

# **SPANISH NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION**

2013-2016

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## 1. INTRODUCTION

Science, technology and innovation policies are a cornerstone in the development of modern societies due to the relationship between a country's ability to create knowledge and to innovate and its competitiveness and economic and social development.

The Spanish Central Government's science, technology and innovation policy and the organisation of actions to foster and coordinate scientific and technical innovation which were attributed to the Central Government under Article 149.1.15 of the Spanish Constitution of 1978, are implemented according to the Science, Technology and Innovation Act 14/2011 of 1 June 2011 through Spain's [National Plan for Scientific and Technical Research and National Innovation Plan \(NATIONAL PLAN.\)](#)

Following the Science Act in 2014, the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION 2013-2020 defines the main objectives during 2013-2020. The [NATIONAL PLAN](#) defines the funding instruments on the RDI activities during the 2013-2016 period such as established in the document.

RDI

The [SPANISH NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION](#) for **2013-2016** enables a simultaneous, continuous approach to the design of actions to foster and coordinate the RDI process, which encompasses everything from generating new ideas to their incorporation in the market in the form of new products and/or processes, improving quality of life, the well-being of citizens and contributing to economic development. It is aimed at all stakeholders in the *Spanish Science, Technology and Innovation System* responsible for: (a) execution of RDI activities; (b) management of RDI RDI activities; and (c) provision of RDI services for progress in science, technology and innovation in Spanish society and the economy as a whole.

Therefore, public funds are assigned through public tenders and proposals to be funded are selected taking scientific and technical criteria into account, as well as criteria of technological viability, entrepreneurial and commercial criteria backed by internationally validated principles, in accordance with standardised, transparent evaluation processes based on peer evaluation committees.

At the same time, due to their horizontal nature, the public RDI activities must be supported and strengthened by sectorial policies. Therefore, the Spanish Ministry of Economy and Competitiveness through the State Secretariat for Research, Development and Innovation coordinates the actions of those ministerial departments whose policies contribute to the achievement of the scientific, technical and innovation objectives established.

The drafting of the [NATIONAL PLAN](#) coincided with the debate and drafting of the future Framework Programme for Research and Innovation RDI in the European Union, "Horizon 2020", and therefore with the reflection on the big challenges and opportunities of EU RDI policies and those of the Member States. When designing these policies, the development and consolidation of the *European Research Area* becomes particularly important, as to: (a) fostering basic scientific and technical research to contribute to the generation of new knowledge supported by principles of excellence and international leadership and which make the basis for future scientific, technological, industrial and entrepreneurial developments and applications; (b) driving technological, industrial and entrepreneurial leadership based on greater capacity to innovate and

execution and funding of RDI activities and (c) fostering RDI aimed at meeting society's great common challenges. In addition to all of this, it must not be forgotten that it is necessary to take urgent action aimed, among other aspects, at facilitating access to new sources and funding mechanisms of RDI activities, as is the case of the European Investment Bank and to promote the mobility of human resources to make the European Research Area a place free of barriers derived from the juxtaposition of the RDI systems of the Member States.

Therefore, Central Government policies on RDI are aligned with their EU counterparts. The **SPANISH NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION for 2013-2016** defines State funded actions introduced to achieve the objectives established and the priorities of the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION (2013-2020).

Several Central Government units participated in the process to design and draft the **SPANISH NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016**. These were experts recruited from the Spanish and international scientific, technical and business community. The **NATIONAL PLAN** was submitted for public consultation in November 2012. More than 800 comments and recommendations were received during this process. They were all duly analysed and debated and, incorporated into this version. Comments from social partners, representatives of public research centres and universities, technology centres and interface units, science and technology parks, business associations, technology platforms, etc., were also taken into consideration. The governments of the Autonomous Communities have been informed through the Executive Committee of the Scientific, Technology and Innovation Council of the Autonomous Communities.

## 2. BACKGROUND

Since the first National Plan of 1988, numerous changes have gradually been made by adapting public RDI policies to the needs of a dynamic environment and, particularly, to the needs of the *Spanish Science, Technology and Innovation System* itself, whose development and evolution are primarily the result of actions and funding by the successive National Plans.

The 6th National Plan for Scientific Research, Development and Technological Innovation (RDI) for the period 2008-2011 present a structure based on four areas: knowledge generation and capability building area; area for promoting cooperation in R&D; sectoral development and technological innovation area and strategic action area.

The **6th National Plan** was structured around defining the Instrumental Lines of Action and transformation in National Plans aimed at achieving the strategic objectives programmed. The replacement of themed areas of action with others of an instrumental nature was one of this Plan's main innovations. However, after the evaluation made reveals that the results in terms of grant management were not achieved, something that has been taken into account when drafting the new **PLAN**.

The main problems detected in the management of the **6th National Plan** are the following structural deficiencies: (1) excessive red tape burdening users; (2) insufficient coordination among inter-institutional and interdepartmental users; (3) an excessive number of instruments and, therefore, (4) fragmentation of funding; (5) errors in the timing of calls and lack of predictability of these; (6) shortfalls and weaknesses of scientific-technical *ex post* follow-up of the actions funded; (7) inadequate exploitation and dissemination of the results of activities

funded in the System as a whole and (8) changes in competency among different ministerial departments which has hindered normal programme development.

Finally, the analysis and diagnosis of the *Spanish Science, Technology and Innovation System*, which reflects the actions defined in the framework of the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION 2013-2020 reveals the need to adopt measures and to make the legal, regulatory, administrative funding reforms required to strengthen the efficiency and flexibility of the *Spanish Science, Technology and Innovation System* and facilitate obtaining and exploiting its results. These are measures that are required to make innovation and generation and use of scientific and technical knowledge levers for the country's social and economic growth.

