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1. Introduction
The Science, Technology and Innovation Plan 2010 is proof of the Basque Government’s determined commitment to position our country as an innovation reference in Europe. If the country’s first economic transformation served to strengthen operational efficiency and put us on the European quality map, the second important economic transformation, in which we are currently immersed, must serve to put us on the European innovation map in its broadest sense. This is an enormous challenge which requires new doses of renewed enthusiasm in order to achieve this new frontier.

The General State Administration’s Balance of the R&D&I¹ policy states that “there has been a significant change in the role of the administrations in terms of R&D&I since 1986, with the gradual transfer of competences to the Autonomous Communities”, which should be interpreted as a positive transformation of the system towards greater prominence of the territorial systems. However, this process of transferring competences to the autonomous communities has not yet taken place in the Basque Autonomous Community, in spite of the fact that exclusivity for them falls on the Basque institutions, as expressly set out in the current legal code.

Therefore, the Gernika Autonomy Statute sets out in Article 10, Section 16 that the Basque Country has exclusive competence in scientific and technical research in co-ordination with the State.² The Basque Administration, convinced of the potential of establishing a solid scientific-technological strategy, endeavoured from the beginning of self-government (in 1980) to design a transversal policy without waiting for the compulsory transfer, using its own resources³.

In light of this situation, greater cooperation between the Central Government and the Basque Government in terms of R&D&I is now more urgent than ever, so that coordination and cooperation between both administrations is carried out under efficient and effective criteria, guaranteeing the necessary resources to define an integral innovation policy that covers the generation of knowledge as well as its transfer and application. The need to intervene from the local sphere in order to have a global presence requires a clear competence framework which allows for the stipulations of the Gernika Statute, without infringing on the necessary inter-institutional coordination and cooperation.

Given that factors have been combined in the success of the new company which have enabled us to reach the current level of well-being, but these are no longer sufficient, the development of self-government in this phase appears to be essential. Indeed, the new factors of competitiveness and progress as society demands we consider new parameters related to contents and the ways in which these are made evident.

The focus to date on technological development, particularly on processes, has enabled us to move towards competitiveness based mainly on costs and the corresponding production efficiency. Without abandoning this field, in which there is still room for improvement, it is necessary to embark on a broader vision of innovation, which emphasizes technological products and companies and fully incorporates innovation in marketing and organization, in accordance with Manual de Oslo’s⁴ guidelines. In short, it comes down to extending the concept of open innovation, based on the fact that innovation deals with the creation of value and not necessarily on the creation of things, and therefore the essential principle is that it should be results orientated and recognised by the market.

Although open innovation is based on our entire technological tradition and heritage and is planned in the existing production fabric and production requirements and demand, in the new context, there are production sectors, such as biosciences or nanosciences, for example, that this Plan promotes, in which the concurrence of science determines the participation of a country like ours in the Knowledge Society. In these sectors, science acquires exactly the same importance as technology has enjoyed to date, up to the point in which faced with the idea of demand, supply oriented sectors are formed in accordance with the science push concept.

Therefore, all of this requires a much richer and more varied Basque Innovation System, in terms of current disciplines or knowledge areas and the importance of relations which must be established in the heart of the system and with the exterior.

A system which, in short, places knowledge in its heart, the origin of which lies in the people that make up Basque society today and is characterised by the economic base and the environment in which we move. Knowledge which has its own life and which is built on a cumulative process in which education, research and innovation participate. Knowledge which flows and evolves with the different agents of the Basque Innovation System represented by the companies, agents of the Basque Science, Technology and Innovation Network and the Basque Government along with the Regional Councils, as well as the General State Administration and the European Union. In short, it represents the propellers of the driving force of the second economic transformation of the Basque Country, whose aim is the sustainable development of our country from the economic, environmental and social point of view.
In order to achieve this objective, the Plan considers five important work areas which outline the action model of the Science, technology and Innovation Plan 2010.

First of all, the necessary cultural change which must accompany and contribute to ensuring that innovation is perceived, not only by companies, but also by the Basque society as a whole, as the essential means on which our future well-being will be based.

Secondly, the recognition of the importance of Science in the new paradigm and its importance, not only in the field of basic excellence research, but also its potential as a source of generation of new initiatives which create wealth in our country. Science must progress by means of sound scientific projects capable of attracting research talent from beyond our borders.

Thirdly, the conviction that the roots of the future competitiveness of our country lie in the reality of the current production fabric in terms of industry and services. Supporting the present is the basis on which to build the new challenges, which not only focus on “made in the Basque Country” but also on “thought in the Basque Country”.

In fourth place, the need to create new sectors which in the future will represent the production reality of our country and which must have greater scientific-technological intensity, enabling a qualitative leap to be taken in the added value generated in our country. For this, research should not only develop from the question “what?” but also from “what for?” This approach towards obtaining results penetrates the set of actions considered in the Plan.

Finally, in fifth place, the wholehearted support of entrepreneurial activities through the creation of innovative companies with a growth vocation and global projection. This field of action is a paradigmatic example of the desired cross-fertilization which must take place for the wide variety and density of relations between the diverse agents of the Basque Innovation System, the combination of which ensures the existence of specialization factors spanning from the generation of technology, to business capacity and the offer of different forms of capital (seed capital, venture capital, investment capital, etc.), factors which are all necessary to build sound proposals for the creation of value.

In order to respond to these important questions which make up the action model, the Science Technology and Innovation Plan 2010 presents the agents responsible for the implementation of the proposed strategies and sets out the focal points and action programmes, which in turn, group the instruments which we are going to use to reach technological convergence and an innovative society. The objective before us is passionate and we must be fully aware that only through the cooperation and work of us all will we succeed in turning the vision of the second transformation towards the knowledge society into a reality.
2. Reference Framework
The PCTI does not represent an isolated action of the Basque Administration but it is linked in the past and the present to a wide range of actions and documents of this Administration and the community which set out their platforms and configuration, whereby the following may be highlighted

– The Business Competitiveness and Social Innovation Plan 2006-2009 (PCEIS) which sets out “a pragmatic reference framework in the establishment of a new competitive model”, based on the five important areas mentioned in the previous section and aimed at three strategic objectives: 1) Increasing the productivity of the economy, 2) Increasing the importance of Industry and 3) Technological and innovation convergence with the parameters of the European Union (EU 15).

– The qualified importance of innovation as a competitiveness tool to achieve the objectives set out by the community Institutions in the renewed Lisbon Strategy for growth and jobs. An extensive outlook of innovation “open innovation” is consolidated and a transition towards a “third generation” of the innovation system is put forward. This all involves, in some way, assigning innovation the role that technology has been playing as a driving force of competitiveness.

The institutional pronouncements and important features that inspire the PCTI reflect the connection with at least two relatively recent legal regulations: Law 8/2004, of 12th November, on Industry in the Basque Autonomous Community (LI) and Law 3/2004, of 25th February, on the Basque University System (LSUV) which, in turn, represents the science, innovation and technology framework in its respective fields.

Among the objectives of LI is “the promotion and fostering of industrial, technology and innovation activity” (Article 1.2, section, e) and it foresees that the Basque Government (the competent Department in the field of Industry) will develop Strategic Plans” (Article 20) and “Industrial Promotion Programmes” (Article 21 LI). The latter will deal with the sectors of “industrial promotion and organization”, “information and knowledge society”, “technology and innovation” and “internationalization” (Article 21.4).

Even when it is proposed to extend the field of research and innovation, beyond the exclusive industrial environment, this continues to be significant for the Basque production fabric and represents the objective of the competitiveness strategy set out in the PCEIS’ (ratified by the President of the Basque Country in his Speech on 22nd September 2006), consolidating its driving capacity on production activity by maintaining the importance on the real GDP of the Basque Country.

On the other hand, LI sets out different contents mandates (particularly, Chapter V, dedicated to “Industrial promotion”, Articles 24 and 25) which the PCTI covers (modulated, within the broad framework of legal interpretation in accordance with the reality of the moment).
2.1 **The Institutional Reference Framework**

### 2.1.1 THE EUROPEAN UNION

Within the European environment, in relation to the inevitable reference to the renewed Lisbon Strategy approved in March 2005, the “Integrated Guidelines for Growth and Jobs 2005-2008” (COM/2005/141 final) are formulated in which the interrelation and need to mutually strengthen the macroeconomic, microeconomic and employment policies is shown. 23 broad guidelines for Member States are incorporated in a single document. It shows the interrelation between the economic policies — macroeconomic and microeconomic policies — and employment policies, whereby those of the microeconomic sphere (Section B) may be highlighted as those that most directly define the guidelines that must be illustrated in the PCTI.

Decision 2006/702/EC, of the Council, of 6th October 2006, on Community strategic guidelines on cohesion for the period 2007-2013, discusses the importance of “promoting innovation, business initiative and the growth of the knowledge economy by means of research and innovation capacities, including the new Information and Communication Technologies”.

Decision 1639/2006/EC, of 24th October, establishing a Competitiveness and Innovation Framework Programme 2007-2013 (PIC) and Decision 1982/2006/EC, of 18th December, concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (FP7). They both establish a Programme in the field of Science, Technology and Innovation and they are complementary in order to mutually strengthen each other to meet the Lisbon objectives.

The PIC considers technological and non-technological aspects of innovation (for technological innovation, focussing essentially on intermediary sectors in research and innovation), whereby the interests of the SMEs and ecological innovation are references that inspire the entire Programme.

FP7 provides continuity and seeks to consolidate trans-national cooperation in terms of research, technological development and demonstration, particularly between public research companies and organizations, specific RTD systems in favour of the SMEs and the mobility of researchers between companies and the academic world. This FP7 focuses more on the technological requirements of innovation in industry and new actions in the form of joint technological initiatives in key fields of industrial interest. It also promotes the dissemination and use of research results from projects and specific themed areas, as well as the coordination of the national research programmes and policies (mentioning, among others, the regional clusters as particularly important agents).

In short, all of these references represent the links which enable this document to be connected to the European research and innovation framework.

### 2.1.2 THE STATE

Within the sphere of State Administration, Law 13/1986, of 14th April, on Promotion and General Coordination of Scientific and Technical Research (modified on numerous previous occasions) foresees a Scientific Research and Technological Development National Plan and defines the different agents responsible for implementing scientific policy.

At present, the “Scientific Research and Technological Development and Innovation National Plan 2004-2007” is in force (approved by the
Council of Ministers on 7th November 2003, which, since the previous Plan for 2000-2003, has incorporated innovation as an element singled out in its name), which formally recognises the action of the Autonomous Communities and the need to complement this Plan with the actions developed by the Autonomous Administrations.

In this respect, it seeks to establish and develop solid cooperation mechanisms between the Basque Administration and the General State Administration, which has become a reality as projects of scientific and technological importance are being defined, such as the creation of a joint Consortium for the promotion of the Spallation Neutron Centre.

2.1.3 REGIONAL COUNCILS

A complete vision of research and scientific activity in the Basque Country must be aware of the role played by the Regional Institutions in this field, particularly by means of their promotion policies and incentives for economic and business activity from diverse sectoral spheres of their competence, with special attention on the fiscal area.

A coordinated approach towards science, technology and research activities in the Basque Country cannot relinquish a complete vision of the activity developed by Basque Institutions, avoiding internal competition and fostering inter-institutional cooperation, the complementary nature of the measures and the coordinated promotion of Projects. In this respect, fiscal measures to promote innovative and research activity are of prime importance.

In this point, it is worth mentioning the Agreement signed between the Basque Government (represented by the Minister for Industry, Trade and Tourism) and the three Regional Councils, within the framework of the Economic Promotion Inter-institutional Plan 2000-2003 (PIPE). This Agreement aims to report on and coordinate the actions of the Institutions involved within the “sphere of economic promotion”, understood in a broad sense which includes innovation, competitiveness and employment. In accordance with this Agreement, the creation of a “Basque Council for Economic Promotion” is contemplated, which is assigned the general task of inter-institutional coordination of the PCEIS.

It is important to highlight the interdepartmental nature of the PCTI, in so far as the numerous prospects offered by research and innovation require the management of the PCTI to pay special attention to various sectoral policies such as those developed in the sphere of employment (vocational training, life-long learning, employment in emerging sectors, research careers, etc.), agriculture, fisheries and food, audiovisu-
2.2 The European Innovation Area as a Reference

2.2.1 ACTION LINES

For the past six years, the European Union has been working to place science, technology and innovation as the vectors of reference to increase its competitiveness against the United States, Japan and new emerging economies which, not only compete in work intensive sectors, but also make rapid progress in knowledge intensive sectors, like South Korea, India or China. Faced with this globalization of the competition, in which the African continent is increasingly being left behind, the European authorities show certain concern for the growing gap between growth experienced in the United States or Japan with respect to that experienced inside the European Union. This loss of competitiveness, along with other important questions such as demographic evolution, sustainable development or climate change cast shadows on the welfare and life quality model advocated to the world by Europe.

Aware of this relationship between competitiveness and the development of wealth and well-being, the European Union places increasing emphasis on competitiveness and innovation in the heart of its agenda. They have both led to the generation of products and services with high added value, which can be sold in the true European single market, as well as in worldwide markets. The existence of an appropriate regulatory framework to back-up a single market that encourages and fosters innovation requires, in the field of science, technology and innovation, a European Innovation Area (EIA) defined by a regulation that facilitates its unification in terms of mobility of researchers, regulations in terms of intellectual protection, etc.

This increasing importance of science, technology and innovation has occurred in a changing scenario in which the three elements have evolved, both from an individual and intrinsic point of view and from the perspective of the interactions and relations woven between the three important disciplines and therefore, between the set of agents responsible for their progress. The increasingly interdisciplinary knowledge networks and communities share, develop and accumulate the knowledge that facilitates the transformation of ideas into new products and services aimed at society as a whole. In this way, the need to strengthen formal and informal ties between companies, universities, technological centres, investors, promotion agents, etc. takes on special importance, so that the EU considers that the clusters acquire increasing relevance as areas in which these interactions are fostered and take place.

With this purpose, the Lisbon European Council in 2000 declared its wish to turn Europe into the world’s leading knowledge economy by 2010. The European Council in March 2005, based on the “Interim Evaluation Report to analyze the level of fulfilment of the Reform Programme approved by the Lisbon European Council in March 2000”, agreed to relaunch the strategy adopted in the Council held in March 2000 in Lisbon. This strategy aimed to make the European Union the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth, with more and better jobs and greater social cohesion with respect for the environment.

Since then, competitiveness and innovation have been progressing, in some cases overcoming reluctance and inertia in order to pave the way in Europe and increase both its programmatic and budgetary weight in the heart of the European Union’s public policies.

Therefore, a series of principles has gradually been built and consolidated on which the action of the European Union and the recommendations made to Member States in terms of innovation, competitiveness and growth is based.

These principles are aimed at reforming and strengthening the public research and innovation systems (including non-technological innovation), facilitating public-private partnerships, ensuring a favourable legal framework, strengthening financial markets and creating an educational and training environment with prospects of attractive professional careers.13

The focus of these new proposals emanating from the European Union is based on considering demand as a driver of innovation in Europe.14 European policies in these areas have focussed to a greater degree on supply policies which have not favoured the transfer of potentially innovative ideas to the market. In light of this situation, there is a bid for a change of direction that eliminates once and for all the weaknesses that characterize R&D&E in the EU as a whole.
Demand as the driving force of innovation in Europe

To this end, initiatives such as Europe INNOVA have been implemented, which seek, by means of actions such as the creation of Technological Platforms, Joint Technological Initiatives or Sectoral Innovation Panels, a greater orientation of research and innovation activity towards the needs identified by the production sectors, and to lead the European production fabric towards more intensive knowledge positions. Similarly, the Regions of Knowledge initiatives, ERA-NETs, and PRO INNO, have strengthened trans-national cooperation and networking relations between state and regional agents by means of the constitution of platforms to exchange experiences and the co-development of scientific, technological and innovative based initiatives.\(^1\)

However, perhaps this need for commitment to R&D&I in the European sphere is most emphatically expressed in Communication 502 (final) of 13th September 2006, which becomes the revised Lisbon strategy for growth and jobs. It appears to put an end to the rhetoric, highlighting the need for political leadership and determination, a kind of inflection point whose most important indicator is the financial framework for 2007-2013 and whose field of application should be transferred to the States and Regions of the Union. This revised strategy indicates a series of strategic elements.

### 2.2.1.1 An Integral Educational System and Favourable for the Research Career

To make the most of the potential of the internal market as a mechanism to encourage and promote research and innovation. For this, it is necessary to eliminate all of the barriers that represent an obstacle to competition with the aim of creating a market that encourages and favours innovation. Given the importance of the services sector in the European production fabric, effort must be made in this field, because it is the sector that is less exposed to competition, and therefore, receives less innovation incentives. For this reason, emphasis is placed on innovation in its broadest sense, transcending from exclusively technological innovation and incorporating organizational innovation, innovation in services, etc. A key element within the configuration of this single market or European Innovation Area is the constitution of the European Patent which speeds up and facilitates the registration of intellectual property and makes this process more efficient. In short, it comes down to having a favourable institutional and regulatory framework to achieve this common Area.

### 2.2.1.2 Taking Advantage of the European Economic Area

There is a desire to make the most of the potential of the internal market as a mechanism to encourage and promote research and innovation. For this, it is necessary to eliminate all of the barriers that represent an obstacle to competition with the aim of creating a market that encourages and favours innovation. Given the importance of the services sector in the European production fabric, effort must be made in this field, because it is the sector that is less exposed to competition, and therefore, receives less innovation incentives. For this reason, emphasis is placed on innovation in its broadest sense, transcending from exclusively technological innovation and incorporating organizational innovation, innovation in services, etc. A key element within the configuration of this single market or European Innovation Area is the constitution of the European Patent which speeds up and facilitates the registration of intellectual property and makes this process more efficient. In short, it comes down to having a favourable institutional and regulatory framework to achieve this common Area.

### 2.2.1.3 Creation of a European Research Institute

The proposal to set up a European Institute of Technology was first presented in 2005 within the framework of the interim review of the Lisbon Strategy.

The European Institute of Technology will be a new legal entity with diverse locations, which will bring together the best university teams and departments from all over Europe in strategic fields. It will be an education, research and innovation agent, structured in such a way that these three fields, which represent the keys of the knowledge society, are integrated.

The EIT will strive to attract the leading and most talented students, researchers and professionals worldwide to work in partnership with leading companies in the development and tapping of cutting-edge knowledge and research, hence increasing the general capacity to manage research and innovation in Europe.
It will consist of a structure on two levels: a governing board, which will represent its nucleus, and a set of knowledge communities distributed throughout Europe, which will organize activities in strategic trans-disciplinary fields.

By responding to the need to foster on one hand an innovation culture and an entrepreneurial spirit in terms of research and education, and on the other hand, new organizational models adapted to current needs, the EIT fulfills a role that is not covered by any of the existing or planned initiatives of the European Union or national universities.

### 2.2.1.4 The Necessary Crossed-Fertilization of Knowledge and Ideas

The commitment to promote cooperation structures that boost effective connection and interaction between the agents operating in innovation areas (European, national, regional, trans-national, etc.). In this respect, the development of clusters with a view to bridging the gap between companies, and between these and other scientific-technological agents, particularly the university, is high on the list of priorities of the European agenda. The EU considers the creation of the European Institute of Technology (EIT) as a structuring action within the framework of cooperation and greater integration between companies and scientific-technological supply. However, cooperation as an action line also is also extended to the trans-national cooperation that must arise within the framework of co-responsibility of European states and regions so that each of them, within their sphere of competence, develops the actions required to advance in harmony with this Reference Framework. The European cohesion policy for 2007-2013 will mobilize funds in favour of regional innovation, whilst Member States will be required to allocate a substantial part of them to innovation and knowledge.

### 2.2.1.5 Financial Resources for Innovation

The obligation to financially support innovation and mobilize private financial resources in such a way that they are aimed at present and planned commitments by means of the Technological Platforms, as well as excellence backed up by the European Research Council (ERC). In addition to the initiatives supported by community funds, such as the 7th R&D Community Framework Programme, the Competitiveness and Innovation Framework Programme, the aforementioned technological platforms or the Joint Technology Initiatives, the Commission, in conjunction with the European Investment Bank, is going to launch a joint risk fund to back investment in high risk research projects and technological development, by means of loans and guarantees, with the hope that these funds in turn mobilize private investment. An ad-hoc instrument has also been designed for the SMEs with the aim of channelling venture capital funds combined with the provision of advanced management services to them (JEREMIE Fund, “Joint European Resources for Micro-to-Medium Enterprises”). In the venture capital field, the framework of State aid is constantly being redefined with respect to this funding instrument. Finally, the tax system also represents an ideal area to drive innovation.

### 2.2.1.6 The Role of Governments

Finally, it is the responsibility of governments to “advocate by example”, improving the provision of public services under the criteria of greater productivity, quality and innovation so as to extend the use of the Information and Communication Technologies (ICT). In this way, in addition to acting as a user of the ICTs, the Public Administration is able to act as a tractor in this sector by generating markets for this type of products and services. This capacity to generate markets is extended to all fields, so that public procurement is highly influential in the markets that need to be exploited. Therefore, the Public Administrations can and must increase innovation incentives in the markets in which they act as a sole client. Monopolies, which traditionally slow down innovative tendencies, must operate as true drivers of innovation, and therefore the Administration must act as an intelligent and at the same time demanding client. In this respect, public procurement prior to commercialization, or in other words, which involves the search for solutions through R&D,
play an important role in countries such as the United States, whilst in Europe this method of stimulating innovation has hardly been used. Markets such as the environment (eco-innovation), transport, space, well-being and culture, construction, etc, may and must act as drivers of innovation.

The combination of all these elements represents a true change of paradigm which, whilst preserving European values, generates a new social structure that is much more committed to innovation in its broadest sense. The elements on which this change of paradigm revolves can be summarised as a market of innovative goods and services, better assigned resources, new financial structures and the mobility of people, capital and organizations.

2.2.2 THE NECESSARY CO-RESPONSIBILITY OF THE STATES

Responsibility for following the defined guidelines does not fall exclusively on the European Union and its institutions, but there is also a marked national and regional responsibility. In fact, the degree of assimilation and internalization of this vision is proving to be imbalanced. Therefore, there are countries that have shown wide-ranging co-responsibility and commitment to the objective and these are making good progress. Meanwhile, there is a series of countries that have failed to assume this objective with the same degree of commitment and they have a longer path to follow in order to meet the Lisbon goals.

Therefore, the Member States, within the framework of the renewed Lisbon Strategy, have defined National Reform Plans, which, in the case of Spain, represent an important challenge in order to fulfil the expectations laid down by Europe.

Spain’s evolution is seriously lagging behind, which appears to distance it from the objectives set out in the Lisbon Strategy. Therefore it has taken on an important commitment in economic terms to face the situation in relation to innovation and hence recover the path defined by European authorities.

In this respect, the Central Government’s National Reform Programme 2005-2010, a key reference in economic policy in general and specifically in industrial policy, represents the State’s commitment to the

Evolution of the States in relation to the Summary Innovation Index

Source: European Innovation Scoreboard 2005.

The increase in the amount and quality of training for science and technology graduates is essential to reach a position of scientific leadership.

2.2.2.1 Increase and Enhance Human Capital

Two important questions are being tackled with respect to “increasing and enhancing human capital”. First of all, the need to improve the amount and quality of training for graduates in sciences, mathematics and technology has been identified in order to reach a technological and scientific leadership position, which will benefit productivity and the wealth and
well-being of citizens. Secondly, the need to increase life-long learning is emphasized, for which reforms to the training model are envisaged so that 12.5% of the population will receive on-going training by 2010, compared with 5.2% in 2004.

Within this area related to human capital, the modification of the Organic Law on Universities is being promoted from the regulatory perspective, with the aim of adapting this law, among other elements, to the intensification of research activity which must be undertaken by universities. This reform aims to make universities a vector of the transformation of Europe into an economy fully integrated in the knowledge society.

2.2.2 R&D&I Strategy (INGENIO 2010)

In relation to the “R&D&I Strategy (INGENIO 2010)”, regulatory reforms are being considered that streamline and simplify the management of resources and accessibility to aid and public contracts. Along with these actions, on-going evaluation of the policies is also planned, with the aim of increasing their reactive capacity, adapting them to the fulfilment of the objectives set out. An example of this new direction is the implementation of the Integrated Monitoring and Evaluation System (SISE) which has been established within the evaluation framework of the R&D&I National Plan.

As far as strategic actions are concerned, the Inter-ministerial Committee for Science and Technology presented the Ingenio 2010 Programme in 2005 as a key element of the National Government’s H&D&I policy.

This new R&D&I action programme involves seven ministries and has a budget of 2,800 million euros. Its objectives are to allocate 2% of the GDP (0.9% of the public contribution) to R&D&I by 2010 and converge with Europe within fifteen years. It also aims to encourage private investment in H&D&I, reaching 55% and positioning Spain close to the European average (58%); introduce a minimum of 1,300 doctors in the private sector a year via the Torres Quevedo programme from 2010, and increase the creation of public research technological companies to a minimum of 130 new companies a year in 2010.

In order to achieve these objectives, more public resources are available as well as improved management and evaluation; all of which is focused on three strategic lines of action: CENIT, CONSOLIDER and the Avanz@ Plan.

The INGENIO 2010 Programme’s boost to R&D&I

Source: http://www.ingenio2010.es/que_es/descripcion.html
2.3 Trajectory of the Science, Technology and Innovation Policy in the Basque Country and the Framework for Future Action

Prior to planning the future, it is worth reviewing the innovation policy in the Basque Country over recent years, taking the return to self-government as a starting point, because if we are in a favourable position today, it is due to past efforts; similarly we will have been able to meet the objectives of the new strategy by 2010 depending on the efforts made now.

2.3.1 1980-1996: SUPPLY POLICY

In an initially adverse context, with the return to Basque self-government, the Basque Country was committed to making policy and rebuilding the country from a multi-dimensional point of view, not only in the industrial sphere, but at all levels (environmental, social, cultural, infrastructures, etc.), to face a severe crisis situation. From the business point of view, the restructuring of industry and achieving higher levels of competitiveness required an urgent boost to the technological level of Basque companies.

This period was marked by the need to lay the foundations of a Basque Science and Technology System. For this, it was necessary to rely on scientific and technological agents with sufficient capacity to define the minimum bases to take the country as a whole to new production trajectories with a future. With this purpose, in 1982, the figure of the Protected Research Entity was created for the existing Technological Centres in the country, which were integrated into the Basque Association of Research Centres (EITE) in 1986. The protected technological centres were created from small test laboratories and existing services revolving around existing industrial centres and training schools. Their activity was centred on generic research and the development of projects applied to industry, relying on the determined commitment of the Basque Government. Therefore, funding from the Department of Industry to the Technological Centres rose from 1.18 million euros in 1982, to 6.9 million euros in 1990 by means of agreements signed with each of the Centres.

The Technological Policy actions that were fostered during the 1980’s were aimed at funding the creation, extension and maintenance of the company R&D units. Along with this structuring action, other actions were also developed to support the production of prototypes and construction of pilot plants, joint technological developments, demonstration operations, technological diffusion, quality, training and exchange and specific R&D projects. R&D business aid increased from 0.95 million euros in 1982 to 12.5 million euros in 1990, of which 8.9 million corresponded to R&D business projects.

The first plan, called the Technological Strategy Plan 1990-1992 (PET), was drawn up in 1990. This set out, for the first time, the main technological priorities to increase business competitiveness. For its drafting, the SPRI’s Strategic Technology and Innovation Unit (UEI) was founded in 1989, and is directly responsible for the management of programmes and activities to support R&D by the Basque Government.

