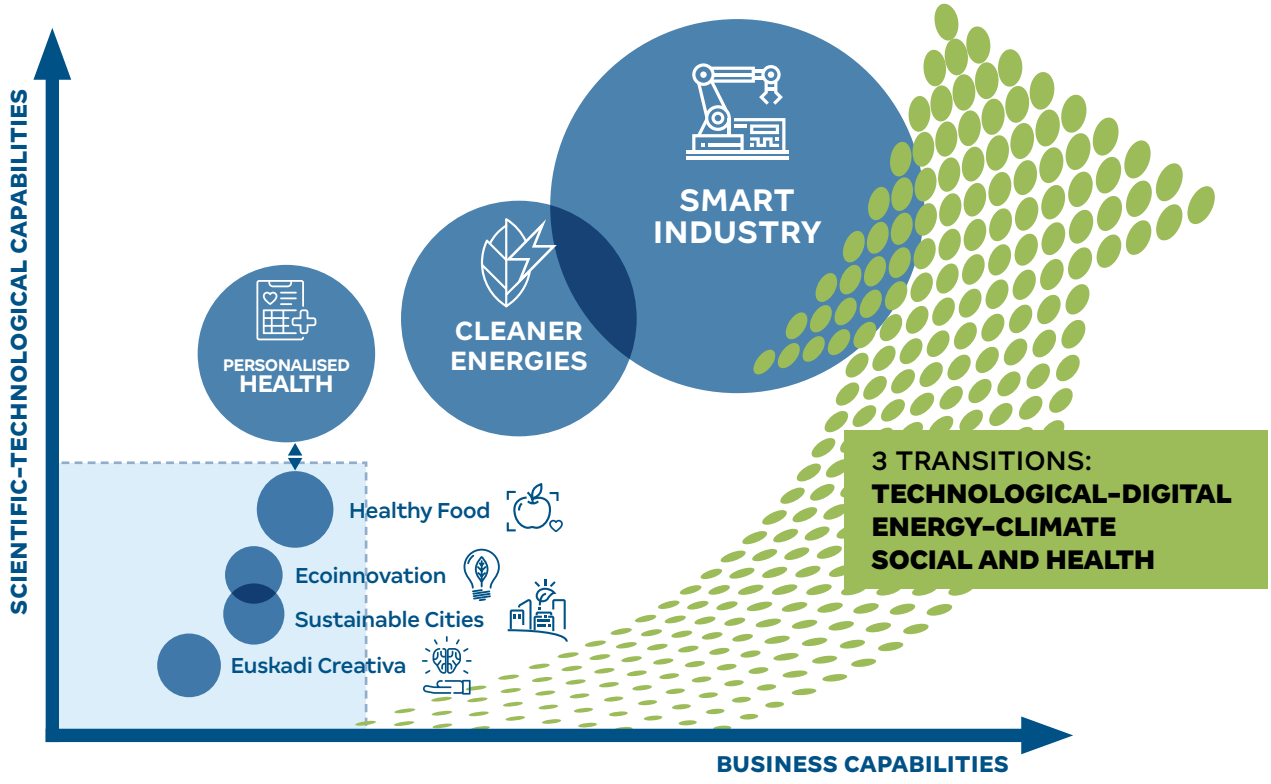
5.1. Evolution of the areas of smart specialisation

The Euskadi 2020 STIP defined the different areas of smart specialisation based on the application of European criteria and methodology for the process of smart specialisation RIS3 and the interaction of three vectors: 1) business capabilities, 2) scientific and technological capabilities and 3) market opportunities.

The review of the areas of smart specialisation made in the process of preparation of the 2030 STIP was largely influenced by the mega-trends and, more specifically, by the three transitions mentioned in section 3.1: technological-digital, energy-climate and social-health.

These three transitions are the main vector in the evolution of the seven areas of the RIS3 Euskadi strategy. They are also linked to cross-cutting sectors such as professional services to companies and digitisation and communication technologies.

Figure 19: RIS3 Euskadi 2030



Source: *Lehendakaritza*, Basque Government.

5.1.1. Strategic priorities

> SMART INDUSTRY

The strategic priority of Smart Industry is one of the drivers of the economic and social development of Euskadi. This is an area that has shown itself able to adapt to technological changes in the past, and is now well prepared to deal with the challenges of the paradigm of the fourth industrial revolution.

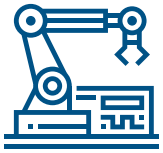


Table 13: Main Smart Industry magnitudes (2019; million euros at current prices, number, %)[12]

Macro-magnitudes	Level		Weight in Euskadi in 2019
	2019	Evolution 2014-2019	
Internal expenditure on R&D (€M)	678.1	+21.8%	45.8%
Gross Added Value (€M)	10,965.7	+21.9%	15.4%
Jobs (number) [13]	151,721	+9.9%	14.0%
Exports (€M) [13]	18,517.2	+20.4%	71.8%

Source: Innobasque, based on data from Eustat.

Helped by the Basque Industry 4.0 technological and industrial development strategy, Basque companies have made progress in the automation and improvement of their processes and have incorporated flexible solutions and technologies in the area of robotisation and additive manufacturing or connectivity between machines and other equipment. However, new challenges have emerged linked to the digital transformation and the efficient use of material and energy resources. The technological-digital and the energy-climate transitions have become the basis for the development of new products and solutions that contribute higher added value and improve the competitive position of Basque industry.

The Smart Industry strategy –Basque Industry 4.0– presents a novel industrial approach to generate economic, social and environmental value driven by connected and innovative companies and services, scientific-technological stakeholders at the cutting edge of technology and highly-skilled human capital.

To achieve this, it proposes the generation and application of innovation and manufacturing technologies that are sustainable and digital and enable the creation of products and services of high added value and the development of new business models with a potentially high impact in terms of prosperity, employment and lower environmental impacts.

It includes the design of products and processes from the life cycle perspective, the sustainable use of materials and processes and the application of digital solutions that improve functionality, efficiency and/or user experience and/or add value through the exploitation of data.

Six overall objectives have been proposed to achieve this:

- Mobilisation and multiplication of efforts in R&D, innovation and digitisation.
- Generation of knowledge through KETs (Key Enabling Technologies) that act as a basis for sustainable and digital production.

[12] Macro-magnitudes of the predecessor of Smart Manufacturing in the Euskadi 2020 STIP.

[13] Data - 2018.

- Insertion in global and sustainable value networks.
- Faster incorporation of advanced solutions and the generalisation of their use in SMEs.
- Attraction and training of talent.
- Outreach to the world.

The objective of the Smart Industry RIS3 area is to drive innovation, technological development, the digital transformation, sustainability and talent as levers of competitiveness for Basque industry and its positioning as a leader in business niches in an increasingly global economy. In this respect, initiatives that boost the digitisation of Basque industry -particularly in SMEs- such as the Basque Digital Innovation Hub, will be strategic, as well as their integration into the European network created by the Digital Europe programme.

The challenges to be faced in achieving this objective by 2030, which are linked to the technological-digital and the energy-climate transitions, are the following:

- Maintain and strengthen our capabilities and competitive advantages around manufacturing technologies, as a basis on which to build value.
- Valorise the use of data, contributing intelligence and value to clients, which involves servitization and the development of new business models.
- Increase the value of products and services, according to the tenets of the Circular Economy.
- Undertake an essential change of culture so that organisations can extract the maximum value from digital technologies and the opportunities related to sustainability.

> CLEANER ENERGIES

Euskadi is internationally positioned as a hub of industrial knowledge and development in the field of energy, with some large tractor-effect international companies located there.

Table 14: Main macro-magnitudes of the cleanest energies (2019; million euros at current prices, number, %) [14]

Macro-magnitudes	Level		Weight in Euskadi in 2019
	2019	Evolution 2014-2019	
Internal expenditure on R&D (€M)	170.6	+11.8%	11.5%
Gross Added Value (€M)	3,580.3	+13.8%	5.0%
Jobs (number) [15]	23,231	+1.8%	2.1%
Exports (€M) [15]	4,265.80	-0.5%	16.5%

Source: Innobasque, based on data from Eustat.

[14] Macro-magnitudes of the previous scope of Energy in the Euskadi 2020 STIP.

[15] Data for 2018.

The *EnergiBasque* strategy of technological and industrial development has the mission of driving the competitiveness of companies in the area of clean energies in global markets through technological innovation, based on the smart specialisation policies of Euskadi with support from the stakeholders in the Basque Science and Technology Network, in order to make progress in environmental sustainability and the transition towards a carbon-neutral economy.

To do this, three over-arching objectives are envisaged:

- Attract and involve leading world companies so that they can exert a tractor effect throughout the value chains, by putting forward technological challenges and strategic initiatives that enable suppliers to improve their competitive position.
- Support business and technological activities with the aim of exploiting new business opportunities in energy markets, based on the competitive advantages of the industrial fabric and the areas of specialisation of the scientific and technological stakeholders.
- Promote the application and integration of key basic technologies for the development of added-value solutions in the energy areas and challenges that are considered a priority.

The objective of the RIS3 area of Cleaner Energies is to drive the development of a Basque industrial sector of high added value, integrated in the global energy value chains. This would make Euskadi a reference territory in Europe for the development of new industrial and technological initiatives in specific fields of energy, thereby contributing to the generation of prosperity, employment and quality of life. The strategy prioritises the development of eight value chains: Wave Power, Wind, Solar, Hydrogen, Gas, Electric Power Grids, Energy Efficiency and Electric Mobility, plus five important facilitating technologies (basic technologies): Storage, Power Electronics, Materials, Circular Economy and Digitisation.

The challenges to be addressed to achieve this objective by 2030, and to which the energy-climate and the technological-digital transitions are linked, are the following:

- To convert the objective of the European Green Deal for zero greenhouse gas emissions by 2050 in the energy-climate transition into a growth strategy by exploiting existing electrification capacity with a competitive range of products and services in smart networks and energy generation from renewables, with special emphasis on areas of opportunity such as offshore wind power and hydrogen.
- Greater cooperative R&D activity in strategic areas, both related to the core technologies of each area and the basic technologies identified as important in each one.
- Digitisation, access to data and sharing data throughout value chains, plus the transition towards new business models based on data.

> PERSONALISED HEALTH

The Basque Healthcare System has evolved in recent decades to incorporate the latest technological and medical developments arising from research and innovation. This has meant that patient care and the management of health and care systems has improved.

Greater life expectancy -an achievement by society- has also meant higher exposure to conditions associated with ageing such as cancer or degenerative illnesses. Going forward, it is expected that technological evolution linked to the "-omic" sciences and developments such as genetic profiling, plus the enormous amount of clinical data available through open inter-operable platforms and progress in artificial intelligence or Big Data will provide diagnoses and treatments that are almost individualised, depending on the characteristics of groups of patients, that will improve the way illnesses are treated and people's quality of life, and delay ageing. It will also be possible to make progress in health prevention and improvement overall through, for example, new connected devices that will boost people's empowerment and co-responsibility, as well as creating new healthcare models.

Table 15: Main macro-magnitudes of personalised health (2019; million euros at current prices, number, %) [16]

Macro-magnitudes	Level		Weight in Euskadi in 2019
	2019	Evolution 2014-2019	
Internal expenditure on R&D (€M)	121.4	+19.8%	8.2%
Gross Added Value (€M)	4,044.9	+16.3%	5.7%
Jobs (number) [17]	52,551	+9.5%	4.9%
Exports (€M) [17]	56.0	+15.3%	0.2%

Source: Innobasque, based on data from Eustat.

The Basque strategy of research and innovation in the field of personalised healthcare will drive these developments through cooperation between the healthcare system, the scientific and technological system (of which it is part) and the business fabric, in such a way that not only will care for individuals in the health system be improved but Basque companies will also be able to develop and export a large part of the new advances and solutions to the challenges posed by health once they have been tested and validated in our setting. These efforts will be concentrated in the areas of medical equipment and digital healthcare, personalised medicine, ageing and social and care services.

Collaborative research and innovation in the fields of health and diet will also be promoted, aimed at healthy eating adapted to the different phases of life.

[16] Macro-magnitudes of the previous field of Bioscience-Health in the Euskadi 2020 STIP.

[17] Data for 2018.

To address these objectives, this RIS3 field will face the following challenges up to 2030, mainly related to the socia-health transition but also to the technological-digital and energy-climate transitions:

- Growth of a high technology/R&D&I-intensive business fabric to compete in the international market and seek suitable financial solutions for the sector. Development timescales and the risks involved in this process vary depending on the value chain and eventual innovations: systems of diagnosis, therapies (treatments in the widest sense, including rehabilitation) and interventions to maintain or improve people's health; tools and solutions for the processing and exploitation of data; the creation of equipment, assistance mechanisms and interfaces for intervention and provision of social healthcare, etc.
- The sustainability of the healthcare system, with a dual focus: through the incorporation of innovations (technological and organisational) and divestment in those of low or no value. This will allow for the provision of quality care in the face of growing demand due to an ageing population, and through the incorporation of circular economy notions to reduce waste and develop an environmental policy in line with Agenda Basque Country 2030.
- The digital transformation of the healthcare system and the conversion of information into knowledge to improve management and decision-making, facilitate research and innovation and, ultimately, increase the level of excellence of the healthcare system, providing a response to across-the-board challenges to the health system such as personalised medicine, electronic healthcare (e-health), telemedicine, active and healthy ageing and healthcare services, improving results in health terms and the patient experience in the process.
- Large-scale access to data and advanced analytics: new ways of managing data and extracting knowledge from diverse and complex data, and using them to drive biomedical research and innovation and make progress in the prevention, treatment and cure of illnesses. The application of Big Data to the health sector can be made in practically all the fields: genomics, epidemiology, clinical trials, clinical operative systems, cooperation by the public, remote monitoring, administration… and in this respect Artificial Intelligence has great potential for application. Special attention will be paid to exploiting its potential to the full for prevention and readiness purposes to provide a fast and efficient response to possible new health crises or pandemics.
- The speedier incorporation of high-impact, evidence-based innovations for the benefit of patients, the healthcare system, and companies that develop products, processes or services for the health sector, driving cooperation by the business sector and other stakeholders with the healthcare system, and innovative public procurement systems.
- Talent: new profiles to exploit technological capabilities, the use of data on a massive scale, and open innovation, plus a generational handover that connects, or includes, the clinical-healthcare aspect with research and innovation. Another feature is the maintenance of parity in this generational handover.
- A balanced implementation of legislation to enable research and innovation in the health field, while guaranteeing data security.

5.1.2. Areas of opportunity

To complement the strategic priorities, continuity is given to the areas of opportunity defined in the previous Euskadi 2020 STIP, adapting their definition to reflect the evolution that has taken place in recent years. As well as the existence of capabilities and knowledge oriented towards internal demand from clients -mainly the Administration- it is worth highlighting the possible synergies and opportunities for cooperation between the areas of opportunity and the strategic priorities to jointly take on the new challenges that Euskadi will face in the future linked to the three transitions. The following areas of opportunity are established:

> HEALTHY FOOD

The food sector will be a strategic sector worldwide in the future, due to an increase in population, demographic changes, the development of (bio) technologies in food production, climate change and progress towards personalised nutrition.

This area of opportunity is understood as healthy food, focused on the development of quality foods for healthy ageing through research and innovation, while boosting the role of the agrifood industry in the Basque economy.

To do this, the food sector in the Basque Country needs to specialise in the creation of value based on ever more efficient processes. This creation of value needs to be leveraged on the following elements:

- Production ecosystems that are safer, healthier and more sustainable.
- The development of a new range of services and products for a population that attaches ever greater importance to the food-health tandem.
- The incorporation of new digital and biotech technologies.

Table 16: Main macro-magnitudes of healthy food (2019; million euros at current prices, number, %) [18]

Macro-magnitudes	Level		Weight in Euskadi in 2019
	2019	Evolution 2014-2019	
Internal expenditure on R&D (€M)	44.1	+24.6%	3.0%
Gross Added Value (€M)	5,720.3	+33.3%	8.0%
Jobs (number) [19]	100,773	+9.8%	9.3%
Exports (€M) [19]	989.7	-4.4%	3.8%

Source: Innobasque, based on data from Eustat.

Euskadi should aspire to be a world reference in the field of food and cuisine as a result of its attributes of quality and economic, social, cultural and environmental sustainability throughout the value chain. To achieve this major challenge it is necessary to drive, promote and develop an industry that is able to place healthy quality products in the market, one that drives sustainability, the creation of an exceptional tourism proposition and the conservation of its cultural, landscape

[18] Macro-magnitudes of the previous field of Food in the Euskadi 2020 STIP.

[19] Data for 2018.

and gastronomic heritage to reach even higher levels of recognition worldwide. This development should be promoted from the food value chain paradigm, from primary production to the consumption of healthy foodstuffs, placing people -the consumers of the food- at the heart of the value chain and looking for synergies and interactions with other economic, cultural and social sectors.

This area of opportunity is facing across-the-board challenges linked to the technological-digital transition, which will require the integration of ICTs into all the links in the food value chain and the energy-climate transition. This will require adaptation to the circular economy, reducing waste to a minimum, recovering and valorising food by-products and redesigning food packaging. The social-health transition is also an opportunity, which can be summarised in the following challenges in terms of the timeframe in question:

- Short-term challenges (2020-2025):
  - Safe, sustainable and healthy food ecosystems.
  - Personalised nutrition: development of the "-omics" and their application to the formulation of new products.
  - New foods for healthy ageing: from childhood to retirement age.
  - New sources of food protein.
- Medium-term challenges (2025-2030): New methods of production of (biotechnological) proteins or other ingredients (biofilms, polysaccharides, fatty acids, vitamins, etc.).
- Precision Nutrition, focused on the importance of nutrition in the prevention of such things as Non-Communicable Diseases (NCTs), thereby contributing to the health and well-being of the population. The aim is to promote new approaches to intervene in the nutrition of specific population groups and strengthen the effects of diet on health and well-being, particularly through impact pathways related to: a) the reduction of the relative risk of prevalence of NCTs in target groups due to dietary factors and b) a reduction in the relative risk of the onset of obesity in target groups of children and adolescents.

> ECO-INNOVATION

Eco-Innovation enables a reduction in the environmental effects of our means of production, increases the resilience of Nature and territories to the pressures suffered, and means the efficient use of natural resources.

The European Green Deal incorporates Eco-Innovation as one of the key drivers of change for economic growth through the new Integrated Product Policy, the Best Available Techniques, the decarbonisation of industry and the integration of criteria for adapting to climate change, particularly in urban structures and the abovementioned infrastructures.

The challenge of the area of opportunity of 'Eco-Innovation' is to enable companies and the Administration to prepare in advance for the new instruments ("drivers of innovation") that will emerge from the EU's Green Deal. This will contribute to improving cost-effectiveness through joint efforts through the supply of knowledge of, and demand for, the uptake of European economic incentives and strategic initiatives such as the *Basque Ecodesign Center* and the *Basque Circular Hub*.

Eco-Innovation is not only driven by internal company elements (costs, differentiation, brand image, etc.) but more so by the environmental policies and instruments created by the European Commission. These are contained, among other things, in the European Green Deal referred to above.

Table 17: Main macro-magnitudes of Eco-Innovation (2019; million euros at current prices, number, %) [20]

Macro-magnitudes	Level		Weight in Euskadi in 2019
	2019	Evolution 2014-2019	
Internal expenditure on R&D (€M)	23.9	+18.8%	1.6%
Gross Added Value (€M)	896.9	+17.9%	1.3%
Jobs (number) [21]	12,595	+10.3%	1.2%
Exports (€M) [21]	265.2	+42.8%	1.0%

Source: Innobasque, based on data from Eustat.

Taking into account the policies linked to this area, e.g., the Basque Strategy for the Circular Economy 2030, the Klima 2050 Strategy and the need to respond to the global challenge of the energy-climate transition -based on the technological-digital transition and propitiating the social-health transition- the main objectives associated with this RIS3 area of opportunity are the following:

- A diagnosis of the impact of the resources invested to date by companies in Euskadi, the BNSTI and the Government in their alignment with the European challenges that will have the greatest impact over the next 5-10 years
- Disseminate the specific European challenges in the industrial sector, i.e. the drivers of business-based Eco-Innovation. From there, anticipate, pilot and deploy responses
- Contribute to improving the cost-effectiveness of Eco-Innovation by networking on the basis of the supply of knowledge and demand for it
- Reinforce the focus of the environmental results of Eco-Innovation, particularly their contribution to reducing greenhouse gases and improving the resilience of the territory
- Get SMEs involved in Eco-Innovation (both technological and non-technological) based on a knowledge transfer plan and support for cost–effectiveness, as well as networking.
- Drive the participation of Euskadi in initiatives and new programmes of the European Commission under the umbrella of the Green Deal, fostering the creation of public-private regional clusters to make it easier to raise funds for the development of transformational green projects.
- Disseminate the good work done by Basque companies in Eco-Innovation on a European level, contributing to better access to market to companies that attach importance to the *green* element.

[20] Macro-magnitudes in the previous field of Ecosystems in the Euskadi 2020 STIP. The figures that appear here, as explained in Annex 3, are exclusively related to the RIS3 Euskadi methodology and have no comparative validity against other methodologies used to calculate Eco-Innovation activity.

[21] Data for 2018.

> SUSTAINABLE CITIES

This area will focus on healthy and sustainable urban development, including Smart Cities within the framework of the Basque Urban Agenda BULTZATU 2050 and mainly through projects of urban regeneration and transformation of a comprehensive nature. These can address, in terms of innovation, the main strategic challenges from an environmental, social, demographic, economic, cultural, technological, safety and health perspective, in an attempt to improve the well-being of the population as a whole.

Table 18: Main macro-magnitudes of Sustainable Cities (2019; million euros at current prices, number, %)[22]

Macro-magnitudes	Level		Weight in Euskadi in 2019
	2019	Evolution 2014-2019	
Internal expenditure on R&D (€M)	48.4	+8.8%	3.3%
Gross Added Value (€M)	6,633.8	+17.4%	9.3%
Jobs (number) [23]	110,836	+7.7%	10.3%
Exports (€M) [23]	1,238.3	+19.0%	4.8%

Source: Innobasque, based on data from Eustat.

The Covid-19 crisis also puts the focus on urban resilience more than ever, i.e. on the resilience of our constructed environment. The lack of resources and limited access to housing will lead to a rethink of the habitability of our cities and buildings from the perspective of the provision of essential services, 'circularity' and self-sufficiency. There is a major field of planning research based on the present reality and the creation of scenarios, exploiting the analysis of urban data, advanced visualisation and artificial intelligence.

The review of the Leipzig Charter that is taking place at the moment, which will influence one of the main focuses of attention of EU investment and R&D&I programmes, highlights the importance that cities, metropolitan areas in general ('functional areas') and regions are taking on to bring about the well-being of all their citizens. Hence the importance of this RIS3 area as a driver for new ways of analysing, understanding and undertaking interventions in cities in all fields (from governance to planning and management).

Taking into account policies linked to this area such as the Urban Agenda for Euskadi BULTZATU 2050, this area of opportunity includes specific challenges such as multi-level and transversal governance, the integration of the *Baukultur* vision of high quality at all levels, and the extension of the plan to new neighbourhoods and vulnerable areas. At the level of innovation, there are challenges linked to the three main transitions:

- Mobility, with its energy and digitalisation vectors (energy-climate and technological-digital transitions), the integration of photovoltaic solar panels (to reduce energy dependence), increasing awareness about the Environment and the probable exponential development of the Internet

[22] Macro-magnitudes of the previous field of Urban Habitat in the Euskadi 2020 STIP.

[23] Data for 2018.

of Things and the circular economy, based on a wide-ranging vision (water cycle, soil cycle, products and services, etc.)

- The incorporation of technological solutions developed in Euskadi in the fields of digitisation and sustainability to address challenges posed by cities.
- Fostering the capacity for integrated, participative and sustainable planning and management, incorporating health -and equitable healthcare- as one of the objectives.
- The encouragement of initiatives, actions and development of innovative products and solutions of a disruptive nature -with a technological basis (or not)- by the business, associative and civil society sectors in the field of cities and the three main transitions, with the following main lines of work, without restrictions or limitations in terms of possible developments or later incorporations:

- Lines of work linked to the energy-climate transition:

· Energy-positive buildings and neighbourhoods.

· Nature-based solutions (NBS) at the building and neighbourhood levels.

· New high-capacity insulation materials.

· Development of products and materials for energy storage at the building and neighbourhood level.

· Promoting the circular economy.

- Lines of work linked to the technological-digital transition:

· Digital twins at the building and neighbourhood level.

· Analytics and exploitation of urban data.

· Development of dynamic urban planning tools.

- Lines of work linked to the social-health transition:

· Cities that are accessible to everyone, both physically and digitally.

· Adaptation of construction and urban planning to an ageing population.

· Urban accessibility and mobility.

· Dynamic management of mobility.

· Healthy cities and environments.

> EUSKADI CREATIVA

The objective here is to evolve towards the creation of a Basque District of Culture and Creativity that would incorporate and give rise to Cultural and Creative Industries (CCIs)[24] as part of the Basque business sector and the Basque Science, Technology and Innovation System.

In this respect, R&D and innovation play a key role in its development, together with other activities linked to the competitiveness of businesses and internationalisation. In this process, one should not lose sight of the particular features and idiosyncrasy of this sector, based on talent, experimentation and creativity.

Table 19: Main macro-magnitudes of Euskadi Creativa (2019; million euros at current prices, number, %)[25]

Macro-magnitudes	Level		Weight in Euskadi in 2019
	2019	Evolution 2014-2019	
Internal expenditure on R&D (€M)	10.2	-0.5%	0.7%
Gross Added Value (€M)	2,396.9	+19.4%	3.4%
Jobs (number) [26]	42,760	+12.7%	4.0%
Exports (€M) [26]	167.7	+11.3%	0.7%

Source: Innobasque, based on data from Eustat.

Regarding the challenges this RIS3 area of opportunity is facing, those related to innovation are associated with the conceptualisation of R&D and innovation in the sector. Although it is a sector in which innovation and the generation of knowledge are indispensable and take place on a continuous basis, this is not reflected in the standard statistics and indicators/metrics. Therefore, defining R&D and innovation in the cultural and creative sector based on internationally agreed business criteria is one of the main challenges implicit in the modification or design of new support tools for the sector. These should be reflected in the corresponding indicators and statistics.

The area also faces the challenge of contributing to other sectors as a driver of non-technological innovation. As for internationalisation linked to innovation, the challenge is to create a more competitive sector. To do this, among other things, contact will be made with the networks operating in this field in Europe.

[24] The Cultural and Creative Industries sector covers the cultural sub-sector (dramatic arts, visual arts, audiovisuals, publishing and printing, music and cultural heritage) and the creative sub-sector (architecture, handicrafts, digital content, design, gastronomy, language industries, fashion, advertising and marketing and video games).

[25] Macro-magnitudes of the previous field of Cultural and Creative Industries (CCIs) in the Euskadi 2020 STIP.

[26] Data for 2018.

As regards the challenges linked to the transitions, the main ones are related to the technological-digital and the social-health transitions.

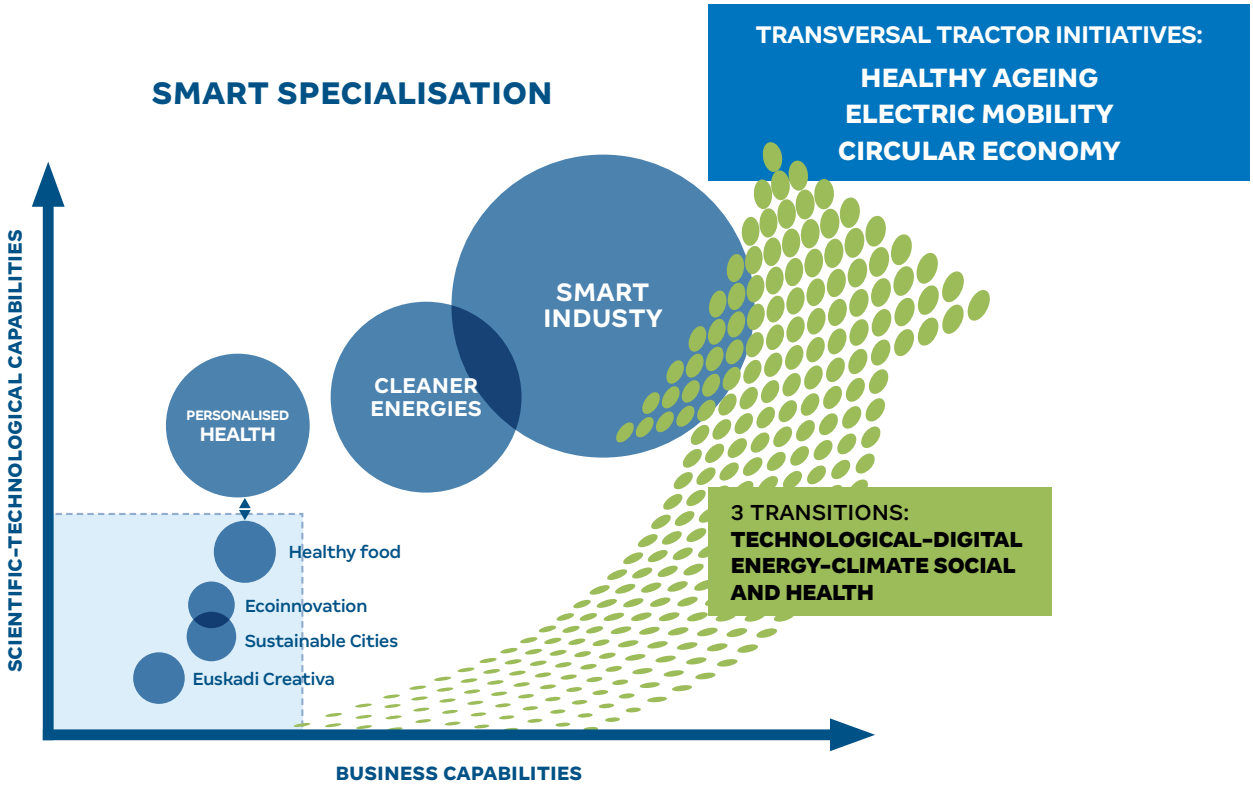
- In the first, the new forms of consumption of cultural content that have already arrived and will continue to evolve have repercussions on new forms of creation, production and distribution of this content. New ways of managing the intellectual property of these creations are also appearing.
- In the case of the second transition, culture can have substantial value in new elements such as healthy ageing or the integration of disadvantaged social groups. Moreover, it is a sector of high employability for young people and women, although there is still room for improvement in their working conditions.

5.2. *Cross-Cutting Tractor-Effect Initiatives*

The 2030 STIP introduces the concept of *Cross-Cutting Tractor-Effect* Initiatives, understood as an instrument that can promote collaborative work among the RIS3 areas in specific strategic fields. This would help Euskadi to undertake the triple technological-digital, energy-climate and social-health transitions. The focus is on establishing and/or sharing common strategies among companies, universities, technology and research centres and public administrations with the aim of identifying tractor-effect projects with well-defined objectives. Their implementation could provide tangible results that could be perceived by Basque society. They would be public-private cooperation projects with transformation potential for Euskadi, concentrating capabilities and investments in research, development and innovation. Whenever possible, participation in larger-scale European projects would be sought, e.g. through the new missions of the Horizon Europe programme.

Three Cross-Cutting Tractor-Effect Initiatives are initially proposed for the 2030 STIP in the fields of healthy ageing, electric mobility and the circular economy, although these may be revised, ended or extended depending on their state of development and the advances and results achieved.

Figure 20: Cross-Cutting Tractor-Effect Initiatives



Source: *Lehendakaritza*, Basque Government.

5.2.1. Healthy ageing

The progressive ageing of the population observed in the most advanced countries is felt more in Euskadi, as Eustat statistics show. In 2019, people over 65 years of age represented 22.2% of the population compared with 18.6% in 2008. In the European Union, this level is only surpassed by Italy.