Given the importance of the metal transformation sector in the Basque production fabric, the actions contemplated in the PET revolved around this sector. For this reason, the technological areas considered were those of most importance for this sector at that time, such as new material technologies, production technologies and the information technologies. Funds allocated to the Technological Centres were 7.6 and 6.7 million euros for 1991 and 1992 respectively, whilst funds allocated to support business R&D were 14.7 and 10.7 million euros respectively.

Later, the Industrial Technology Plan 1993-1996, (PTI) took over. This Plan was approved in accordance with the guidelines of the General Framework for Industrial Policy 1991-1995 and the guidelines of the Basque Council for Technology (CVT), whose creation was approved by the Basque Parliament in 1993. The most significant aspects of the new Plan can be summarised in three important questions:

1. Consideration of innovation as a systematic process that arises from the linear conception of R&D&I in accordance with the new theories imposed. This fact implies the necessary transformation of innovation policy, in which importance is given to interactions between all of the agents of the system (scientific, technological, business, financial areas, etc.), and between all of the different work areas (research, technological development, engineering, marketing, commercial, production, distribution, design, etc.).
2. Consideration of the technological demands of the recently created clusters which are consulted in order to define the priority technological areas in the R&D projects included in the Plan. In this way, support lines are established which aim to promote cooperation between companies and between companies and Technological Centres. The chosen technological areas continue to be those most closely related to the traditional sectors of Basque industry, or in other words, the technologies considered in the previous plan along with the incorporation of environmental technologies.

3. Support for R&D projects was classified on this occasion, as Type I Generic Projects, which were those proposed by the Technological Centres, and the Type II Generic Projects, which were those requested by the clusters, in which business R&D units, sectoral R&D centres and the University participated. In the case of Type I Generic Projects, support went from 7.3 million euros in 1993 to 6.1 million in 1996. On the other hand, support for Type II Generic Projects increased from 3.2 million euros in 1993 to 7.4 million euros in 1996.

The scarce presence of the University was an important deficit in this period. From the scientific policy perspective, the first steps taken by the Department of Education sought an increase in scientific production, mainly that of the university system. Actions related to the training of researchers and their participation in research projects were particularly relevant.

2.3.2 1997-2005: PROMOTION OF TECHNOLOGICAL DEMAND

The Science and Technology Plan 1997-2000 (PCT) was defined within the General Action Framework for Industrial Policy 1996-1999. This period was marked by the need to consolidate the Basque System for Science and Technology, whilst incorporating into the programmatic agenda the need to systematically promote technological demand by companies and the production sectors in the Basque Country.

The PCT represents an inflection point by seeking a greater integration of the entire Science-Technology-Company system, given that, on one hand, it integrates policies for the general promotion of knowledge and support for scientific research carried out mainly by the University, and on the other hand, actions fostering the development and technological innovation of the Technological Centres with companies. This integration of the scientific and technological system was made possible thanks to the cooperation between the Department of Education (scientific policy) and the Department of Industry (technological policy).

The Basque Network for Technology, which integrated the University, was set up in 1987 to promote this interdepartmental cooperation, whilst the Basque Council for Technology (CVT) was extended to incorporate the University and the Department of Education, changing its name to the Basque Council for Science and Technology (CVCT).

In this way, the Plan contemplated technological programmes (horizontal and specific), as well as basic research programmes, whose main beneficiary was the University. Public funding of the PCT amounted to 64.2 million euros in 2000.

The aim of the Science, Technology and Innovation Plan 2001-2004 (PCTI) was the international consolidation of the Basque Country as a scientific and technologically innovative country, maintaining, like in the PCT 1997-2000, the integrating character which combined the actions of various Departments and Bodies of the Basque Government.

Its integration level advanced qualitatively as the Plan brought together two new focuses on competitiveness and research towards the knowledge society and reinforced its complementarity with other initiatives of the Basque Government, such as the Basque Country in the Information Society Plan or the 3E 2010 Energy Strategy.

In this respect, the Plan remained committed to non-orientated basic research and also established a further five key areas with their corresponding programmes:
**Competitiveness** Area with three programmes: Materials and their Processes, Design, Production and Lifecycle, and Logistics Transport and Mobility.

**Environment and Energy** Area with three programmes: Clean Energies, Sustainability of the Environmental System and Sustainability of Economic and Social Activities.

**Information Society** Area, with four programmes: ICT, Digital Company, Advanced Business Management and Digital Administration.

**Quality of Life** Area, with five programmes: Health, Tourism, Consumption, Leisure and Sports; Construction and Cultural Heritage; Economy and Development, and Social Cohesion and Action.

**Living Resources** Area, with four programmes: Biotechnologies and Pharmaceutical Technologies, Agricultural and Farming Technologies, Food and Agricultural Technologies and Nature Conservation.

As a new feature and new point of inflection, the PCTI defined strategic research as action intended to promote basic research activities aimed at special areas of relevance for the Basque Country, including technologies such as biotechnology, nanotechnology, microtechnology, microenergy, or virtual reality. In this way, diversification in future knowledge intensive sectors took on unprecedented importance in this Plan, setting out the training of researchers and technologists in these technologies, the development of supply capacities by means of the generation of infrastructures and the purchase of technologically advanced equipment, international coopera-

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**Evolution of Science, Technology and Innovation Policy in the Basque Country**

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**The PCTI 2001-2004 encouraged diversification in future knowledge intensive sectors such as biotechnology, nanotechnology, microenergy, or virtual reality.**

Source: Basque Government.
tion and participation in research projects, technological development and innovation. 38.44 million euros were invested in this new line of work throughout the validity of the Plan.

Total budgets for the PCTI increased from 132.4 million euros in 2001 to 173.9 million in 2004.

In short, the 2.1 million euros assigned to the technological policy in 1982 (1.2 million for Technological Centres and 1 million for R&D business units), increased to 173.9 million for the Science, Technology and Innovation Policy in 2004.

2.3.3 TOWARDS THE THIRD GENERATION OF INNOVATION POLICIES

The graph, which summarises the trajectory in three stages and reveals the future elements, may be interpreted by relating these stages to the three generations of technological or innovation policies that are defined in the different paradigms.

The first part of the linear idea of innovation begins in the laboratory and is transformed into market applications by means of consecutive steps. Elements of this conception remain in the current diversification policy, such as Bio, although the design of cooperative centres with the presence of ab initio companies takes it away from the linear model. What is clear is that, besides specific cases, this type of policy exemplified by the United States for many years and nowadays, by some national systems, is a complete failure in the long term if it is implemented in a domineering way and applied to the majority of production sectors because it is based on three highly questionable suppositions:

• That innovation follows a linear sequence of activities from basic research to the market;

• That there is a long diffusion period for new products with enough time for another new wave to appear prior to losing competitive advantage;

• That the organizational and social capacities reflected in the territory are not important for competitiveness.

Compared with this science push approach, Japan has overtaken the United States with the production pull approach and emphasis on technology and a system driven by industry requirements. Here, the paradigm of the second generation proposed that development should be led from demand and production requirements, in which the regional clusters play a key role, recognising that the system is complex and full of feedback loops and the diffusion of innovation is of exceptional importance. This paradigm leads to the idea of a system in which all of the agents are integrated in a regional base; regional innovation systems that are none other than an alternative way of considering regional competitiveness models, in the style of Michael Porter.

The challenge of the third stage, in which we now find ourselves, is to consolidate the second generation and define some lines and initiatives that will take us into the third generation. It is a transition towards an undefined model that is still under construction, which forces us to become innovative with innovation. The basic idea is that the innovation and creativity that uphold it should touch all areas that influence the economic results in a society, rather than just focus on property rights and on competition, which is more common.

The success achieved and the effort made to date should serve as a stimulus to redoubling them, because the results for 2015 will be determined by what we are capable of doing today.

2.3.4 BUSINESS COMPETITIVENESS AND SOCIAL INNOVATION PLAN 2006-2009

2.3.4.1 Before the new Competitiveness Scenario

The “Business Competitiveness and Social Innovation Plan 2006-2009” is a programmatic reference framework in the establishment of a new competitive model. It is a new model adapted to respond to the challenges arising from a new order based on the flow of knowledge, not only of information, innovation, technology and collaboration, but also competition. It is a new way of perceiving reality. Compared with the traditional economic orthodoxy based on the concept of shortage, in this new paradigm governed by knowledge, this principle is openly challenged because it is multi-
plied indefinitely in such a way that the more it is used, the further it extends.

In this context, the Business Competitiveness and Social Innovation Plan 2006-2009 becomes a unique opportunity to tackle, in a non-traumatic way, the set of structural changes which the Basque society and economy faces, known as the “Second Basque Transformation” (and is called a change of paradigm in the European context).

Therefore, a competitiveness model based on five important areas is considered:

**Main Lines of Action**: This area considers three important lines of action such as values and human resources as the central apex of the model, innovation as a means to achieve higher levels of productivity and therefore improve the competitiveness of our country, and the size and business groups as a formula for competing in the global economy.

**Cluster, Trade and Tourism Strategies**: in addition to a transversal vision in the set of actions, specific initiatives are considered that have been adapted to the specific characteristics of certain sectors of activity.

**Requisite Resources**: This provides a systematic and integral vision towards the requirements of companies to increase their competitiveness, incorporating the availability of resources in such varied areas as the availability of land, energy policy (3E-2010 Plan), funding and taxation policy.

**Organization and Support for the Model Development**: This considers the governance that guarantees good management and leadership in the implementation of the Competitiveness and Social Innovation Plan 2006-2009.

**Coordination and Working with other Policies**: With the aim of strengthening the systematic and integral vision of the aspects that influence competitiveness, the Plan includes aspects that, although not yet under the direct responsibility of the Department of Industry, Trade and Tourism, have a direct impact on the level of competitiveness reached, the combination of which may be affected by a lack of intra and inter-institutional cooperation.

### 2.3.4.2 Objectives of the Competitiveness Plan

According to these considerations, and as a summary, the Business Competitiveness and Social Innovation Plan puts forward three important strategic objectives for the country.

In addition to recognising the strategic role of the industrial sector, the objectives are closely connected to innovation as a competitiveness tool and to reaching technological convergence, which are closely related to this plan.

#### Strategic Objectives 2009

The Business Competitiveness and Social Innovation Plan 2006-2009 extends the concept of innovation, considering organizational, marketing and technological innovation.

#### 2.3.4.3 Innovation as the Focal Point of Competitiveness

The centrality of innovation in the new competitive model encompasses two important questions: orientation towards results and the scope of the innovation concept with the aim of tackling it in its widest sense.
As far as orientation towards results is concerned, it aims to increase the productivity of science, technology and innovation, namely, the outputs derived from the activities set out in the aforementioned three fields.

As for the scope of innovation, it aims to give special relevance to areas that have not been considered to date, such as organizational innovation, innovation in marketing and new fields of application which go beyond product or process innovation, areas in which this concept have mainly evolved to date.

In both cases, the need for a new focus associated with a major transformation in the action model is evident, in which the different agents must become familiar with the paths, whilst the public promotion instruments must be adapted to facilitate and encourage the aforementioned orientation towards results, and the concept of innovation in its broadest sense.

Another important aspect of the new competitive model, which the Business Competitiveness and Social Innovation Plan 2006-2009 aims to influence, is the social and relational character and exploration and exploitation of knowledge. For this, the innovation system is considered as a set of organizations and institutional and business agents that, within a certain geographical area, interact between each other with the purpose of assigning resources to the performance of activities aimed at the generation and dissemination of knowledge on which innovation that boosts economic development is based.
3. Diagnosis
3.1 Starting Point

Following the geographical and provisional contextualization presented in the previous chapter, it is now time to define the Basque Country’s starting point in relation to the five important questions which have been identified and are among the priorities of the European, State and Basque Governments in order to face global competition on the 2010 horizon. These five important questions are:

Human Capital: fostering creativity, on-going training and research activity.

Market: Europe, an area full of opportunities for innovation.

Plural Innovation: diversity due to the multiplication of innovation areas.

Financial Capital: mobilization of public and private resources to promote innovation.

Government: facilitator and driver of innovation in society at large.

This analysis, which does not aim to be a thorough diagnosis of innovation in the Basque Country, will also allow the relative position compared with other States that form part of the EU-15, the EU-25, the United States and Japan to be verified.

3.1.1 HUMAN CAPITAL: PROMOTING CREATIVITY, ON-GOING TRAINING AND RESEARCH ACTIVITY

Human resources represent the most important asset to enable Europe to successfully fulfil the Lisbon Strategy. The combination of certain aptitudes and attitudes are seen to be essential in order to progress along the planned path. Among the main characteristics, the following may be highlighted:

3.1.1.1 Innovation Culture

Social awareness of issues related to science and technology in the European Union in general is relatively low. For example, the level of information is far higher in sport than in scientific and technological discoveries. In Spain, the situation is even lower than the EU-25 average. In 2005, 53% of the population failed to be informed on questions related to science or they did so marginally, whilst the European average for this group stood at 40%. Within Spain, the Basque Country (12%) is at the bottom of the table in terms of population that claim to watch science and technology documentaries compared with 40% in Aragon or 30% in Catalonia or Madrid. A general evaluation of science places the Basque Country in line with the national average, whereby 47% of Basques make a positive evaluation, although when considering the relationship between science and opportunities, the Basque Country, along with Galicia, is the Autonomous Community that perceives the least relationship between these con-
cepts. This lack of optimism also occurs in the field of science and technology and their ability to cure illnesses, with evaluations below the national average, along with Navarra and Cantabria.

### 3.1.1.2 Population with Secondary Education

The Basque Country is positioned among the most advanced countries of the European Union in terms of population with secondary studies (81.1% in 2005), far above the European average (73.8%) and ahead of countries like Germany or France.

### 3.1.1.3 Population with Higher Education

In terms of the availability of highly qualified human resources (individuals with higher education), for the 25-64 year-old segment, the Basque Country is slightly above the European average, with 26% of people with higher education studies in 2005, compared with the European average of 23.1%.

### 3.1.4 Entrepreneurs

One of the elements that best conveys the ability to transfer and apply knowledge lies in the entrepreneurial spirit of society. The “Global Entrepreneurship Monitor 2005” provides highly significant information in this respect. In 2005, 5.4% of the adult Basque population were involved in the running of start-up companies, or in other words, companies with less than 42 months of activity, a figure which is very similar to its neighbours (Spain 5.65%, France, 5.35%, Germany 5.39%), but contrasts with that of countries like Ireland (9.83%) or the United Kingdom (6.22%). The profile of an entrepreneur is a male of between 35 and 45 years old, with an advanced level of studies and a monthly income in excess of 1,200 euros. It is worth mentioning that in the majority of cases (65%), the business project is not innovative and in 80% of cases, production is not for export, which gives rise to competition levels that are only slightly based on differentiation and are focussed on local markets, aspects in which the Basque Country coincides to a greater or lesser degree with the OECD countries.

### 3.1.5 Investment in R&D by the University System

The R&D effort made in 2005 by the scientific-university system (HERD) was 0.25% of the GDP, a long way behind the European and Spanish average.

### 3.1.6 Graduates in Science and Technology

The proportion of new science and technology graduates which nourish the Basque Innovation System is extremely high: the percentage of graduates in science and technology degrees in 2006 was 26.1‰, which...
Although the Basque Country has an important researcher mass, it is necessary to further promote its mobility in order to reach the highest levels of scientific excellence.

3.1.1.7 Researchers

In 2005, 13.1‰ of the active population in the Basque Country were R&D staff and 8.2‰ were researchers (of which 35% were women), percentages which were above those obtained in Spain and the EU.

Furthermore, it is necessary to improve the qualifications of the personnel in the Basque Science Technology and Innovation Network (RVCTI), given that a very small percentage of them have a PhD. Hence, just one Technological Centre of the 13 affiliated to the Network boasts almost 30% of researchers with a PhD (Saretek Survey 2004).

This shortage of doctors is also reflected in the Basque University System, whose third cycle PhD students represented 4.48% of its students in the academic year 2004/2005 (NSI); figures which contrast with the Autonomous University of Madrid (11.73%) or with the Autonomous University of Barcelona (9.11%).

Another element that requires greater dynamism is the mobility of researchers. Mobility is an asset which is acquiring more and more importance for the agents in general, but particularly for scientific-technological research centres. Data shows that there has been limited mobility to date and therefore it needs to be encouraged. In 2004, for example, the number of foreign researchers in Basque Technological Centres was 22, whilst the number of Basque researchers working abroad for a period in excess of two months was 28.

By means of the evolution registered to date in terms of researchers, the clear technological character of the Basque Science and Technology System can be appreciated. In 2005, R&D staff from knowledge areas...
areas related to engineering and technology represented 65%, whilst the combination of scientific disciplines occupied the remaining 34%.

On the other hand, the incorporation of new researchers in the university has undergone an average annual growth of 1.7% compared with 8.8% for the entire Basque Innovation System in the period 1994-2001. In Finland, the annual growth rate of university researchers was 12% for the same period.

Presence today in this Important Market, considering all of its dimensions, cannot be measured in any other way than by means of the evaluation of the outputs provided by the Basque Country in the different markets. However, the diagnosis does not allow the degree of openness in the different markets to be measured, although it does offer parameters on which the Basque Country’s participation in them may be estimated.

### 3.1.1.8 On-Going Training

The knowledge society feeds off people who wish to constantly learn new ideas and capacities or participate in life-long learning activities. In the Basque Country, 4.9% of the population is involved in life-long learning activities, clearly below the community average (11%) and a long way behind the leaders (34.7% in the case of Sweden and 29.1% in the United Kingdom).

The data provided identifies the need to give maximum priority to human capital as far as the attitudes and aptitudes required to face the challenges are concerned.

### 3.1.2 MARKET: EUROPE, AN AREA FULL OF INNOVATION OPPORTUNITIES

Taking advantage of the European Economic Area, the European Research Area and the European Innovation Area represents a clear orientation towards results, or in other words, towards the market.

Presence today in this Important Market, considering all of its dimensions, cannot be measured in any other way than by means of the evaluation of the outputs provided by the Basque Country in the different markets. However, the diagnosis does not allow the degree of openness in the different markets to be measured, although it does offer parameters on which the Basque Country’s participation in them may be estimated.

#### 3.1.2.1 Expenditure on Innovation

The Basque Country’s expenditure on innovation amounted to 2,162 million euros in 2005, which represented 3.8% of the GDP and almost doubled figures for Spain in this concept.

#### 3.1.2.2 European Economic Area

**New Products for the Market**

In 2006, sales of new products for the market represented 1.6% of turnover in Basque companies, a below average figure for the EU, which represented 4.57%, and far behind countries like Slovakia (12.8%) and Portugal (10.8%).

**New Products for the Company**

In 2006, sales of products that are new for the company but not for the market represented 4.2% of the total business turnover in the Basque Country, a below average figure for the EU which represented 6.73%. Countries like Portugal (15.1%) or Germany (10%) stand out in this area.

**Percentage of exports in high-tech products**

The Basque Country has seceded in increasing the percentage of high-tech products with respect to the total volume of exports, moving from 0.8% at the beginning of the 1990’s to 6.9% in 2003, although the past two years have witnessed a slight fall to 4.3% in 2006.
In spite of this important progress, it is still a long way off the European average (18.4%) and countries like Ireland and Luxembourg, which represent around 30%. A special case is that of Malta with 55.9% of exports in high-technology products.

**Employment in medium-to-high and high-tech sectors**

The Basque Country is strong in the medium-high tech manufacturing sectors, occupying third position in the EU in terms of job creation.

However, looking at the medium-to-high and high-tech sectors together, employment in 2006 represents 10.13%, which is above the European average (6.66%), and is only exceeded by Germany (10.43%).

A recent study attributes 36% of employment in the Basque Country to sectors considered to be knowledge intensive, which is still a long way behind regions of Europe such as Stockholm (58.6%) or Greater London (57.7%).

**Employment in High-Tech Services**

It is necessary to banish the mistaken yet widespread idea that services do not need to innovate, or that innovation belongs to industry. There are many tertiary activities in which technological innovation is an essential and differential factor to determine their competitive position. The financial sector, software development services, engineering, design, etc, are clear examples. An additional element to highlight is that the degree of technological development in the services sector and particularly within the services sector to companies, is decisive for industry and for the business fabric at large.

Furthermore, innovation understood in the broadest sense, which includes non-technological innovation, is essential because the latter is extremely important in the services sector.

In any case, innovation in the services sector in the Basque Country remains pending. Although the services sector has been gaining relative weight in the economy, its expenditure on innovation is half that of the industrial sector and although the percentage of innovative companies is a little higher that the average for Spain (18%, compared with 14%), it fails to reach half of that for the EU (40%). This is the result of the oversight experienced in the services sector in the design and application of technological policies throughout Europe and particularly in the Basque economy.

Therefore, employment in high-technology services represented 3.4% in 2005 in the Basque Country, a long way behind the leading country in the EU, Sweden, although slightly above the European average which stood at 3.19%.

### 3.1.2.3 The European Innovation Area and the European Research Area

**EPO Patents**

The capacity of companies to develop new products is decisive to increase their competitiveness in the knowledge economy. Applications for EPO (European Patent Office) Patents in the Basque Country, with 29 patents per million inhabitants in 2005, is a long way behind the most advanced regions (Germany stands out with 312) and is below the European average (136.7 in 2006), due partly to the production structure, with little weight from high technological intensity sectors, and also due to the lack of a patenting culture, and ignorance of the advantages of the appropriate protection of intellectual property.

**USPTO Patents (United States Patent and Trademark Office)**

Applications for USPTO patents per million inhabitants in the Basque Country stood at 7.9 in 2005. Basque companies own 80% of patents, whilst individuals apply for 19% and scientific-technological agents are in possession of the remaining 1%.

**Triadic Patents**

Applications for triadic patents in the Basque Country stand at 13.1 per million inhabitants. Basque companies own 82% of patents, whilst individuals hold 14% and scientific-technological agents have the remaining 4%.

**Number of New Community Trademarks**

The number of new community trademarks per million inhabitants in the Basque Country was 368 for 2006, a figure above the EU-25 aver-
age, which stood at 100.7 in 2006. Luxembourg presented far higher figures with 782.7 in 2006.

**Number of New Community Designs**

In 2006, the Basque Country presented a level of new community designs of 268 per million inhabitants, a figure above the average for Spain (106.2 in 2006) and the EU-25 average, which was 110.9 for 2006. Luxembourg stands out with 377.6 designs per million inhabitants.

**Number of Scientific Publications**

The number of scientific publications in the Basque Country reflects less productivity than expected, bearing in mind the weight of researchers in the whole of Spain. Therefore, if Basque researchers represented 7.4% of researchers in Spain in 2005, they are responsible for just 4.3% of the total publications, behind other regions such as Madrid (28.5%) or Catalonia (20.3%). Between 2001 and 2005, the number of scientific publications in journals with an international circulation per year and for every ten thousand inhabitants in the Basque Country was 5.5, occupying twelfth place in all of the regions of Spain. In the case of publications in Spanish journals, the Basque Country occupies eighth position, with a result of 0.99 documents.

### 3.1.3 PLURAL INNOVATION

One of the aspects that best activates innovation is the necessary cross-fertilization of capacities, skills, disciplines and knowledge areas by means of formal and informal collaboration between all agents, companies (SMEs and large companies), Technological Centres, universities, public research organizations, financial entities, promotion agents, etc.

The effort made in research and development provides a comparative idea of the innovation capacity of a region or country and, therefore, its competitive position compared to third parties. With this aim, looking at the figures for the Basque Country’s total expenditure on R&D over the GDP, the effort made by all of the Basque agents (in terms of dedication of economic and human resources to R&D activities) translates into a convergence process towards the average levels of effort in research and development made in the European sphere.

Global expenditure on R&D activities represented 1.43% of the GDP in 2005 (almost 825 M€ in absolute terms). This level is above the average for the State (1.13% in 2005), although it is still quite a way behind European levels (EU-25 =1.90% in 2004) and half-way towards the Barcelona Objective (3% in 2010).

**GERD of EU Countries, Japan and USA and leading European regions (2004)**

![GERD of EU Countries, Japan and USA and leading European regions (2004)](chart-url)

Source: Eurostat

In spite of this significant effort and the ground we have covered, it is necessary to continue progressing to come into line with the parameters registered in the most developed countries and regions: the Basque Country still has a long way to go to reach the head.

As important as recognising what lies ahead, is recognising how much progress has been made. In this respect, it is necessary to highlight that the efforts made in terms of innovation over the past two decades has been extremely important. The following sections will enable us to move closer to this reality.
**3.1.3.1 Private Expenditure on R&D**

The formal creation of new knowledge in companies, particularly in knowledge intensive sectors, is an essential factor in the promotion of innovation. The Basque Country in 2005 is part of the group of European countries in which the greater proportion of expenditure on R&D is attributed to companies (1.14% of the GDP). However, it is necessary to point out that if the contribution of expenditure on R&D by Technological Centres (multisectoral, sectoral and Cooperative Research Centres) is subtracted, the percentage represents 0.86%, which is below the European average, which stood at 1.30% of the GDP in 2004, highlighting the position of Finland and Sweden, whose expenditure is more than 2% of the GDP (2.45% and 2.93% respectively).

Although the phenomenon of concentrating expenditure on innovation in large companies also occurs in the Basque Country, it is in a much lower proportion than other countries. The excessive fragmentation of the innovative effort is characterized by the low percentage of average expenditure on R&D by company (88 companies carry out 79% of the total expenditure on R&D) and by the low number of technologists and researchers by company.

Furthermore, 60% of companies that carry out R&D activities have less than one researcher in full-time equivalence and spend less than 200,000 €/year.

**3.1.3.2 Public Expenditure on R&D**

Expenditure on R&D represents one of the main driving forces of economic growth in a knowledge economy. In the Basque Country in 2005, the Administration funded 0.32% of expenditure on R&D over the GDP.

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**Evolution of internal expenditure on R&D in the Basque Country by disciplines in thousands of euros**

which positions it below the community average (0.70%) and far behind the leading countries (Iceland is the most advanced country with 1.37%, followed by Finland with 1.03%).

In relation to expenditure on R&D (public and private) by knowledge areas, the technological character of R&D in the Basque Country is once more evident.

3.1.3.3 Business Expenditure on Innovation

Company expenditure in 2005 on technological innovation activities represented 1.89% of the GDP. This value is above the European average (1.5%), whereby the countries with a higher expenditure are Switzerland (3.48%) and Malta (3.29%).

If business expenditure on innovation in the Basque Country is broken down into innovation activities, the acquisition of machinery and equipment stands out with 38.4% as well as expenditure on internal R&D with 38.4% of the total, whereby expenditure on the remaining activities stands at 23.2%.

3.1.3.4 Internal Innovation of the SMEs

28.7% of SMEs in the Basque Country in 2004 carried out internal innovation activities, which is above the European average (25.96%), although still far behind countries like Switzerland (54.8%) or Germany (43.4%).

3.1.3.5 Investment in Medium and High Technology

The new competitive paradigm requires investment in technologies of the future (medium-high and high technology manufacturing sectors) rather than in traditional sectors (medium-low and low technology manufacturing sectors). In 2006, medium-high and high technology companies represented 73% of total business expenditure on R&D in the Basque Country, below the European average (89.19%), and far behind the leading countries (92.7% in the case of Sweden and 92.3% in Germany).

3.1.3.6 Non-Technological Innovation

Innovation in marketing, commercialization, organization, training, etc, or in other words, non-technological innovation, has acquired major importance in the global knowledge era. In the Basque Country in 2004, 31.7% of companies had carried out non-technological activities. This figure is below the European average, which stands at 42.45% (figure for 2000).

Traditionally, Basque companies have made important efforts to transform their management models and adapt to the changing needs of their environment. This fact is demonstrated through the existence of more than 4,200 ISO 9000 certificates in the Basque Country or the recognition of Basque organizations in the EFQM European Quality Award (EQA), representing a unique case in Europe in relation to the size of the country.