Demographic ageing leads to all kinds of social, economic and political changes in society, with consequences on a scale that compromise quality of life, housing, health, social protection, the labour market, demand for goods and services, family structures, the sustainability of the tax system or inter-generational relations, to mention just a few.

The healthcare system needs to develop a more global and integrated philosophy of care that is capable of dealing with the consequences arising from ageing and the increase of chronic illnesses and dependence, which both require better levels of health and social care.

In this context, healthy ageing is defined as the process of optimisation of peoples' physical, mental and social health in order to improve their quality of life as the years go by and to facilitate the active participation of older people in society.

The challenges identified in this in this Cross-Cutting Tractor-Effect Initiative up to 2030 are the following:

- Scientific: understand how ageing takes place to delay the illnesses associated with it. Understand the causes of illnesses related to ageing and ways of preventing, treating and curing them.
- Healthcare: maintain an adequate level of social healthcare for the needs of the population in question, in an equilibrium with economic sustainability.
- Social: bring about social changes that favour the implementation of healthy habits and co-responsibility in looking after one's health.
- Business and institutional: to develop sustainable business models associated with social healthcare, well-being and leisure; to understand and coordinate interactions between different sectors and legislation to facilitate the development of innovations and the business models associated with them.

Population ageing opens up a range of opportunities linked to different RIS3 areas of specialisation. This initiative will be implemented in coordination with the following RIS3 areas:

- Personalised health.
- Smart industry.
- Healthy food.
- Sustainable cities.
- Euskadi Creativa.

5.2.2. Electric mobility

There is concern around the environmental and social problems arising from the generalisation of an urban transport model based on fossil fuels in the second half of the 20th century. Transport represents a quarter of greenhouse gas emissions in the European Union, and the level continues to rise. To achieve climate neutrality, it is necessary to reduce emissions from transport by 90% by 2050.

The disadvantages of the present mobility model, e.g. air pollution, excessive energy consumption, the effects on people's health or overcrowded roads, have led to a collective will to find alternatives that help to offset these negative effects, among which we would highlight electric means of transport.

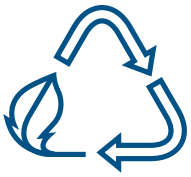
The transport sector is very important for the Basque economy, both for its weight and its connections with other sectors (industrial and service) and its intense international activity. The electrification of transport means radical changes for the sector in general in terms of products, process and business models that affect the global value chain and, therefore, the role that Basque companies play in it. Some of these changes are challenges which have their origins in the sector itself. Other changes are associated with Industry 4.0 and its implications for the relationship between transport and other sectors and the need to develop new business models. This situation makes the need and the opportunity very clear to carry out research to integrate new products, technologies, materials and the production processes related to the electrification of means of transport in the value chain of the Basque Country.

The challenges faced by this initiative up to 2030 are the following:

- Related to advanced manufacturing: In the automotive sector, for example, there are more products per car in electric vehicles. The variety of propulsion systems, including hydrogen, together with new products associated with electric vehicles, means that the value chain has to manage a higher number of references for a single car model. This clearly means that the approach to manufacturing needs to change. It also signals the need to incorporate products linked to electric vehicles into the portfolio that represent a process of development and manufacturing that is completely new to the value chain.
- Materials and processes: both the electrification of transport and efforts to reduce CO2 emissions from combustion signify a need to make major reductions in the total weight of vehicles. New manufacturing processes and materials are required to produce lighter and safer elements in vehicles.
- Batteries: new technologies with less dependence on reserves of rare metals, new non-lithium-based technologies ('beyond Li'), a longer working life of electrochemical batteries and a second life for them.
- The integration of electrical means of transport and charging infrastructures: the adaptation of distribution networks (forecasting and management of demand); fast, ultra-fast and wireless charging and the monitoring and adaptation of power grids to fast and ultra-fast charging; cybersecurity applied to the interaction between the vehicle and the electric power system; communication systems and services for the management of electric mobility.
- Eco-Innovation: a greater need for the rotation and recycling of vehicles and components; the importance of remanufacturing due to the greater use of plastics and composite materials.

The positioning of Basque companies in the development of electric means of transport and their components, as well as infrastructures for the electrification of transport, will require, in principle, cooperation with a number of RIS3 areas such as:

- Smart Industry.
- Clean Energies.
- Eco-Innovation.
- Sustainable Cities.



5.2.3. Circular Economy

Global warming is now an unquestionable reality, and it has been seen that it can mean benefits for the environment and people's health if it is correctly managed. It can also mean opportunities for more sustainable economic growth, the development of new sectors of activity and the creation of higher-quality employment.

Euskadi is a pioneering region in its commitment to sustainable development, care for the environment and its strategy to fight climate change. It has set itself the target of becoming a carbon-neutral territory as soon as a just transition allows -no later than 2050- and a territory and society that are more resilient in the face of climate change, in line with the European Green Deal.

The European Green Deal assigns a major role to progress towards a circular economy, with the aim of reducing the entry of virgin materials and the production of waste products, thereby closing the circle of the economic and ecological flows of resources. In a context of a rapidly growing world population, the circular economy is essential to maximise the efficiency of the use of resources, particularly in regions with a scarcity of raw materials such as Euskadi.

In this context, the bioeconomy is also an opportunity to transform key sectors of the economy based on a new generation of materials, products and new business models that valorise the use of biological resources that already exist in the territory. Euskadi can become a benchmark region in bioeconomy, based on a model of balanced and sustainable development that fosters the generation and consolidation of business activity with high added value and entails the optimal exploitation of the territory's resources.

The challenges faced by the Circular Economy initiative, shared with those put forward in the European and Basque strategies for a Circular Economy, are the following:

- Innovation in advanced and sustainable materials, processes, products and services.
- Driving the creation of new, more circular, business models.
- Extending the working life of products.
- Reducing the consumption of raw materials and the generation of waste.
- Reducing food waste.
- Promoting more efficient use of plastics.
- Waste management and use of secondary raw materials.
- Increasing re-use, recycling and waste recovery rates.
- Increasing the use of secondary raw materials.

Challenges are also posed regarding the level of innovation and competitiveness of the Basque technological and productive sector:

- Engage, train, support, coordinate and facilitate cooperation among key stakeholders: public administrations, industry (including SMEs), scientific-technological entities.
- Develop and demonstrate scientific and technological solutions in the economic, governance, social and environmental fields to increase circularity in key economic sectors such as waste, water, food, wood, machinery and capital goods, electrical and electronic equipment and construction.
- Reduce energy consumption through energy efficiency and increase the share of renewable energy in industrial consumption.
- Guarantee the traceability of industrial components and machinery to facilitate their remanufacture, modernisation, disassembly and recycling.
- Optimisation of the consumption of energy and raw materials in the entire value chain, anticipating upstream and downstream impacts related to changes to materials, manufacturing processes, parameters, equipment, etc., providing an overall vision that affects all stakeholders: suppliers, manufacturers, end users...

The cross-cutting nature of the evolution towards a circular economy requires cooperation among the following RIS3 areas:

- Smart Industry.
- Cleaner Energies.
- Eco-Innovation.
- Sustainable Cities.
- Healthy food.

5.3. Basic technologies map

The evolution of the areas of specialisation and their adaptation to the technological-digital, energy-climate and social-health transitions will largely depend on technologies that cross-cut all of them, and that are versatile in their range of application. These basic technologies have the potential to trigger disruptive innovations. Mastery of these technologies will be necessary to guarantee that Basque companies position themselves in the global value chains associated with the areas of specialisation.

Some of these basic technologies are already fulfilling this role, and there are other emerging ones that will have the potential to revolutionise the way in which we live and the world of the future. Therefore, it is necessary to continue mastering the technologies at our disposal by taking advantage of present scientific, technological and business strong points, together with the exploration of emerging technologies to get an early position in new market niches of high added value.

As well as contributing to the competitiveness of businesses and improving people's quality of life, mastery of the basic technologies will provide greater resilience in strategic value chains and lead to less dependence on increasingly scarce resources.

The 2030 STIP sets out to drive R&D&I in a series of basic digital, virtual, physical, biological, chemical and material basic technologies that have the potential to contribute to the evolution of the areas of specialisation and their adaptation to the three transitions. The list of basic technologies envisaged in the present Plan is shown below:

Table 20: Map of Basic Technologies

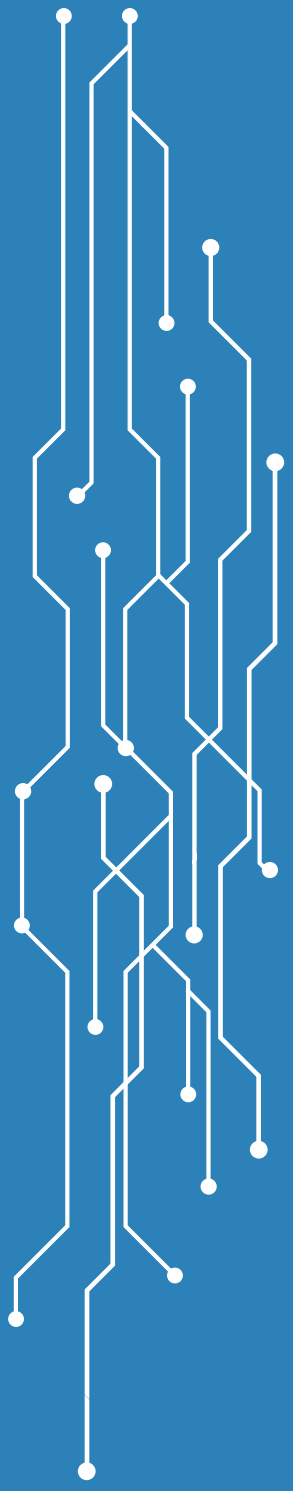
DIGITAL OR VIRTUAL TECHNOLOGIES	**Artificial Intelligence and Big Data/Data Science:** *Algorithms for prediction or decision-making, Machine learning, Data Analytics, Artificial vision, Digital Twin.*
	The Internet of Things and 5G Technologies: *IoT Connectivity, Digital platforms, Cloud computing.*
	Cybersecurity : *BlockChain, Product Cybersecurity, Network Cybersecurity.*
	Cyber-physical Systems: *Control Algorithms, Actuators, Embedded Electronics, Sensors and Biosensors.*
PHYSICAL, BIOLOGICAL, CHEMICAL OR MATERIALS TECHNOLOGIES	**Materials and Processes:** *Advanced and Functional Materials, 3D Printing, Manufacturing processes, Robotics, Microelectronics.*
	Energy storage: *New technologies beyond Lithium-Ion, Storage of hydrogen and power to gas, Hybrid Systems.*
	Power electronics.
	Biotechnologies and Genetics: *Biology of systems, Biological Chemistry, Theranostics, Cell Therapies.*
	Nanotechnologies: *Nanoelectronics, Nano-photonics, Spintronics, Nanobiotechnology.*
	Quantum technologies and Neutron Physics: *Quantum clocks and synchronisation, Optical-quantum metrology, Simulation and design of materials and molecules in quantum computers. Neutron physics.*

Source: *Lehendakaritza*, Basque Government.

This map is a starting point from which each Steering Group can work to adapt it to its field of specialisation, the result being a specific map of vertical technologies applied to specific sectors and fields of activity. This map will be a living entity and can be reviewed during the period of validity of the 2030 STIP, although two comprehensive reviews will be made of it in 2023 and 2026.

6.

Support instruments for R&D and innovation



Support instruments for R&D and innovation are an essential element in the implementation and deployment of the present Plan[27].
These instruments, based on European recommendations for the implementation of specialisation strategies, leverage the strategic management of key aspects of the Plan, promote transversality, have an impact on different fields and levels and stimulate external cooperation with the system.

[27] The European Joint Research Center (JRC) underlines the importance of the design of a solid policy mix for the process of implementation and deployment of the RIS3 strategy.

The instruments that support the deployment of the 2030 STIP, i.e. the policy mix, are structured in the six following categories:

- **Technological training and a boost for business R&D.** This combines instruments to support business R&D of a strategic or competitive nature and the demonstration of technologies with a high level of technological maturity.
- **Support for business-based innovation ecosystems.** This includes instruments for the promotion of business-based innovation -both technological and non-technological- that is closer to the market and generally of an incremental nature within the Basque business fabric as a whole. It also contains instruments for promoting business-based innovation in areas of opportunity.
- **Convergence of capacities and fostering R&D&I in cooperation.** This consists of instruments to support cooperation between scientific and technological stakeholders, as well as among them and with companies, to combine disciplines and capabilities in R&D&I.
- **Generation of scientific and technological capabilities.** This brings together basic support instruments for scientific and technological stakeholders in the Basque Network of Science, Technology and Innovation.
- **Management of scientific, technological and business talent.** This includes instruments that promote the generation and development of research talent, the attraction of internationally prestigious research talent and the incorporation of talent into the world of business that can speed up the introduction of innovations in companies.
- **Outreach and internationalisation of the R&D&I system.** These are instruments that support the generation of links to other research centres and foreign companies to carry out R&D and innovation activities such as transnational R&D&I activities.

The instruments referred to above can be of different types, for example, subsidy programmes regulated in Official Gazettes, grants/scholarships, support services and knowledge infrastructures. Among the main beneficiaries of these instruments are companies and other entities that generate economic prosperity and employment, and have the capacity to pull the entire Basque Science, Technology and Innovation System. Secondly, the stakeholders in the BNSTI, whose mission is the generation of knowledge and the transfer and provision of R&D and innovation services to the business fabric, public administrations and society in general.

As well as the instruments that support a range of solutions for science, technology and innovation, others take advantage of the demand for technology and innovative solutions by the Administration. At the international level, these instruments are steadily increasing in importance; one of them is innovative public procurement. This purchasing modality, generally used in the health field, is being extended to other fields in which the public sector operates. Innovative public procurement is a modality that benefits both the Administration and -indirectly- citizens and companies as a support mechanism for the business sector, the Administration manages to solve a need for which there was no solution in the market, and companies can develop novel solutions that better serve their clients' needs.

The previous Euskadi 2020 STIP emphasised the need for the instruments to evolve in the medium term towards a more comprehensive vision and inter-departmental approach. This aim is to focus them on the generation of connections among stakeholders throughout the R&D&I value chain, facilitating their connection to European programmes. In the 2030 STIP this challenge is still there.

Taking the different instruments that currently make up the policy mix as a starting point, the following evolution criteria up to 2030 are set:

- Propitiate tractor-effect country projects that contribute to the economic and social transformation of Euskadi to address the transitions identified.
- Strengthen programmes and projects that foster cooperation among stakeholders and respond to the challenges faced by the country.
- Simplify and focus the policy mix towards the pillars and operational objectives.

- Exploit synergies between instruments of different departments to boost inter-institutional cooperation.
- Align the Basque instruments with their European equivalents to guarantee their complementarity and make good use of European funds.

The instruments in the policy mix are the main operational element of the 2030 STIP so they contribute to the achievement of the targets set in the operational objectives, and to the successful deployment of the RIS3 strategy for Euskadi.

Table 21: Contribution of the policy mix to the strategic pillars and operational objectives

CATEGORIES OF THE POLICY MIX		Training in technology and driving business R&D	Support for business-based innovation ecosystems	Convergence of skills and fostering R&D in cooperation	Generation of scientific-technological skills	Management and promotion of scientific, technological and business talent	Outreach and internationalisation of the R&D&I system
STRATEGIC PILLARS							
	Pillar 1: Scientific excellence	LOW	LOW	AVERAGE	HIGH	HIGH	AVERAGE
	Pillar 2: Technological and Industrial Leadership	HIGH	LOW	HIGH	AVERAGE	AVERAGE	AVERAGE
	Pillar 3: Open Innovation	AVERAGE	HIGH	HIGH	LOW	AVERAGE	AVERAGE
	Common element: Talent	LOW	LOW	LOW	HIGH	HIGH	AVERAGE
OPERATIONAL OBJECTIVES							
1.	**Maximize the orientation of Basque R&D&I to results**	HIGH	AVERAGE	HIGH	HIGH	HIGH	LOW
2.	**Drive R&D and innovation in companies, particularly in SMEs**	AVERAGE	HIGH	LOW	AVERAGE	LOW	LOW
3.	**Strengthen the internationalisation of Basque R&D&I**	AVERAGE	LOW	LOW	AVERAGE	AVERAGE	HIGH
4.	**Promote scientific-technological talent, particularly among women**	AVERAGE	LOW	AVERAGE	AVERAGE	HIGH	AVERAGE

Source: in-house

6.1. Initiatives and programmes to support R&D&I

Below we describe the main support instruments for research, development and innovation by different Departments of the Basque Government[28] and the Territorial Administrations[29]. The main strategic guidelines that will guide their evolution throughout the duration of the Plan (up to 2030) are also presented. The instruments are grouped into the six categories described above.