3.1.3.7 Cooperation for Innovation

The degree in which the SMEs are involved in joint innovative activities is measured by the flow of knowledge between the public research institutions and companies and between different companies. 6.1% of Basque SMEs that carried out innovation activities in 2006 had signed a cooperation agreement. This value is below the European average (11.6%, figure for 2006).

One of our country’s incentives for cooperation is the development of clusters. These contribute to the circulation and creation of knowledge between participating companies and represent the base for the promotion and development of training structures that improve the skills of workers.

3.1.3.8 Participation in the Framework Programme

Since the third Research Framework Programme, Basque participation has been rising significantly, in spite of the difficulties and increasing competition. Whilst the return on the III FP was 10% of the State total, this figure increased to 14% and 15% in the IV and V FP respectively, reaching a provisional figure of 16.2% in the mid-term of the VI FP, far above its specific weight (6.38%) of the total of the State economy.

The Basque Innovation System has an agency for the promotion of the European Research Area (Eurobulegoa) as a Reference Framework for
agents, providing them with a means of communication with Brussels, as well as a set of European research nodes.

3.1.4 FINANCIAL CAPITAL: MOBILIZATION OF PUBLIC AND PRIVATE RESOURCES FOR INNOVATION

3.1.4.1 Public and Private Funding

In 2005, public funding of R&D in the Basque Country amounted to 267 million euros (from a total of 823 million), of which 129 million were allocated to the Administration and higher education, whilst the remaining 138 million euros were used by the private sector.

In Spain, public funding of R&D in 2005 amounted to 4,803.8 million euros (from a total of 10,196.8 million), whilst expenditure of the Administration and higher education amounted to 4,697.9 million.

In relation to public funding of R&D from abroad, mainly from the European Union, this figure reached 28.4 million euros in the Basque Country in 2005 compared with 585.7 million in the same year for Spain as a whole, which means that the Basque Country absorbed 4.8% of foreign public funding in R&D.

Structure of R&D Funding and Implementation in the Basque Country and in Spain in 2004

Source: Prepared by Eustat 2005 and National Statistics Institute 2004
On the other hand, the private sector in the Basque Country provided funds of 528 million euros for R&D, of which 490 million were used by the private sector itself and only 37.9 million were allocated to expenditure on R&D by the Administration and higher education.

In Spain, private sector funding amounted to 4,807 million euros in 2005, whilst real expenditure amounted to 5,499 million, thanks to the contribution of the public sector as a source of funding.

Bearing in mind the limited weight of the State’s public research organizations in the Basque Country, it stands out that 22% of expenditure on public R&D, which includes higher education, is by means of private funding, whilst in Spain as a whole, this private funding figure for R&D in the public sector only reaches 8%.

3.1.4.2 Venture Capital

The volume of venture capital in the initial phase, which includes seed capital and start-up capital, is a measure of the relative dynamism in the creation of new companies. Existing venture capital societies in the Basque Country, compared to those in Spain, present weaknesses in terms of their dimension and prominence (in 2001, they represented approximately 3% of the total invested by national venture capital societies). As far as venture capital is concerned in the initial phases, the Basque Country stood at 0.018% of the GDP in 2006, below the European average (0.025%) but with a significant increase compared with 0.012% in 2003.

3.1.5 THE GOVERNMENT: FACILITATOR AND MOTIVATOR OF INNOVATION IN SOCIETY AS A WHOLE

3.1.5.1 Public Funding of Innovation

Basque innovative companies receive more public funding than other European countries: 13.6% compared with 10.6%, although this percentage is far below countries like Luxembourg (39.3%) or Ireland (27.8%). Looking at the origin of the funding, companies receiving resources from the Basque Government clearly stand out above all of the innovative companies that receive public funding, with 22% of the total of these companies, whereby this percentage decreases when resources come from other administrations. In the case of companies with 10 or more employees, the Basque Government also funds a higher percentage, more specifically, 36.4% of companies.

3.1.5.2 Broadband

In the past five years, the Basque Country has taken an important leap forward in the incorporation of the new technologies in society in general and particularly in companies. In this respect, the Basque Country in the Information Society Plan (2002-2005) established the spread of broadband to the entire territory among its strategic objectives.

In 2006, the penetration rate of broadband in the Basque Autonomous Community stood at 14.7%, which places the country above the European average (10.6%) although still far behind the leading countries (the Netherlands: 22.4%, Denmark: 22%).

3.1.5.3 Expenditure on ICT

As previously mentioned, the Public Administration acts as a tractor in the incorporation of the ICTs as an element of competitiveness, although the companies should be making an important effort, as their implementation is closely linked to profit and productivity.

Expenditure on ICT in the Basque Country is 6.22%, slightly below the European average, which stands at 6.4% of the GDP. The countries with a higher expenditure are Bulgaria (9.9%), Estonia (9.8%) and Latvia (9.6%).

Summary

Many of the indicators in the aforementioned sections may be used as input in the definition of the SII, Summary Innovation Index, which may represent a summary of this diagnosis.

According to the Summary Innovation Index for 2006, the Basque Country (0.35) is below the European average (0.45), in a position far behind the more advanced countries such as Sweden (0.73) or Finland (0.68).
On the other hand, according to the recently published European Regional Innovation Scoreboard 2006, the Basque Country is in 55th position on the ranking of 203 European regions, with an index score of 0.55, whereby a maximum of 0.90 was obtained by the region of Stockholm.

If we analyse the components of the index in relation to the European leaders, we can see that, in accordance with the seven components, the only strength with respect to our economy lies in the percentage of workers in medium-high and high technology sectors with respect to the total workforce in industry.

These must be our references and therefore the five areas defining the base from which the Basque Country faces the challenge of its new transformation must be strengthened.

We are now in a better starting position than that we had in the 1980’s to reach the current situation, but we are faced with important challenges for innovation to pervade society as a whole. Whilst up to now, important economic effort and resources have been dedicated to generating knowledge, as implied by the indicators that measure the input dedicated to R&D&I, the challenge now lies in systematically dedicating knowledge to generating wealth, well-being and quality of life, hence obtaining output indicators that clearly position us in the global knowledge society.
European Regional Innovation Scoreboard (2006 RIS)

Source: European Regional Innovation Scoreboard.
The acceleration in the rate in which events occur as a result of globalization, forces us to increase “the power of our engine”, increasing our agility to continue advancing towards leadership positions in the European Innovation Area. Past formulas are no longer enough to continue moving forwards and it is necessary to give the Basque Innovation System a renewed boost.

This boost includes making the most of the advantages obtained through the exploration and exploitation of knowledge, by means of a constant innovation process, which highlights the underlying dynamic and creative nature in the construction of new competitiveness factors.

In addition to strengthening the ability to implement technological advances in order to create a competitive advantage, this process consists of the organizational, marketing and commercial innovative processes, etc. It also incorporates social and relational aspects. Life-long learning is of prime importance to all this, as well as the ability to adapt, which in turn, determines the innovation capacity of individuals, companies, organizations and, in short, society as a whole.

This creation of skills and competences is based on the ability to establish cooperation networks at all levels, both in the local and international sphere.

The Science, Technology and Innovation Plan 2010 echoes these new characteristics and is based on a conceptual model that adopts the metaphor of the propellers of an engine, which are none other than the Second Important Economic Transformation of the Basque Country.
4.1 Knowledge as the Core of the Model

The central line of this engine is knowledge, an unlimited resource in constant evolution, whose origin lies in the action and interaction of the entire Basque society and between this and the rest of the world. This knowledge is expressed differently in accordance with the agents involved and the activity in which it is created, transferred or applied. Its evolution forms part of a cumulative process, more typical of open and multi-dimensional systems than closed ones. In this respect, the model echoes the term “open innovation”, originally conceived to describe the change in R&D business activities from a closed model based on total control of the laboratory to market sequence to the present external cooperation models. It may be extended, not only to highlight the connectivity and the external networks, but also the wide innovation concept orientated towards results.

4.2 The Reality on which our Future is Built

Knowledge is built on physical or natural resources: the people who make up the Basque society today and the current wealth generating economic base and is responsible for reaching the levels of well-being, on which our future will be based. It is society and the people that form part of it that provide the necessary elements for the operation of the knowledge-based innovation system. Therefore, if knowledge is the key element on which the model revolves, human resources and their interaction represent the necessary energy for this movement to take place.
4.3 Education, Research and Innovation as Instruments

A second element of the propeller blades is the so-called knowledge triangle, which indicates the instruments required to move towards the Knowledge Society. The first is the educational model which provides qualified human capital to face the new challenges. Secondly, there is a research system and scientific-technological resources which allow progress within the confines of knowledge. A third element is innovation to generate knowledge-based wealth.
4.4 The Agents of the Model and their Interaction

As far as agents are concerned, as the third element of the propeller blades, there are organizations, such as companies, agents of the Basque Science, Technology and Innovation Network and the Government, which is understood to be the Public Administrations whose actions affect the competitiveness of the Basque Country.

The interactions of the agents are particularly important, making up the share capital which encompasses all of the relations and interactions between the agents which are converged in the generation, transfer and application of knowledge. It is a dynamic flow of multi-dimensional and multi-directional relations whose value, although difficult to measure, is decisive. The density of the relations diffuses traditional segmentation and the combination offers the different agents new roles and functions. This is translated into an increase in share capital and the implications between them, make traditional behaviour based on uni-directional relations more difficult, but at the same time, create a breeding ground for innovation and increased competitiveness.

The model considers the capacity to generate knowledge within the system, yet at the same time, incorporating the capacity to transfer this knowledge within the system and beyond it.

4.5 Sustainable Development as a Goal

All of these elements are united by an ultimate objective, Sustainable Development and its triple perspective of: economic competitiveness, environmental balance and social development.

Business competitiveness covers companies of today as well as those that are founded in the future. The environmental balance through eco-innovation is a key vector in this new scenario. Furthermore, social and human development, given the social nature of innovation, is far-reaching, as it will enable us to position our country in the cutting edge of modernity and quality of life standards.
5. Strategic Decalogue of the PCTI 2010
The model presented is based on ten strategic lines which stamp it with its own character and personality, making it particularly valid to move from the current reality in the Basque Country towards the goals set out by the Basque Country Competitiveness Forum 2015 for the 2015 horizon.

5.1 Cultural Change

New challenges are put forward, not only for the Basque business fabric, but also for society at large. In light of the eruption of these challenges, it is necessary to promote a cultural change that is backed by the commitment of all the agents involved in the Basque Innovation System. This change will take place by means of integrated science-society communication, with the ultimate objective of changing the scale of values which enables the implementation of the tangible and intangible innovation culture in society as a necessary step for the transition to the knowledge society.

5.2 Orientation towards Results

The skills and capacities of the Basque Science, Technology and Innovation Network must be oriented towards results in the form of new products, companies etc. It is not a matter of merely exploring the limits of knowledge, but also exploiting this knowledge, with the aim of generating wealth, adding value and increasing the level of well-being of Basque society.

More specifically, the process must facilitate the adaptation of the research to be carried out in accordance with the demands of Basque clusters and sectors.

5.3 Human Resources

Human resources represent a strategic factor for the PCTI 2010. Highly qualified people and researchers are essential to achieve the defined objectives, so training and attractiveness are two aspects to be taken into consideration. Furthermore, it is necessary to adapt the stock of human capital to the constant changes arising from the economic and technological transformations and in turn, obtain a net increase in the number of researchers.
5.4 Competitiveness of Today’s Business Base

In the current economic framework, where knowledge is the central element, commitment to a dynamic business fabric is required, turning knowledge and innovation into the driving forces.

Companies are the benchmark, which must be offered new tools for innovation to converge knowledge generation and production.

A key factor of this plan is the need to guide actions in order to achieve a migration of today’s business base towards activities with added value, capable of competing in the global market. For this, a central element of the PCTI 2010 supports the present by means of actions aimed at increasing competitiveness. The increased value of today’s business base will be achieved through the generation and application of knowledge.

5.5 Diversification towards Emerging Sectors

Demands of the international economic avant-garde and full insertion in the knowledge society encourage the creation, development and consolidation of new technology and knowledge intensive sectors, which develop naturally from the current business fabric or through their creation.

Therefore, the need to build the future is made evident, as the premises on which this plan is based consider the long-term, whereby one of its strategic factors is to consolidate and strengthen the diversification of the business base towards scientific, technological and knowledge intensive sectors, which today are embryonic in our country.

5.6 Technological Entrepreneurial Activities with a Global Presence

Entrepreneurial spirit and creativity values are two aspects required for a better adaptation of society in general to the new global reality.

The creation of new technology-based companies with a global presence is considered in this plan as a spearhead for the Basque business transformation. The main characteristic of these companies, which will be promoted from different initiatives, will be their capacity to compete in rapidly growing global markets.
5.7 Technological and Innovation Convergence

The main strategic objective of the new Science, Technology and Innovation Plan is for the Basque Country to reach technological convergence with Europe through its leadership in innovation. The strategies and actions presented in it are oriented towards positioning the Basque Country among the leading regions in Europe, as a true pole of global knowledge.

5.8 Quality Research

The Plan is committed to promoting scientific research, whereby its development gives a decisive boost to research, from the perspective of the competent organizations and institutions as well as from the point of view of research as a first-rate professional option. This dual dimension is oriented towards results which enable scientific productivity to be increased and act as a catalyst so that science is able to represent a vector of the knowledge society. In this respect, the ability to attract and retain proven researchers takes on unprecedented importance.

5.9 University

The University is considered to be the cornerstone of the Second Basque Social and Economic Transformation. For this purpose, the university must be adapted and play a key role in terms of research for excellence, entrepreneurial activities and knowledge communities. The Basque University System, in general, and the UPV-EHU (University of the Basque Country) in particular, must contribute to the progress of the innovation system on the road to excellence, becoming a benchmark in the generation of knowledge and an important node of attractiveness for talented people. It must also increase its active participation in the generation of wealth by means of the application of the knowledge generated. If the University has played a key role in the training of human resources, its new challenge lies in becoming a reference for research.
5.10 European Research Area

The Basque Country considers that the ERA is the natural framework for Basque Science and Technology relations, and therefore the globalization of the system is one of the key elements of this policy. This globalization revolves around participation in international projects aimed at scientific-technological research in areas of interest to the current business base. It is the consolidation of the country as an international business centre based on knowledge and active participation in European research programmes and as economic support to business projects between various regions and states.

Furthermore, the PCTI 2010 considers it necessary to set out measures which seek effective equality between men and women.

As a summary and in order to define the interrelation between the different elements of the decalogue, their functions are set out in the graph.

Whilst human resources (principle 3 of the decalogue) represent the foundations on which the remaining strategic factors of the decalogue are laid, orientation towards results and convergence of technology and innovation represent to a certain extent the objectives sought. The remaining strategic factors of the decalogue are in some way the pillars of the PCTI 2010 action model.
6. Action Model
6.1 Cultural Change

When talking about Science, Technology and Innovation and the necessary policies for their promotion and development, the agents closest to the production fabric are considered to be their beneficiaries. However, cultural change goes beyond these limits to position itself on a social scale. As a result of the diagnosis carried out, the need to make a special effort in this respect emerges, so that the whole of the Basque society is aware of the importance of the commitment to science, technology and innovation. Our well-being depends to a large extent on how the progress of which we are capable in these areas is perceived by society today. True participation in the knowledge society basically depends on these ideas penetrating Basque society as a whole.

For this reason, a true Science-Technology-Innovation and Society dialogue, which raises awareness of its importance, is more necessary than ever. Therefore, Science, Technology and Innovation professionals must make an effort to raise awareness of the scope and impact of the scientific-technological advances in terms which can be understood by citizens in general. Citizen acknowledgement of the role of scientists and technologists in the contribution to general well-being is also necessary.

This acknowledgement must be extended to innovative people and organizations, particularly those that assume risks and develop their creative capacity in the field of innovation, through entrepreneurship and the development of new wealth-generating activities for the country.
6.2 Scientific Policy

6.2.1 The Role of Science as a Vector for Knowledge Generation and Valuation

Aware of the importance of Science in the Knowledge Society, efforts have been stepped up to possess a Science subsystem which, under the premises of quality and excellence, positions our country as a benchmark in Europe. If the success of the First Transformation was due to a large extent to the development of the technological subsystem, the Second Transformation requires the strengthening of a scientific system capable of combining the generation of quality knowledge and excellence with the evaluation and exploitation of this knowledge.

One of the most important characteristics of the so-called Knowledge Society is the increasingly closer relationship between Science and the Market. As their names suggest, knowledge areas such as biosciences or nanosciences form part of the Science commercialization paradigm. In this way, Science, Technology and the Market represent an inseparable and multidirectional system which requires a systematic approach for the abandonment of departmentalized policies and instruments. On the other hand, from the perspective of the scientific-technological policy, it would be difficult to go from incremental innovation, on which we have focused to date, to radical innovation, which must now lead the way in the development of Science and technology in order to place them at the forefront of excellence. This commitment, led by the Lehendakari (President of the Basque Country), requires, more than ever, the support and involvement of the Government as a whole, regardless of Departments, as characterized by the third generation of innovation policies.

The evolution recorded to date in terms of expenditure on R&D and research staff gives the Basque science and technology system a pronounced technological character. This Basque R&D character has proven to be a key feature in the socio-economic development of the country, and should also represent a vector for the development of the Knowledge Society in the future. However, the different scientific disciplines must take an unprecedented qualitative leap for their expansion within the parameters of quality and excellence, which will represent a growing asset for progress in the Knowledge Society and in the competitiveness of the Basque Country.

6.2.2 The Three Pillars on Which Scientific Policy Is Based

To advance in the direction indicated, the Science subsystem is based on three key pillars:

In addition to generating knowledge, the University must value it and make it the driving force of the socio-economic development of the Basque Country

On one hand, the Basque University System is going to use the University Plan 2010 as a framework for its adaptation to the European Higher Education Area, its full integration into the European Research Area and its participation in the Knowledge Society. As indicated in Article 67.3 of the Basque University System Act (LSUV), this University Plan states that university research is an essential line in the contribution of the University System to the development of science in general.

A University System that is promoted on these premises will guarantee the development of Basic Science (unguided and guided) in our country. In this way, the foundations are laid for a profound transfor-
formation which enables the University System to be strengthened and taken to a category of excellence.

The University, understood to be the public and private universities in this Country, is faced with the challenge of positioning science, scientific knowledge generation and its evaluation as a true asset to enable the Basque Country to fully enter the Knowledge Society. As research creates more qualified jobs and increases productivity and growth in the long term, its contribution to the socio-economic development of the country shall be essential.

In the 1990’s, the Basque Country was equipped with a powerful network of technological centres which improved the technological capacity of the agents in the country and particularly of companies. This technological modernization allowed companies to improve their production processes and their products by incorporating the technology required to increase their productivity, in turn enabling them to develop a high level of exports. Nowadays, the University is in the position to lead the changes that must take place in our innovation system in order to fully develop its scientific potential, obtaining competitive advantages that allow the Basque Country to participate in the European Research Area in its own name.

The second and third pillars on which scientific policy lies are the Co-operative Research Centres (CRC) and Basic and Excellence Research Centres, respectively. Today, the Donosti International Physics Centre and the Biophysics Foundation of Bizkaia fall into this category, in addition to the Basic and Excellence Research Centres, BERC, which this Plan is going to promote over the forthcoming years.

All of these centres, set up with criteria of excellence, represent an asset which must be appropriately valued and which may represent the embryo of a selective network of elite centres in research into certain knowledge areas. This is an unprecedented commitment in the Basque Country and its materialization may provide us with a voice on the European scientific research map. The dimension of this bid requires interdepartmental and inter-institutional cooperation. In particular, it involves close cooperation between the Basque Government’s Department of Education, Universities and Research and the Department of Industry, Trade and Tourism, to join budgetary resources in order to secure a stable and sustainable funding system for these centres, enabling the development of research excellence.

It is a question of providing sufficient financial muscle to a group of centres whose mission is to carry out basic research aimed at specific niches belonging to scientific fields and disciplines which, on many occasions, are the source and origin of essential knowledge to participate actively in the Knowledge Society and generate economic activity. This participation involves the commitment to take on the whole of the knowledge value chain, which spans from its exploration to its exploitation, following the orientation towards results principle which is ever-present in the PCTI 2010.

Today, there are emerging sciences and technologies in which it is necessary to gain a foothold from the very first phases of knowledge generation. Awareness of this fact is the first step towards a firm commitment to a University System that seeks excellence and a research system that presents the necessary means to shine in the future.

The difference between the CRCs and the Basic and Excellence Research Centres is that the latter have the sole mission of basic and guided research excellence, whilst the CRCs combine scientific research (mainly guided) with a mission of exploiting and transferring the knowledge generated.

In both cases, the CRCs and the Basic and Excellence Research Centres, as well as the Basque University System, require clear action lines, aimed at the fulfilment of the objectives.

6.2.3 THE TWO LINES ON WHICH SCIENTIFIC POLICY IS BASED

To enable the Basque Country’s science system, which essentially comprises of the University System, the CRCs and the BERCs, to carry out the task of generating and evaluating scientific knowledge, two basic lines have been defined:

1. Excellence in research and in the evaluation of the research.
2. Development of the research career in the Basque Country.
With respect to the first line, excellence in research and in the evaluation of the research, a clear orientation towards results excellence is set out for the exploration and exploitation of knowledge.

In terms of exploration, a set of instruments is required that enables the training of research staff as well as the provision of human resources and materials which facilitate the development of research activity in the Basque University System, the CHCs and the Basic and Excellence Research Centres. For this reason, research excellence must be promoted through the support of prestigious research groups so as to continue their work with sufficient guarantees in terms of human and economic resources, minimizing activities that deviate from this goal.

The need for a critical mass of researchers that cannot yet be classified as excellence but represent a promising seed for science in our country is also set out. Like in the previous case, to develop the research capacities that point towards an important “average class researcher” it is necessary to guarantee the financial means to progress in accordance with the guidelines.

As for evaluation or exploitation, research excellence does not culminate in the generation of knowledge per se, but it should be accompanied by a set of actions that allow its transfer to society, either through quality publications, new patents or even new business initiatives which, in this case, adopt a strong scientific component. Therefore, the strengthening of existing programmes such as Entreprenari, facilitate the transfer of scientific knowledge and its commercial exploitation in the interests of society at large.

In relation to the second line, the development of the research career in the Basque Country, an integral approach is put forward, covering both the training stage of researchers and their consolidation, considering the need to support the period required to acquire research aptitude in order to subsequently guarantee and enter into a contractual relation with the host research centre. Once the doctorate has been obtained, training should be rounded off with a post-doctorate phase, marked by specialization outside the system, facilitating and encouraging mobility. The system should also be adapted so that externally trained researchers can carry out their specialization within the Basque scientific system, hence contributing to its enhancement.

With respect to the consolidation of researchers, there are two lines that define this stage in the research career. On one hand, the recovery of people that have specialized outside the Basque science system, providing contractual and functional mechanisms that facilitate their reincorporation. On the other hand, the attraction of consolidated external researchers by means of an active recruiting policy and evaluation of this professional profile.

This line of action is specifically considered given its importance within the framework of globalization and worldwide competition to attract capacities of renowned prestige in the field of research, and the need to have the most appropriate instruments to increase the attractiveness of the RVCTI in the research world. Therefore, this attractiveness may only be achieved if ad hoc strategies exist with the availability of specific resources, capable of accumulating the necessary know how to bring this ambitious project into fruition. Therefore, the creation of the IKERBASQUE Foundation was supported as an institution responsible for carrying out all of the necessary activities to attract and recruit researchers of renowned prestige from outside the Basque Country whose final destination will be an agent of the RVCTI.

The IKERBASQUE Foundation operates as an instrument that allows the appropriate measures to be established to strengthen and increase the research level of Basque educational institutions, whilst enhancing them with contributions from agents with experience acquired outside the Basque system. The implementation of cooperation agreements between the IKERBASQUE Foundation and university institutions is also planned, which consist of, for example, the placement of researchers attracted by the IKERBASQUE Foundation in university institutions.

In any case, measures that guarantee university capacity and autonomy in the implementation and development of the PCTI and participation in bodies or entities which are set up to reach areas converging with this plan will be established. In this respect, a balance between university autonomy and the wide capacity margin provided by the Administration to set up funding channels and tools for University research activity will be fostered.
On the other hand, the line of activity focused on attracting researchers of renowned prestige is highly significant, particularly bearing in mind that one of the problems faced by the research capacity, particularly that linked to the Basque University System, is related to generational turnover which is going to arise in the short term.

Similarly, the availability of people that raise the level of research quality and excellence is a way of increasing the competitive tension required in the science system to advance along the path of excellence and quality. The attraction of people from outside also represents a channel to increase cooperation relations with leading research groups and the internationalization of the science system.

The close ties between both of the proposed lines are evident, given that the capacity to attract people is strongly conditioned by the presence of knowledge communities and powerful research groups, which in turn are affiliated to institutions and organizations with attractive scientific projects capable of competing internationally.

6.3 Competitiveness as the current Economic base: Supporting the Present

6.3.1 OPEN INNOVATION, THE MESSAGE OF THE COMPETITIVENESS STRATEGY

The Science, Technology and Innovation Plan 2010 is responsible for developing and extending the message put forward in the Business Competitiveness and Social Innovation Plan 2006-2009 and can be summarised as the idea of open innovation. The term, “open innovation”, originally conceived to describe the change in R&D business activities from a closed model based on total control of the laboratory to market sequence to the current external cooperation networks, may be extended, not only to highlight connectivity and the external networks, but also to tackle the concept of innovation in its broadest sense, which is orientated towards results and encompasses product innovation, process innovation, marketing innovation and organizational innovation.

The idea of open innovation lies in the fact that knowledge is dispersed in the new economy, and in order to compete, nobody may rest on their laurels, but they must buy and sell knowledge, and above all, they must share, cooperate and liaise; in short, learn within the limits of the organization.

Innovation also means creating value, without this necessarily involving the creation of new things. In fact, from a total of twelve dimensions for the creation of value in the company: 1) new products and services, 2) common platforms, 3) customized solutions, 4) new consumers, 5) new experiences for consumers, 6) value capture, 7) processes, 8) organization, 9) value chain, 10) points of presence and channels, 11) consumer networks, and 12) brand; only two of them correspond to the traditional field of technological innovation.

This creation of value is the base of business competitiveness and shall continue to be the driving force of the Basque economy, as it has been to date, and the increase in the innovative intensity in all dimensions is what will support the creation of value.
For this reason, the Government, as it has done for the past twenty-five years, continues to support industry as the driving force of economic development and must provide this fabric with the instruments to facilitate the incorporation of the new factors of competitiveness, those that allow competition in terms of added value rather than in costs. The competitiveness of the business base is built on what already exists. This was one of the premises of the Competitiveness Programme 1990 and once more represents the core of the main action in this Science, Technology and Innovation Plan 2010. The increase in the innovative intensity (technological and non-technological) of sectors, clusters and business groups which make up the current Basque industrial and services business base represents a channel with an important task of raising the added value of production in our country.

The PCTI 2010 seeks to raise the innovative level of the Basque industrial and services business fabric by setting out three action lines:

- Direct the innovation system to business demand. This involves identifying needs and opportunities in the diverse sectors and clusters, which will be the basic input for the supply design by innovation agents.

- Extend the base of innovative companies. This involves developing specific actions for companies with low innovative capacity (without capacity to directly contract R&D). Geographic and organizational cooperation and proximity are elements to be considered.

- Systematic Innovation. The objective is for companies to acquire the capacities that enable them to incorporate innovation in their business culture, management strategy and system, beyond sporadic R&D&I projects.

For each level of innovative effort, the scientific technological supply must provide responses and solutions aimed at covering business demands related to their increased innovative effort. This clear orientation towards business demand and securing tangible results in terms of improving the competitive position of the company is expressed in the programmed instruments and in the way in which the scientific technological supply agents carry out their functions.
6.3.2 MAIN INSTRUMENTS TO SUPPORT THE PRESENT: “INNOVA INITIATIVE” AND “OPEN INNOVATION SUPPORT PROGRAMMES”

In order to implement the idea outlined in the previous section, an INNOVA initiative has been defined with two differentiated strategies: first of all, “INNOVA-cooperation”, to promote the competitiveness of clusters and sectors by means of cooperation for innovation; and secondly, “INNOVA-company”, the purpose of which is to encourage companies to develop the capacity of systematic innovation. This initiative is complemented with a series of support programmes which, under the generic name of “Open Innovation Support Programmes”, influence the different types of innovation defined in Oslo’s Manual product innovation (GAITEK), process innovation (INNOTEK) and innovation in marketing and organization (ALDATU).

6.3.2.1 The Innova Initiative: “INNOVA-cooperation” and “INNOVA-company”

The “INNOVA Initiative” is developed by means of two differentiated strategies:

**INNOVA-Cooperation**

The first strategy has the vocation of promoting cooperation research, guided by demand requirements, in order to improve the competitive-
ness of clusters and sectors. Four instruments have been developed for its implementation:

a) Strategic Sectoral Observatories.

The development of this initiative is based on the implementation of the corresponding “Strategic Sectoral Observatory” in each cluster or sector, whose function shall be the identification of needs and the detection of opportunities in the current production fabric:

• Identify needs based on the situation of the production fabric and comparison with the best practices in the sector.
• Detect opportunities, providing a technological monitoring service for the market and competitive intelligence.

The objective is the development of the cluster or sector for which different segments will have to be created (in accordance with size, position in the value chain, etc…) to determine the various needs of the different target segments.

Coordination of the different observatories to make them function as a network will correspond to the “Basque Innovation Agency”. Management of each Observatory will be entrusted to each cluster or sectoral association, whereby the corresponding programme contract will be established. Its implementation and development shall be the responsibility of the agents of the Basque Network for Technology with capacities in the areas related to the sector or cluster and with the services sector.

b) Sectoral Innovation Agenda.

Comprising of the projects identified to respond to the detected needs and opportunities. An analysis of needs and opportunities is not enough. It is necessary to define projects and establish costs and impact indicators in order to prioritize them.

c) Programme Contracts for the competitiveness of clusters and sectors.

The Basque Innovation Agency, as coordinator of the Basque Innovation System, analyses the different sectoral agendas to identify projects of a transversal nature and to verify whether the knowledge required is already available within the system.

In the case of available knowledge, a transfer project will be established. For unavailable knowledge, a series of research projects will be drawn up, whereby the corresponding consortia will be formed for their development, in which “agents of the Basque Innovation System” may participate with capacities in those areas required by the project, as well as companies that are interested and willing to cooperate. The funding of these projects will be carried out by means of the corresponding programme contract, depending on whether the knowledge generated is public knowledge, which will be made available to all of the companies in the sector.

d) Transfer Programmes.

Each project of the agenda which is to be developed must include a transfer programme in which the actions to be carried out for knowledge transfer to companies are specified.

The objective is to bring knowledge closer to the companies of the sector. Bearing in mind the different instruments available, the following will be used: companies participating in research projects in exchange for their cooperation enjoy a direct transfer of knowledge. For the remaining companies, other channels will be used such as diffusion workshops, technological and non-technological training which will be organized through the “innovanet network”, the possibility of incorporating trained fellowships in the company, etc.

In the case of small companies, design formula with integral “turnkey” solutions are used which will be transferred via the services sector.

INNOVA-Company

The second strategy is born with the objective of promoting the innovation culture, innovation management and the reinvention capacity of organizations, in short, the development of innovative companies.

Three elements have been implemented for this purpose:

a) “Innovation Workshops”, to raise awareness in the company of the need to innovate for survival in a global environment. Proactive tasks will be carried out through the Innovanet Network (set of non-profit making Basque institutions that foster the promotion of innovation in companies).

b) The Company “Innovation Agenda” is drawn up following the strategic reflection of innovation in the company and is evaluated and reviewed as the innovation projects are implemented.

c) “Communities of Management Practices 21”, seek a dual objective: share the experience of managers in leading this process, as well as facilitating the development of skills and competences that a manager must have in order to run organizations in the 21st century.

The final objective is to increase the innovative company base.
6.3.2.2 “Open Innovation Support Programmes”: INNOTEK, GAITEK, ALDATU

In both scenarios, within the framework of the INNOVA COOPERATION initiative and the INNOVA COMPANY initiative, the needs and opportunities identified in the sectoral and business innovation agendas may be channelled in accordance with their characteristic, towards open innovation programmes with the aim of adapting the instruments in the search for optimal responses. Therefore the INNOTEK programme will focus on supporting technological development, whilst the GAITEK programme will focus on new products, and the ALDATU programme is aimed at marketing and organizational innovation.

6.3.3 MAIN AGENTS INVOLVED IN SUPPORTING THE PRESENT

From the perspective of the agents involved, the different elements set out indicate that companies are not solely responsible for improving their competitiveness. Effectively, the surrounding environment plays an equally important role in so far as the capacities required to improve the competitiveness of a company are not always found within the organization, but depend on the support of external organizations that are able to provide the necessary resources and skills.

The following graph represents the value chain of knowledge associated to the niche of the main activity of the different agents involved in its operation and indicates the wide variety of agents that participate in open innovation. Far from representing a linear sequence, the operation of this value chain is the result of a density and intensity of interrelations whose common denominator lies in obtaining a specific result, which in this case, translates into increasing the competitive position of the Basque business fabric.

Among all of the agents, due to their importance, the Technological Centres stand out, which receive public funding on the condition of obtaining results linked in some way to the objectives of the programmes included in the Plan. There is also a differentiated programme to promote specialization, internationalization and network projects and the incubation of the remaining agents in the Basque Network for Science and Technology. An important aspect in relation to the supply agents concerns the mobility programme for technologists from the Technological Centres to companies, given that this formula is highly effective in facilitating the transfer of knowledge. Likewise, lines to support diffusion, training and transfer are also considered.

Agent niches in the Science, Technology and Innovation System that influence the increased competitiveness of companies
6.4 Diversification towards Emerging Sectors: Building the Future

The increase in innovation in absolute terms cannot merely be promoted from the innovative intensification of companies that make up the current production fabric. For this reason, it is necessary to support new sectors that are born with a strong R&D&I culture and commitment. The increase in systematic R&D&I also requires the support of new knowledge-intensive companies and sectors. This is the latest proposal to support diversification into new sectors such as biosciences or nanosciences.

A key aspect which is closely linked to diversification towards future sectors is strategic research which must be promoted, particularly in those sectors with a high scientific component. In the Science, Technology and Innovation Plan 2001-2004, strategic research was defined as the field of basic research developed by agents of the Basque Science, Technology and Innovation Network, determined by the potential to meet the scientific-technological and innovation needs of the business sector, in particular, or of Basque society in general.

Along the same lines, in the new Science, Technology and Innovation Plan 2010, strategic research is also characterized as guided basic research of excellence, but focused in this new stage on the know-why concept (knowing what the possible applications of science and technology are and their purpose) beyond the mere concept of know-how (knowing and understanding how things work) as an ultimate goal, whereby the business sector plays a central role.

Unlike the actions within the framework of the improving competitiveness objective, and which may be considered as “demand pull” given that their development is aimed at providing responses to the needs and opportunities of companies, the actions developed in this block may be considered as “science push” or “technology push”. In this case, the task of promotion and leadership initially falls on the administration. It is a question of facilitating the creation of knowledge-intensive activities, either from the perspective of the creation of a specific scientific-technological offer with the vocation of transferring the results of the research to the production fabric, or from the perspective of consolidation of a production fabric in knowledge-intensive sectors.

This “science push” or “technology push” policy in forthcoming years focuses on a small number of bids to decisively support four sectors of the future for the Basque economy. These bids are shared by the Basque Government and the Regional Councils, who also support initiatives aimed at their development.

- Biosciences
- Nanosciences
- Alternative Energy
- Electronics for Intelligent Transport

These bids follow a similar pattern for their implementation as they are based on the definition of integral strategies which consider the development of the set of links in the value chain, from the generation of knowledge to its final application through the creation of new products, new services and even new companies which exploit the acquired knowledge.

From the perspective of knowledge generation, the Plan sets out the unprecedented importance of Science and its increasingly direct and interrelated link with the business fabric. Therefore, we are faced with a new paradigm in which knowledge exploration and exploitation are difficult to separate. In order to respond appropriately to the implications derived from these new situations, the figure of the Cooperative Research Centres (CRC) has been used, in which strategic research (guided basic and applied) is carried out by research groups which combine the capacities of the University, other agents of the scientific-technological supply and companies, to which the support of the Administration must be added.

Research in cooperation is obviously the fundamental idea of the Cooperative Research Centres, as their name suggests and is therefore applicable to improve the competitiveness of any sector of activity. An example is the case of the CIC-tourGUNE for Tourism, which is up and running. However, it is unquestionable that it has also proven to be particularly appropriate for the development of areas related to “science push” or “technology push”, providing two essential values: On one hand, the sum of physical and virtual research capacities of cooperation and on the other hand, a component closer to the market which is represented by the active presence of companies and which avoids the risk of a purely linear concept of innovation.

The CRCs have been set up on these foundations as projects with the ability to attract researchers from the international scientific community and create true poles of knowledge with a real international projection. Although they promote newly founded sectors, they are also born with the vocation of guiding their research towards securing
results which may be used by the CRCs themselves or by companies in the environment which usually cooperate closely with them. In this way, progress is made in broad knowledge areas such as biosciences or nanosciences towards fields with a certain degree of specialization. It is also a pragmatic way of progressing in the construction of value chains that integrate the exploration-exploitation combination.

In this respect, the CRCs act as a cornerstone of the combination, given that their mission includes the task of exploring and exploiting knowledge by means of fostering the creation of new knowledge-intensive companies.

In addition to the CRCs, support for diversification also considers a series of instruments which coincide with other important lines of the PCTI 2010. The role played by the Technological Centres and the University System, particularly the UPV-EHU stand out and is revealed in the support for the acquisition of scientific and technological equipment as well as support for the research career in the Basque Country.

Instruments to foster the creation of companies, as well as specific business R&D&I support programmes are equally valid to promote business diversification. As far as the former is concerned, namely, support for the creation of new companies, this is set out as the last important work area which characterizes the action model of the PCTI 2010.
Entrepreneurial activity in the Basque Country according to the latest studies by the Global Entrepreneurship Monitor presents a positive balance, but one of its most notable weaknesses is the limited innovative character of the companies which are created and the lack of growth capacity following a few years of operation.

The proposal is based on the verification that the creation of new companies with a scientific and technological base must play a more significant role, and for this, a strong boost is required in this area. In this respect, not only does the number of companies in sectors of the future need to grow, but they must compete in a global world.

A quick look at the innovation and competitiveness policies around the world shows the importance of the development of scientific-technological-based companies for competitiveness in the knowledge society. Their implementation requires the combination of capacities, aptitudes and attitudes.

One of the key elements in the new type of entrepreneurial activity which is to be activated lies in the objective dimension of companies that creatively seek to create. These companies must become driving forces of new sectors and knowledge-intensive activities and need to have a global projection whereby a critical mass and a dimension which positions them in this global market is required.

However, at the same time, growth must be accompanied by investment in companies, in such a way that decision centres are not exposed to possible delocations as a result of the takeover of future companies by foreign capital. Under no circumstances may this capital, which should be actively attracted, represent a majority that puts future development in the Basque Country at risk.

The scientific-technological base of companies must not be associated with the origin of a new company. This is a necessary condition but is not enough. The existence of a market niche sustains any initiative of this type. Any approach that fails to target the market is destined to failure, regardless of the technology, idea or knowledge area of the business project base.

In the highly competitive world in which we move, it is the market that determines the success of the product, and the technological capacity and adaptation should be understood as that which enables the ultimate objective to be fulfilled, which is none other than the market.

For this reason, the centrality of the market is a key factor in the development of initiatives such as NETS and CONNECT GUNEA, promoting the cross-fertilization and cooperation in multidisciplinary work areas in search of the balance between technology, marketing, market, design, etc. The activation of this type of capacities in the identified projects shall be decisive in awakening the leadership vocation in markets.

The leadership vocation must be present in the definition of the new business project. Only in this way can a business plan be designed which is tailor-made to the final objective, defining the capital from the outset, in addition to the other resources required to face the challenge.

For this reason, activating the scientific-technological and innovative niches as sources from which companies are set up, in such a way that innovation in its broadest sense is translated to the markets, is the axis on which the NETS and CONNECT GUNEA initiatives become meaningful. For this, proactive efforts capable of “building projects and ideas that are likely to become the companies of tomorrow” are essential:

- Providing a new orientation towards results which is defined in the PCTI 2010 through the signing of Programme Contracts with the Technological Centres.
- Activating awareness of these in the desired direction and reinforcing the proactive work undertaken by the BICs.
- Facilitating the availability of the necessary capacities related to technological feasibility and market orientation which these business projects require.
- Capitalizing on the projects in an optimum way so that a lack of capital is not the reason why projects of this nature do not emerge in our country. His capitalization shall be by means of the provision of specific funds in addition to attracting private funds or funds from outside the Basque Innovation System.

In short, acting as an element of proactivity and promoting the cooperation of the necessary assets so that knowledge generation is transferred to the market in the form of new products and new services.
7. Agents of the Basque Innovation System faced with the new strategy
This section responds in detail to the question “who?”, which has been described as the driving force of the second transformation. The Basque Country is currently immersed in a process of reformulating the innovation system, in reality, in what has been characterized as its transition towards the third generation of innovation systems, which in turn is an essential tool to successfully approach the transition towards the knowledge society which is proposed in the second economic transformation.

The main characteristic of an advanced system of this type is its focus on the social and relational dimension, an essential element to be taken into consideration in today’s knowledge society. This implies bearing in mind the participation in the system of all the agents involved and the results of their relations, as well as a policy agenda that promotes and supports ties between them through an appropriate set of tools.

This importance of relations arises from the growth of network structures in socio-economic life and the deeply-rooted theorizing that makes the social dimension become increasingly important in economic analysis.

At present, the Basque Innovation System is in an appropriate level of maturity to undertake a reflection of its social dimension since two conditions are fulfilled:

- The existence of three subsystems organized with different players and a notable set of capacities for innovation.
- The existence of regular and bidirectional relations between the different agents.  

One of the important objectives is to strengthen the coordination and cooperation of these subsystems and agents of the systematic model that has been presented throughout this document, and which is characterized by the existence of a wide variety of relations between science, technology and innovation.

It is necessary to revitalise the flow of relations between companies, the government, RVCTI and the university, or in other words, the share capital, in such a way that it becomes an axis that pushes the system towards increased competitiveness.

The application of social standards, reciprocity, trust and exchange of economic and political proposals, or in other words, the use of share capital, contribute directly to innovation through a reduction in trans-
actional costs between the agents and a greater transfer of knowledge which has a positive impact on development.

Relational interaction is a prescriptive response to the problems of competition and knowledge generation which arise within the system. In the local context of the Basque Country, the university, companies and the Government are learning to encourage economic growth through development, or in other words, through generative relations.

In this generative context, it is important to highlight the role that the university may play as the instigator of socio-economic development in the heart of this relational model. Its potential as a technological agent must be appropriately exploited, and the convergence between these three worlds must lead to academic researchers becoming entrepreneurs of their own technologies or companies working in a university laboratory, for example.

The agents involved in this model are presented below, although it is true that the relational flow has not yet been consolidated, the steps put forward for the forthcoming years are channelled in this respect.
7.1 Companies

7.1.1 SMES, LARGE COMPANIES AND BUSINESS GROUPS

The organization model of the Basque Innovation System takes the consolidation of an advanced and competitive business system that promotes the value of its product and develops new sectors of knowledge-intensive activity, as a base to reach a high level of well-being.

The multidimensional focus of the sustainable development triangle, made up of the three structural dimensions: economic development, environmental balance, and social development, has an impact at all levels and therefore direct repercussions on the company. Consideration of these three dimensions is based on the principle that the market mechanisms are not unique in determining the competitiveness of a company. Social and environmental criteria are also integrated.

It is said that a company is “competitive”, from the sustainable perspective, when it is capable of obtaining a sustainable profitability through the sale of its products and services in the targeted market. Sustainable implies that the company sells in the market, first of all, generating economic profit in a combination of operating excellence of the production process and constant innovation; secondly, having succeeded in minimizing the environmental impact of its production, hence generating fewer ecological tracks (objective: zero ecological tracks); and, thirdly, developing its activity in a socially responsible way, or in other words, guaranteeing maximum personal and professional development of its workers (internal social responsibility) and generating a positive impact on the local and/or global environment (external social responsibility).

The enormous challenges facing the company in its process towards sustainable competitiveness are determined by the emerging changes in the three structural dimensions of sustainable development and its capacity to confront them in a simultaneous and balanced way.

First of all, the company must confront the change in the production model and the eruption of a new competitive paradigm in which “thought in the Basque Country” becomes just as important as “made in the Basque Country”, in which creativity enables new markets to be generated and the future to be built each day.

From the strategic point of view, facing this revolution in the making inevitably becomes an opportunity to concentrate and specialize in business functions with increased added value. The only specialization possible is increasingly becoming economic activities with the capacity to generate and apply knowledge, particularly, those with a greater technological intensity.

Within this dynamic specialization process, companies must increasingly support their processes with cooperation networks beyond the limits of the organization, which also form part of the process for innovation and the construction of unique value proposals.

What is undeniable, regardless of how important all of the agents of the system are, the key players to confront this new scenario are the SMEs, which make up the largest part of the Basque production fabric.

As set out in the White Book on the Basque Innovation System, in order to reach the objective of technological convergence, 1,600 companies, mainly SMEs, must carry out R&D activities by 2010 (almost 1,000 in 2004). This represents a real structural change in the production fabric, given that this increase cannot be reached by today’s companies. The path faced by companies today to increase their R&D efforts may lead them to the reference scenario represented in this graph, but will not allow the structural change scenario to be fulfilled. Therefore, the vocation of this Plan to support the creation of new knowledge-intensive companies which strengthen this R&D&I capacity and allows the number of innovative companies to be raised as far as possible is justified.

Basque Business Groups (GEV) deserve special mention in this section, as their driving potential to date has almost exclusively been limited to production activity. Therefore, initial measurement of the driving effect referred to the capacity to generate employment and wealth. Later, this evaluation of the driving effect incorporated the influence on the value or supply chain of these groups, representing an asset that conditions the production paths of the territories in which these industrial dynamics are built.

However, it is also true that this tractor effect also has undeniable value from the perspective of the innovation system, and perhaps it has not been duly evaluated to date, and therefore, its potential has not been maximized. The innovative activity of these groups requires a network of dynamic relations between all of the agents of the system, in addition to providing a channel for globalization.
The new Science, Technology and Innovation Plan 2010 seeks to decisively activate this potential by paying particular attention to the relational dynamics of the business groups. The tractor effect is nothing without the groundwork that allows its activation. It is highly important to turn this tractor potential in the field of innovation into a reality, in such a way that the anchor of these Basque Business Groups in the Country and their relations encourage progress along the path of the Knowledge Society.

### 7.1.2 R&D BUSINESS UNITS

The Technology and Innovation Business Units are defined as structures responsible for promoting technological innovation within companies, planning and carrying out development projects which can subsequently be implemented in companies. They are formal organizations with their own recognizable structure, made up of highly qualified expert technicians, and their objective is to obtain new innovative products, services and processes which improve the competitiveness of companies.

The Technology and Innovation Business Units are a basic instrument to strengthen and formalize the innovation process, professionalize technology in the business environment and create a favourable framework for the development of technological opportunities that lead to improved competitiveness in the international sphere.

The Basque company faces its own process towards sustainability, with a commitment to knowledge (and its leading generation tool, R&D&I) as a strategic opportunity. In this scenario, the Technology and Innovation Business Units represent a valid instrument to guarantee the continuity of the innovative process and to consolidate the strategic bid that R&D represents for the Basque company.

The final objective is two-pronged. On one hand, advancing in operating excellence, guaranteeing efficient production processes from all sustainability points of view (essentially economic efficiency and environmental efficiency).

On the other hand, these Units represent the opportunity to progress in the diversification of the company and in the launch of new business lines and new products which gradually consolidate this necessary migration towards activities with higher added value.
At the same time as the business groups, the strategy supports and takes advantage of the role of sectoral associations and clusters as an element of competitiveness and the backbone of the Basque economic structure so that they develop their function in the field of Science, Technology and Innovation.

Basque companies bring together more than twenty-five sectoral associations and fourteen clusters. The latter were one of the differential factors in the first economic transformation of the Basque Country in the 1990’s, and nowadays are references in the Basque share capital. In this respect, the strategic reflections carried out at the same time as the Science, Technology and Innovation Plan 2010 in the heart of each cluster served to reinforce, promote and renew the underlying spirit in the notion of sectoral associations and clusters:

- Give a new boost to the cluster strategy by means of the identification of cooperation actions that improve the competitiveness of companies in those areas that require the cooperation of capacities and competences that would be impossible to develop individually. The R&D&I field proves to be paradigmatic.
- Position the diverse links, flows and interrelations between companies in trans-sectoral spheres in the centre of the activity.
- Integrate the flow of products, knowledge and innovation and relations between different economic levels such as the company (micro), intra and inter-sectoral relations (meso), and finally, flow and relations deriving from the pattern of specialization of the territory as a whole (macro).
7.2 The Basque Science Technology and Innovation Network

7.2.1 TECHNOLOGICAL DEVELOPMENT AND RESULTS ORIENTED INNOVATION SUBSYSTEM

Technological Centres: Results Orientation

In light of the advent of the Second Economic Transformation of the Basque Country, the Basque technological Corporations and Alliances must face it with a solid commitment, responsibility and motivation to become key players, with the aim of creating wealth and social well-being.

In recent years, the technological corporations and alliances have become consolidated as Government partners in the configuration of an innovative country, as they are an effective instrument for the implementation of the Basque Country’s industrial policy and their strategy is aligned with the scientific-technological policy of the Basque Country.

The strategy of the Centres has its eyes on the same elements as the Government: business competitiveness, diversification in high value sectors, innovative culture and internalization of the Basque Innovation system.

The strategy of the Centres has its eyes on the same elements as the Government: business competitiveness, diversification in high value sectors, innovative culture and internalization of the Basque Innovation system.

In general, we can say that the leitmotiv of the Centres is the research and development activity, on which their business is focused, whereby it does not conflict with the emerging sector of advanced services in the Basque Autonomous Community, which it cooperates with and supports in its development. Research, development and innovation are the main lines of its activity.

By means of this focused activity, they become the main allies of the Basque business fabric, as they attract and above all, generate technological knowledge and transfer it to the business fabric, accompanying companies in their competitive process. The corporations and alliances are oriented towards providing added technological value to the business demand of the clusters as well as the sectors and companies of the Basque Country.

These place their trust in the Basque Technological Centres because they know how to respond effectively and competitively to their present and potential demands in the global knowledge market. The Technological Centres must be able to provide this added technological value to clusters and sectors at the hand of the Sectoral Technological Committees which coordinate the monitoring and verification of the entire process, from the detection of the needs and opportunities to the transfer of knowledge.

They must also strengthen their role within the Cooperative Research Centres, which are perceived as the best formula to develop essential knowledge in those work lines of special strategic interest to each Centre and an efficient way of adding such necessary critical mass to a small country like ours.

By jointly orienting and leading them and assuming a more active role, research capacities will be developed in areas and the transfer of results and the development of new business initiatives in areas of diversification of special interest for the Basque Country will be guaranteed, hence reinforcing the new paradigm in which the exploration and exploitation of knowledge is inseparable.

They must grow but without duplicating already existing capacities and competences in the system. Growth means knowing how to specialize in technologies and markets, as well as being a key player in the Second Basque Economic Transformation. Likewise, Basque technological corporations and alliances seek synergies and economies of scale in an international environment.

As an instrument to achieve all of these aspects, highly qualified training and the mobility of human capital become a key factor for corporations and alliances, which must act as a platform for the qualification and training of people, which will firmly and increasingly be transferred to companies to promote their access to the migration to activities of higher added value.

Furthermore, they ensure their specialization process and complement their capacities and specialize in themed priority areas for the Country: biosciences, nanosciences, alternative energies and electronics for intelligent transport. Focused R&D activity allows important and increasing scientific-technological and business returns in the aforementioned priority areas of the country.

The growing capacity to generate knowledge allows greater scientific-technological output which is commercially exploited, as well as improved results in terms of new products and new companies.

It must not be forgotten that the Technological Centres are a core element of the European Research Area, as their activity and competences are recognised by the international scientific-technological commu-
Tecnalia Corporation

Centres in the process of joining Allied Technological Centres

Staff: 210
Sales 2006: €15.99M

Oceanographic and Environmental Activities. Fishing and Food-related Technologies

Engineering - Software Products, Services and Applications - Automotive

Materials - Industrial and Environmental Processes - Automotive

Construction and Development - Automotive, Energy, Metals Technology - Regional Development

ICT Systems - Electronics - Digital Company Automotive

Agricultural and Forestry Research and Development

Staff: 53
Sales 2006: €5.12M

Centres in the process of joining Allied Technological Centres

Industrial and Health Systems

Staff: 90
Sales 2006: €6.3M

Teaching and Development

Materials - Industrial and Environmental Processes - Automotive

Construction and Building Maintenance

Tourism, Hospitality and Quality of Life

Staff: 1,310
Sales 2006: €93.18M

IK4 Alliance

Associated Technological Centres

Staff: 274
Sales 2006: €11.2M

Materials Mechanics Electronics and Communications Environment Engineering Micro-electronics

Energy New Materials Surface Treatments

Environment Industry Biotechnology Plastic Materials and Composites Recycling

Mechanical Engineering Electronics Communications Alternative Generation Systems

Mechatronics and Precision Engineering Manufacturing Micro and Nanotechnologies Automotive

Digital TV and Interactive Services Industrial Multimedia Applications

Staff: 76
Sales 2006: €4.2M

Staff: 126
Sales 2006: €9.1M

Staff: 233
Sales 2006: €16.2M

Staff: 203
Sales 2006: €14.2M

Staff: 23
Sales 2006: €1.23M

Technological Centres and Collaborating Entities

Staff: 109
Sales 2006: €9M

Staff: 90
Sales 2006: €9.4M

Staff: 74
Sales 2006: €5.6M

Staff: 65
Sales 2006: €3.1M
nity. It is necessary to see the European Research Area as a vehicle to value the business sector and not as an area for funding opportunity.

The competitiveness of the Centres in Europe is strengthened by means of agreements with prestigious Universities and Research Centres, international projects in excellence consortiums aimed at scientific-technological research, the development of international projects in conjunction with companies, without forgetting the training of researchers at European reference centres and the incorporation of leading researchers.

Finally, the Technological Centres are funded in accordance with results within the objectives and instruments of the scientific-technological policy of the Basque Country. It attempts to reaffirm its orientation towards business diversification and social competitiveness based on efficiency in results (creation of new companies in areas of diversification, patents etc.) and the achievement of an income structure aimed at results, in which the projects under contract to Basque companies are priority.

7.2.2 SCIENTIFIC AND UNIVERSITY SUBSYSTEM

The University System is the only agent of the science, technology and innovation system that brings together the three sides of the knowledge triangle: education, research and innovation.