6.1.1. TRAINING IN TECHNOLOGY AND DRIVING BUSINESS R&D

SUPPORTING PROGRAMMES OF THE BASQUE GOVERNMENT

> CROSS-CUTTING PROGRAMMES:

HAZITEK (DDESMA)**:** Support for carrying out R&D of a strategic or competitive nature with high potential of results and impact in companies, in the areas of smart specialisation of the STIP (RIS3 areas).

BASQUE INDUSTRY 4.0 (DDESMA)**:** Assistance Programme to support demonstration R&D projects that address the Technology Transfer of "technology suppliers" (e.g. the stakeholders in the BNSTI) to industrial and advanced services companies, thus speeding up the transfer of the results of the R&D projects in the EICTs (Electronic, Information and Communication Technologies) to the market.

ARTIFICIAL INTELLIGENCE (DDESMA)**:** An assistance programme to support demonstration projects for the application of commercial services and/or solutions based on Artificial Intelligence in companies that can activate supply and demand of this technology in Euskadi, to improve business competitiveness.

5G BUSINESS (DDESMA)**:** Assistance Programme to support projects for the implementation of 5G technologies aimed at speeding up their adoption to enable the digital transition of the economy in the business field. Carrying out these projects should have a demonstration effect for similar projects. The uses associated with these projects should envisage the implementation of 5G solutions or technologies already available in the market that are applicable to company operations.

> SECTORAL PROGRAMMES:

DEMONSTRATION OF MARINE ENERGY (DDESMA)**:** Assistance for investments in the demonstration and validation of emerging renewable marine energy technologies.

BALIOSASUN (DS)**:** Valorisation of R&D&I results of in the healthcare system, driving their implementation and/or transfer to the business fabric.

BERRIKER BERRIA (DDESMA)**:** Assistance for R&D&I in the agricultural, food and fisheries sectors.

[28] **Departments of the Basque Government:**
• **DE:** Department of Education. • **DCPL:** Department of Culture and Language Policy. • **DDESMA:** Department of Economic Development, Sustainability and the Environment. • **DPTVT:** Department of Territorial Planning, Housing and Transport. • **DS:** Department of Health.

[29] **Territorial Administrations:**
• **DFA:** Territorial Administration of Alava. • **DFB:** Territorial Administration of Bizkaia. • **DFG:** Territorial Administration of Gipuzkoa.

OTHER SUPPORT INSTRUMENTS

> KNOWLEDGE AND TECHNOLOGY INFRASTRUCTURES

BASQUE DIGITAL INNOVATION HUB (DDESMA)**:** A connected network of assets and infrastructures for training, research, testing and validation that offers industrial SMEs the technological skills required for dealing with the challenges of Industry 4.0.

ADVANCED MANUFACTURING CENTRES (CFA) IN AERONAUTICS AND WIND POWER (DFB, DFG, DDESMA, and others): Infrastructures for the validation and demonstration of aeronautical and wind power technologies.

BIMEP (BISCAY MARINE ENERGY PLATFORM) (DDESMA and others): A systemic collaboration infrastructure for the demonstration and validation of marine energy technologies and devices (wave converters and deep-sea offshore wind turbines).

4GUNE (DE): A systemic cooperation infrastructure to contribute to the strengthening of University+Business cooperation in the new Basque RIS3 scenario, implementing cooperation models and co-creation mechanisms (e.g. skills map, cross-border laboratory with smart technologies, University+Business programme).

AIC (DFB and others): Collaborative innovation infrastructures in the automotive sector.

STRATEGIC ORIENTATION VIS-À-VIS THE FUTURE

Drive singular strategic projects, led by tractor-effect companies of an international dimension that are able to create new niches of opportunity for the Basque economy and energise local value chains.

Strengthen the creation of stable joint ventures around large-scale challenges, based on new cooperation formulae that go beyond carrying out a single specific project.

Consolidate and strengthen sectoral R&D programmes and scientific and technological skills, and adapt them to new trends and companies' needs in each sector.

Support the creation and operation of testing and validation infrastructures, and open them up to participation by international leaders.

Drive the transfer of knowledge from the Basque Network of Science, Technology and Innovation to companies.

6.1.2. SUPPORT FOR BUSINESS-BASED INNOVATION ECOSYSTEMS

SUPPORTING PROGRAMMES OF THE BASQUE GOVERNMENT

> CROSS-CUTTING PROGRAMMES:

INNOBIDEAK (KUDEABIDE, LEHIABIDE, PERTSONAK) (DDESMA)**:** Support for projects that improve the competitiveness of companies through the introduction of innovations in products, business processes, increasing the size of companies, cooperation in value chains, advanced management models and encouraging the participation of individuals in the company *(a cooperation programme between the Basque Government and the Territorial Administrations).*

HAZINNOVA (DDESMA)**:** Technical consultancy services for the identification of needs and the implementation of non-technical innovations/solutions in small companies.

INDUSTRIA DIGITALA (DDESMA)**:** Support for the incorporation of EICTs in the business fabric aimed at the improvement of its competitiveness.

INPLANTALARIAK (DDESMA): A technological consultancy for micro-companies to address the digital transformation through the practical, personalised and made-to-measure implementation of TEICs that help to improve their competitiveness.

INDUSTRIAL CYBERSECURITY (DDESMA): Support for projects to improve the cybersecurity of companies, stimulating the convergence and integration of protection systems, ensuring secure access to information, adaptation to standards, etc.

> SECTORAL PROGRAMMES:

ASSISTANCE FOR THE FISHERIES AND AQUACULTURE SECTORS (DDESMA): Support for investments aimed at fostering, through innovation, competitive fisheries and aquaculture that are sustainable in environmental terms, financially viable and socially responsible.

COOPERATION MEASURE OF THE PDR (DDESMA): Support for innovation projects in cooperation in the agrifood sector and the rural environment in Euskadi, through the European Agricultural Fund for Rural Development (EAFRD).

ECO-INNOVATION PROGRAMME IN THE CIRCULAR ECONOMY (DDESMA): Assistance for carrying out innovation projects in the fields of Ecodesign, demonstration in the circular economy and Eco-Innovation.

BERRINGURUMENA (DDESMA): Assistance for the development of pilot innovation and demonstration projects aimed at reducing environmental impacts, particularly those related to greenhouse gases and adaptation to climate change.

BAI+D+I (DPTVT): Assistance for the development of innovation projects in the field of urban regeneration that contribute to the objectives of the RIS3 area of opportunity "Urban Habitat".

KSI BERRITZAILE (DCPL): Support for Basque companies in the Cultural and Creative Industries sector, with the aim of creating and developing areas of opportunity for new projects in the fields of technological innovation and innovation in organisational models and business structures.

SUPPORTING PROGRAMMES FROM THE TERRITORIAL ADMINISTRATIONS

PLAN 2i FOR THE PROMOTION OF INNOVATION AND ADVANCED INVESTMENTS (DFB): Assistance to increase the ability of companies to compete, innovate and make technologically advanced investments in a sustainable manner, integrated into their surroundings.

3i PROGRAMME OF COMPREHENSIVE SUPPORT FOR INNOVATION, INTERNATIONALISATION AND INVESTMENT (DFB): Support for projects with the potential for high impact that can increase the competitiveness of companies through actions that have an effect on innovation, internationalisation and investment.

NEW INNOVATIVE COMPANIES (DFB): Promotion of the creation and implementation of innovative companies.

PROGRAMME TO PROMOTE THE TRANSFORMATION OF COMPANIES (DFG): Support for projects involving the intelligent application of business capabilities, differentiation and diversification, transforming them into new or better products, services, markets and/or business models.

ÁLAVA INNOVA (DFA): Support for innovative projects and/or actions (in products, production processes, organisation, marketing and markets, etc.) to assist in achieving economic modernisation, higher productivity and greater competitiveness of the productive fabric.

PARTAIDETZA (DFG)**:** Promotion of the participation of individuals in companies, driving organisational models that facilitate this participation and an ecosystem that propitiates the development of companies that have these organisational models.

ADINBERRI (DFG)**:** Support for R&D&I activities that have the potential to impact the framework of healthy ageing, the excellence of the social-healthcare system and the competitiveness of industry in this field.

TXEKINTEK/BARNETEKIN (DFG)**:** Support for the creation of companies with a technological base and/or carry out innovation, both through individual initiative and through corporate intra-entrepreneurship.

ÁLAVA EMPRENDE (DFA)**:** Incentives to create new companies in Álava, particularly innovative ones with high growth potential.

SMART MOBILITY INDUSTRY (DFG)**:** Support to drive the transformation of companies that focus on new business niches in the fields of electromobility, energy storage and self-driving vehicles.

GIPUZKOA INDUSTRIA 4.0: DEVELOPMENT OF PRODUCTS AND SERVICES (DFG)**:** Support for projects for the development of new products, technologies or applications aimed at the Advanced Manufacturing and Industry 4.0 market.

ELKARLANEAN (DFB)**:** Stimulating innovation through cooperation between companies.

BIZKAIA CREATIVA (DFB)**:** Promoting the development of new projects in existing or new creative companies that enable the consolidation of a strong sector of this type of company in the territory.

TECHNOLOGICAL 'CHECK-UPS' (DFB)**:** Advice from a technology expert on a problem detected by a company in one of its products or processes.

GIPUZKOA 4.0 ADVANCED MANUFACTURING NETWORK: TECHNOLOGICAL BONUSES (DFG)**:** Subsidies to foster innovation in SMEs so that they can incorporate the Advanced Manufacturing and Industry 4.0 model and improve their technological position through the granting of "technological bonuses".

ENTRPRENEURSHIP AND SOCIAL INNOVATION SOCIAL (DFB)**:** Support for the implementation of new projects by companies or innovative social organisations to promote the creation of new innovative enterprises in Bizkaia.

INNOVATIVE ENTREPRENEURIAL PROJECTS AND STABLE AND QUALITY EMPLOYMENT (DFB)**:** Subsidies for the design, development and execution of projects that involve new ideas, new ways of doing things or that use innovative methodologies in terms of entrepreneurship and stable and quality employment.

GASTRONOMY 4.0 (DFG)**:** Driving the transformation of companies in the gastronomy value chain, promoting the use of new technologies and Integral Innovation (products, services, management, processes, industrialisation, etc.)

ASSISTANCE FOR INNOVATION IN THE LABELLING OF RIOJA ALAVESA WINES (DFA)**:** Promoting the design of labels that describe the new indications of wines approved by the Regulatory Council of the Rioja Qualified Designation of Origin to boost their promotion in the market.

RESEARCH AND INNOVATION IN SOCIAL CARE (DFG)**:** Support for research and innovation projects to characterise emerging social needs and forms of social care.

OTHER SUPPORT INSTRUMENTS

> SUPPORT PLATFORMS AND SERVICES:

BIND4.0 (DDESMA)**:** An accelerator that guarantees access by international technological start-ups to top-level Basque tractor-effect clients, through projects for the incorporation of innovative technologies and solutions.

PUBLIC PROCUREMENT OF INNOVATION (Various)**:** Fostering business-based innovation aimed at boosting the development of new, innovative markets from the demand side through public procurement instruments.

MEDTECH (DS)**:** Support of the Public Health System for innovation in Basque companies, cooperating in processes of validation and demonstration of health technologies.

TKGUNE (DE)**:** A strategic environment of support for technological innovation in companies through vocational training centres, driving the transfer of knowledge and great competitiveness.

INNOSASUN (DS)**:** Support instrument for innovation through which cooperation between the Basque public healthcare system and Basque industry is structured.

BASQUE ECODESIGN CENTER (DDESMA and others)**:** A public-private collaboration between companies and the Basque Government, aimed at the conceptualisation and implementation of innovative Ecodesign projects in the framework of the circular economy. It incorporates the Basque Ecodesign Hub, which specialises in training in the field of Ecodesign.

BASQUE DISTRICT OF CULTURE AND CREATIVITY (DCPL)**:** A strategic instrument that sets out to drive the development of a Basque 'District' of Cultural and Creative Industries.

STRATEGIC ORIENTATIONS FOR THE FUTURE

Create itineraries through the complementary nature of different programmes of innovation, both sectoral and cross-cutting.

Strengthen support to small- and medium-sized companies with a low profile in innovation.

Strengthen the role of intermediary entities for the promotion of innovation (organisations that drive clusters, local development agencies and other sector stakeholders) and Vocational Training centres so that smaller companies can take advantage of the opportunities, technologies and good practices related to digitisation and innovation and the range of public support services and instruments.

Develop a system of recognition of small- and medium-sized innovative Basque companies to attach prestige and visibility to their efforts.

Promote open innovation in the business fabric, in cooperation with the Basque University System.

Consolidate and develop sector-based innovation programmes and services: adapting them to the trends and needs of each sector, promoting demonstration projects, linking them to international initiatives and introducing new public-private formulae.

Strengthen the role of the Administration in driving business-based innovation through Innovative Public Procurement at the sector level, plus other instruments.

Develop support programmes for digitisation based on the evolution of ICTs.

6.1.3. CONVERGENCE OF SKILLS AND FOSTERING R&D&I IN COOPERATION

SUPPORTING PROGRAMMES OF THE BASQUE GOVERNMENT

> CROSS-CUTTING PROGRAMMES:

ELKARTEK (DDESMA)**:** Support for the carrying out Collaborative Basic Research and Research with High Industrial Potential projects carried out by stakeholders in the BNSTI in the RIS3 areas of smart specialisation of the STIP.

UNIVERSITY + BUSINESS PUE ACADEMY PROGRAMME (DE)**:** Assistance for research projects in private universities that are of interest to companies and involve their participation.

AREAS OF SPECIALISATION IN APPLIED INNOVATION PROGRAMMES IN EMERGING SECTORS (DE)**:** Assistance for innovation and entrepreneurship projects in cooperation with vocational training centres.

> SECTORAL PROGRAMMES:

ASSISTANCE FOR STRATEGIC RESEARCH AND DEVELOPMENT PROJECTS IN HEALTH (DS)**:** Support for basic research and technological development projects carried out through cooperation among stakeholders of the BNSTI, in the priority RIS3 areas of Bioscience-Health: personalised medicine, medical equipment, rare diseases and neuroscience-neurotechnology. Support is also given to other actions of particular interest.

KLIMATEK (DDESMA)**:** Support for R&D projects, innovation and demonstration in adaptation to climate change, aimed at companies and stakeholders in the BNSTI.

STRATEGIC ORIENTATIONS VIS-À-VIS THE FUTURE

To drive projects of greater scope and cooperation.

Alignment with the challenges and the new specialisation strategy of the present Plan.

Promote the combination of high-excellence scientific, technological and business capabilities through cooperation.

Systematise processes to generate and transfer knowledge, strengthening the role of the BRTA (Basque Research & Technology Alliance), as well as organisations driving clusters, as intermediary stakeholders between supply and demand for R&D.

Intensify the relationships between companies and the university world through the University+Business Strategy.

6.1.4. GENERATION OF SCIENTIFIC AND TECHNOLOGICAL CAPABILITIES

SUPPORTING PROGRAMMES OF THE BASQUE GOVERNMENT

> BASELINE FUNDING PROGRAMMES:

EMAITEK+ (DDESMA)**:** Assistance for improving and orientating the results and capacities of the Technology Centres and Cooperative Research Centres to the market, working throughout the R&D value chain and focusing on acquiring new knowledge with future potential in the RIS3 areas of smart specialisation of the STIP, driving cooperation in the process.

CONTRACTS FOR THE BASQUE UNIVERSITY SYSTEM (SUV) PROGRAMME (DE): Cooperation actions originating from the SUV linked to the "University-Business-Society", "Research Excellence" and "Training and Internationalisation" fields.