Its full cooperation in the new competitive model is essential. If during the first transformation, the education vertex concentrated the energies and resources of this system, the new situation requires that research and innovation assume enough prominence to position science, at least in the same levels of development and expansion as technology experienced throughout the so-called First Important Economic Transformation of the Country.

In fact, the participation of Science, in so far as the new paradigms are concerned place it more strongly related and closer to goods or services production activity, representing one of the qualitative aspects on which the success of the future lies. For this reason, the development and promotion of the Basque University System represents one of the main challenges faced by the Science, Technology and Innovation system, particularly in the aspect of research and innovation. In effect, and as the maximum exponent of Science in our country, the University System must occupy the leading positions in terms of exploration and exploitation of knowledge within the parameters of excellence and quality. The Basque Country cannot ensure the success of the Second Transformation of its production fabric if the University System does not act as a driving force in this process.

In order to achieve these goals, public resources allocated to the funding of the University are determined by:

In the case of UPV-EHU:
- Ordinary Grant
- Pluri-annual Investment Plan
- Programme Contracts

In the case of the University of Deusto and the University of Mondragón:
- Programme Contracts

These resources are set out in the II University Plan 2007-2010.

The Basque University System has undergone important development over the past 25 years. With the transition, there was a radical transformation in the scientific-university scene. At that time, in the Basque Country, the university environment went little further than the contribution of the University of Deusto and some scattered polytechnic institutes and other faculties and university colleges with greater or lesser weight.
University System: Important Challenges for the Future

In higher education, the Basque Country has 4 Universities with 28 faculties, 3 Higher Technical Colleges and 11 University Colleges. The following are worthy of mention: University of the Basque Country, Euskal Herriko Unibertsitatea, founded in 1980, (49,352 students in the first, second and third cycles and 4,305 lecturers), two private universities: Deusto (11,060 students and 1,466 lecturers) and Mondragón (3,765 students and 285 lecturers), three centres of the National Correspondence Education University, as well as some Polytechnic Schools of Universities based in other Autonomous Communities.

Figures for the University System in the Basque Country

As far as the education vertex is concerned, the challenge lies in its full adaptation to the European Higher Education Area without renouncing its identity, defined first of all by its contribution to the standardization of the use of the Basque language in all of the facets of life in the Basque Country.

However, this stage appears to have reached its end and a new period is emerging in which the University must become consolidated in terms of quality and excellence of the progress made.

This new period is marked by the other two vertexes, or in other words, by research and innovation. Therefore, if the Education vertex must be oriented towards full integration into the European Higher Education Area (EHEA), research in the Basque University System must form an active part of the European Research Area (ERA) and innovation, which is the source of this system, must clearly contribute to the full incorporation of our country in the Knowledge Society.

In addition to all of these interdependences, the University must be capable of exercising strong leadership in its own socio-economic environment, in such a way that it renews or activates its essential role as an intellectual but also economic and scientific-technological driving force of Basque society.

For this, first of all, a Basque University System model will be defined, which develops all of these elements. A model which, within the necessary process of rationalization and optimization of qualifications, will determine new management and direction mechanisms which allow the generation of a true Basque University System which is attractive and capable of competing with the best university districts in Europe in the capture and promotion of talent (researchers, teaching staff, students).

Furthermore, this new model will explore the launch and promotion of new specialized basic research scientific centres arising from the University. In this respect, the Basque University System Act, due to its spirit and wording, allows the challenges to be confronted through the development of the potential offered and around which the keys to future success revolve. This is extremely valid, particularly as far as the possibility of strengthening the research career is concerned.

This is the proposal laid out in the II University Plan in which research and orientation towards results, measured in terms of publications, patents and new scientific based companies, are given a renewed boost.

One of the aspects which is going to be influenced, in addition to the clear orientation towards quality and excellence, is the internationalization of the University System through exchange and mobility at all levels between centres in the Basque Country and those with the best European and international university districts.

Beyond this teaching, research and innovative specialization, the Basque University System must increase its contribution and response
Agents of the Basque Innovation System faced with the new strategy

The success of the chosen model is dependent on the University System accepting to play a key role in the process of social and economic transformation that the Basque society is embarking on.

Universities will therefore have to become actively integrated in the development of ambitious projects, capable of combining basic research with more applied research, strengthening work in cooperation with other agents (companies and Technological Centres) until this collaboration becomes habitual practice. The organization of knowledge and innovation areas for business development in the form of scientific-business parks or poles may be a valid form of direct involvement.

The University System must be a source of exciting ideas and projects which are consolidated as an element of prestige, valued by citizens who, not only understand the importance of the University, but also go further and commit themselves to the idea of strengthening the human and financial resources devoted to its development.

**7.2.2.1 Cooperative Research Centres**

The creation of stable cooperation structures in the form of Cooperative Research Centres (CRC) is already a reference in the new Basque Innovation System. The promotion of the CRCs’ aims to consolidate flexible institutions with a balance between scientific excellence and the commercial exploitation of results, allowing the growth of the scientific mass of the Basque Innovation System, the competitiveness of existing sectors towards products with greater added value, diversification towards new knowledge-intensive industries and progress in the internationalization of the system and its presence in the ERA.

Therefore, the basic objective of a CRC is to take on basic research projects oriented within the lines of strategic research for the Basque Country. This type of centres seeks to create a model of temporary technological alliance between flexible and dynamic technological centres, research groups, universities and companies, allowing projects of great international importance to be confronted.

The creation of an agglutinating structure like this, presents clear advantages, among which obtaining a critical research mass, setting up of a reference centre, a sole interlocutor for different research programmes, the possibility of embarking on top rate research projects, integration in research networks of excellence, the effective use of infrastructures and existing research resources and the Dynamics in the Creation of a CRC possibility of attracting world class researchers stand out.

The boost to these new cooperative scientific and technological infrastructures and their capacity to develop ambitious projects must serve to increase the attractiveness of the Basque Research System. All of the agents must participate actively in the creation of Cooperative Research Centres (CRC) as an initiative that adds professional development channels for existing researchers in the Basque Country and acts as a centre to attract and welcome researchers from all over the world. In short, it is a question of cooperating locally in order to be able to compete in the creation of global knowledge.

**7.2.2.2 Basic and Excellence Research Centres**

Basic and Excellence Research Centres are knowledge generation structures in areas of scientific interest for the Basque Country. These revolve around a research group of international reference which is characterized by its novelty within the Basque Science and Technology System and for its research excellence.

These organizations are born with the vocation of being the spearheads of the Basque University System and scientific research carried
out in the Basque Country and are said to be the headquarters of new European knowledge centres connected with centres located worldwide. Their purpose is to position the Basque Country in the global research networks (exchange of researchers, lecturers and students, as well as knowledge and experiences) and make it attractive and visible in the international arena.

At present, the RVCTI has two centres that fulfil the aforementioned characteristics:

Donostia International Physics Centre (DIPC). Its main aim is to promote scientific research in the field of basic and applied physics in areas of interest for the Basque society and for international scientific development.

The Biophysics Foundation of Bizkaia has the dual objective of carrying out high-quality research, mainly in the field of biological membranes, and educating young scientists according to international quality standards.

As previously mentioned, this Plan is going to promote the creation of Basic and Excellence Research Centres, BERC; the new figure designed to promote scientific research of excellence with the vocation of attracting internationally renowned scientists in knowledge areas that are considered to be relevant to this Plan, in order to raise and drive the level of competition and research in these areas.

7.2.2.3 Building Knowledge Communities

As indicated in the previous section, the European Union has embarked upon a key initiative: the creation of a European Institute of Technology (EIT), whose aim is to obtain critical mass in certain knowledge areas. This Institute will bring 10 Knowledge communities to life which will form its operating nucleus. These communities will be integrated associations comprised of teams from universities, research organizations and industry to carry out research, education and innovation tasks in the corresponding areas.

The Basque Country has three structured and consolidated knowledge communities which may act as a bridge to form part of the European Institute of Technology in three disciplines: Biosciences, Nanosciences and Manufacturing.

Biosciences Knowledge Community

- CSIC-UPV/EHU Basic and Excellence Research Network
  - BIOPHYSICS
    - Biomolecular Spectroscopy Studies.
    - Lipids, Proteins and Bacterial Toxins.
  - BIOTECHNOLOGY
    - Functional Genomics.
    - Proteomics.
    - Cellular Biology and Stem Cells.
    - Metabolomics.
    - Biocomputing.
    - Structural Biology and Proteomics Unit.
  - BIO MATERIALS
    - Biomaterials for new biotechnological and clinical applications.
    - Characteristics of functional biomaterials.
    - Molecular Image and Characterization of Functional Biomaterials Unit.
  - X-Ray Diffraction
    - X-Ray Diffraction 230V, 50/60Hz.
  - Nuclear Magnetic Resonance
    - 600MHz, 800 MHz.
  - Electronic Cryomicroscopy
    - 120Kev, KeV.
  - PROTEINEES dp (robot).
  - Ultraflex TOF/TOF.
  - Q-TOF Premier: Quadrupole.
  - LtC Premier.

- CIC biomaGUNE Cooperative Research Centre

- CIC biomaGUNE Cooperative Research Centre

- Magnetic Force (MFM) Scanning Electron Microscopy (SEM)
  - FTIR, Atomic Absorption Spectrometers (AAS).
  - XFR (X-Ray Fluorescence).

- Included on the Roadmap for State Infrastructures

300 Researchers in the Community

- Single Photon Emission Tomography (SPET_CT).
- Magnetic Resonance Spectroscopy (MR).
- Fluorescence and bioluminescence.
- Atomic Force (AFM) Scanning Tunnelling (STM)
Nanosciences Knowledge Community

NANOSCIENCES KNOWLEDGE COMMUNITY

D.I.P.C. Basic and Excellence Research Network

MIXED CENTRE (EHU-CSIC) Mixed Research Centre CSIC UPV-ENU

CIC microGUNE Cooperative Research Centre

CIC nanoGUNE Cooperative Research Centre

PHYSICS FOR MATERIALS
- Condensed Material Physics.
- Polymers and Crystalline Materials.

MATERIALS PHYSICS UNIT
- Basic Research in Nanostructures.

MICROTECHNOLOGIES
- Sensory Layer Processing.
- Encapsulation and interconnection.
- Replication and Microassembly.

NANOSCIENCES
- Nano-structures and low dimensional structures.
- Nano-materials, nano-systems.
- Nano-electronics, nano-biotechnology.

400 Researchers in the Community

Manufacturing Community

MANUFACTURING COMMUNITY

marGUNE Cooperative Research Centre

UNIVERSITIES
- UPV-EHU
- MGE
- TECNUN

TECHNOLOGICAL CENTRES
- PATRONIK
- LABEIN
- TEKNIKER
- IDEKO

R&D CENTRES
- AOTEK
- KONIKER
- LORTEK

HIGH PERFORMANCE MANUFACTURING
- Intelligent Manufacturing, Control and Adaptation of the process
- Manufacture of almost finished part
- Diode Laser
- High speed camera
- X-ray diffractometer

400 Researchers in the Community
The final objective is none other than the participation of these knowledge communities in the European Institute of Technology project, hence contributing to add critical mass in Europe from the Basque Country.

7.2.3 INNOVATION SUPPORT SUBSYSTEM

The Basque Innovation System also has agents whose function is to facilitate physical and virtual meeting and interaction points. In the case of the Basque Innovation System, it is made up of a network of technology parks, advanced services companies and private financial services.

7.2.3.1 Technology Parks and Innovation Poles, Creative Environments of Excellence

Innovation must have favourable conditions which help the different agents in the performance of innovative activities as well as a predisposition for them.

Technology Parks (and also the Business and Innovation Centres), the meeting point between scientific-technological and business knowledge, are set up as optimum settings for innovation and diversification, by facilitating, among other elements, the implementation of new systems of business management, the development of new products and processes, the organization of new ways of learning, the creation of new technological based companies, etc. All of this makes them key players to reach higher levels of competitiveness throughout the country.

Furthermore, these agents act as a showcase for local innovative companies, making an enormous capital of international relations available, allowing a Network operation, which is essential in the medium term to respond to the demands of the new global market.

However, the impact of the Technology Parks goes beyond their setting, spreading economic effects, technological diffusion and the innovation culture, encouraging internal and international cooperation, contributing to avoiding the connectivity gap through powerful communication infrastructures, designing support channels for the internationalization of the Basque company, and in short, acting to bring technological knowledge to society.

The Basque Country was a pioneer in the State in the implementation of Technology Parks (Technology Park of Bizkaia in 1985) and in the conception of a Basque Technology Park Network. This on-going process will be consolidated in the near future with the construction of the new Technology Parks in Abando and Ortuella, the Garaia Innovation Pole, as well as the UPV/EHU Scientific Park are a step further on the path towards consolidating areas for technological diffusion and quality business development.

Graph 7.14. Technology Parks 2006

<table>
<thead>
<tr>
<th>Technology Park</th>
<th>Companies</th>
<th>Jobs</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park of Bizkaia</td>
<td>170</td>
<td>6,200</td>
<td>1,700</td>
</tr>
<tr>
<td>Park of Álava</td>
<td>91</td>
<td>2,750</td>
<td>480</td>
</tr>
<tr>
<td>Park of San Sebastián</td>
<td>49</td>
<td>2,800</td>
<td>335</td>
</tr>
<tr>
<td>TOTAL</td>
<td>310</td>
<td>11,750</td>
<td>2,515</td>
</tr>
</tbody>
</table>

The new Technology Parks in Abando and Ortuella, the Garaia Innovation Pole, as well as the UPV/EHU Scientific Park are a step further on the path towards consolidating areas for technological diffusion and quality business development.
Technology Park of Meatzaldea, located on the left bank in cooperation with the Regional Council of Bizkaia and the implementation of a Scientific Park of the University of the Basque Country UPV/EHU in Bilbao.

The experience accumulated over these years and the success in their development and growth has turned this model into a European reference in R&I, facilitating their own evolution towards authentic innovation and knowledge poles.

### 7.2.3.2 Advanced Services Companies

The transfer of the knowledge generated is carried out by agents or services related to external R&I, such as Technology Knowledge-Intensive Business Services (TKIBS).

At present, the economic conditions as a result of the globalization processes have stimulated an increase in competition, which means that Basque companies must dramatically increase their levels productivity and competitiveness, requiring external support for the design and implementation of the new strategies which lead to these objectives.

For this reason, it is increasingly necessary to develop activities and turn to services connected to the production processes themselves, which are directly related to innovation and technology. They act as reinforcement to the local business base, facilitating modernization and the adaptation of the production system of Basque companies to the new global conditions, contributing in this way to sectoral development within a global vision of the economy.

Within the Basque Country, as suppliers of TKIBS, in addition to private companies, it is worth highlighting the activity carried out by agents of the Basque Science, Technology and Innovation Network (RVCTI), particularly the Technological Centres with their development and technological diffusion activities.

On the other hand, the University has interesting capacities and competences to boost the competitiveness of companies, so it is necessary to intensify the proximity of the University-company. This relationship occurs more frequently in the SMEs that are being set up in new sectors such as biotechnology or nanotechnology.

### 7.2.3.3 Private Financial Services

The bid for new sectors, as well as the technological reinforcement of existing sectors, requires the development of funding instruments that facilitate the commercial exploitation of ideas and place R&D&I in a favourable environment for its expansion and proliferation. Instruments such as venture capital, seed capital or the business angels take on a crucial role in the new model and their own importance to respond to the needs of their socio-economic environment.

Current venture capital societies, with an important public weight, must advance towards a greater volume and specialization of funds and an increased presence of private capital in order to confront the ambitious proposals set out in the Science, Technology and Innovation Plan 2010. The mobilization of financial resources becomes an important element to ensure the implementation of different projects without any problems beyond their interest and results.

The system must take advantage of the existence of a financial culture and the presence of an advanced financial sector with a long tradition in the country, to attract it towards the necessary boost to Science and Technology.

In the new context, the commitment to knowledge is a socially productive future investment, which can not be considered as an investment without returns, but instead it must be considered as a profitable bid. The increasing proximity between the most basic research and its materialization in technological applications facilitates the presence of private investors seeking profitability for their capital. The profitability and economic results of many of the most knowledge-intensive sectors (such as those related to biotechnology and nanosciences), represent a sufficiently meaningful example to attract interest in their support.

The involvement of financial agents and institutions in the innovation system requires learning formula for the financial sector and for researchers and technologists, which enable them to come together. Under no circumstances should the complexity of technical aspects or the lack of future perspective with respect to the results pursued become a barrier that discourages support for projects with a high technological component and strong economic influence.

In any case, the mobilization of private capital ultimately depends on the capacity of the Basque Innovation System to develop interesting
projects, with a greater commercial orientation and real knowledge of their potential by investors. Meeting points must also be set up to allow capital needs to be crossed with investment possibilities and the participation and involvement of a greater number of business angels.

7.2.4 SUMMARY

This is a system that brings together a varied set of agents in which the relations and interactions produced stand out and through which knowledge flows in its different stages (generation, transfer and application).

Another important aspect is the role that these agents play in the Basque Innovation System. Without wishing to classify them or locate them, it is interesting to know their activity niche or “core business”, although the limits and frontiers are increasingly more widespread, as has been constantly demonstrated.
7.3 The Government

### 7.3.1 MANAGEMENT BODIES

#### 7.3.1.1 Basque Council for Science, Technology and Innovation

This Council is responsible for putting forward the strategic lines for the whole of the science, technology and company system in the Basque Country. The Council is chaired by the Lehendakari (President of the Basque Country) and is made up of leading figures of the Government Departments directly involved in research and technological policy; the three Provincial Councils, as well as the vice-chancellors of the Basque universities and the heads of the Basque Innovation Agency (INNOBASQUE) and the Basque Foundation for Science and Research (IKERBASQUE).

This body guarantees links and coherence between the Science, Technology and Innovation Plan 2010 and other departmental policies implemented by the government as a whole.

#### 7.3.1.2 Basque Research Council

Within the framework of the stipulations of the Statute of Autonomy, Act 3/2004, of 25th February on the Basque University System which establishes in Article 56 that the Basque Government will create the Basque Research Council which is responsible for the observation, coordination and promotion of research, development and innovation in the Basque Autonomous Community.

The following functions correspond to the Basque Research Council:

1. Promote excellence in research, development and innovation and its adaptation to the social, cultural and economic interests of the Basque Autonomous Community.

2. Be aware of and report on the situation and evolution of research and particularly promote the integration of the Basque Research System in the European Research System.
3. Be aware of and report on research training needs and the level of satisfaction of social demand in these aspects.

4. Advise the Department of Education, Universities and Research and any other organization on research matters.

5. Advise the Basque Agency for Evaluation and Accreditation on the criteria to use in the pre-evaluation for the hiring of research staff for the UPV/EHU (University of the Basque Country).

6. Coordinate the measures required for the necessary links between university research and the production and/or business system.

7. Coordinate networking in research matters between the Universities of the Basque University System and the remaining agents of the Basque Science, Technology and Innovation Network.

8. Foster ties and collaboration with other university institutions in terms of research, development and innovation.

9. Carry out the task of a permanent observatory for the fulfilment and respect for research freedom and promote its values.

10. Deal with the demands, needs, concerns and suggestions of researchers and research groups regardless of the field of their research and channel them to the competent institutions.

11. Ensure that the gender perspective is integrated in research projects in the different areas of knowledge and there is a balanced representation of men and women in research groups.

12. Any other task with which it is entrusted, in relation to its field of activity.

### 7.3.2.2 Basque Innovation Agency - INNOBASQUE

The Business Competitiveness and Social Innovation Plan within which this Science, Technology and Innovation Plan 2010 falls, provides the Basque Country with a new management tool, the Basque Innovation Agency, which aims to become the leading body for the coordination of the Basque Innovation System and support the implementation process of the new science, technology and innovation policy.

The Basque Innovation Agency was set up as a public-private foundation which combines the public institutions, members of the Basque Science, Technology and Innovation Network and economic and social agents.

The Basque Innovation Agency carries out the following functions:

1) Promote the coordination and effective collaboration of all the agents in the field of Science, Technology and Innovation.

2) Facilitate the interaction of the agents in the Basque System of Science, Technology and Innovation and link the requests of the production fabric with the capacities of the system.

3) Encourage intellectual property and its management as a tool for competitiveness.

4) Encourage R&D&I fiscal policy as an incentive for the Basque business fabric and investment in new innovative activities.

5) Develop mechanisms for monitoring and following up the activities and results of the policy as well as of the activity of the agents of the System.

6) Recommend and propose actions to improve the System to the different Agents.

7) Represent the Basque System of Innovation and promote its integration and participation in international networks.

8) Communicate and spread science, technology and innovation and its associated values among the Basque society.

### 7.3.2 MANAGEMENT, IMPLEMENTATION, MONITORING AND EVALUATION BODIES

#### 7.3.2.1 Science and Technology Committee

Like in the previous plan, this is the interdepartmental body within the Basque Government which acts as a coordinator for the definition, design and implementation of scientific and technological policies. Its basic mission is to verify the interdepartmental nature of the PCTI 2010 during its implementation period.
7.3.2.3 Basque Foundation for Science and University Research

The IKERBASQUE Foundation aims to contribute to the promotion and development of research and scientific, humanistic and technological knowledge in the interests of society, universities and research centres and the scientific community as a whole, facilitating the gradual consolidation of researchers and scientists established in the Basque Country. In this respect, the IKERBASQUE Foundation will be able to participate in the promotion of research at universities, public or private research centres or institutes and establish collaboration with national and foreign institutions and organizations.

Within these broad objectives, the following specific activities are the most important and immediate:

a) Promote the production, promotion and dissemination of scientific and technical knowledge.

b) Strengthen research groups working in the Basque Country to increase their performance.

c) Develop an active human resources policy for the promotion of research in the Basque Country.

d) Establish scientific and academic collaborations with national and international universities and important research centres.

e) Establish collaborations, as legally defined, with public administrations and with the private sector in the areas of its activity.

f) Create and run research centres of its own or as part of a collaboration.

g) Organize national and international scientific meetings.

h) Obtain its own resources, subsidies, grants and donations from public institutions and private individuals and entities, in order to fund actions that facilitate the fulfillment of the founding objectives.

i) Any other activity that contributes to the fulfillment of the main objective and the founding goals.

The contents of the previous sections are not limiting and any purpose in relation to the fulfillment of the objectives and development of the activity must be considered valid.

7.3.2.4 Innovanet Network

This aims to establish a network of intermediary innovation agents and areas that contribute to strengthening the coordination of the Basque Innovation System, for the deployment of the innovation strategy, in cooperation with the Regional Councils and other local institutions and organizations.

The Innovanet Network has three main objectives:

1) Ensure the effective coordination of inter-institutional action in the fields of science, technology and innovation.

2) Promote and increase innovation efficiency.

3) Increase the capillarity of the promotion of innovation in the Basque business fabric in order to reach as many companies as possible.
8. Areas of Activity
The areas of activity presented in this section develop the responses of the PCTI to the aforementioned question: “What for?” within the innovation system model.

As already mentioned, the proposed model indicates three important objectives which are closely related to the three pillars of sustainable development: economic competitiveness, environmental balance and social development.

In order to fulfill these three objectives, four important areas are defined: Competitiveness, Diversification, Eco-Innovation and Social Innovation, which are closely related to the strategies of the Business Competitiveness and Social Innovation Plan. The Action Programmes of an instrumental nature which are going to be made available are detailed in order to subsequently carry them out.

In principle, any of these strategic areas may influence the three sides of sustainable development, although logically a special connection is given to each of them.

In terms of competitiveness, strategies of a sectoral and cluster nature are being implemented, and particularly two strategies: tourism, already defined, and Commerce, to be defined in the development of the Plan, as well as a series of technological strategies which are generally transversal and highly influential in the economic competitiveness of the Basque Country, such as: high performance manufacturing, new materials, food safety, ICTs and language industries.

The Area of Diversification includes the bioBASQUE and nanoBASQUE strategies, which already enjoy quite a long trajectory, along with those for intelligent transport and energy, which are innovative.

There is also the Eco-Innovation strategy and the social innovation strategy which is set out in three chapters related to the transformation of organizations, intelligent territories and social research.
### General Perspective of the Areas of the Science, Technology and Innovation Plan 2010

The table below illustrates the areas of focus under the Science, Technology, and Innovation Plan 2010, categorized into three main domains: Economic Competitiveness, Environmental Balance, and Social Development. Each category is further divided into specific areas, each with a brief description of their focus.

#### Economic Competitiveness
- **Support the Present**
- **Build the Future**

#### Environmental Balance

#### Social Development

**Competitiveness**
- **Tourism (tourGUNE)**
- **Commerce**
- **High Performance Manufacturing**
- **Energy Sector**
- **New Materials**
- **Food Safety**
- **ICT’s**
- **Language Industry**

**Diversification**
- **Biosciences: bioBASK 2010**
- **Nanosciences: nanoBASK 2015**
- **Alternative Energy (energyGUNE)**
- **Electronics for Intelligent Transport**

**Eco-innovation**
- **Envirobask**
- **Meteorology and Climatology**

**Social Innovation**
- **Business Transformation**
- **Intelligent Environments**
- **Social Research**
8.1 Support the Present or Improve Competitiveness

This area is aimed at improving the competitiveness of the sectors, clusters and business groups that form part of the current Basque business base. It seeks to actively increase the (technological and non-technological) innovative intensity which boosts its competitive position. The current business base, both industrial and services, has significant room to increase the added value of its production, which will allow it to continue to be the driving force of the Basque economy, as it has been up to now.

The Government, as for the past twenty-five years, continues to be committed to industry as the driving force of economic development and must make the necessary instruments available to this fabric in order to facilitate the incorporation of new factors of competitiveness, namely those which allow competition in added value rather than in costs.

This Plan gives special relevance to innovation in services because science, technology and innovation, which are not industry resources, play a key role to move towards a competitive services sector which is prepared for the necessary liberation of the market from Europe.

a) The most significant responses to improve competitiveness, in the services sector and industry shall be determined by:

b) A network of Technological Centres aimed at the technological demand of industrial and services companies in this country.

c) The creation of specialized Cooperative Research Centres (CRC) in specific areas to improve business competitiveness.

d) A direct support to R&D&I for industrial and services companies, which facilitates innovation in industrial and services companies in terms of product, process, marketing and organization.

e) The promotion of cooperation in light of the obvious need to combine complementary capacities and skills, the combination of which is necessary in many of the fields that affect innovation.

f) Support for training which enables the level of skills and capacities of the individuals carrying out their activity in companies (technologists, commercial representatives, management, etc) to be increased by means of the promotion of life-long learning.

8.1.1 Tourism

In the specific case of the tourism sector, an R&D&I strategy has already been developed with the following objectives:

- Develop new tourist niches or segments associated to innovative services.
- Increase returns of the sector.
- Foster the innovation culture in the tourist and leisure sector.
- Promote entrepreneurial activities and the evolution of new business initiatives
- Develop and market entire and modular services-products, which are easy to access via numerous channels.
- Promote and generate research capital in this field, fostering transversal and interdisciplinary teams and international cooperation.

A key element in the development of the sector shall be the contribution of the tourGUNE Cooperative Research Centre (CRC), which has been formally set up and will focus its activity on R&D&I to improve the competitiveness of the sector, combining capacities in order to achieve the aforementioned objectives.

8.1.2 Commerce

Commerce, as an essential part of the tertiary sector, is considering the implementation of its own technological development and innovation strategy. In fact, the knowledge society, with the inherent technological advances, associated to a large extent to the ICT’s, directly affects the commercial paradigm, as it enables the conceptual and operating model of commercial businesses to be reinvented. When we talk about R&D&I, we automatically think of industry, health, and we forget the possible impact on the commercial sector. Reality shows us that technology and innovation, seen from a broad conception may:

- Improve the efficiency of commercial processes (logistics, customer relations, etc.).
- Help conceive new products and services.
- Promote the generation of new concepts and commercial businesses.
Tourgune Strategy

**Knowledge Generation**
- Excellence research: etourgune Programme.
- Coordination of existing IT capacity in RVCT aimed at the tourism sector.
- High level training in tourism sciences: Post-graduate studies. Establishment of strategic alliances.

**Business Development**
- Creation of a new advanced services industry.
- Technological support to companies.
- Technology Transfer to tourist industries.

**Sector Dynamization**
- Coordination of the sector: technological companies, tourist companies and destinations.
- Monitoring and prospective.
- Supra-regional agreements: Andalusia, Balearic Islands, Basque Tourism Agency Basquetour.

**Integration of the Social Dimension**
- International Research Integration Platforms: EUREKA Tourism
- Communication and Diffusion.

**Development Framework of the Commerce R&D Strategy**

<table>
<thead>
<tr>
<th>SCIENTIFIC-TECHNOLOGICAL FIELDS</th>
<th>THEMED AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professionalisation of the sector</td>
<td>1. Design, tracking and handling of perishable products</td>
</tr>
<tr>
<td>New digital business models and business processes</td>
<td>2. Technologies for the integration of all social groups</td>
</tr>
<tr>
<td>Support for business structures</td>
<td>3. Confidentiality and security technologies</td>
</tr>
<tr>
<td>“In-store” digitised processes</td>
<td>4. Technologies to support the innovation of work processes of the commercial sector</td>
</tr>
<tr>
<td>Customer purchasing experience</td>
<td>5. Management of the supply chain, logistics</td>
</tr>
<tr>
<td>Infrastructure and technologies</td>
<td></td>
</tr>
</tbody>
</table>
As the extent of the potential fields of activity is extremely large, some priority themed areas have been defined for the sector, in order to dedicate a sufficient critical mass and encourage the participation of companies in their development.

Together with the scientific-technological areas that have been identified, and which are closely related to the ICTs, the planned themed areas provide the framework in which the innovation strategy in Commerce is going to be developed, providing a cooperation platform, which may eventually become a Cooperative Research Centre (merkaGUNE).

Furthermore, the Plan specifically considers a set of actions whose impact, in some cases, is aimed at technological areas of special relevance to increase the competitiveness of the production fabric because it has a transversal impact on diverse production sectors related to the Basque economy, and in other cases, because specific market niches or opportunities are exploited. These actions are set out below.

### 8.1.3 ENERGY SECTOR

The Basque business fabric includes extremely important companies in the energy sector, mainly in the fields of electricity generation, transportation and distribution of electricity and gas and manufacturers of electrical or energetic capital goods. Within industrial activity, energy is a sector that contributes significantly to the Basque GDP and is one of the most active sectors in exportation. The majority of the Basque energy industry is grouped into the Energy Cluster, which encompasses around 90 companies and institutions, with a turnover in excess of 10,000 million euros and offering direct employment to more than 25,000 people.

A key element to improve competitiveness in this sector is by increasing its technological intensity, in relation to process improvements and the development of products. The technological lines with a greater impact on improving the competitiveness of the sector are:

- **Distributed Generation (“Smart grids”).** This refers to the development of products and components which allow the adaptation and control of electricity distribution networks and the integration of resources and sources of distributed generation. This line includes all of the devices for communication, metering and improving the quality of energy required for network management.

- **Power and control electronics for the integration of renewable energies in the electrical network.**

- **Wind Energy.** Technological advances in wind-driven generators, through the increase in unitary power and reduction of specific weight, improvement in production output and new systems of control.

- **Photovoltaic Solar Energy.** Improvements in conversion efficiency, architectural integration in buildings, development of new components such as inverters, regulators and guidance and control systems.

- **Efficiency and Energy Savings.** Innovation and technological development of systems, equipments and applications for energy efficiency are the keys to achieving savings in consumption, defined as an objective and to boost the manufacturer’s market for these systems. Industrial energy equipment (furnaces, boilers, engines, refractories, combustion systems), co-generation systems in industrial processes and in the services sector, and energy equipment for homes and buildings (lighting, electrical appliances, advanced acclimatization, seals and insulation systems, sensonics and control for buildings) are included along these lines.

This commitment to supporting the present of the energy sector is complemented with exploration and the exploitation of the alternative energy niche.

### 8.1.4 HIGH PERFORMANCE MANUFACTURING

The most important industrial sectors –automotive, aeronautics, capital goods, etc.—, can improve their competitiveness by increasing the added value of their production. In this respect, the development of new generations of production methods which facilitate the incorporation of new manufacturing technologies aimed at the processing of new materials, and the improvement of processes and products stand out.
8.1.5 NEW MATERIALS

The updating and survival of traditional sectors in the Basque economy, such as steel, the metal-mechanic or automotive industry; and the most recent consolidation of development sectors, such as the aeronautics, electronic and biotechnological sectors are paradigmatic with respect to their dependence on important research activity in Materials Science and Engineering (MSE).

The design, development and application of new materials, often replacing those currently used, may condition the future of many companies. If they are unable to adapt to the new tendencies imposed by the markets and the new technologies, they will be eliminated by companies that have known how to take advantage of the opportunities presented in this field.

Manufacturing: Scientific Areas and Business Applications

8.1.6 FOOD SAFETY

Food safety represents an activity with important technological contents from diverse knowledge areas.

The different disciplines that are combined in this field represent a research niche with an important future projection.

8.1.7 INFORMATION TECHNOLOGIES

In this global context, this programme pursues the development of technologies and scientific fields which enable the Basque Country to be positioned nationally and internationally as a reference in advanced services of the Information Society. The challenges and tendencies identified for the sector in the medium-long term are:
• Communications: Creation of the next generation of networks and evolution of existing ones towards reliable, safe and scalable infrastructures.

• Information and Contents: Interactivity, interoperability, possibility to make use of the same contents on numerous platforms and devices and multi-sectoral character of the applications.

**Food Safety: Scientific Areas and Business Applications**

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**ICT Services: Scientific Areas and Business Applications**

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8.1.7.1 **Ambient Intelligence - AmI**

Within the ICTs and looking towards the future, the new concept of Ambient Intelligence is revealed, in which users are surrounded by intelligent and intuitive interfaces, and an environment capable of recognising and responding to the presence of different individuals in a fluid, non-intrusive and almost invisible way. The main feature is that people are the central point of the Information Society. Ambient Intelligence will enable the user to efficiently and effortlessly manage information exchange and interaction with the environ-
ment, for example, via interfaces that understand human movements and language.

Within the context of Ambient Intelligence and bearing in mind current tendencies as well as the potential of Basque companies in the sector, a series of business applications have been identified which, due to their strategic nature and future may be considered as “bids” for the Basque Autonomous Community:

- Sensor Networks (SN)
- Wireless Communication Networks
- Network Security
- Information.
- Virtual, augmented and mixed Reality
- Technologies for processing contents
- Biometric Technologies
- Person – Device Interfaces
- Semantic Technologies
- Assistive Technologies

### 8.1.8 LANGUAGE INDUSTRIES

The language industry arose, among other aspects, to demolish the language barrier, in such a way that anyone can use his/her own language as a means of communication with technology, hence becoming an essential tool in the Information Society.

If a multi-lingual society such as Basque society wishes to participate in this technological progress, it must assume responsibility for adapting technology to its linguistic environment, reaching natural person-machine communication. Therefore, this programme sets out the following objectives:

- Improve the quality of life of citizens, facilitating interaction with diverse systems, communication, provision and reception of services and accessibility to information.
- Promote the standardization of the Basque language at all levels.
- Facilitate access to the Information Society.
- Contribute to the industrial growth of the country and provide it with the mechanisms that facilitate the internationalization of its products or services.
- Provide citizens, companies and institutions with tools to obtain a more precise use of language, greater diffusion and easier location.
8.2 Build the Future or Diversification

This area is aimed at the sectoral diversification of the Basque production fabric. It responds to the obligation of the public sector to confront the medium and long term, with the aim of securing the most favourable conditions so that companies that are set up in the future do so in sectors that are positioned at the forefront of the knowledge society. In order to build this future, new sectors which contribute to the diversification of the business fabric towards knowledge-intensive sectors will be promoted through science and technology.

This area focuses efforts on the “what for?” of science, technology and innovation with a view to the future with a finalist vocation and aimed at the business specialization of the Basque Country in technology and knowledge-intensive sectors in which they act as vectors of production diversification. With this objective, action is clearly aimed at obtaining results which are likely to be turned into business and sectoral opportunities in the future, without forgetting that the base and origin of these results also lies in scientific research.

For this reason, given the importance of the scientific base of many of these new sectors, a differential aspect of this area is the consideration of proximity between science and the company and the establishment of new links and relations between these environments, up to the point of being mistaken for breaking down traditional barriers. In fact, this is one of the principles that gave rise to the Cooperative Research Centres (CRC), an initiative on which these sectoral diversification strategies revolve to a large extent.

The most important responses for diversification of services and industry are determined by a set of common action principles, which are the following:

- Drafting and definition of integral business development strategies for each of the sectors identified.
- Creation of Cooperative Research Centres (CRC) to support diversification with a strong scientific component.
- Support for the creation of new companies with a vocation for rapid growth and internationalization.
- Training of researchers and technologists capable of developing their professional activity in the field of research in companies as well as with scientific technological supply agents.

Furthermore, the Plan specifically contemplates a set of sectoral diversification bids which come into fruition by means of an integral strategy, whose main characteristics are detailed below.

8.2.1 BIOSCIENCES STRATEGY: BIOBASQUE 2010

The area of BioSciences was included as a Strategic Area in the previous Plan, whereby it was identified as an emerging business sector. Hence, bioBASQUE 2010 was designed, an integral strategy for the development of a new business sector related to the BioSciences. The actions carried out to date have acted as a catalyst, increasing the scientific-technological critical mass, coordination between agents and essentially, creating around thirty new companies.

In this respect, among the agents involved, the Basque Foundation for Research and Innovation in Health is particularly relevant, in the heart of which the Basque Institute for Health Innovation/O+Berri (permanent innovation platform of the System, committed through excellence to the constant reinvention of its organizational systems and its management tools and systems) and the Basque Institute for Health Re-

**Biosciences: Scientific Areas and Business Applications**

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search/O+Iker (grouping activities of the Foundation that are most directly related to biomedical research) have been set up.

At present, the most interesting markets are those related to health, particularly pharmaceuticals and biomaterials. Pressure to develop new medicines and more personalized therapies creates enormous business opportunities for biotechnological companies. Within this general framework, the challenges identified for the sector in the medium-long term are the following:

- **Convergence of Technologies**: Evolution and integration of technologies of different origins which are combined to develop new products, services or processes.

- **Development of powerful Technological Platforms**: Evolution towards technologies that jointly integrate or use technologies, allowing a wide range of responses to more global questions. Domination as well as research creativity is essential for scientific-technological development. The capacity to obtain mass data (gene sequencing, identification of proteins and metabolites, high performance screening, etc.) and extract relevant information represent a key element of competitiveness.

Within Health Technology, there are two areas of particular interest; on one hand, ageing, in relation to gerontotechnology, directing technology towards improving the quality of life of people of an advanced
age and on the other hand, Disability, related to biomedical engineering, research into disabilities to improve the quality of life of disabled people.

The Health Technologies converge technologically with the biosciences, nanosciences, manufacturing, ICTs and cognitive technology, making products accessible to the market and the final user, economically accessible in addition to generating new companies in the market with the ultimate aim of improving the quality of care and life for people.

8.2.2 MICRO-NANOSCIENCES STRATEGY: NANOBASQUE 2015

In recent years, NanoScience and the Nanotechnologies have gone from being emerging scientific technological branches, and at times hidden or integrated into wider and more restrictive fields of basic research, to become one of the leading lines of basic and applied research, which is developed in advanced countries. It is considered as one of the areas with the best future for industrial development, as the first examples of products that integrate advances in this discipline are being seen on the market.

The Basque Country has been firmly committed to the implementation of initiatives mainly in the field of strategic research. The NanoBASQUE 2015 Strategy has been defined to support and promote the business development of the nanosciences in the Basque Country.

NanoBASQUE 2015 is an integral strategy that ranges from science development and knowledge generation, essential in this field which is still in its early stages, to applied research, technology transfer and business development.

It is intended that by 2015, the Basque Country will have become a benchmark region in the development of nanotechnology in Europe, in the field of R&D as well as industrialization; there will be a wide industrial sector working in nanotechnology, based on start-ups and spin-offs focusing on nanotechnology, and business groups with a turnover that represents a significant percentage of the Basque GDP and nanotechnology will be an important component which is integrated in a wide variety of products and processes of Basque companies in nu-

NanoBASQUE 2015
merous sectors, whereby the Basque Country will participate in the important market that is currently awaiting.

The research areas are:

- Basic research in nanostructures and low dimensional structures
- Nanomaterials and nanosystems
- Nanelectronics
- Nanobiotechnology

**8.2.3 ALTERNATIVE ENERGY STRATEGY**

In order for the energy sector to continue being a strategic sector in the country, it is necessary to be firmly positioned in the new alternative energies.

These areas require scientific-technological critical mass to turn the Basque Country into a Competence Centre in new energy sectors, essentially those related to renewable energy sources.

The commitment to alternative energies is particularly focused on a series of research lines closely related to:

- Wave Energy
- Production of Biofuels
- Fuel and hydrogen cells, principally for stationary and portable applications, type MEA and SOFC
- High temperature thermoelectric solar energy systems, through the development of systems for capture, accumulation, control and auxiliary systems.

Within the framework of this strategy, the new Energy Cooperative Research Centre will play an important dual role: On one hand, knowledge generation through the setting up of reference research groups...
and providing equipment for research. On the other hand, coordination and activities as a network with the aim of taking maximum advantage of existing scientific and technological capacities to strengthen the proposed lines of work.

**8.2.4 ELECTRONICS FOR INTELLIGENT TRANSPORT STRATEGY**

In recent decades, economic growth experienced by society has led to a significant increase in the mobility of people and goods. In this context, society, the market and industry demand constant improvements to transport and Intelligent Transport Systems (ITS), defined as transport systems of the future, which aim to satisfy social and individual demands.

In the Basque Country, the railway, automotive and aeronautics as well as the spatial sectors, core sectors of this programme, concentrate increased capacity on the development of new technologies, new products and new services which enables evolution towards ITS. The challenges identified for each of these sectors are:

**Intelligent Transport Systems**

- Electric and Electronic Engineering and Information and Communication Technologies applied to transport infrastructures, vehicles or transport and users. The ITS systems allow essential information to be shared, providing society with added value in transport networks, greater security and the minimization of the environmental impact.

- Technological Surveillance Project. This refers to the creation of a service which provides useful information at the appropriate moment, saving time and effort, and allowing the companies, organizations and institutions associated to the Transport and Logistics Cluster to be up to date.
• Cluster Training Catalogue. Compilation of existing training in Transport and Logistics in the Basque Country and its comparison with the training needs of associates to detect uncovered niches or needs.

• Fleet Optimization Project. Study into existing solutions for fleet management and optimization (fleet rationalization, reduction of empty trips, etc...) to improve the competitiveness of the Cluster companies.

Railway (High Speed)

• Information Technologies. On-board, real time, broadband, safe telecommunications. Wireless, safe train-track telecommunications and on-board internet and multimedia.

• Highly reliable and long lifecycle electronics. Applications related to sensorics, integral train control systems, electronic security devices, stability and comfort.

Automotive Industry

• Information Technologies. Applications for the location of vehicles, en-route guidance and computerised traffic management.

• Electronics, mechatronics and sensorics. Applications related to safety, electronic vehicle control, incorporation of new, low cost features for comfort.

• Control and electronic power systems for hybrid engines. Applications for evolution towards the hybrid vehicle (power splitter, power control units, etc.).

Avionics

• Information Technologies. Applications related to the location of aeroplanes, computerised traffic management, communication systems with aeroplanes, global infrastructures and HMI interfaces.

• Modular and integrated electronics. Applications such as sensorics, electronic safety devices, communication equipment, automatic navigation and guidance, diagnosis and control equipment and electronic power systems for hybrid engines.

Space

• Information Technologies. Applications related to the on-board data management, data transmission and communications, integration software, simulation and monitoring.

Electronics for Intelligent Transport: Scientific Areas and Business Applications
• Modular and integrated electronics. Applications such as: electronic control systems safety for deployment or sequencers, control electronics (guidance and control systems) and useful load electronics (optoelectronic technologies).

Naval
• Improvement of monitoring and data capture systems for on-board safety.
• Control and automation of navigation.

• Automation of the optimization of logistics chains.
• Optimization of the use and occupation of vessels.
• Management of empty containers and imbalances of containers.
• Traffic Management Strategies.
• Decision support systems by means of information technologies.
• Intelligent control of engines.
• Vessel-land vehicle interoperability for goods and passengers.
8.3 Eco-Innovation

With respect to the environmental balance, the Plan considers a series of actions, all of which are focussed on developing the necessary knowledge and technologies to promote the environment as an essential variable in our development.

Furthermore, the environment is conceived as an opportunity to reinforce innovation with the aim of increasing competitiveness and offering products and services that reduce our ecological tracks. In this respect, the environment and innovation combination, whose paradigm is eco-innovation requires specific support mechanisms and programmes due to its strategic nature.

The Basque Environmental Framework Programme 2002-2006 and the Basque Strategy for Sustainable Development 2002-2020 have served as the Reference Framework to set the objectives and contents of this area.

A central aspect is the tractor effect that the fulfilment of new standards and regulations may and must have on innovation. Therefore, eco-innovation (ecology-innovation combination) represents a central element to make the environment an innovation vector applied to products and services, integrally considering their life-cycle.

In accordance with the aforementioned, the area of sustainability and natural resources brings together the following characteristics:

- Direct R&D&I towards sustainability and quality of life.
- Pursue the development of an environmental industry which offers services and products aimed at improving the sustainability of production activity as a whole.
- Advance towards a sustainable industry that makes eco-innovation one of its competitiveness factors

Furthermore, the Plan has an impact in this field through the development of the strategy set out below.

8.3.1 ENVIROBASQUE

This consists of the launch of a strategy aimed at aligning the scientific, technological, business and social capacities available in the Basque Country, in order to be in a position to take advantage and value business opportunities in relation to protecting the environment: creation of global knowledge-intensive companies and development of technologies whose activity is related to environmental protection and regeneration.

The current production model, even with the reflections that sustainability is provoking in the heart of our society, leads to significant environmental impact, causing water, land and atmosphere pollution or reducing the biodiversity and other natural resources.

In order to confront this situation, strategies and activities have been implemented to prevent and control pollution, recycle waste generated, combat climate change and conserve the biodiversity.

Linked precisely to these policies, the environment offers a wide range of business opportunities related to prevention and/or minimization of the environmental impact of our production and consumption model (new production processes, alternative energies, energy and material efficiency, water treatment, new consumption guidelines, etc.), such as environmental protection, recovery and regeneration of deteriorated areas (landscape restoration, new models of territory planning, promotion of the growth of native species and breeds, environmental adaptation of infrastructures, etc.).

EnviroBASQUE: Líneas de Investigación

- Pollutant Prevention and Control
  - Water Treatment
  - Cleaning up of Land
- Waste Minimization and Recycling Residues
  - End of Materials Cycle
  - Life Cycle Analysis
  - Revaluation of Waste
- Fight Against Climate Change
  - Carbon Sequestration
  - Distributed Energy Generation
- Conservation of Biodiversity
  - Genetic Bank of Autochthonous Species and Breeds
  - Monitoring and Valuation of Biological Diversity
- Territorial Sustainability
  - Sustainable Consumption and Environmental Economy
  - Landscape Restoration
The report on the State of the Environment in the Basque Country 2004 presents as an initial conclusion and summary of the entire document, that the economic development and consumption model in the Basque Country is still a long way off finding an environmentally sustainable path. This strategy proposes advancing on this track, overcoming development inertias of the past, scarcely sensitive to environmental considerations, and turning these needs into the base to generate new technology and knowledge-intensive business opportunities, and adapted to the sought-after framework of sustainability.

8.3.2 METEOROLOGY AND CLIMATOLOGY

Activities related to these fields shall be related to the provision of information for decision-making in diverse areas, such as administration, the industrial sector, the transport sector, tourism, energy and others; for adverse meteorology scenarios, winter maintenance, agriculture, fishing, health, power generation, efficient use of energy, maritime transport, air transport, sports, etc.

In the case of Meteorology, applications and/or products will be focused on modifications to processes, development of control elements, improvements to data and impact of meteorological phenomena and the implementation of the research results which must be carried out in a short or medium time period.

In the case of climatology, applications and/or products may represent tools for decision-making, particularly in the most strategic phase or for the development of climatological control elements and the implementation of the research results which must be carried out in a short or medium time period.

In summary, the products which are expected to be obtained from research in this area are:

**Meteorology**
- Meteorological modelling and prediction.
- Agrometeorological, hydrometeorological, oceanometeorological, winter maintenance, biometeorological, bioclimatological modelling.
- Registration and analysis of atmospheric phenomena.
- Registration and analysis of oceanic phenomena.

**Climatology**
- Pressure on the environment and climate.
- Dangers and natural disasters.
8.4 Social Innovation

The only thing that remains stable today is change and even so, this statement is not altogether true given that the speed at which change takes place is on the increase, hence altering the very essence of change.

Acknowledgement of this statement means taking into account that changes do not only affect the economic sphere, but they also have an impact of the same intensity on society as a whole. The Market as an institution, with its rules of play, and success in it through the competitiveness of some and the capacity to purchase of others, is no more than an area for interaction and on many occasions, it is not the most relevant.

Innovation, as the social phenomenon that it is, cannot be limited to innovation in products, processes, marketing and organization. With the aim of covering its entire complexity and wealth, it is necessary to introduce the human dimension, interaction between people, between organizations, etc., which extends to the commercial sphere and places it in a context in which the cognitive dimension is the unit of analysis regardless of the area in which it is carried out.

For this reason, this area takes all aspects related to human action into consideration, and particularly its understanding associated to the changes that the new paradigms and worldwide scenarios introduce. Knowledge of the ways in which individuals and society as a whole interact with the area, the result of which is the fruit of building factors and resources whose exploitation condition the capacity to build new resources in the future also takes on special importance. These are the questions that are dealt with in this area and whose main instruments are:

- Research into social sciences and humanities.
- Creation of Basic and Excellence Research Centres that explore these questions within the limits of knowledge.
- Implication for society as a whole and consideration of the importance of innovation at all social levels.

This area contemplates development in three specific areas such as business transformation, research into intelligent environments and territories and social research.

8.4.1 Business Transformation

All social, environmental and economic change affects companies, as they have to move and adapt in advance to survive in the framework of intense competitiveness, within a context in which economic activities undergo a rapid and growing mutation.

Research into the changes that are produced and how they affect the evolution of companies takes on significant importance in the new paradigm. Better knowledge of these processes must favour the search for solutions for the internal management of the company and for relations built with its environment, with a special impact on learning.

8.4.2 Intelligent Environments and Territories

In this area, the need to provide socio-economic dynamism to the Basque Country through sustainability has been determined. The creation of value in the three sides of the sustainability triangle: economic, environmental and social, is sought in the short and long term, contributing in this way to increasing the well-being and authentic progress of present and future generations.

The latent and unstoppable process towards the digital revolution which is taking place today, is accelerating the transformation of today’s society towards the knowledge society, which is characterized by working in networks and the emergence of innovative environments. The idea of Intelligent Territory and Creative Economy Area are new dimensions of the knowledge based economy. The new economic era requires a new class of regions and territories in general.

The Intelligent Territory is the culmination and synthesis of the creative territory, digital territory and science, in which the arts and sciences are united in urban ecology and technological advances in communication.

In this general framework, the main challenge faced by these territories is retaining and attracting strategic resources (capital, companies and talent), ensuring their connectivity throughout the world and promoting the development of belonging to living networks. This evolution involves:

- New Urbanism and Architecture from the competitiveness and multi-disciplinary approach and in accordance with the principles of sustainability.
• Connections and dialogue with the environment. Networks of cities.
• Latest generation digital infrastructures.
• Environmental awareness and responsibility.
• Coherent structures of territory governance.
• Transport and Logistics.

8.4.3 SOCIAL RESEARCH

We currently find ourselves in a redefinition process of research into areas of social sciences and humanities. The second globalization and the total irruption of the knowledge society, make knowledge, the economy and the environment key fields of research due to their huge impact on society.

For this reason, it is necessary to establish, promote and encourage research lines which develop specific analysis activities in these areas, from the experimental point of view as well as their influence on society, linking them to aspects related to innovation.

Social research will therefore be aimed at different areas of interest such as: the transformation towards the Information and Knowledge Society, knowledge transfer, the role of networks and the social aspects of innovation, climate change, transport and the environment and the impact of globalization on small economies. This excellence and competitive research must contribute towards progress in actions in different contexts and to global problems.

Therefore, the knowledge society will mark new ways of doing business, communication styles affecting society, constantly modifying the social uses of technology.

Furthermore, new values are being developed due to the irruption of innovation, science and technology, bringing about changes in practices and social behaviour, which have a direct impact on the economy and competitiveness.
9. Action Programmes
The set of programmes set out below respond to the question, “how?”. All of the programmes, which have been designed with the aim of efficiently and effectively assigning public funds, represent a typology with the following main characteristics:

- Programme Contracts are designed for the competitiveness of clusters and sectors as initiatives which integrate a series of actions and services which make up a package of customized solutions to meet the demands of the business sector and which range from R&D projects to dissemination, training and technology incorporation actions with the aim of not only generating knowledge per se, but also subsequently applying it to the production fabric to improve its competitiveness.

- The criteria for the non-competitive public funding of the Technological Centres is going to be modified to set out their orientation towards results more satisfactorily.

- Future commitment will be specifically and integrally administered in order to provide research with the human, technical and financial capacities required to progress in the generation of new knowledge, which in turn, is directed towards laying the foundations for the production of goods and services that increase competitiveness and the standard of living in the Basque Country.

- New initiatives are considered in which the Administration is going to play an important role in new projects associated to future commitment, which require the involvement of the public sector as a vector for their development and catalyst for private initiative.

Of course, aid programmes are included among these programmes and round off the map of public resources, acting as a catalyst of the Basque Innovation System as a whole.
### List of Programmes included in the Plan and their Strategic Lines

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<td>Sectoral Diversification Programme</td>
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<td>Public Funding of Orientation towards Results T.C.</td>
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<td>Specialization and Boost to Agents of the RVCTI</td>
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<td>Creation of Innovative Companies with a Global Presence</td>
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<td>Dissemination of Science, Technology and Innovation</td>
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<th>Impact Level</th>
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<td><strong>Classes</strong></td>
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9.1 **Action Programmes to Increase the Competitiveness of Today’s Business Base**

The aim of these programmes is to raise the innovative level of Basque industrial and services business fabric. They are based on identifying business demand in order to guide supply agents to respond appropriately to these needs. A dual approach is proposed: first of all, “INNOVA-cooperation”, through clusters or sectors seeking to identify needs to incorporate knowledge at a sectoral level, which may be satisfied through cooperation projects; and secondly, “INNOVA-company”, which promote the development innovation capacities in the company based on strategic reflection. These two initiatives are complemented with a series of programmes, “OPEN INNOVATION PROGRAMMES”, the aim of which is to support companies so that they develop technological (product, process) and non-technological (marketing, organization) innovation projects, either individually or as part of a cooperation.

**Demand Oriented System**

9.1.1 **INNOVA COOPERATION INITIATIVE**

This model is conceived as an integral package of solutions designed to respond to the needs of the clusters and sectors that currently make up the country’s production fabric.