BERC PROGRAMME (DE): Assistance to support stakeholders in the Basque Network of Science, Technology and Innovation accredited in the category of Basic Excellence Research Centres.

> OTHER SUPPORTING PROGRAMMES:

EKIZIEN (DDESMA): Assistance for the purchase of scientific equipment by research entities of the BERCs, research structures of non-public universities, CRCs and Technology Centres.

AZPITEK (DDESMA): Assistance Programme for the purchase, installation and updating of scientific-technical equipment required for carrying out R&D&I and the validation and demonstration of its results. Aimed at the improvement of the quality of results and their scientific-technological, economic and social impact.

BASIC AND APPLIED RESEARCH PROGRAMME (PIBA) (DE): Assistance for basic and/or applied research projects.

IKERKETA TALDEAK (DE): Assistance to support the activities of excellence research groups in the Basque University System.

> SECTORAL PROGRAMMES:

ASSISTANCE FOR R&D PROJECTS IN HEALTH – INTENSIFICATION OF RESEARCH ACTIVITY IN THE FIELD (DS): Support for projects to promote research in health and intensification of research in the field, exclusively aimed at BNSTI stakeholders accredited in the category of Health Research Centres.

ASSISTANCE FOR RESEARCH, DEVELOPMENT AND INNOVATION IN THE AGRICULTURAL, FORESTRY SECTORS AND FISHERIES AND AQUACULTURE (DDESMA): Assistance to increase the efficiency and improve the competitiveness of these sectors, contributing to their sustainable growth and fostering cooperation in the agricultural/forestry and fisheries and aquaculture sectors in Euskadi.

SUPPORTING PROGRAMMES FROM THE TERRITORIAL ADMINISTRATIONS

SCIENCE AND TECHNOLOGY AND INNOVATION NETWORK (DFG): To drive R&D in Gipuzkoa through support for research and investment projects carried out by research centres, Technology centre, R&D units, universities and other entities.

OTHER SUPPORT INSTRUMENTS

> SCIENTIFIC INFRASTRUCTURES:

KEY INFRASTRUCTURES FOR LINKER RESEARCH EXCELLENCE (DE): Assistance Programme for the provision of infrastructure to drive research excellence in emblematic and strategic fields.

NEUTRON PHYSICS AND NEUTRINOS (DE): Assistance Programme for investment in scientific equipment and the recruitment of trainee researchers in fields involving neutrons and neutrinos.

SUPERCOMPUTING (DE): Assistance Programme for investments in high-performance computing centres in Euskadi (ATLAS and ARINA), and the recruitment of trainee researchers in the fields of High-Performance Computing and Artificial Intelligence.

QUANTUM PHYSICS TECHNOLOGIES (DE): Assistance Programme for investment in scientific equipment and the recruitment of trainee researchers in fields related to emerging quantum physics technologies.

> SUPPORT SERVICES:

I2BASQUE: Network of support and services for telecoms and ICT infrastructures for stakeholders in the Basque Science and Technology

STRATEGIC ORIENTATIONS VIS-À-VIS THE FUTURE

Alignment with the objectives and indicators of the present Plan.

Strengthen the incorporation/generation of top-level infrastructures and scientific and technological equipment.

Create new programmes to boost the generation of scientific and technological skills in the RIS3 areas, based on specific needs (generational change, infrastructures, cooperation, etc.).

Orientate programmes towards the generation of knowledge in cutting-edge scientific fields with future potential included in the map of basic technologies (neutron physics, etc.).

6.1.5. MANAGEMENT OF SCIENTIFIC, TECHNOLOGICAL AND BUSINESS TALENT

SUPPORTING PROGRAMMES OF THE BASQUE GOVERNMENT

> SUPPORTING PROGRAMMES:

IKERBASQUE PROGRAMME (DE): Programme to attract and retain international talent in the following categories: Junior (Fellows), Advanced (Associates), and Reference (Professors).

PRE-DOCTORAL PROGRAMME FOR RESEARCHERS WHO DO NOT HOLD A DOCTORATE (DE): Assistance aimed at funding research for preparing a doctoral thesis by graduate research personnel.

POST-DOCTORATE PROGRAMME FOR RESEARCH WHO HOLD A DOCTORATE (DE): Assistance aimed at developing research personnel who hold a doctorate.

BIKAINTEK (DDESMA): Assistance for following doctorate programmes in industry and the recruitment of research personnel in companies.

IKERMUGIKORTASUNA (DE): Programme to promote the mobility of research personnel.

EGONLABUR (DE): Assistance for stays in centres different to those in which the Pre-Doctoral Programme for the Training of Researchers takes place.

IKASIKER GRANTS (DE): Collaboration grant with research groups in the Basque University System, BERCs, CIS, CRCs and Technology Centres, aimed at university students who want to start a career in research.

ASSISTANCE FOR THE TRAINING OF RESEARCH AND TECHNOLOGY PERSONNEL IN THE SCIENCE-TECHNOLOGY AND BUSINESS ENVIRONMENT OF THE BASQUE AQUACUTURE AND FOOD SECTOR (DDESMA): Facilitate, through doctoral theses or a research project, technological development and innovation, expertise and specialisation of young graduates.

SUPPORTING PROGRAMMES FROM THE TERRITORIAL ADMINISTRATIONS

TALENTUA IKASKUNTZA (DFG)**:** Promotion of talent and individual skills through support for projects that boost processes of implementation in companies, as well as research projects and the development of tools and methodologies, etc.

GIPUZKOA FELLOWS (DFG)**:** Support for the recruitment of researchers who have undertaken post-doctoral training in research groups of international importance in centres of the BNSTI in Gipuzkoa.

TRAINING IN EXCELLENCE (DFB)**:** Support for training in research excellence of young postgraduates through professional development courses in prestigious international centres, with the aim of rounding off their academic training and improving their chances of joining companies, universities or research centres in Bizkaia.

GRANTS FOR RESEARCH AND INNOVATION PROJECTS IN THE FIELD OF THE ENVIRONMENT (DFG)**:** Grants for research and innovation projects in the field of waste prevention and recycling, energy sustainability and climate change, and information and communication about climate change.

BIZKAIA BBK PROGRAMME (DFB)**:** Grants aimed at young graduates to undergo specialised training in foreign universities, followed by later placement in a cutting-edge company in Bizkaia.

OTHER SUPPORT INSTRUMENTS

> KNOWLEDGE INFRASTRUCTURES:

UNIVERSITY-COMPANY SESSIONS (DE)**:** Laboratory-classroom sessions in universities, co-created and co-funded by companies to promote joint training and R&D&I activities.

COMPANY-UNIVERSITY SESSIONS (DE)**:** Laboratory-classroom sessions in companies, co-created with the Basque University System to develop collaboration-training projects in the fields of teaching and research, aligned with the RIS3 strategy.

> OTHER STRATEGIC INITIATIVES:

STEAM EUSKADI STRATEGY (DE)**:** Promotion of scientific-technical education and training through the educational phases, encouraging vocations and professional aspirations in the STEM field, with special emphasis on young women and the promotion of science, technology and culture in Basque society.

DUAL UNVERSITY TRAINING (DE)**:** Fostering graduate and postgraduate qualifications that include a university education model, alternating with cooperation with companies, strengthening cooperation in the university+business sphere and promoting the employability of students.

STRATEGIC ORIENTATIONS VIS-À-VIS THE FUTURE

Alignment with the objectives and indicators of the present Plan.

Strengthen the incorporation/generation of top-level infrastructures and scientific and technological equipment.

Create a programme to attract technological talent with international projection.

Create new programmes that support the generation of scientific and technological skills in the RIS3 areas, based on specific needs (generational change, infrastructures, cooperation, etc.).

Orientate programmes to the generation of knowledge in cutting-edge scientific fields with future potential that appear in the map of basic technologies (neutron physics, etc.).

6.1.6. OUTREACH AND INTERNATIONALISATION OF THE R&D&I SYSTEM

SUPPORTING PROGRAMMES OF THE BASQUE GOVERNMENT

> SUPPORTING PROGRAMMES:

ERA-NETS (through Hazitek) (DDESMA)**:** Promoted by the European Union through Horizon 2020, these are transnational networks of public bodies that finance R&D&I. Their objective is to coordinate national and regional research programmes and to prepare and launch joint calls to drive transnational research and technological development and innovation projects. Euskadi is currently participating in the Manunet, M-Eranet and SuSAN networks...

PROGRAMME OF TRACTOR-EFFECT EUROPEAN RESEARCH PROGRAMMES (Lehendakaritza)**:** Assistance for the presentation of Tractor-effect European Research Programmes in calls for the second phase of Horizon 2020 Programme, led by participants in the Basque Network of Science, Technology and Innovation.

> OTHERS:

IKERBILERAK (DE)**:** Assistance for the organisation of in-person congresses and meetings in the Basque Autonomous Community in the field of scientific research.

OTHER SUPPORT INSTRUMENTS

> SUPPORT SERVICES:

EEN -EUROPE ENTERPRISE NETWORK- (DDESMA and Others)**:** A network sponsored by the European Commission to support and advise companies, particularly SMEs, in fields related to policies and business opportunities at the European level, as well as assistance in technology transfer processes and access to European funding programmes for R&D&I.

EUSKAMPUS- INTERNATIONAL EXCELLENCE CAMPUS (UPV/EHU, Euskampus and others)**:** An infrastructure for fostering and channelling cooperation between stakeholders in the Basque Country (entities in the BNSTI, companies, social organisations, etc.) and between these and international stakeholders in the fields of high-level training, research, and the valorisation and transfer of knowledge in an international context.

> KNOWLEDGE INFRASTRUCTURES:

CROSS-BORDER COOPERATION LABORATORIES (LTC) (UPV/EHU, Euskampus y varios)**:** A programme to foster the creation of cross-border research communities through research projects in a specific field, with the aim of increasing the added value of scientific results and the visibility of joint research at the EU and international levels.

STRATEGIC ORIENTATIONS VIS-À-VIS THE FUTURE
Maintain and adapt based on the guidance in the new framework programme and the objectives of the present plan.
Drive new initiatives, taking advantage of the opportunities offered by Horizon Europe and other European programmes.
Promote the search for new opportunities outside Europe, in coordination with other policies and instruments currently applied in Euskadi.
Introduce batteries of measures to encourage the attraction of R&D activity by international companies.
Foster international cooperation around scientific, technological and testing/validation infrastructures.
In the specific case of Personalized Health, drive the participation of Euskadi in the Cancer mission of Horizon Europe.

6.2. Guidelines for the evolution of the Basque Network of Science, Technology and Innovation

The mission of the entities in the Basque Network of Science, Technology and Innovation that constitute the knowledge infrastructure of the Basque Science, Technology and Innovation System is to generate knowledge and its transfer and offer R&D and innovation services to the business fabric, the public administrations and Basque social organisations in order to address present and future challenges.

Due to its singularity and importance, taking into account its contribution to the Science, Technology and Innovation Plan and the number of entities, individuals and resources represented, the general guidelines for its evolution up to 2030 are analysed.

Table 22: General guidelines of the Basque Network of Science, Technology and Innovation

Types of entities	General guidelines on evolution up to 2030
• **University Research Structures** • **Basic Excellence Research Centres (BERCs)** • **Stakeholders in the Dissemination of Science, Technology and Innovation**	Drive their internationalisation for the generation and attraction of knowledge of excellence.
	Strengthen research excellence based on a strategic vision, in emblematic lines aligned with Europe and the present Plan.
	Strengthen their capabilities through singular scientific infrastructures.
	Drive the transfer of research excellence to the participants in the BNSTI and the business fabric.
	Drive cooperation with companies and other stakeholders in the BNSTI within the framework of the University+Business strategy.

Tipología de entidades	Orientaciones generales sobre la evolución a 2030
• **BRTA (Basque Research & Technology Alliance)** – **Multi-focused and sectoral Technology Centres** – **Cooperative Research Centres (CRCs)** • **Business R&D units** • **Supply and Demand Intermediaries**	Strengthen the results-based orientation of the stakeholders aligned with the objectives of the present Plan. In the specific case of the BRTA centres, also promote their alignment with the research agenda.
	Promote alliances and cooperation among the stakeholders, particularly among the BRTA centres, through joint initiatives and shared infrastructures.
	Project Basque scientific and technological capabilities internationally under a single brand.
	Drive participation in, and cooperation with, International Platforms and Networks.
• **Health Research Centres (CIS)** • **Health R&D Organisations** • **BIOEF-Basque Foundation for Innovation and Research in Health**	Drive, strengthen and adapt them based on the guidelines and objectives contained in the present Plan.
	Strengthen their capabilities through mechanisms that attract, recover and retain individuals who carry out research and innovation in Personalized Health.
	Promote cooperation between the healthcare system, the scientific-technological system and the business fabric.

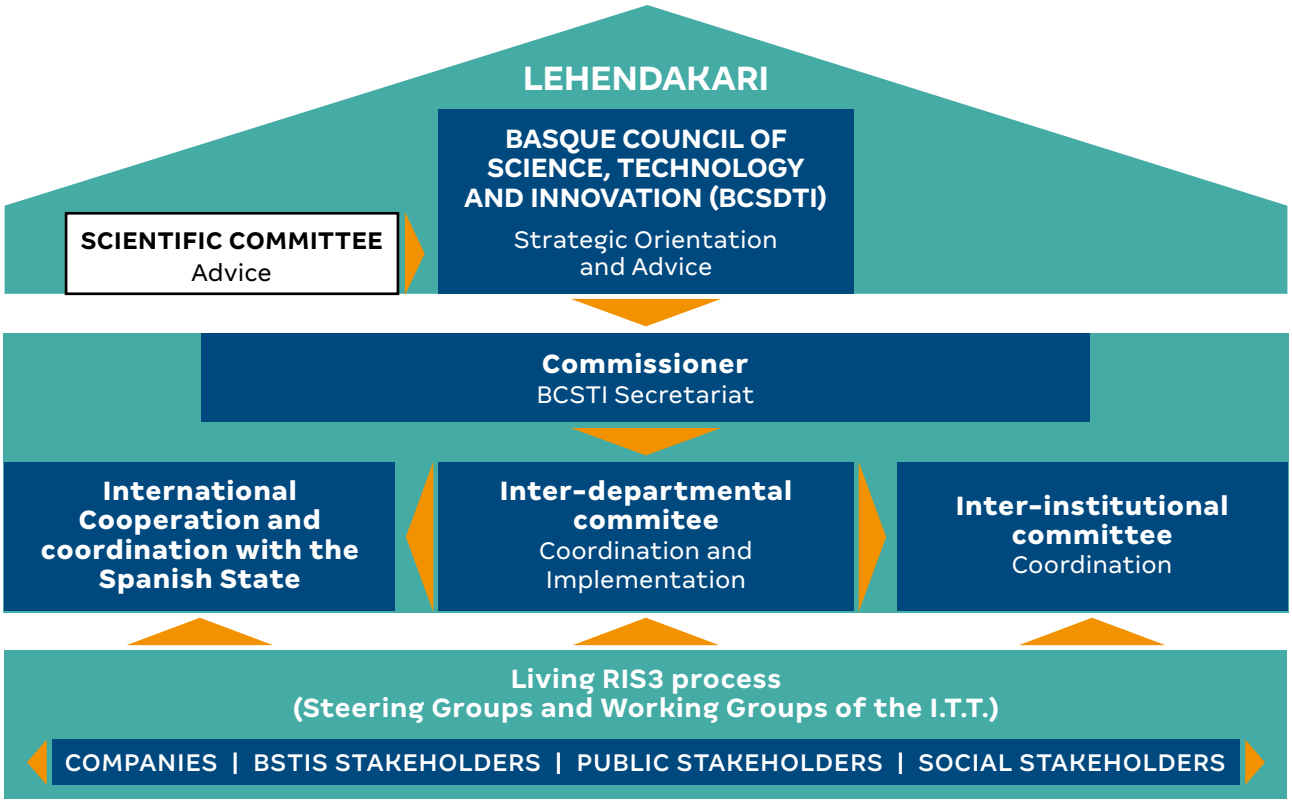
Source: Basque Government.