It integrates the development of the necessary innovative activity to generate knowledge and stages of transfer and application of the generated knowledge at the request of companies.

a) Needs identification and opportunity detection phase: Strategic Sectoral Observatories.

The response to the vocation of orientating the Innovation system to business demand and the search for results is based on the identification of needs and opportunities. When analyzing needs and opportunities in the different sectors or clusters, segmentation must be carried out according to criteria related to the position in the value chain and/or size. This initiative attempts not only to respond to the most advanced companies of the sector, but also to contribute to progress in general.

For this, “Strategic Sectoral Observatories” have been established in each cluster or sector. In the case of clusters, they are based on strategic reflection and the corresponding Programme Contract is drawn up with the cluster and sectors for the development of the Observatories. Coordination of the activities of the Observatories shall be carried out by the Basque Innovation Agency.

“Strategic Monitoring and dissemination of strategic information in companies.”
This initiative contemplates making monitoring and strategic information dissemination mechanisms available to the companies and sectors.

Therefore, the Strategic Sectoral Observatories also offer a strategic intelligence service (it is necessary to analyze trends and work with forecasts to detect opportunities and needs) which provides valuable information for decision-making in the search and exploitation of business opportunities.

It is not just a question of supplying the companies of the clusters and sectors with valuable information responding to their specific interests (market, competition, technology, replacement product, etc…) but also promoting and revitalizing a sufficient group of companies in a specific field, which will be defined in collaboration with the clusters and sectors, with the aim of mobilizing them and involving them in the reflection on the change brought about by technological development, new tendencies in the market in which they have positioned themselves, etc.

**INNOVA COOPERATION Initiative**

b) Project definition and prioritization phase: Sectoral Innovation Agenda.

In response to the needs and opportunities detected in the previous phase, projects are defined and prioritized, which make up the “Sectoral Innovation Agenda”.

It is necessary to establish criteria to prioritize the projects according to their impact on the sector. The projects must incorporate impact indicators which allow them to be compared and monitor those selected.

These agendas must enable the Technological Centres to focus and orient their specialization, and the advanced services sector to improve their supply, adapting it to the real needs of the business fabric.

c) Project implementation phase: Programme Contracts for the competitiveness of clusters and sectors.

Once the projects have been defined and prioritized, it is necessary to analyse the innovation agendas of the different clusters or sectors to identify transversal projects that have an impact on various sectors or clusters. This function will be carried out by the Basque Innovation Agency, within the framework of its coordination activity.
On the other hand, it is necessary to determine whether the knowledge required already exists in the Basque Innovation System, or whether it is necessary to develop a research project to develop the required knowledge. The Basque Innovation Agency, as coordinator of the Basque Innovation System, will be responsible for verifying this question.

If the necessary knowledge exists in the system, the following phase, establishing a transfer project, will be initiated.

If the required knowledge does not exist in the Basque Innovation System, a research project will be launched and the corresponding consortia will be set up, in which the following may participate: different agents of the innovation system with capacities in the area in question (supply specialization), as well as companies interested and willing to cooperate in the development of the project. These projects will be supported via the corresponding programme contract for the competitiveness of clusters and sectors. This favourable treatment is justified provided the knowledge generated is made available to the group of companies in the sector.

Another element to bear in mind is the close collaboration between diverse agents in so far as the cooperation between agents represents a favourable vehicle for enhancing business competitiveness.

d) Knowledge transfer phase: Bringing the knowledge to the company.

The objective is to bring the knowledge to the group of companies in the sector. This means that each project has a specific transfer plan considering the different instruments available: companies that participate in research projects in exchange for collaboration obtain a direct transfer of knowledge; for the rest, other channels will be used such as diffusion workshops and technological and non-technological training which will be organized via the “Innovanet Network”, the possibility of incorporating trained fellowship students in the company.

In the case of small companies, design formula with integral "turnkey" solutions are used which will be transferred via the services sector.

e) Monitoring and evaluation phase

The Basque Innovation Agency will monitor and evaluate the projects, and will also be responsible for the joint evolution of the R&D&I Programmes.

For this, a Programme Management Committee will be created with the involvement of the Administration, representatives of the demand side (clusters and companies) and representatives of the supply side (Technological Centres, University, etc.).

9.1.2 INNOVA COMPANY INITIATIVE

The Innova Initiative responds to the vocation to create innovative organizations, incorporating innovation into the business strategy as an internal capacity of the organization and promoting systematic innovation as a means to permanently improve their competitive position.

It is born with the objective of creating an environment that facilitates the evolution of organizations on the innovation path, aspiring to become a useful tool for those companies that wish to innovate or wish to do so systematically.

In both cases, as those who innovate are people, training actions are contemplated for the managers who must lead the change (“Excellent Managers”), as well as for their work teams.

In this way, innovative companies in our country are boosted, understanding these to be those that fulfil two conditions:

- Be an organization with a culture and capacity to innovate.
- Have incorporated the concepts of intention, reconsideration and systematic into their innovation activity, enabling them to constantly innovate.

Furthermore, they innovate in the product, process, market and organization, enabling them to maintain their competitiveness in the long term.

The initiative is structured into three phases:

9.1.2.1 Phase 1 Raising Awareness

The actions of this phase are aimed at raising awareness of the managers of organizations of the need to innovate, by means of innovation workshops.

The Innovanet Network plays an essential role in this phase, obtaining capillarity and bringing innovation closer to the SMEs and to all economic sectors.
9.1.2.2 Phase 2 Strategic Reflection

Its objective is to tackle the current situation of the company and detect which elements must be developed in the future in order to be an innovative organization, in accordance with the level of maturity of the capacities required to innovate.

9.1.2.3 Phase 3 Drafting of the Innovation Agenda

As a result of the reflection, the company will draw up its innovation agenda which will include two types of action, depending on its capacities:

- Projects whose result is the introduction of incremental innovation, and which in turn allow the company to acquire the capacities to confront systematic innovation. These projects will be supported by means of resources from the INNOVA initiative.

- Strategic projects for the company in the sphere of process, product, market or organization innovation. These projects will be supported by the GAITÉK, INNOTÉK and ALDATU programmes, which are explained in the following section.

When the company draws up the Innovation Agenda, it acquires a commitment to lead its Agenda towards the path of systematic innovation.

9.1.3 OPEN INNOVATION

This block brings together two important action lines, in which the company is a key player in the development of innovation as a means of creating value. These actions may arise from the implementation of the projects identified in the pectoral and business innovation agendas. However, they are also the framework of support for the development of joint or individual projects which the companies wish to develop regardless of whether they have previously participated in the two models of the INNOVA (COOPERATION AND COMPANIES) initiative.

These two action lines are:

- Support for marketing and organization innovation, and particularly for all dimensions suitable for creating value other than technology: common platforms, personalized solutions, new consumers, new experiences for consumers, value capture, organization, value chain, points of presence and channels, consumer networks and brand. This line seeks to ensure that innovation in the company is not a sporadic occurrence, but instead it is integrated into the culture and strategy of the organization in each and every one of the elements of the company’s value chain. For the development of this type of initiatives, support will be provided by a specific new generation programme to improve the competitiveness of companies through marketing and organizational innovation (ALDATU).

- Support for technological innovation. As far as technological innovation is concerned, namely innovation in processes and products, projects sponsored by companies or groups of companies that wish to take on research projects, either through their own R&D units or by contracting Technological Centres or Universities, will be supported. The knowledge developed will belong to the company or groups of companies. Financing shall come mainly from private funds. Furthermore, the cooperation and creation of consortiums is included as a formula to obtain sufficient dimension to develop R&D&I by the business fabric. The development of activities related to this field often requires the cooperation of capacities and competences found in different organizations. For this reason, the setting up of consortiums represents an essential requirement to enable certain R&D&I projects to be carried out.

Two types of initiatives:

- Improve the competitiveness of companies through the promotion of projects that include R&D&I activities to develop new products (GAITEK).

- Improve the competitiveness of companies through the promotion of projects that include R&D&I activities to improve products and processes (INNOTEK), as well as other Accompanying Actions, which increase the efficiency of these activities.

9.1.4 PUBLIC FUNDING OF RESULTS ORIENTED TECHNOL OGICAL CENTRES

9.1.4.1 Justification

The Technological Centres are a differential and central element of the Basque Innovation System, whereby they are key players to become leaders in the knowledge society, respond to the needs of companies and drive the research work towards the necessary business applica-
tions for diversification into the areas determined by the Basque scientific-technological policy.

The Basque Technological Centres are now an essential asset and a powerful reference in the European competitiveness context. In addition to the intrinsic value of each of them, their leading potential is that they are set up as inter-related parts of a broader system.

They are not exogenous infrastructures, nor do they operate independently from the other business and social agents which make up the competitive reality of our country, and they are concerned about the transfer of the knowledge and skills acquired to the entire system.

They must contribute to raising the innovative level of the Basque business fabric in industrial and services areas with high added value, by means of a solid commitment to the Basque business fabric, and aligned to areas within the Basque scientific-technological policy.

This transferable results orientation in areas with an important R&D&I culture will condition the non-competitive public funding of the Technological Centres, based on the results obtained in a series of outputs such as the creation of companies or creation of patents or mobility of researchers, all of which are related to the areas of strategic interest for the Basque Country, including biosciences, nano-sciences, alternative energies and electronics for intelligent transport.

### Indicators to evaluate the results orientation (results efficiency) which condition public funding

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<tr>
<th>RESULTS EFFICIENCY</th>
<th>OBJECTIVES</th>
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<tr>
<td><strong>ADDED VALUE ANALYSIS</strong></td>
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<tr>
<td>Added value by R&amp;D&amp;I under contract</td>
<td>80%</td>
<td>0.08</td>
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<tr>
<td>R&amp;D&amp;I income under contract with new technologies</td>
<td>20%</td>
<td>0.05</td>
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<tr>
<td><strong>ALIGNMENT WITH DEMAND</strong></td>
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<tr>
<td>Added value for contracted R&amp;D&amp;I in the Basque Country</td>
<td>75%</td>
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<td>Cooperation Cluster Projects</td>
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<td><strong>PRODUCTIVITY</strong></td>
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<td>Individual or joint Patent Applications (EPO) per 100 researchers</td>
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<tr>
<td>Individual or joint Patents approved (EPO) per 100 researchers</td>
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<td>0.07</td>
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<tr>
<td>Individual or joint Patents registered (EPO) and used internally and/or by third parties per 100 researchers</td>
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<td>0.08</td>
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<td><strong>ENTREPRENEURSHIP</strong></td>
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<td>NTBS created during the period audited per 150 researchers</td>
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<td>NTBS invoiced &gt;1 M€ per 150 researchers</td>
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<tr>
<td>Increase in employees in NTBS's that invoice &gt;1 M€</td>
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<td><strong>NETWORKING</strong></td>
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<td>Leaders of European projects per 100 researchers</td>
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<td>European projects with Basque companies</td>
<td>40%</td>
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<td>Rotation of researchers from the centre to the business fabric per 100 researchers</td>
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<td>0.04</td>
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<tr>
<td><strong>SCIENTIFIC-TECHNOLOGICAL COMPETENCE</strong></td>
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<td>SCI publications per 100 researchers</td>
<td>20</td>
<td>0.08</td>
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<tr>
<td>Doctors on the payroll per 100 researchers</td>
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<td>0.07</td>
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### 9.1.4.2 Two Types of Funding

Efficiency Criterion: Measures the quality and impact of funding for R&D&I activities of the Technological Centres. According to this criterion, the allocated funding represents 50% of the non-competitive public funding granted to the Technological Centres.

This criterion is evaluated annually and in accordance with the fulfilment of objectives established by a series of indicators aligned with the objectives set out in the Basque scientific-technological policy.

Criterion based on the results oriented income structure: Measures the results oriented income structure of the Technological Centres Ac-
According to this criterion, the allocated funding represents 50% of the non-competitive public funding granted to the Technological Centres.

This criterion is evaluated annually and in accordance with the fulfilment of objectives for which three different indicators are used:

- **Scientific-Technological Incubation Projects** carried out in cooperation with agents of the Basque Science, Technology and Innovation Network.
- **Scientific-Technological Network Projects with a theme** that structure joint research between two or more agents of the Basque Science, Technology and Innovation Network (Basque Universities, R&D Business Units, etc.).
- **Actions of Special Interest** such as international mobility, infrastructure creation and purchase of advanced scientific equipment, dissemination, preparation of reports, studies, etc.

### Indicators to evaluate the orientation towards results (results oriented income structure) which condition the non-competitive public funding

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<tr>
<th>STRUCTURE OF RESULTS ORIENTED INCOME</th>
<th>OBJECTIVES</th>
<th>WEIGHT</th>
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<tbody>
<tr>
<td>R&amp;D&amp;I INCOME UNDER CONTRACT</td>
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<td>0.5</td>
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<tr>
<td>Total R&amp;D&amp;I Income under contract</td>
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<tr>
<td>EUROPEAN RETURNS</td>
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<td>0.25</td>
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<tr>
<td>Income obtained from European Union R&amp;D&amp;I aid programmes (Framework Programme, CIP)</td>
<td>12.5%</td>
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<tr>
<td>TOTAL R&amp;D&amp;I INCOME</td>
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#### 9.1.5 SPECIALIZATION AND PROMOTION OF RVCTI AGENTS

The variety and wealth of the Basque Science, Technology and Innovation Network requires funding mechanisms aimed at the rest of the agents that make up this network. For these organizations, the formula used to date will be considered valid, via the SAIOTEK Programme, which grants non-returnable subsidies conditioned by the economic research mass (researchers, technicians and fellowship students) affiliated to the beneficiary centre.

These grants cover different activities such as:

- **Specialization Projects** aimed at intensifying knowledge in Scientific-technological fields in line with the Basque Science, Technology and Innovation Policy.
- **Internationalization Projects** aimed at establishing international cooperation projects and agreements backed by the agents of the Basque Science, Technology and Innovation Network.

#### 9.1.6 INCORPORATION OF TECHNOLOGISTS IN COMPANIES

The recognised importance of human capital in the proposed model, in which people are the energy to meet the new challenges, requires a clear orientation of instruments towards the promotion of innovation which influences directly on training and education.

The incorporation of technologists in companies through grants and employment contracts is a key requirement in the Basque Innovation System, which improves the competitive position of companies. People and their own professional career are the best mechanism to transfer knowledge between agents and create the necessary crossed-fertilization of ideas. In order for this crossed-fertilization to produce the expected results, multi-disciplines becomes an important asset. A greater balance between qualified professional profiles (scientists, technologists, entrepreneurs, etc.) will further enrich the system, facilitating the necessary mixture to allow new future projects to emerge. For this reason, the following options are considered:

- **Incorporation of technologists in companies** as the most effective way of transferring know-how to the company by means of the integration of qualified researchers in the technological and research centres. An initial contact shall be through the performance of joint development projects in which training through implementation is the cornerstone.
• Support for the performance of Doctorate Theses in Companies, as a method of generating a high level qualification and important added value in the Basque business fabric.

• Transfer of Technologists from the Company to the Technological and Research Centres. Similarly, with the aim of obtaining a greater business vision within the centres, the transfer of staff from companies to the centres will be supported, whereby the initial contact is based on joint technological interests.

9.1.7 DISSEMINATION OF SCIENCE, TECHNOLOGY AND INNOVATION

Dissemination represents a set of actions which promotes knowledge transfer between agents of the Basque Innovation System from a multi-directional point of view. For this reason, a specific programme has been developed which complements the dissemination contemplated in the integral programmes (Programme Contract for the competitiveness of clusters, Diversification Programme, Results oriented public funding and Saiotek).

Therefore, this programme will cover the dissemination of knowledge developed by any agent of the Basque Innovation System that wishes to know the results of their R&D&I activities.
9.2 Action Programmes for Sectoral Diversification

9.2.1 SECTORAL DIVERSIFICATION

This programme, which also presents an integral focus, is designed to respond to research in knowledge areas that act as a base for the development of new production sectors in the Basque Country.

As in the case of the Programme Contract for the competitiveness of clusters/sectors, this programme brings together a series of support actions, all of which are related to the acquisition and construction of capacities and competences in knowledge areas of the future.

Sectoral Diversification Programme

9.2.1.1 In response to the commitment and opportunity niches

Integral strategies have been defined for the development of the commitment and opportunity niches, which sometimes require the cooperation of other Government Departments and Regional Councils (inter-departmental cooperation).

These strategies contemplate actions of a diverse nature, including the following, which are all covered by this programme:

- Generation of infrastructures and the purchase of advanced scientific equipment. Diversification strategies, in particular, as well as those that set out to improve the competitiveness of existing sectors contemplate the creation of Cooperative Research Centres (CRC) among their actions. This represents the commitment to develop certain scientific-technological capacities linked to diversification in the first case. In the second, the competitiveness of certain sectors exposed to competition due to the use of new materials also gives rise development of CRCs with the objective of improving their scientific-technological capacities. This occurs in the case of new materials, which are often presented as replacements to traditional products in the industrial sector in the Basque Country. Within the field of increasing competitiveness, the creation of CRCs is also considered with the vocation of offering technological responses to a certain sector, as in the case of tourism.

- Development of research lines based on existing knowledge or otherwise, carried out through research and/or practical experience with the aim of acquiring new knowledge on the foundation of phenomena and observable events or alternatively, aimed at a certain use or application.

These research lines will represent the areas of specialization in which the Basque Country will position itself within the framework of a wide variety of knowledge areas, including biosciences and nano-sciences.
The integral nature of the strategies associated to the diversification programmes also considers support for the lines of application which, in short, will enable the implementation and visualization of the bids, as well as the specialization trajectory:

- High level training activities for the research team.
- Activities related to the signing of national cooperation agreements.
- Scientific and technological monitoring activities.
- Placement of researchers and technologists of agents of the Basque Science, Technology and Innovation Network in foreign centres of excellence.
- Placement of leading international researchers and technologists with Agents of the Basque Science, Technology and Innovation Network.
- Recovery of scientific-technological researchers and technologists of Agents trained in foreign centres.
- Dissemination of scientific-technological research.
- The necessary training to develop the research carried out with guarantees of success is contemplated (training, specialization and attraction of researchers, development of infrastructures and availability of scientific-technological equipment, etc.).
- Transfer by means of different models is integrally contemplated. Specifically, part of the knowledge must give rise to new knowledge-intensive companies.

9.2.1.2 Monitoring and Evaluation

The Basque Innovation Agency, INNOBASQUE, and the Technological Innovation Department of the SPRI will act as the Technical Secretariat of these programmes.

Management Committees will be set up for monitoring and evaluation, in which the Administration, companies and scientific-technological agents will participate.

9.2.2 ETORGAI: BUSINESS APPLICATIONS

This programme supports the development of strategic business initiatives arising from business leadership and based on cooperation and making use of the scientific-technological capacities in the Basque Country. Therefore, ETORGAI arises from the need to strengthen the commitment to business R&D&I applications within the Basque business fabric and take advantage of the scientific-technological capacities of the Basque Country by means of stable cooperation through consortiums.

This programme considers the funding of integrated industrial research projects of a strategic nature, and in line with the areas of improving competitiveness and sectoral diversification defined in this Plan. The ETORGAI projects are defined by the global dimension of the innovation considered and by the intensity of the required R&D&I investment in order to meet not only the individual objectives of companies, but also to exercise a tractor effect on the economy of the Basque Country and contribute to its internationalization.

Along with ETORTEK (emphasis from support to the scientific-technological supply), the ETORGAI programme complements the commitment undertaken in terms of strategic research, with the aim of accelerating the pectoral and economic diversification processes through the creation of new products, jobs and companies.
9.3 **Scientific Policy Action Programmes**

9.3.1 **DEVELOPMENT OF THE RESEARCH CAREER**

This programme brings together a set of initiatives, which are all related to the development of the research career in all of its stages (training, specialization, mobility, attraction, etc.).

1) **Graduate Placement Programme with Agents of the RVCTI**

Support for final year projects in R&D for students in their last year of university, supervised and headed by research staff from the destination centre of the RVCTI.

2) **Training Grants for Researchers**

These grants are confined to the pre-doctorate phase of researchers and consider the following models:

- **Pre-doctorate Grant Programme**, which consists of two options: On one hand, the model applicable for centres in Spain and on the other hand, the model applicable for centres abroad. Its objective is the basic training in scientific, technological and humanistic research for university graduates who wish to do a doctoral thesis within a third cycle study programme, in any area of scientific, technological or humanistic knowledge.

- **Pre-doctorate Grant Programme associated to projects.** The aim of this grant programme is also scientific, technical and humanistic training, offering this training option within specific research projects funded by the research grant programme of the Department of Education, Universities and Research.

3) **Post-doctoral Grants (Specialization)**

Post-doctoral specialization grant programme for researchers abroad, the aim of which is the specialization in basic and applied research for doctors who wish to participate in a research project in foreign universities or research centres.

Through the call to support research groups, lines to support the hiring of doctors in the Basque university system will also be established.

4) **Mobility Programmes**

The Specialization and Mobility Programme for Researchers aims to strengthen ties with the scientific, technological and humanistic community of the agents affiliated to the RVCTI with leading researchers who usually work outside the Basque Country.

This programme considers the following models:

A) The model whose beneficiaries are visiting researchers who are integrated into scientific and technological research centres in the Basque Country (known as model A).

B) The model whose beneficiaries are researchers from scientific and technological research centres in the Basque Country, who are able to spend periods at centres outside the Basque Country.

5) **Attraction and Recovery of Researchers**

The aim of this action is to attract and recover excellent researchers from outside the System to carry out their work with agents of the RVCTI, hence strengthening capacities and knowledge in different areas of the Plan.

Along with the support programmes for mobility and foreign placements, the incorporation and recovery of researchers facilitates the openness of the System and introduces new, differentiated knowledge.

In this way, it is intended to complement existing capacities in the Basque Innovation System with the entrance of human resources that contribute to strengthening it, particularly in emerging areas of research.

The action will consist of defining a suitable combination of financial resources and direct intervention which facilitates, on the one hand, that agents of the RVCTI define the researcher profiles that they require, and on the other hand, a formal search process is set up at leading research centres around the world.

For this, IKERBASQUE, Basque Foundation for Science and Research, is going to develop a specific task which will speed up and revitalize the hiring of research staff for their incorporation with the different agents of the RVCTI. With this purpose, IKERBASQUE will safeguard the welcoming capacity of the different agents as an initial step to ensuring attractive job offers for researchers.

IKERBASQUE will be responsible for the fulfilment of the research quality and excellence demands of the people hired, guaranteeing, in turn, their research careers with in the Basque Scientific System.
The keys to the success of this action lie in:

- Continuous and pro-active monitoring of staff requirements at the centres of the RVCTI.
- Search and selection process in which the contribution of the candidates to the jobs is of prime importance.
- Commitment and willingness of the agents of the RVCTI to incorporate people into their organizations.
- Social valuation of external people and their incorporation into research work.

6) Basque Award for Research

The Basque Research Awards for research excellence. The award looks for recognition of research work carried out in the fields of Science, and Technology and Social Sciences and Humanities.

7) Qualified Research Assistants

With the aim of strengthening support capacities to University research, the Scientific Policy Directorate assumes responsibility for increasing the number of qualified research assistants that will be associated to the infrastructures and equipment of general research services.

9.3.2 BASIC AND EXCELLENCE RESEARCH CENTERS (BERC)

The growing importance of the Science subsystem in the new paradigm makes a firm commitment to its development in the Basque Country more important than ever. The creation of the Basic and Excellence Research Centres (BERC) represents this commitment to combine willingness to raise the level and quality of scientific research in the Basque Country and the attraction of leading researchers from outside the Basque Scientific System, who catalyze both excellence and the internationalization of the research carried out.

The creation of new research groups of reference in their areas of knowledge will be supported by the figure of researchers with a reputable and consolidated professional career. These people must lead the research groups made up of people from outside the system as well as researchers from the RVCTI. For this reason, this initiative will be closely related to IKERBASQUE, in so far as the latter must carry out an active role in the capture and attraction of researchers from outside the Basque Innovation System.

Its creation and launch will be organized gradually, in line with the following work schedule.

9.3.2.1 Identification Phase of the Basic and Excellence Research Centres

The areas of activity defined in the Plan will be taken into consideration for the identification of the BERC. The Department of Education, Universities and Research, with guidance from the International Scientific Advisory Committee, will establish a list of BERC which will be backed initially. Their constitution will be based on an active attraction policy of consolidated and reference researchers in their respective areas of knowledge, and with the capacity to lead a team of researchers mainly from outside the Basque Scientific System. IKERBASQUE will carry out the necessary tasks to recruit researchers in order to set up these research groups. These BERC must also establish cooperation mechanisms with researchers in the Basque University System hence increasing their research capacity.

Once all of the proposals for the creation of a BERC have been collected, they will be evaluated by an external assessment body, specifically created and comprising of experts in the field of science. These evaluations will be carried out in accordance with the parameters set out to consider the preliminary feasibility of the BERC.

- On one hand, the adaptation to the priorities defined by the Government through the Basque Science and Technology Policy and the International Scientific Advisory Committee.
- On the other hand, exceeding a research excellence threshold by the main researcher and the research group.
9.3.2.2  Preparation Phase of the Basic and Excellence Research Centres

The BERC that are successful in the preliminary feasibility evaluation will sign a Programme Contract, opening a maturity period for the Project by means of the preparation of a thorough strategic plan that lays out its bases, in accordance with the established parameters of quality and excellence. This work will be undertaken by the IKERBASQUE Foundation with the cooperation of the main researcher and the research groups of the potential BERC.

Once the different strategic plans have been drawn up, which are specifically aimed at increasing the dimension of the research groups by means of excellence criteria and the attraction of researchers through IKERBASQUE, a new evaluation phase will be initiated in which the specifically created assessment body will participate once more.

Success in this evaluation will lead to the launch of the Basic and Excellence Research Centre.

9.3.2.3  Launch Phase of the Basic and Excellence Research Centres

A pluri-annual Programme Contract will be drawn up for the implementation of the BERC and the fulfilment of the objectives defined in the Strategic Plan, which will finance these Centres conditioning part of the funding to obtaining results which confirm their excellence (in terms of publications and other scientific output).

9.3.3  BASIC RESEARCH (GUIDED AND UNGUIDED)

Resources to support the research of consolidated groups

They are defined with the aim of facilitating and promoting research activities, as well as increasing the quality of scientific research carried out by the research groups of the Departments and University Colleges of the Universities with their headquarters in the Basque Country through the award of financial grants for the development of research in exact and natural sciences, technological development, medical sciences, social sciences and humanities, and the acquisition of the necessary scientific infrastructure for their development.

The aim of this action is to promote excellence in research, guaranteeing the presence of a series of leading groups in diverse knowledge areas, which may serve as a spearhead and reference point for research groups in the Country.

There are two key factors for the success of the programme:

- The decision of the agents to progress and commit themselves to excellence.
- The public management capacity, first of all, to appropriately define and negotiate the programmes, and secondly, carry out strategic monitoring which facilitates dissemination and social recognition of the research carried out.

This action is applied through the award of subsidies, development of calls for competitive concurrence as well as the signing of the corresponding Programme Contracts with centres and the direct involvement of the Public Administration for the promotion, development, processing and monitoring of the agreements signed.

9.3.4  SCIENTIFIC INFRASTRUCTURES AND FACILITIES

Cooperative Research Centres (CRC)

Support for the creation of Cooperative Research Centres, strategically aimed at promoters of social coordination, the design of public and private funding, scientific and technological orientation, selection of personnel of excellence, among others. In addition to other financial resources that may be obtained (Central Government, European Union), the public calls for strategic research devote special chapters to appropriately fitting out the centres.

The Cooperative Research Centres represent the Basque commitment to emerging scientific-technological areas, acting as cooperation platforms between companies, universities and technological centres.
The CRC's that are already up and running are supported, for example the CIC bioGUNE, CIC biomaGUNE and CIC marGUNE, whereas CIC nanoGUNE, focused on nanosciences, CIC micro-GUNE, focussing on Microsciences, CIC touGUNE for tourism and CIC energyGUNE, focusing on renewable energies, will be promoted.

Cooperative Research Centres

General Research Services of the UPV-EHU

The development of research activity in the university scientific community requires the provision of general research services that offer scientific equipment suitable for the development of the research activity. For this, those services whose operation will in turn be strengthened by are going to be promoted.

i2BASK Academic Network

This is an action within the framework of the Basque Country in the Information Society Plan. Its main objective is to act as a backbone for the R&D&I community in the Basque Country with ICT infrastructures and services that facilitate cooperation between the different agents of the Basque Science, Technology and Innovation Network, as well as agents located in other similar networks. It provides the capacity to take on advanced cooperation projects with requirements in terms of intensive calculation resources, virtual reality, multimedia, large scientific facilities, etc. In other words, they are resources that exceed the possibilities of a Centre and they are designed to be shared among the academia networks.

Science and Technology Infrastructures

This refers to supporting the consolidation of a series of excellent infrastructures in the Basque Country that initially, allow its Innovation and Knowledge System to become an international reference pole in Science and Technology, also acting as a lever for the restructuring of the System in the new competitive context, and finally, encouraging the incorporation of outstanding Basque or foreign people (either directly or through agreements with universities, companies, research centres, etc.).

The approach is three-pronged:

On one hand, it seeks to support the creation and consolidation of medium sized infrastructures in the form of Cooperative Research Centres or Scientific-Technological Platforms and laboratories specialized in areas of interest for the scientific-technological and business agents in the Basque Country.

Secondly, it attempts to promote the development of new scientific-technological infrastructures with a supranational impact, as well as
other important projects that provide the System with capacity and increased attractiveness. At present, the European Spallation Neutron Centre is focusing the efforts of the Basque Administration in cooperation with the General State Administration to locate this infrastructure in the Basque Country.

Finally, the strategy consists of taking advantage of the existence or creation, in other areas of the European Research Area, of global and scientific infrastructures (i.e. ITER) through the participation of Basque agents in their creation and in the exploitation of their scientific potential, as well as the participation of Basque companies in the development of the high added value components required for their configuration.

The keys to the success of the action are based on:

• **The Cooperation Culture.** The desired use of European and international scientific-technological infrastructures and capacities located in other geographical areas awakens an increased international cooperation Culture and the extension of European focus in the conception of the Basque Innovation System by the agents that form part of it. This is going to require important strategic planning and management, as it cannot be improvised a posteriori nor can it be left to the evolution of events.

• **The Future Perspective.** The project of constructing a scientific-technological research facility or centre should not be exclusively aimed at the satisfaction of the needs and demands of the scientific-technological and business agents currently in the Basque Country. On the contrary, they must be conceived as a driving force for the consolidation of a much broader scientific-technological system than at present. The infrastructure must be fully exploited by current agents for their own qualification, but above all, they should respond to the demands of new research teams. In other words, the initial consideration must ensure that the facility does not have a vocation as a mere experimental centre for knowledge centres and international agents without a real presence in the Basque Country but it must be the driving force of a huge scientific-technological network, suitable for an international reference.

The instruments are the direct involvement of the Public Administration and multi-partite funding with contributions from all of the administrations and the private sector, as well as the setting up of subsidy programmes to companies for their technological qualification aimed at a high value participation in the configuration and development of scientific-technological infrastructures in the Basque Country.
9.4 **Action Programmes for Entrepreneurial Technological Activities with a Global Presence**

9.4.1 **CREATION OF INNOVATIVE COMPANIES WITH A GLOBAL PRESENCE**

Support for the creation of scientific-technological companies is based on two elements:

First of all, the NETS Programme which supports the creation of scientific and technology based companies. This programme is designed to facilitate the transformation of knowledge into new marketable products or services which represent the “core business” of new business initiatives.

These new business initiatives have been characterized by the development of activities involving products and/or services with a high level of scientific-technological knowledge.

Similarly, the business initiatives promoted by the NETS Programme has been characterized by its high level of R&D&I activities.

The use of own patents or obtaining industrial property rights must form part of the keys to competitive advantage.

The scientific-technological character of the new companies requires the active participation of highly qualified scientific-technological personnel in the development of the company.

Secondly, the CONNECT GUNEA initiative has been defined as the specific response to a type of company that is characterized by being innovative and having a high growth potential and a global presence as a result of the rapid internationalization vocation.

Its development covers the provision of services grouped into four levels and supplied by their availability to the necessary external capacities.

1. **Searching.** This consists of promoting proactivity in cooperation with the remaining agents and having a joint vision with the aim of identifying product-market-technology chains, whose link can be found dispersed among the different agents of the System and are likely to become an Innovative Global Company.

2. **Validation.** Its purpose is the technical (technological due diligence) and economic validation of the projects by means of a thorough evaluation which reveals the innovative level, the market and risk level incurred. The performance of this task requires the combination of specific capacities. Participation in a network such as CONNECT promotes access to these capacities regardless of their geographical location.

3. **Support.** This consists of the incorporation in each project of the capacities required for the necessary mentoring and monitoring to drive business initiative, at least until the consolidation of the second round of funding.

Participation in the CONNECT network provides access to advanced capacities and competences which are essential in the initial years of global innovative companies due to the proximity to researchers and scientists of the science and technology Systems in which they are integrated.

4.1. **Capitalization: Seed Capital** a key asset of CONNECT GUNEA is its access to the Seed Capital Fund with the ability to participate in the initial stages of the EIPG once the project validation phase has been completed. Likewise, specific efforts will be made to attract private capital.

Insertion in the international CONNECT network provides access to sources of seed capital that CONNECT GUNEA may mobilize in the interests of the Basque initiatives.

4.2. **Capitalization: Second Round of Funding Capital.** CONNECT GUNEA will integrally manage the preparation of companies so that they may access a second round of funding. For this, the necessary capacities will be provided to prepare projects and organize the rounds with public and private funding within and outside in the Basque Country.

Participation in the CONNECT network will facilitate this task given the expertise of the different nodes of the network in the provision of this type of services, as well as access to investment networks, business angels, etc.
10. Mobilization objectives of resources and indicators on the 2010 horizon
In order to implement the Science, Technology and Innovation Plan 2010 as defined in this document, it is necessary to mobilize an important amount of economic resources. For this, a firm commitment is required from all of the agents involved in order to reach the objectives set out.

The following tables refer to a forecast of the resources that can be mobilized in innovation for the Basque Country on the 2010 horizon from the point of view of the source of funding. In addition to the significant effort which must be made by the rest of the agents involved, the role that the Basque Administration is going to play as the main instigator of the actions defined in the Plan, as the facilitator of the innovation process in the entire Innovation System and mobilizer of a large sum of additional private resources is particularly important.

Public commitment has developed enormously over recent years and in addition to the creation of an Innovation Fund approved at the heart of the Basque Council of Finance, the funding of new programmes set out in this Plan will be possible.

A vast amount of resources are available to reach the objective of 2.25% of the GDP on R&D expenditure (with the horizon of 3% by 2015) by the end of the period of the Plan. It is estimated that with the cooperation of other agents and the private sector, almost four billion euros will be mobilized over the next four years.

### Mobilization of Resources in R&D in the PCTI 2010

<table>
<thead>
<tr>
<th>RESOURCES MOBILIZED IN SCIENCE, TECHNOLOGY AND INNOVATION IN THE B.A.C. 2006-2010 (million euros)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>FORECAST 2006-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERD/GDP</td>
<td>1.54%</td>
<td>1.69%</td>
<td>1.84%</td>
<td>2.04%</td>
<td>2.25%</td>
<td>2.25%</td>
</tr>
<tr>
<td>Public Funding</td>
<td>383.62</td>
<td>38.37%</td>
<td>544.82</td>
<td>42.94%</td>
<td>548.44</td>
<td>40.70%</td>
</tr>
<tr>
<td>Budgetary Resources in the Basque Administration</td>
<td>330.92</td>
<td>33.10%</td>
<td>440.12</td>
<td>34.69%</td>
<td>431.74</td>
<td>32.04%</td>
</tr>
<tr>
<td>Basque Government</td>
<td>299.46</td>
<td>29.95%</td>
<td>407.76</td>
<td>32.14%</td>
<td>398.25</td>
<td>29.55%</td>
</tr>
<tr>
<td>Regional Councils</td>
<td>31.47</td>
<td>3.15%</td>
<td>32.36</td>
<td>2.55%</td>
<td>33.49</td>
<td>2.49%</td>
</tr>
<tr>
<td>Budgetary Resources of the General State Administration</td>
<td>52.70</td>
<td>5.27%</td>
<td>64.70</td>
<td>5.10%</td>
<td>76.70</td>
<td>5.69%</td>
</tr>
<tr>
<td>INNOVATION FUND</td>
<td>0.00</td>
<td>0.00%</td>
<td>40.00</td>
<td>3.15%</td>
<td>40.00</td>
<td>2.97%</td>
</tr>
<tr>
<td>European Union and Exterior</td>
<td>31.55</td>
<td>3.16%</td>
<td>35.02</td>
<td>2.76%</td>
<td>38.87</td>
<td>2.88%</td>
</tr>
<tr>
<td>Private Funding</td>
<td>583.58</td>
<td>58.37%</td>
<td>647.78</td>
<td>51.06%</td>
<td>719.03</td>
<td>53.36%</td>
</tr>
<tr>
<td>Other Sources</td>
<td>1.05</td>
<td>0.11%</td>
<td>1.05</td>
<td>0.08%</td>
<td>1.22</td>
<td>0.09%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>999.80</td>
<td>1,268.66</td>
<td>1,347.56</td>
<td>1,472.95</td>
<td>1,625.51</td>
<td>6,714.49</td>
</tr>
</tbody>
</table>
### Summary Table of the R&D&I Resources provided by the Basque Administration and the Government, broken down into Departments for 2006-2010

<table>
<thead>
<tr>
<th>BASQUE ADMINISTRATION RESOURCES (Million Euros)</th>
<th>Basque Government</th>
<th>Regional Councils</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>TOTAL 2006-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERD/GDP</td>
<td>1.54%</td>
<td>1.69%</td>
<td>1.84%</td>
<td>2.04%</td>
<td>2.25%</td>
<td>2.25%</td>
<td>2.25%</td>
<td>2.25%</td>
</tr>
<tr>
<td>Planned % of total</td>
<td>Planned % of total</td>
<td>Planned % of total</td>
<td>Planned % of total</td>
<td>Planned % of total</td>
<td>Planned % of total</td>
<td>Planned % of total</td>
<td>Planned % of total</td>
<td></td>
</tr>
<tr>
<td>Department of Industry, Trade and Tourism</td>
<td>157.62</td>
<td>47.63%</td>
<td>216.06</td>
<td>45.00%</td>
<td>202.53</td>
<td>42.93%</td>
<td>224.08</td>
<td>44.72%</td>
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<tr>
<td>Department of Education, Universities and Research</td>
<td>22.52</td>
<td>6.80%</td>
<td>25.83</td>
<td>5.38%</td>
<td>31.13</td>
<td>6.60%</td>
<td>37.11</td>
<td>7.41%</td>
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<tr>
<td>Department of Agriculture, Fisheries and Food</td>
<td>18.67</td>
<td>5.64%</td>
<td>19.17</td>
<td>3.99%</td>
<td>21.28</td>
<td>4.51%</td>
<td>23.62</td>
<td>4.71%</td>
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<td>Department of Health</td>
<td>7.88</td>
<td>2.38%</td>
<td>5.86</td>
<td>1.22%</td>
<td>5.95</td>
<td>1.26%</td>
<td>6.04</td>
<td>1.21%</td>
</tr>
<tr>
<td>Presidency</td>
<td>0.40</td>
<td>0.12%</td>
<td>0.45</td>
<td>0.09%</td>
<td>0.50</td>
<td>0.11%</td>
<td>0.55</td>
<td>0.11%</td>
</tr>
<tr>
<td>Department of Housing and Social Affairs</td>
<td>0.84</td>
<td>0.25%</td>
<td>0.93</td>
<td>0.19%</td>
<td>1.03</td>
<td>0.22%</td>
<td>1.15</td>
<td>0.23%</td>
</tr>
<tr>
<td>Department of Transport and Public Works</td>
<td>2.36</td>
<td>0.71%</td>
<td>2.69</td>
<td>0.56%</td>
<td>2.98</td>
<td>0.63%</td>
<td>3.30</td>
<td>0.66%</td>
</tr>
<tr>
<td>Department of Justice, Employment and Security</td>
<td>0.26</td>
<td>0.08%</td>
<td>0.28</td>
<td>0.06%</td>
<td>0.29</td>
<td>0.06%</td>
<td>0.30</td>
<td>0.06%</td>
</tr>
<tr>
<td>Department of Culture</td>
<td>0.09</td>
<td>0.03%</td>
<td>0.14</td>
<td>0.03%</td>
<td>0.14</td>
<td>0.03%</td>
<td>0.15</td>
<td>0.03%</td>
</tr>
<tr>
<td>Department for the Environment and Land Planning</td>
<td>0.17</td>
<td>0.05%</td>
<td>1.30</td>
<td>0.27%</td>
<td>1.44</td>
<td>0.31%</td>
<td>1.60</td>
<td>0.32%</td>
</tr>
<tr>
<td>Department of the Interior</td>
<td>2.61</td>
<td>0.79%</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00%</td>
</tr>
<tr>
<td>Department of Finance and Public Administration</td>
<td>7.05</td>
<td>2.13%</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00%</td>
</tr>
<tr>
<td>Vice-Presidency</td>
<td>2.55</td>
<td>0.77%</td>
<td>3.00</td>
<td>0.62%</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00%</td>
</tr>
<tr>
<td>Total Departmental Budget</td>
<td>223.02</td>
<td>67.39%</td>
<td>275.72</td>
<td>57.43%</td>
<td>267.27</td>
<td>56.66%</td>
<td>297.90</td>
<td>59.46%</td>
</tr>
<tr>
<td>UPV/EHU</td>
<td>64.86</td>
<td>19.60%</td>
<td>76.20</td>
<td>15.87%</td>
<td>80.76</td>
<td>17.12%</td>
<td>85.81</td>
<td>17.13%</td>
</tr>
<tr>
<td>Osakidetza – Health Service</td>
<td>9.58</td>
<td>2.89%</td>
<td>9.91</td>
<td>2.06%</td>
<td>10.26</td>
<td>2.18%</td>
<td>10.62</td>
<td>2.12%</td>
</tr>
<tr>
<td>Section 20 (Special Economic and Social Investment Plan)</td>
<td>2.00</td>
<td>0.60%</td>
<td>1.50</td>
<td>0.31%</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00%</td>
</tr>
<tr>
<td>Section 99 (Diverse Departments)</td>
<td>0.00</td>
<td>0.00%</td>
<td>44.43</td>
<td>9.25%</td>
<td>39.95</td>
<td>8.47%</td>
<td>32.03</td>
<td>6.39%</td>
</tr>
<tr>
<td>Total Government R&amp;D&amp;i Funding</td>
<td>299.46</td>
<td>90.49%</td>
<td>407.76</td>
<td>84.93%</td>
<td>398.25</td>
<td>84.42%</td>
<td>426.36</td>
<td>85.10%</td>
</tr>
<tr>
<td>Regional Councils</td>
<td>31.47</td>
<td>9.51%</td>
<td>32.36</td>
<td>6.74%</td>
<td>33.49</td>
<td>7.10%</td>
<td>34.66</td>
<td>6.92%</td>
</tr>
<tr>
<td>Innovation Fund</td>
<td>0.00</td>
<td>0.00%</td>
<td>40.00</td>
<td>8.33%</td>
<td>40.00</td>
<td>8.48%</td>
<td>40.00</td>
<td>7.98%</td>
</tr>
<tr>
<td>Total Public Funds PCTI 2010</td>
<td>330.92</td>
<td>–</td>
<td>480.12</td>
<td>–</td>
<td>471.74</td>
<td>–</td>
<td>501.03</td>
<td>–</td>
</tr>
</tbody>
</table>
The objectives set out during the lifespan of the Science, Technology and Innovation Plan 2010 are set out below.

Therefore the Science, Technology and Innovation Plan has an Integrated Control Scoreboard and a table of results indicators for the action plans to be carried out during its implementation.

As far as the Integrated Control Scoreboard is concerned, its indicators are presented in five blocks in accordance with the structure set out in section 2, referring to the current situation of the Basque Innovation System. In this way, objectives for questions that are considered to be priority, not only by the European Government, but also by the Central and Basque Governments, to face global competition on the 2010 horizon will be set out.
Integral Control Scoreboard of the PCTI 2010

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>European Innovation Scoreboard</td>
<td>0.35</td>
<td>0.45</td>
<td>0.73 Sweden</td>
<td>0.5</td>
</tr>
</tbody>
</table>

**HUMAN CAPITAL**

| R&D Personnel (FTE): Personnel in Full-Time Equivalence in R&D activities (Data 2005) | 12,506 | 2 million | 346,078 France | 15,000 |
| R&D Personnel (FTE) of active population: Percentage in %/oo that represents total personnel in Full-Time Equivalence in R&D activities of the total active population (Data 2005) | 13.1‰ | 10.3‰ | 13.8‰ France | 16.4‰ |
| Researchers (FTE): Number of Researchers in Full-Time Equivalence (Data 2005) | 7,820 | 1,217,524 | 269,500 Germany | 10,500 |
| Researchers of active population (FTE): Percentage in %/oo that represents total researchers and technologists in Full-Time Equivalence in R&D activities of the total active population (Data 2005) | 8.2‰ | 6.2‰ | 7.4‰ Germany | 11.7‰ |
| Expenditure on R&D (thousands of €) per researcher (FTE) (Data 2005) | 116 | 171 | 227 Sweden | 200 |
| Occupation in high technology services | 3.43 | 3.35 | 5.13 Sweden | 5 |
| Graduates in Science and Technology | 26.1 | 12.7 | 26.1 BAC | 30 |

**MARKET / ORIENTATION TOWARDS RESULTS**

| Sales of new products for the market (percentage of total turnover) | 1.6% | 4.57% (2005) | 13.6% Malta | 2.2% |
| Exports of high technology products over total exports | 4.3% | 18.4% | 55.9% Malta | 10.2% |

.../...
### KEY R&D&I INDICATORS IN THE BASQUE COUNTRY

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td><strong>PLURAL INNOVATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Effort in R&amp;D: Percentage of Total Expenditure on R&amp;D (GERD) of the GDP</td>
<td>1.43%</td>
<td>1.84%</td>
<td>3.86% Sweden</td>
<td>2.25%</td>
</tr>
<tr>
<td>Business Effort in R&amp;D: Percentage of Total Expenditure on R&amp;D of Companies (BERD) of the GDP</td>
<td>1.13%</td>
<td>1.17% UE27</td>
<td>2.92% Sweden</td>
<td>1.73%</td>
</tr>
<tr>
<td>Innovation Expenditure in Companies: Percentage of expenditure on Innovation over total Turnover</td>
<td>2.76%</td>
<td>1.5% (2002)</td>
<td>3.48% Switzerland</td>
<td>3.3%</td>
</tr>
<tr>
<td>Innovative Companies: Percentage of companies (with more than 10 employees) with technological innovation activities over the total of companies</td>
<td>33.3%</td>
<td>42% (2004) UE27</td>
<td>65% Germany (2004)</td>
<td>42%</td>
</tr>
<tr>
<td><strong>FINANCIAL CAPITAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Public Funding of R&amp;D&amp;I (in millions of €)</td>
<td>212</td>
<td>–</td>
<td>–</td>
<td>429</td>
</tr>
<tr>
<td>Venture Capital: Percentage of Venture Capital of GDP</td>
<td>0.0018</td>
<td>0.025% (2004)</td>
<td>0.067% Suecia</td>
<td>0.03%</td>
</tr>
<tr>
<td><strong>GOVERNMENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University System Effort in R&amp;D: Percentage of Total Expenditure of the University System on R&amp;D (HERD) of GDP</td>
<td>0.25%</td>
<td>0.41%</td>
<td>0.48% Germany</td>
<td>0.41%</td>
</tr>
<tr>
<td>Public Sector Effort in R&amp;D: Percentage of Total Expenditure of the Public Sector on R&amp;D (GOVERD) of GDP</td>
<td>0.05%</td>
<td>0.25%</td>
<td>0.42% Germany</td>
<td>0.10%</td>
</tr>
<tr>
<td>Expenditure on Information Technologies: Percentage of expenditure on ICTs of the GDP.</td>
<td>4.75 (2004)</td>
<td>6.4</td>
<td>8.6 Sweden</td>
<td>6.75</td>
</tr>
</tbody>
</table>
In accordance with Article 149.1.15 of the Constitution, the State has powers in relation to the promotion and general coordination of scientific and technical research.

An initial study for the period 1991-2005 revealed an accumulated deficit of 958 million euros, as a result of measuring the difference between the contribution via the State R&D funding quota (6.24%) and the return via state public aid in R&D (2.42%). This data is only an initial approximation which does not include opportunity costs.

An additional important element is the limited presence of centres associated to the Higher Council for Scientific Research (CSIC). From a total of 134 centres affiliated to the CSIC, only 2 are located in the Basque Country, which are units of the UPV-EHU associated to the CSIC rather than centres in themselves.


One of the objectives of the PCEIS is maintaining the weight of Industry along with the increase in productivity, set out in the table of indicators.

Law 8/2004 on Industry of the CAE: “Article 24.– Technology and innovation. Innovation and the development of technologies will be promoted, as well as the incorporation of advanced technologies in industrial companies of the Basque Country and the generation of technological infrastructures for shared use, whereby initiatives in the following areas will be developed: a) Action projects in research and development and technological innovation in areas of basic and applied research. b) Promotion of the creation and consolidation of an efficient technological infrastructure to improve industrial competitiveness, with the collaboration of other administrations. c) Technological transfer plans in the field of industrial innovation between companies and technology supply entities. d) Collaboration with Basque technological agents as well as with inter-institutional forums in terms of technology. e) Joint technological infrastructures to promote the spread of industrial and business information, as well as information on the technologies available within industrial property instruments, for improved knowledge between companies. f) Adaptation of industrial activities to environmental and security demands, promoting the corresponding preventive, protective and corrective measures by means of the development and incorporation of the appropriate technologies. g) Creation and promotion of agreements with other administrations and private entities in the field of basic and applied research”.

“Article 25.– Technological Entities 1.– Those non-profit making legal entities, among others, whose goals or objectives expressly include the development of the Information Society, scientific research or innovation and technological development will be promoted. 2.– Likewise, technological associations with a tendency towards the development of research or technological projects with a wide economic and social repercussion and a high impact on the state of the art and research aimed at companies in the Basque production sectors. 3.– In accordance with the stipulations on development of this law, the entities set out in this article may be considered as preferential for the purposes of accrediting them as research, development and technological innovation entities and their subsequent integration in the Basque Network for Science and Technology”.

Of the Guidelines adopted in COM (2005) 141 final the following are particularly worthy of mention: Guideline: To increase and improve investment in R&D; Guideline: To facilitate innovation and the implementation of the Information and Communication Technologies; Guideline: To encourage the sustainable use of resources and strengthen the synergies between environmental protection and growth or the Guideline: To contribute to creating a strong European industrial base.

Priority which contemplates improving the attractiveness of Member States, regions and cities by improving accessibility, ensuring adequate quality and level of services, and preserving the environment and the creation of more and better jobs, improving the adaptability of workers and enterprises and increasing investment in human capital (DEC 2006/702/EC, Annex).

Programme which follows on from the previous “Sixth Framework Programme 2002-2006” (on the other hand, first of the specific Plans to promote the knowledge Europe following the adoption of the Lisbon Strategy in 2000), established by Decision 1513/2002/EC of the European Parliament and the Council.


Discussion note to the informal meeting of the competitiveness ministers: “Demand as a driver of innovation, towards a more effective European innovation policy”, Jyväskylä, Finland, 10-11 July 2006.


Permanent Lisbon Unit, (2005), Convergence and Employment: National Reform Programme, under the coordination of the Economic Office of the President of the Spanish Government, page 76.

The three generations are described in "Innovation Tomorrow. Innovation policy and the regulatory framework: Making innovation an integral part of the broader agenda”. Innovation papers n° 28. Directorate-General for Enterprise (European Commission 2002).


Diagnosis is based on the European Scoreboard for Innovation Indicators 2005 used in the Business Competitiveness and Social Innovation Plan 2006-2009 and incorporates other indicators required to evaluate the Science subsystem to which this scoreboard pays less attention.

Special Eurobarometer 224, (2005), Europeans, Science and Technology, European Commission.


F. Todtling in F. Todtling et al. (2006), “Innovation in knowledge intensive industries: the nature and geography of knowledge links”, European planning studies Vol. 14, n°8, pages 1035-1058, establishes an interesting differentiation between synthetic knowledge and analytical knowledge. The former, synthetic knowledge, arises in traditional industries (machinery, engineering, etc.). It is characterized by the innovative application or combination of existing knowledge. Low levels of R&D are produced and it is aimed at the solution of client problems. Learning by doing, learning by interacting, practical skills and tacit knowledge is imported. Innovation models are mainly incremental. The latter, analytical knowledge, arises in knowledge-intensive industries (biotechnologies, ICT, software, etc.). It is backed by scientific input. Coded knowledge or knowledge that can be coded is imported. Knowledge input comes from publications or “coded” studies and knowledge generation is based on the application of widely shared scientific principles and methods. Knowledge processes are more formalized (R&D units) and results are documented (reports, patents, etc.), although tacit knowledge is also relevant.
As an example of this migration in the relational models and the role of agents, we can say that knowledge-intensive companies tend to publish, as research groups act; Universities, on the other hand, act by creating companies and investing in them, directly exploiting the knowledge generated; and the Administration becomes a partner of new business projects and research and development projects.


Clusters are defined by the OECD as networks of highly interdependent companies, linked to each other in a value chain, which at times also consists of strategic alliances with other types of organizations such as universities, research institutes, knowledge-intensive business services, interface institutions, etc. All of these characteristics reflect the need to transform clusters with the final objective of maintaining their role as drivers of competitiveness.

During the 1990’s, the Basque Country fostered the creation of cluster associations in the most significant sectors of the Basque production structure. Therefore, organized into themed committees, the clusters initiated inter-business cooperation processes for the identification of common needs, the definition of joint R&D projects, the analysis of technological tendencies, the evaluation of capacities, etc.

The Basque Innovation System currently has four consolidated Cooperative Research Centres and three under way.

CIC bioGUNE: Specialized in the generation of knowledge and exploitation of genomics, proteomics, and other advanced tools for the development of products and services related to health and life quality.

CIC biomaGUNE: Specialized in multi-disciplinary research in biomaterials and engineering.

CIC microGUNE: Specialized in the fields of micro-technologies.

CIC marGUNE: Specialized in high performance manufacturing.

CIC tourGUNE: Specialized in Tourism - already up and running.

CIC nanoGUNE: Specialized in Nanotechnology.

CIC energyGUNE: Specialized in Alternative Energies - under development.


Decree 1/2007 of 17th April of the Lehendakari (President of the Basque Country) in which the Basque Science, Technology and Innovation Council is created. Published in the BOPV (Basque Official Journal) on 13th July 2007.

The Environmental Framework Plan 2007-2010 is currently being drafted.

Learning by doing.