7.

Governance of the Basque Science, Technology and Innovation System

The Euskadi 2020 STIP defined and implemented a model of governance for the Basque Science, Technology and Innovation System that has been applied and adapted in recent years. This model is aligned with world trends and has a multi-level focus that integrates both public and private stakeholders and incorporates different levels of leadership in the form of the Basque Council of Science, Technology and Innovation, operational deployment and coordination, technical deployment, and participation in the strategy. This basis of governance will facilitate the management of the challenges that Euskadi will face in the next years related to the triple technological-digital, energy-climate and social-health transitions, and also the management of risks to continue driving sustainable economic growth through the establishment of alternatives.

Figure 21: Leadership and governance bodies of the BSTIS



Source: *Lehendakaritza*, Gobierno Vasco.

The 2030 STIP sets out to consolidate the constructed model of governance. In this respect, the characteristics that govern its design, and will influence the introduction of improvements that can contribute to its consolidation, are the following:

- Integrated and coordinated, avoiding the excessive centralisation that could represent an erosion of the diversity and scope of initiatives presented
- Open to participation to facilitate consensus and support for the strategic directions and priorities established in the Plan
- Managed according to criteria of transparency that facilitate the understanding of the decision-making process and the allocation of resources among the different entities that make up the multi-level architecture
- A dynamic system for the management, achievement and analysis of results based on the implementation of ex-ante and ex-post evaluation mechanisms of projects, programmes and policies in the ecosystem in order to guarantee their effectiveness
- Be simple and operational, to facilitate -not complicate- quick decision-making by each body or stakeholder. It is a case of avoiding continuously paralysing planning and control systems, propitiating responsibility and action
- Orientate the whole system to the achievement of clearly-defined objectives, and to the implementation of mechanisms and corrective measures to ensure compliance with them.

7.1. Model of Governance of the Basque Science, Technology and Innovation System

7.1.1. Leadership

The Basque Government is the highest-level entity in Euskadi in the area of scientific-technological research, development and innovation as a result of the transfer of functions from the Central Administration to the Basque Autonomous Community in 2009; the transfer was enacted in Royal Decree 3/2009 dated 9 January 2009. Prior to this, all the Basque institutions were already making a firm commitment to research and innovation and this has continued to date. This sustained commitment over time has been seen in a number of proposals and initiatives that have led to major results in the last three decades. The Basque Science, Technology and Innovation System has been constructed as a result of this strategic commitment; it sets out to contribute to improving the competitiveness of companies and the well-being of society in general.

Basque Council of Science, Technology and Innovation

The Basque Council of Science, Technology and Innovation was set up to respond to the need for strong leadership of the System by integrating and coordinating the initiatives put forward by the different levels of Government in an effective manner. The Council is the main body for the strategic orientation, participation, consultancy and promotion of science, technology and innovation policies in Euskadi. It is also a catalyst and coordinator of the Basque Science, Technology and Innovation System.

For the Basque Government, the 2030 STIP represents a strengthening of its strategic commitment to Research, Development and Innovation. The new Plan aims to continue driving R&D&I policy, improving the standard of living and the quality of employment of Basque society, solving the main challenges Euskadi is facing and guaranteeing balanced economic and social development that is sustainable at the same time.

The need to promote a greener, more digital and more inclusive Euskadi, and to boost the strategy of smart specialisation, together with the urgent need to recover from the economic and social consequences of the current pandemic as soon as possible, require the reinforcement of the Basque Council of Science, Technology and Innovation, which has led to its renewal at the start of the new STIP. This renewal has involved widening the representation of the institutions through the participation of more departments of the Basque Government, plus scientific and technological representation together with the Centres of Research Excellence and the BRTA (Basque Research Technology Alliance). The representation of Basque companies has also been renewed in the search for greater representation of the RIS3 fields.

On this basis, and under the leadership of the *Lehendakari,* the Council is made up of the heads of the areas of Economy and the Treasury, Economic Development, Sustainability and the Environment, Education, Health, Territorial Planning, Housing and Transport, Culture and Language Policy of the Basque Government; the Territorial Administrations of Bizkaia, Gipuzkoa and Araba; the vice-chancellors of the three universities in the Basque University System (UPV/EHU, University of Deusto and Mondragon Unibertsitatea); a representation from the BRTA: the Technology Centres and Collaborative Research Centres; Basic Research Excellence Centres and four companies representing private investment in R&D, plus the Basque Science Foundation, Ikerbasque; the Basque Innovation Agency, Innobasque; and Jakiunde, the Academy of Science, the Arts and Letters.

To facilitate the functioning of the Council, the *Lehendakari* is assisted by a Commissioner for Science, Technology and Innovation who sits on the Council and acts as its Secretary. This person will be assisted by a technical secretariat set up by Innobasque, the Basque Innovation Agency.

Moreover, the Basque Council of Science, Technology and Innovation has an Advisory Scientific Committee that functions as an advisory body to the Basque Council of Science, Technology and Innovation. This Committee is made up of no more than ten individuals, professionals of recognised prestige in the field of science, technology, research and innovation who are appointed by the President of the Basque Government.

7.1.2. Operational deployment and inter-departmental and inter-institutional coordination

This Plan strengthens inter-institutional cooperation and coordination based on a shared commitment to innovation through a multi-level governance model. With the aim of facilitating inter-departmental and inter-institutional coordination in the operational deployment of the strategic guidelines defined, the following committees have been set up:

- An **Inter-Departmental Committee** made up of representatives from main departments of the Basque Government, with substantial investments and actions in the field of research, development and innovation, and in representation of the areas of specialisation of the RIS3 strategy. This Committee guides the actions of -and obtains feedback from- the Steering Groups and the Working Groups in the Cross-Cutting Tractor-Effect Initiatives. The coordination role of the Inter-Departmental Committee is strengthened through regular contacts and meetings with the recently-appointed Commissioner for Science, Technology and Innovation and other persons responsible for the main departmental policies and programmes.
- An **Inter-institutional Committee** that widens the scope of the work of the above Committee to the three Territorial Administrations and Eudel (Association of Basque Municipal Councils) with the aim of coordinating support activities and programmes, avoiding the duplication of functions and seeking operational synergies in the allocation and use of resources. Inter-institutional cooperation and coordination are key factors in responding to the new scenario and achieving the objectives set in the 2030 STIP.

7.1.3. Technical deployment and participation in the strategy

The leadership of the Basque Council of Science, Technology and Innovation, together with the deployment of the strategy through the Inter-Departmental Committee, are strengthened on a third level that facilitates the participation and contribution of the stakeholders in the Basque Science, Technology and Innovation System through what can be called 'entrepreneurial dynamics'. These dynamics are organised around two types of instruments:

- **Steering Groups:** consisting of stakeholders in the 'triple helix' (companies, universities, technology and research centres and the Administration), whose main objective is to drive the deployment of the RIS3 strategy in its areas of specialisation. Each Group follows the strategic guidelines and works with the Basque Government department that is closest to its field of action. These departments participate in the Inter-Departmental Committee and the Basque Council of Science, Technology and Innovation.

- **Working Groups for Cross-Cutting Tractor Initiatives:** consisting of representatives of the participating Steering Groups and other stakeholders in the triple helix, to share strategies and identify tractor-effect projects that have clear objectives defined in terms of timescales in the fields of Healthy Ageing, Electric Mobility and the Circular Economy (these may be reviewed during the term of the STIP, depending on its implementation and results). The leadership and initial promotion of the three initiatives will fall on the Steering Groups of the three strategic priorities (Personalized Health, Smart Industry and Cleaner Energies).

7.2. International cooperation and coordination with the Spanish State

The internationalisation of R&D&I is a key factor in improving the competitiveness of Euskadi and its ability to solve the main challenges faced by Basque society, thereby also contributing to solving global challenges. The governance model should also contribute to the internationalisation process, strengthening the presence of the Basque Science, Technology and Innovation System in the European Research Area and in inter-regional cooperation initiatives in the priority areas for Euskadi established in the RIS3 strategy.

Euskadi starts from a good international position in research and innovation, as shown by the raising of 664 million euros from international public and private funds in the 2014-2019 period. If this figure is projected to the whole of the STIP for 2014-2020, the total would surpass 800 million euros. Within the Horizon 2020 European framework programme, Euskadi was allocated 30 ERC Grants from 2014 to 2020 linked to scientific excellence. It is recognised as a reference through Basque Industry 4.0 and works actively in initiatives such as EIT Food and EIT Manufacturing. However, it is necessary to strengthen this position and have a greater presence in European tractor-effect projects, in the KIC (Knowledge and Innovation Communities) driven by the EIT, in public-private partnerships or the new missions established in the new Horizon Europe programme.

In parallel, and in relation to the RIS3 specialisation strategy, synergies and complementary tie-ups with other regions that are working in similar specialisation areas are required, in line with the work done in the Vanguard Network, EIP-on-AHA (European Innovation Partnership on Active and Healthy Ageing, which recognises Euskadi as a Reference Site with a Certificate of Excellence) and the S3 platform. In this respect, the Euro-region made up of Nouvelle Aquitaine, Euskadi and Navarre represents an opportunity, as is the case of other regions with which strategic cooperation agreements have been signed (Bavaria, Flanders, Wales, Jiantsu, etc.)

Finally, coordination between Euskadi's policies and those of the Central Administration in the field of science, technology and innovation is done through the established inter-governmental bodies:

- The Conference of Regional Presidents.
- The Science, Technology and Innovation Policy Council.
- The Basque Country-State Coordination Committee.
- The Network of Public Policies for R&D&I.

7.3. Monitoring and evaluation

7.3.1. Monitoring and evaluation system

A comprehensive monitoring and evaluation system was designed and implemented following the diagnoses and processes of analysis carried out prior to the definition of the Euskadi 2020 STIP. This system has produced good results to date, and the idea is to maintain, consolidate, improve and simplify it as far as possible.

The system for the monitoring and evaluation of the 2030 STIP will be based on two levels that are complementary to each other:

1. Evaluation of the Strategy: aimed at monitoring progress towards the objectives established in the 2030 STIP in relation to targets, plus a quantitative and qualitative analysis of the level of compliance, bearing in mind the European context and trends. To do this, annual reports will be issued to describe the evolution of each one of the objectives, as well as information on the degree of implementation of the instruments and their contribution to the objectives. Based on this, recommendations for improvements will be made. This will facilitate the process of discerning the most suitable programmes and instruments to achieve an effective deployment of the strategy.

   Taking into account the plan to make two intermediate reviews of the plan, indicating progress up to 2023 and 2026, the strategy will be previously evaluated to contribute to these intermediate reviews. A final evaluation of the 2030 STIP will be made prior to the preparation of the next Science, Technology and Innovation Plan. The intermediate and final evaluations of the Plan, and any reviews that are required, will be approved by the Basque Council of Science, Technology and Innovation and will be sent to the Governing Council and the Basque Parliament for information.

2. Evaluation of the Basque Science, Technology and Innovation System: aimed at learning about the situation and overall performance of the regional system of science, technology and innovation vis-à-vis Europe, and also bearing in mind the evolution of the European EIS and RIS (the reports que describe the evolution of the national and regional innovation systems). With this objective in mind, biannual reports will be issued analysing the main R&D&I indicators. A qualitative evaluation will also be made based on the opinions of professionals in the System. In parallel, and whenever considered necessary, external evaluations will be made by international expert individuals and organisations.

The monitoring and evaluation of the STIP, coordinated by the Commissioner for Science, Technology and Innovation, will be assisted by a technical secretariat created by Innobasque (Basque Innovation Agency), which incorporates the evaluation, energising and socialisation of innovation as part of its mission. As a part of this function, Innobasque will draw up the biannual report on the situation of the Basque Science, Technology and Innovation System.

7.3.2. Dashboard of the plan

All the indicators in the 2030 STIP are shown below (previously presented per operational objective):

OPERATIONAL OBJECTIVE	AREA MEASURED	INDICATOR	Situation in 2019	Target 2023	Target 2026	Target 2030
OPERATIONAL OBJECTIVE 1: **Maximize the orientation of Basque R&D&I to results**	Socioeconomic results	Knowledge-intensive employment	17.7%	18.3%	18.6%	19.0%
	Scientific and technological results	Scientific publications in the top 10% most cited internationally	18.8%	20%	21%	22%
		Exports of products of high- and medium-high technology	55.3%	56%	57%	58%
	Results of innovation	Sales of new products on total turnover	18.3%	19%	19.5%	20%
OPERATIONAL OBJECTIVE 2: **Drive the activity of R&D and innovation in companies, particularly in SMEs**	Activities and resources for innovation	Investment in R&D	€1,481M	€1,630M	€1,892M	€2,300M
		Investment in R&D financed by companies	€799M	€810M	€920M	€1,100M
		Companies that innovate in products and/or processes	42.2%	50%	55%	60%
		Investment in innovation	0.68%	0.8%	0.9%	1.0%
	Protection of innovation	Number of patent applications EPO	194	220	240	260
		Number of trademark applications EU	465	600	700	800
		Number of industrial design applications EU	125	155	185	225
OPERATIONAL OBJECTIVE 3: **Strengthen the internationalisation of Basque R&D&I**	Leadership and international competitiveness	International financing of R&D	€128M	€145M	€170M	€200M
		Leadership of projects - Horizon Europe (*)	27.0%	20%	20%	20%
		Basque companies participating in Horizon Europe (*)	77	100	110	120
		Scientific publications - international cooperation	1,651	1,920	2,220	2,560
OPERATIONAL OBJECTIVE 4: **Promote scientific-technological talent, particularly women**	Promotion of talent and new careers	Research personnel - doctorate level	30.9%	33%	34%	35%
		New STEM graduates	29.1% (2020)	31%	33%	35%
	Gender Equality and promotion of women researchers	Female researchers	36.3%	37.5%	38.5%	40.0%

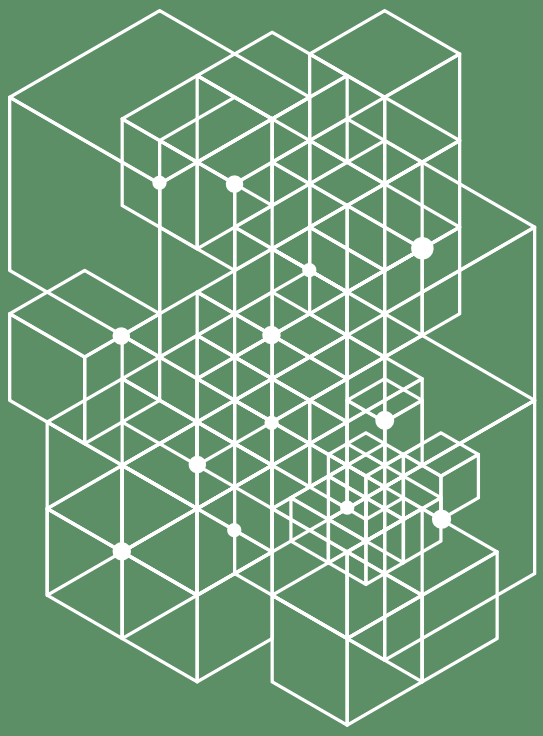
(*) From 2028, companies participating in the next European Framework Programme of Research and Innovation.

8.

Economic fundamentals of the 2030 STIP

To ensure compliance with the objectives of the Plan and provide a response to the defined RIS3 strategy, Euskadi as a whole (including public funding and private investment) should make a firm commitment to continue investing in R&D so as not to fall behind in innovation and competitiveness in Europe. In 2019, investment in R&D represented 1.86% of Euskadi's Gross Domestic Product (GDP) against an European average of 2.19% The objective in 2030 is dual: on one hand, reach and even surpass the European average and, on the other, continue to increase the effectiveness and efficiency of investments in R&D, obtaining more practical results in terms of impact on employment and the competitiveness of companies.

To achieve these objectives, the commitment of the Basque Government remains firm. The strategic nature of investments in R&D&I for the future of Euskadi requires a sustained commitment over time. As a result, the Basque Government undertakes to increase its annual R&D&I budget by 6%30 for the duration of the 2030 STIP (2021-2030).



[30] The minimum increase of 6% will be applied to the average increase in the period 2021-2030.

Table 23: Estimated budget evolution to support R&D&I by the Basque Government (million euros; 2020-2030)

Budgets to support R&D&I (estimate, figures in million euros)	2020 (*)	2023	2026	2030
BASQUE GOVERNMENT (**)	486,6	580	690	870

(*) Draft budget 2020 of the Basque Government, used as the basis for forecasting the evolution, applying 6% annual growth from 2021 to 2030.

(**) The budgets include the following research fields: scientific and university, technological and industrial, agrifood, health, public research and innovation and Innovation Fund).

Source: *Lehendakaritza*, Basque Government.

As well as this budgetary commitment to research, development and innovation by the Basque Government, the following economic principles are established, to be taken into consideration in the development of the Plan:

- Involve companies as the main stakeholders in the research effort through the implementation of instruments to achieve greater private leverage and funding based on results.
- Obtain a commitment from other Basque public administrations to make a coordinated and stable budgetary effort.
- Incentivise fund-raising from programmes that drive R&D&I at the European level (mainly Horizon Europe) and from the Central Government.
- Attract resources from outside through investment in R&D by foreign companies, the ultimate aim being to implement research centres, technological development and innovation in Euskadi.
- Attract private investment and/or venture capital that can drive the development of innovative projects with high growth potential and create employment and economic prosperity.
- Foster Innovative Public Procurement as an instrument to generate demand and mobilise more public resources in R&D&I that can leverage the activity of our business fabric in this field.

Taking into account the evolution of the main economic parameters that have determined the evolution of investment in R&D in recent years, e.g. the objectives set in the 2030 STIP, the following scenario for 2021-2030 has been defined:

Table 24: Parameters of the economic scenario of the 2030 STIP

Expenditure on R&D: annual growth rates per source of funding (estimate)	2021-2023	2024-2026	2027-2030
Funding by the Basque Government	6.0%	6.0%	6.0%
Private funding from the business sector	2.2%	4.4%	4.6%
International funding	2.5%	5.5%	4.6%
Funding by Territorial Administrations and Local Councils	1.0%	2.3%	3.0%
Funding by the Central Government	5.6%	5.6%	4.8%

Source: *Lehendakaritza*, Basque Government.

The evolution of investment in R&D based on the parameters included in this scenario would be the following:

Table 25: Forecast evolution of Investment in R&D in the 2030 STIP per source of funding (million euros; 2020-2030)

Investment in R&D per source of funding	2020	2023	2026	2030
Total Investment in R&D	**1,465**	**1,630**	**1,892**	**2,300**
Public funding	**571**	**676**	**801**	**1,001**
Basque Government (*)	480	571	680	857
Territorial Administrations (**) and Local Councils	23	23	25	28
Central Government	69	82	96	116
Funding by business	**759**	**810**	**920**	**1,100**
International funding	**135**	**145**	**170**	**200**

(*) Only investments in R&D are included, hence the figures are lower than those that appear in Table 22. They will be verified later with figures from the R&D Survey of Eustat.

(**) Support budgets for innovation and entrepreneurship of the Territorial Administrations are not included, as this kind of expenditure is not included in the R&D Survey of Eustat. Tax credits for R&D are not included either (for each euro of direct assistance that the Territorial Administrations grant companies, the latter can deduct [on average] up to 3 euros. The effective application of this will depend on the company's yearly tax results).

Source: *Lehendakaritza*, Basque Government.

Based on the above estimates for the full period of implementation of the 2030 STIP, the total volume of investment in R&D in 2021-2030 will exceed 18,600 million euros.

We would highlight the tractor effect of the public funds of the Basque Government, which act as a lever of private investment to reach European levels in terms of investment in R&D. Therefore, the forecast economic scenario is a highly demanding and ambitious one, in line with the strategic nature that the Basque Government assigns to the 2030 STIP.

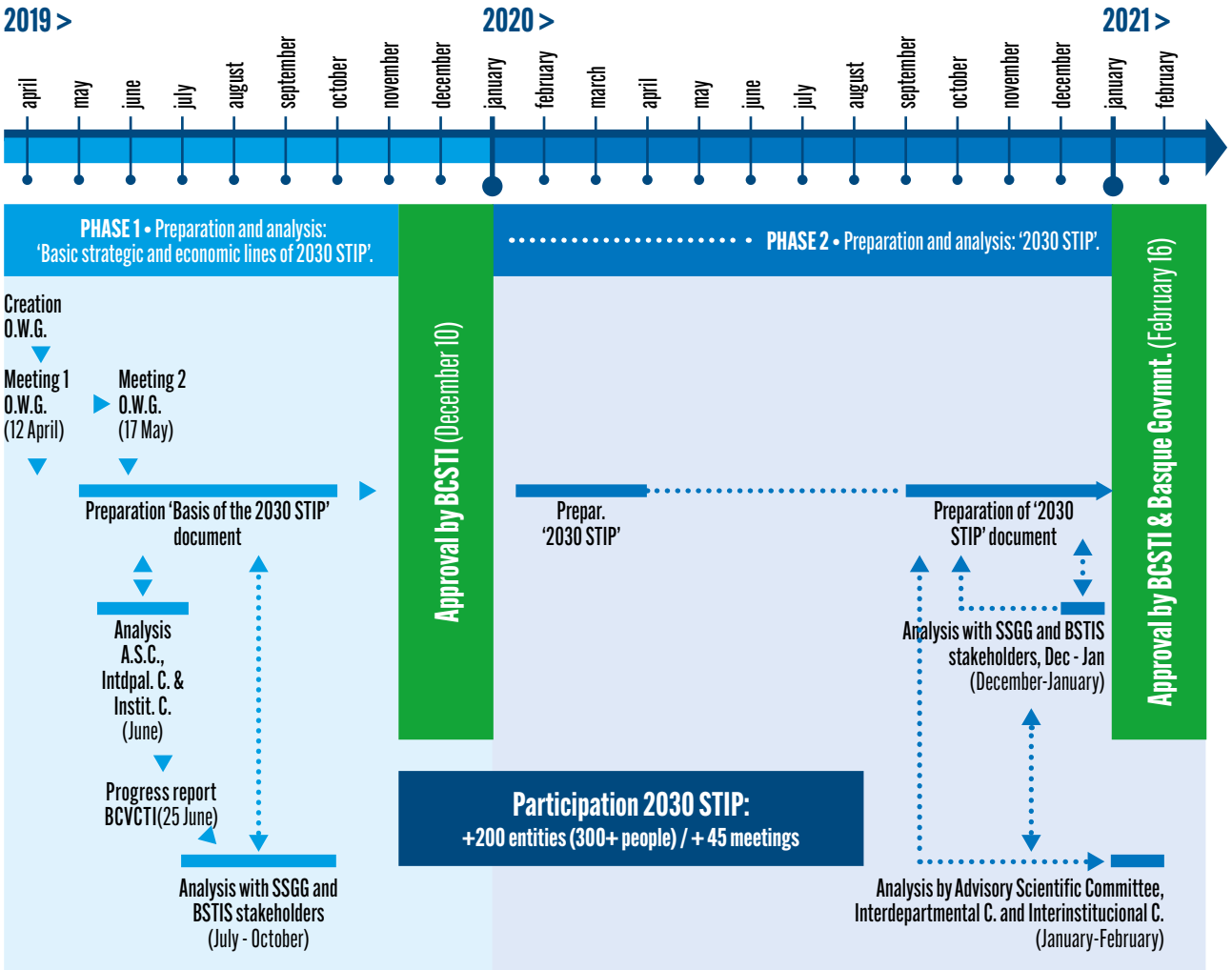
Annex 1
Process of analysis of the 2030 STIP

The following groups took part in the process of analysis set up in April 2019 for the initial preparation of the Basic strategic and economic lines, followed by the full document of the 2030 STIP:

- An *ad hoc* Operational Working Group to prepare a first draft of the document containing the strategic and economic lines of work.
- Advisory Scientific Committee.
- Inter-Departmental Committee.
- Inter-institutional Committee.
- Basque Council of Science, Technology and Innovation.
- Steering Groups.
- Key stakeholders in the Basque Science, Technology and Innovation System (clusters, companies, TTCCs and CRCs, Universities and BERCs, etc.).

The working timescale is shown below:

Figure 22: Process of analysis



Source: In-house.

Below is a list of the 200 entities and 300 individuals that participated in the 45 working meetings:

Table 26: Summary of participation in the preparation of the 2030 STIP

Group / Committee	No. of meetings	No. of organizations	No. of individuals
Operational Working Group	2	9	10
Advisory Scientific Committee	3	9	13
Inter-Departmental Committee	3	6	30
Inter-institutional Committee	2	5	8
Basque Council of Science, Technology and Innovation (BCSTI)	3	23	40
Basque Research and Technology Alliance (BRTA)	2	17	21
Universities and Basque Research Excellence Centres (BERC)	2	15	26
Cluster Energising Associations	4	29	36
Hospitals and Health Research Centres	2	11	16
Steering Groups	8	70	70
Other working meetings with departments of the Basque Government, Territorial Administrations and companies	14	6	30
TOTAL	**45**	**200**	**300**

Source: In-house.

The specific composition of the Groups and Committees is as follows:

- **Operational Working Group:** a team of 10 individuals charged with creating the first draft of the document titled 'Strategic and economic basis of the 2030 STIP', consisting of representatives of the Basque Government and organisations in different Steering Groups for RIS3: Tecnalia, Corporation Mondragon, SPRI, Euskampus, Energy Cluster, Basque Health Cluster, Azti and Innobasque.
- **Advisory Scientific Committee (ASC):** an advisory body in the Basque Council of Science, Technology and Innovation, consisting of 10 prestigious professionals in the field of science, technology, research and innovation: Maribel Arriortua (UPV/EHU), Inmaculada Estévez (Neiker), Iñaki Garmendia (Ega Master), Nuria Gisbert (energiGUNE CRC), Víctor Gómez (Universitat Autónoma de Barcelona), Rufino J. Hernández (UPV/EHU), Mª del Carmen Mijangos (ICTP del CSIC), Oihana Otaegui (Vicomtech), Agustín J. Sáenz (Tecnalia) and Izaskun Zeberio (Hospital Universitario de Donostia).
- **Inter-Departmental Committee of Science, Technology and Innovation:** an operational body for the deployment of governance, consisting of 25 representatives of the main departments of the Basque Government with significant actions in the field of research, development and innovation. Its mission is to manage the "living RIS3 process", evaluate the instruments in the Plan and identify corrective measures, as well as coordinating the governance of the stakeholders in the BNSTI.
- **Inter-institutional Coordination Committee:** a committee that extends the scope of the work of the Inter-Departmental Committee to representatives of the three Territorial Administrations

and Eudel with the aim of coordinating their support activities and programmes, avoiding duplication, seeking operational synergies and managing the allocation and use of resources.

- **Basque Council of Science, Technology and Innovation (BSTIC):** the body for strategic orientation, participation, consultancy and promotion of policies related to science, technology, research and innovation in Euskadi. Presided by the *Lehendakari,* until 2020 it was made up of 22 individuals in representation of the Basque Government (5 departments and the Governing Council), the three Territorial Administrations (DFB, DFG and DFA), the Basque Universities (UPV/EHU, Deusto and Mondragon), four tractor-effect companies in representation of private investment in R&D (Corporation Mondragon, Gestamp, Sener and Siemens Gamesa), Tecnalia, IK4, Ikerbasque, Innobasque and Jakiunde. The institutional representation of the Basque Government has been increased by one department in 2021, as well as scientific and technological representation: The Research Excellence Centres (represented by DIPC), the BRTA (Basque Research Technology Alliance) and a representative of the Technology Centres and CRCs (Neiker). The representation of Basque companies has also been renewed in an effort to obtain a greater presence of the SIS3 fields (Dominion Global, Grupo Arteche, Danobat Group and FAES Farma).

The following organisations have also contributed to the preparation of the 2030 STIP document:

- **Scientific and academic research:** UPV/EHU, University of Deusto, Mondragon Unibertsitatea, Ikerbasque, Achucarro Center, BC3, BCBL, BCAM, BCMaterials, Materials Physics Center, Poly mat, Biofísica Bizkaia, DIPC and Euskampus.
- **Industrial research and technological development:** Basque Research and Technology Alliance, Azterlan, Azti, Ceit, Cidetec, Gaiker, Ideko, Ikerlan, Lortek, Neiker, Tecnalia, Tekniker, Vicomtech, bioGUNE CRC, nanoGUNE CRC, biomaGUNE CRC and energiGUNE CRC.
- **Health research:** Osakidetza, Biocruces Bizkaia, Biodonostia, Bioaraba y Bioef, BERC Atxukarro, bioGUNE/biomaGUNE CRCs, Basque Health Cluster, Faes Farma.
- **Business research:** Aernnova, Angulas Aguinaga, Arcelormittal, CAF, CIE Automotive, Faes Farma, Gestamp, Iberdrola, Ibermatica, Ingeteam, Irizar, ITP, Ormazabal-Velatia, Repsol-Petronor, Sener, Viralgen Sector Core.
- **Cluster energising associations:** Hegan, Cluster Food, Acicae, Basque Health Cluster, Eraikune, Cluster Energía, Habic, Foro Marítimo Vasco, Aclima, AFM + ESKUIN + ADDIMAT, Gaia + AVIC + Basque Game, BCLM, AFV + FUNDIGEX + SIFE, BCLM (MLC-ITS + UNIPORT).
- **50 organisations belonging to the Steering Groups** for Advanced manufacturing, Energy, Biosciences-Health, Food, Ecosystems, Urban Habitat and Cultural and Creative Industries.

Annex 2
New features of the 2030 STIP

The main novelties introduced in the new plan are:

1.	**Comprehensive vision** so that 'Euskadi should take its place among the most advanced regions of Europe in innovation in 2030, with a high standard of living and quality of employment'.
2.	**Strengthening inter-institutional cooperation and coordination** based on a shared commitment to innovation.
3.	**Greater coordination with other departmental policies** in the framework of a global strategy of Government up to 2030.
4.	Materialisation of **five Social Challenges linked to the SDG for 2030;** the STIP should contribute to solving these.
5.	**New strategic pillars** (scientific excellence, technological-industrial leadership and open (i)nnovation) aligned with the **Horizon Europe** programme + talent as a core element.
6.	Greater **alignment of operational objectives and indicators with the international reference indicators** for Innovation (RIS and EIS).
7.	**Evolution of the RIS3 Euskadi strategy,** incorporating the technological-digital, energy-ecological and social-health **triple transition** and smart services and technology companies in the fields of digitisation and communication: - Manufacturing **>** Smart Industry. - Energy **>** Cleaner Energies. - Health **>** Personalised Health. - Food **>** Healthy Food. - Ecosystems **>** Eco-Innovation. - Urban habitat **>** Sustainable Cities. - Cultural and Creative Industries **>** Euskadi Creativa.
8.	**Launch of three Cross-Cutting Tractor-effect Initiatives** based on the missions contained in the Horizon Europe programme, to promote collaborative work among the RIS3 areas that have a social impact in strategic fields for Euskadi.
9.	**Identification and deployment of the map of basic cross-cutting technologies.**
10.	**Strengthening of the Basque Government's strategic commitment to R&D&I (6%+** annual budget).

Annex 3
Sectors linked to the RIS3 areas

The calculation of the macro-magnitudes linked to each RIS3 area has been done by distributing the weight[31] of all the branches of economic activity, with the aim of avoiding overlaps among then and the consequent over-dimensioning of economic activity overall.

This distribution, made by the Governing Council with technical support from Innobasque, was analysed with the departments and deputy ministries linked to each of the RIS3 Steering Groups.

NACE 2009	Branch of activity	Advanced manufacturing	Energy	Biosciences-Health	Food	Urban Habitat	CCIs	Ecosystems
01	Agriculture, stockbreeding, hunting and related services	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
02	Silviculture and forestry operations	0.0%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%
03	Fisheries and aquaculture	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
05	Coal mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
06	Extraction of oil and natural gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
07	Extraction of metallic minerals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
08	Other extractive industries	0.0%	0.0%	0.0%	0.0%	20.0%	0.0%	0.0%
09	Support activities for extractive industries	0.0%	0.0%	0.0%	0.0%	20.0%	0.0%	0.0%
10	Food sector	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
11	Beverages	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
12	Tobacco industry	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	Textiles	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
14	Clothing industry	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
15	Leather and footwear industry	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%

[31] This calculation is only used to analyse the evolution of the RIS3 areas during the period of implementation of the 2030 STIP. Other Government plans and documents can use other approaches, e.g. based on value chains; their results may be different from those shown here.

NACE 2009	Branch of activity	Advanced manufacturing	Energy	Biosciences-Health	Food	Urban Habitat	CCIs	Ecosystems
16	Wood and cork industry. except furniture. basket making and plaiting	20.0%	0.0%	0.0%	0.0%	80.0%	0.0%	0.0%
17	Papermaking	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
18	Graphic arts and reproduction of recorded formats	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
19	Coking plants and oil refining	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
20	Chemical industry	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	Pharmaceutical industry	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
22	Rubber and plastic products	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
231	Manufacture of glass and derived products	80.0%	0.0%	0.0%	0.0%	20.0%	0.0%	0.0%
232	Heat-resistant ceramic products	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
233	Ceramic products for the construction sector	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
234	Manufacture of other ceramic products	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
235	Manufacture of cement. lime and plaster	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
236	Manufacture of concrete, cement and plaster elements	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
237	Cutting, carving and finishing of stone	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
239	Manufacture of abrasive products and non-metallic mineral wholesale products	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
24	Metalworking; manufacture of iron. steel and alloy products	82.1%	17.9%	0.0%	0.0%	0.0%	0.0%	0.0%
25*	Manufacture of metallic products, except machinery and equipment. except 251	98.5%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%
251	Manufacture of metal elements for construction	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
26	Manufacture of computer, electronic and optical products	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	Manufacture of electrical material and equipment	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
28*	Manufacture of wholesale machinery and equipment; except 2822 and 2892	96.8%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%
2822	Manufacture of lifting and handling machinery	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
2892	Manufacture of machinery for the extractive and construction sectors	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
29	Manufacture of motor vehicles, trailers and semi-trailers	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
30	Manufacture of other transport material	95.3%	4.7%	0.0%	0.0%	0.0%	0.0%	0.0%

NACE 2009	Branch of activity	Advanced manufacturing	Energy	Biosciences-Health	Food	Urban Habitat	CCIs	Ecosystems
31	Manufacture of furniture	20.0%	0.0%	0.0%	0.0%	80.0%	0.0%	0.0%
32	Other manufacturing industries	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
33	Repair and installation of machinery and equipment	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35	Electricity, gas, steam supplies and air conditioning	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
36	Water catchment, treatment and distribution	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
37	Wastewater collection and treatment	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
38	Collection, treatment and elimination of waste; valorisation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
39	Decontamination and other waste management services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
41	Construction of buildings	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
42	Civil engineering	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
43	Specialised construction activities	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
45	Sale and repair of motor vehicles and motorcycles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
46	Wholesale trade and trade intermediaries. except for motor vehicles and motorcycles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
47	Retail trade, except for motor vehicles and motorcycles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	Land transport and piping	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
50	Transport by sea and navigable inland waterways	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
51	Air transport	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
52	Storage and activities linked to transport	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53	Postal and parcel services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	Accommodation services	0.0%	0.0%	0.0%	16.0%	0.0%	0.0%	0.0%
56	Food and drinks services	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
58	Publishing	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
59	Film, video and TV programmes. sound and music recording/publishing	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%

NACE 2009	Branch of activity	Advanced manufacturing	Energy	Biosciences-Health	Food	Urban Habitat	CCIs	Ecosystems
60	Radio and TV programming activities	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
61	Telecommunications	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
62	Programming, consultancy and other IT-related activities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
63	Information services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
64	Financial services, except insurance and pension funds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
65	Insurance, reinsurance and pension funds, except compulsory Social Security	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
66	Ancillary activities for financial and insurance services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
68	Real estate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
69	Legal and accountancy activities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
70	Headquarters / business management consultancy	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%
7111	Technical architecture services	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
7112	Technical engineering services and other activities related to technical consultancy	0.0%	11.1%	0.0%	0.0%	5.0%	0.0%	10.0%
7120	Technical tests and analyses	0.0%	0.0%	0.0%	0.0%	20.0%	0.0%	5.0%
72	Research and development	57.5%	19.1%	10.5%	7.1%	3.1%	0.4%	2.4%
73	Advertising and market surveys	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
74	Other professional, scientific and technical activities	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
75	Veterinary activities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
77	Rental activities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
78	Activities related to employment	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
79	Travel agencies.,tour operators, reservation services and activities related to these	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
80	Security and research activities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
81	Services to buildings and gardening	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
82	Administrative: offices and other ancillary activities to companies	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

NACE 2009	Branch of activity	Advanced manufacturing	Energy	Biosciences-Health	Food	Urban Habitat	CCIs	Ecosystems
84	Public Administration and Defence; compulsory Social Security	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
85	Education	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
86	Healthcare	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
87	Assistance in residences	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
88	Social services activities without accommodation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	Artistic creation and spectacles	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
91	Libraries, archives, museums and other cultural activities	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
92	Gambling	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
93	Sports, recreation and entertainment	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	Associative activities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
95	Repair of computers, personal effects and domestic use articles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
96	Other personal services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
97	Household activities as employers of domestic workers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
98	Household activities - producers of goods/ services for public use	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
99	Extraterritorial organisations and bodies	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Annex 4
Methodology for calculating indicators

Indicator	Calculation	Source
Knowledge-intensive employment	Numerator: Number of people employed in manufacturing industry of a high and medium-high technological level, knowledge-intensive market services (excl. financial services) and high-technology knowledge-intensive services. These sectors correspond to the following NACE codes - Rev. 2, respectively: 21, 26; 20, 27-30; 50-51, 69-71, 73-74, 78, 80; 59-63, 72.	**Eurostat** Statistics on high-tech industry and knowledge-intensive services
	Denominator: Total number of people employed.	
Scientific publications in the top 10% most cited internationally	Numerator: Number of indexed scientific publications in Scopus among the 10% of the most cited indexed scientific publications in Scopus of the world.	**Ikerbasque**
	Denominator: Number of indexed scientific publications in Scopus.	
Exports of high and medium technology products.	Numerator: Monetary value of high and medium-high technology products exported. The high- and medium-high technology products correspond to the following Standard International Trade Classification (SITC) codes: Rev. 3: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891.	**Eustat** Panel of Indicators of Innovation EIS
	Denominator: Total value of products exported.	
Sales of new products on total turnover	Numerator: Turnover from new or significantly improved products for companies with 10 or more employees in the industrial and advanced services sectors.	**Eustat** Innovation Survey
	Denominator: Total turnover of companies with 10 or more employees in the industrial and advanced services sectors. The industrial and advanced services sectors correspond to the so-called 'core' sectors included in the following CNAE-2009 codes: 05-09, 10-33, 35, 36-39, 46, 49-53, 58, 61-63, 64-66, 71-73.	
Investment in R&D	Internal expenditure on R&D carried out in Euskadi.	**Eustat** Statistics on R&D
Investment in R&D financed by companies	Internal expenditure on R&D carried out in Euskadi financed by companies. Includes the financing of private and public companies and Private Non-Profit Institutions of a corporate nature, i.e. Technology Centres (multi-focused and sectoral), Cooperative Research Centres (CRCs) and R&D Units is Companies in the Basque Network of Science, Technology and Innovation (BNSTI).	**Eustat** Statistics on R&D
Companies that innovate in products and/or business processes	Numerator: Number of companies with 10 or more employees in the industrial and advanced services sectors. that have introduced some product and/or of business process innovation. Includes companies with innovation activities under way and/or abandoned (EIN).	**Eustat** Innovation Survey
	Denominator: Total number of companies with 10 or more employees in the industrial and advanced services sectors. The industrial and advanced services sectors correspond to the so-called 'core' sectors included in the following CNAE-2009 codes: 05-09, 10-33, 35, 36-39, 46, 49-53, 58, 61-63, 64-66, 71-73.	

Indicator	Calculation	Source
Investment in innovation	Numerator: Expenditure on innovation activities, excluding internal and external R&D, in companies with 10 or more employees in the industrial and advanced services sectors.	**Eustat** Innovation Survey
	Denominator: Total turnover of companies with 10 or more employees of the industrial and advanced services sectors. The industrial and advanced services sectors correspond to the so-called 'core' sectors included in the following CNAE-2009 codes: 05-09, 10-33, 35, 36-39, 46, 49-53, 58, 61-63, 64-66, 71-73.	
Number of patent applications EPO	Number of European patent applications to the European Patents Office (EPO) according to the residence of the first entity applying. Includes international patents (PCT) that have entered the European phase.	**European Patents Office (EPO)** Index of Patents
Number of trademark applications EU	Number of trademarks applied for to the European Union Intellectual Property Office EUIPO). Includes applications to the World Intellectual Property Organisation (WIPO) according to the "Madrid System".	**Eustat** Panel of Indicators of Innovation EIS[32]
Number of industrial design applications EU	Number of individual industrial designs applied for to the European Union Intellectual Property Office EUIPO).	**Eustat** Panel of Indicators of Innovation EIS[33]
International funding of R&D	Internal expenditure on R&D carried out in Euskadi financed by external sources. Includes both external public funding (e.g. subsidies from the Horizon Europe Framework Programme) and external private funding (e.g. the sum received by a subsidiary to carry out R&D).	**Eustat** Statistics on R&D
Leadership of Horizon Europe projects	Numerator: Number of Basque participants with the role of leader (coordinator) in the Horizon Europe Framework Programme (from 2028 in the next European Framework Programme of Research and Innovation).	**Innobasque** Observatory of Basque Participation in European R&D&I Projects
	Denominator: Total number of Basque participants in the Horizon Europe Framework Programme (from 2028, in the next European Framework Programme of Research and Innovation).	
Companies participating in Horizon Europe	Number of company stakeholders participating in European projects under the Horizon Europe Framework Programme (from 2028, in the next European Framework Programme of Research and Innovation). Company stakeholders include business associations, Company R&D Units in the BNSTI, SMEs and large companies.	**Innobasque** Observatory of Basque Participation in European R&D&I Projects
Scientific publications in international cooperation	Numerator: Number of indexed scientific publications in Scopus with at least one foreign co–author.	**Ikerbasque**
	Denominator: Total population (million people).	**Eurostat** Demographic statistics
Research Personnel holding a Doctorate	Numerator: Research personnel holding a doctorate Full-time Equivalent (FTE).	**Eustat** Statistics on R&D
	Denominator: Research personnel equivalent to full-time.	
New students accessing STEM degree	Numerator: New entrants to bachelor degree courses linked to science, technology, engineering and mathematics (STEM). The branches of study considered as STEM are those defined in the STEAM Euskadi strategy. Engineering and Architecture and Sciences.	**Ministry of Universities** Integrated University Information System (SIIU)
	Denominator: New entrants to bachelor degree courses	
Female researchers	Numerator: Female researchers Full-time Equivalent (FTE).	**Eustat** Statistics on R&D
	Denominator: Research personnel Full-time Equivalent (FTE).	

[32] Figure calculated from the Panel of Indicators of Innovation (EIS) of Eustat and the nominal Gross Domestic Product (GDP) at market prices, valued at Eurostat purchasing power parity.

[33] Figure calculated from the Panel of Indicators of Innovation (EIS) of Eustat and the nominal Gross Domestic Product (GDP) at market prices, valued at Eurostat purchasing power parity.

Annex 5
Reference documentation

A5-1. DOCUMENTS OF STUDIES, ANALYSES, MONITORING AND EVALUATION

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A5-3. OTHER REFERENCE DOCUMENTS

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Annex 6
Glossary

Applied research	Original studies carried out to acquirer new knowledge; aimed at a specific and practical objective or purpose.
Basic research	Experimental or theoretical studies undertaken (above all) to obtain new knowledge on the basis of observable phenomena and events, without the intention of attaching any particular application or use to it.
BCSTI	Basque Council of Science, Technology and Innovation.
BERC	Basque Excellence Research Center.
BIOEF	Basque Innovation and Health Research Foundation.
BNSTI	Basque Network of Science, Technology and Innovation.
BSTIS	Basque Science, Technology and Innovation System.
Business process Innovation	New or improved business processes for one or more functions that significantly differs from previous products or business processes in a company, and that has been launched in the market or implemented in a company.
CCIs	Cultural and Creative Industries.
CIS	Health Research Centres (previously called 'Health Research Institutes).
Cluster	A group of inter-related companies and organisations that make up a system of vertical and horizontal actions that mutually support each other and represent competitive advantages for a country or region.
CNAE	National Classification of Economic Activities.
Covid-19	Coronavirus Disease 2019.
CRC	Cooperative Research Centre.
DCPL	Department of Culture and Language Policy.
DDESMA	Department of Economic Development, Sustainability and the Environment.
DE	Department of Education.
DFA	Territorial Administration of Álava.
DFB	Territorial Administration of Bizkaia.

DFG	Territorial Administration of Gipuzkoa.
DPTVT	Department of Territorial Planning, Housing and Transport.
DS	Department of Health.
EICTs	Electronic, Information and Communication Technologies.
EIS	European Innovation Scoreboard. European panel of innovation indicators.
EnergiBasque	Integral strategy for business development in the Energy sector.
EPO	European Patents Office.
ERDF	European Regional Development Funds.
EU	European Union.
EU-27	The 27 countries currently members of the European Union.
EUIPO	European Union Intellectual Property Office.
Eurostat	European Statistics Office.
Eustat	Euskal Estatistika Erakundea - Basque Statistics Institute.
Experimental development	Systematic work based on knowledge acquired from research and practical experience, and on the production of new knowledge oriented to the manufacture of new products or processes, or to improve already existing products or processes.
FTE	Full-time Equivalent.
GDP	Gross Domestic Product.
GGPP	Steering Groups.
GV	Basque Government.
ICTs	Information and Communication Technologies.
Ikerbasque	Basque Science Foundation.
Industrial research	Planned research or critical studies aimed at acquiring new knowledge and skills that may be useful in developing new products, processes or services, or enable considerable improvements to those already in existence.
INE	National Statistics Institute.
Innobasque	Basque Innovation Agency.

Innovation (business)	A new or improved product or business process, or a combination of the two, that significantly differs from previous products or business processes in a company, and that has been launched in the market or implemented in the company.
IPFSL	Private Non-profit Institutions.
KET	Key Enabling Technologies .
Market pull	Research based on demand from clients.
OCDE	Organisation for Economic Cooperation and Development.
PA	Assistance programme.
PCT	Patient Cooperation Treaty.
Policy mix	The combination of a country's monetary and fiscal policies.
Product Innovation	A new or improved good or service that significantly differs from the goods or services previously produced by the company and has been launched in the market.
R&D	Research & Experimental Development. R&D covers the creative and systematic work done with the aim of increasing the volume of knowledge (including knowledge of the human race, culture and society) and devising new applications of knowledge.
R&D&I	Research, Experimental Development and Innovation.
RIS	Regional Innovation Scoreboard. European panel of indicators of innovation at the regional level.
RIS3	Research and Innovation Smart Specialisation Strategies.
RRF	Recovery and Resilience Facility of the European instrument Next Generation EU.
STIP	Science, Technology and Innovation Plan.
Scopus	Bibliographic database of abstracts and quotes from articles in scientific journals.
SDG	Sustainable Development Goals.
SMEs	Small- and Medium-Sized Companies. Companies that employ fewer than 250 people, whose turnover or annual revenues do not exceed 40 and 27 million euros respectively. Moreover, the following criterion of independence should be maintained: A company is considered independent provided that the participation in capital, or right to vote, by other companies or groups that are not SMEs should not be higher than 25%. At the statistical level, due to lack of information available reference is made to all companies that employ fewer than 250 people.
STEAM	Science, technology, engineering, art and mathematics.
STEM	Science, technology, engineering and mathematics.
TTCCs	Technology Centres.
Technology push	Research driven by advances in science and technology.
UNO	United Nations Organisation.
UPV/EHU	University of the Basque Country – *Euskal Herriko Unibertsitatea.*

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