Parallel to the development of this **NATIONAL PLAN** the government will undertake reforms and establish measures to create a favourable environment for RDI including, among others: (a) improved governance of public institutions in the *Spanish Science, Technology and Innovation System*, (b) fostered public-private cooperation; (c) increased private investment in R&D&i; (d) optimisation of tax incentive systems for R&D&i; (e) access to and development of different sources of private funding for RDI activities; (f) support to create technology based companies and fostering an entrepreneurial culture in universities and public organisations to encourage innovation and contribute to the creation of spin-offs; (g) creation of a suitable intellectual property rights management model; (h) incorporation of technology surveillance and competitive intelligence as part of the RDI process and (i) the drive towards a new public policy model for RDI based on the demand that stimulates generation of leadership abilities in RDI.

The **NATIONAL PLAN** is a document designed to develop and fund Central Government actions in the area of RDI to enable achievement of the objectives and priorities of the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION. In addition, the document has been drafted as a funding instrument of the *Spanish Science, Technology and Innovation System* into account by designing actions and funding mechanisms that will increase the scientific and technological leadership of its stakeholders, both public and private; drive the abilities of our productive community through the country's RDI; foster talent in RDI by defining mechanisms to facilitate successful insertion in the job market; and guide RDI activities towards the challenges facing society.

### **3. OBJECTIVES OF THE SPANISH NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016**

The ultimate aim of the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION, to which the **NATIONAL PLAN** contributes and implements, is to promote the international leadership of the *Spanish Science, Technology and Innovation System*, guarantee sustainability of the ability to generate knowledge and to enhance the competitiveness of the business fabric of our country, which must be provided with a solid foundation in science and technology and in innovation in all its dimensions.

Thus, the actions of Central Government contained in the **NATIONAL PLAN** are set out in four **NATIONAL PROGRAMMES** which correspond to the STRATEGY objectives (TABLE 1 BELOW). These **PROGRAMMES** enable the development of specific objectives linked to implementation and development of the **PLAN** itself, which are linked, in turn, to the corresponding indicators of the impact of the results.

TABLE 1. Correspondence between the general objectives of the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION and the State Programmes of the NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION.

SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION 2013-2020	PROGRAMMES FROM THE NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016
PROMOTION OF TALENT AND EMPLOYABILITY	NATIONAL PROGRAMME FOR THE PROMOTION OF TALENT AND ITS EMPLOYABILITY
FOSTER EXCELLENCE	NATIONAL PROGRAMME TO FOSTER SCIENTIFIC RESEARCH AND TECHNICAL EXCELLENCE
BUSINESS LEADERSHIP	NATIONAL PROGRAMME FOR BUSINESS LEADERSHIP IN R&D&I
GUIDING RDI TOWARDS SOCIETY'S CHALLENGES	NATIONAL RDI PROGRAMME AIMED AT SOCIETY'S CHALLENGES

### 3.1. SPECIFIC OBJECTIVES OF THE NATIONAL PLAN

#### 1. Strengthen training and employment of human resources in RDI activities in both the public and private sectors.

Human resources, training and upskilling of the latter are, without a doubt, the basis of progress and well-being of a country and are critical to the development and strengthening of society's scientific, technological and innovative skills. In the last ten years in Spain there has been an outstanding increase in the number of human resources trained in R&D&I, although there is still a significant imbalance due to: (a) the continuing low capacity of the *Spanish Science, Technology and Innovation System* to incorporate these human resources; (b) unequal distribution of people involved in RDI activities between the public and private sectors and scant mobility between both, which hinders knowledge transfer; (c) the insufficient number of RDI research technicians and managers incorporated in the *System*, and (d) lack of international mobility and reduced capacity to attract international human resources to public universities and research centres. In turn, fierce global competition from the best researchers and technologists is generating short-term tension in the *System* which must be corrected to prevent a dearth of human capital.

The plan defines actions destined to fund and strengthen: the promotion of new vocations in scientific, technical research and innovation; specialised pre- and post-PhD training and technical training in RDI activities; labour insertion of human resources in R&D&I, in both public and private sectors; international and intersectoral mobility of these; talent identification and retention and international attraction for incorporation into the *System*.

#### 2. Improve the quality of scientific and technical research to achieve the highest level of excellence and impact, contributing international scientific and technological leadership of all the stakeholders from the *Spanish Science, Technology and Innovation System*.

The generation of new knowledge not only contributes to international leadership of the country but is also one of the pillars of future progress and social and economic well-being. Public funding in this area is essential because it permits the generation of knowledge to advance whose results means significant qualitative advances in the scientific and technological area in the medium and

long term, thereby improving the international impact of our institutions and their scientific and technological skills and their potential transfer to the productive sector.

Traditionally, basic RDI project funding has been one of the main tools for the development of the *Spanish Science, Technology and Innovation System*, particularly in the public sector. To enhance the impact of the research capacities of our *System*, the following are envisaged: (a) increase critical mass, in cases where this is a determining competitiveness factor; (b) promote stable collaboration between specialist research groups; (c) increase the number of interdisciplinary R&D groups; (d) trigger interest and participation by the private sector in funding basic research through new sponsorship formulas and corporate social responsibility and (e) extend Spanish participation in R&D projects involving international cooperation which are funded from abroad, particularly in the framework of the European Research Area.

This **PLAN'S** objective is linked to Encouraging Excellent Scientific and Technical Research reflected in the SPANISH STRATEGY and aligned with European policies in this area, particularly with the initiatives and actions led by the European Research Council (ERC) which will be fostered especially by this **PLAN**.

### **3. Strengthen the capacities and international leadership of institutions, centres and scientific and technical research performers.**

The competitiveness of the *Spanish Science, Technology and Innovation System* depends not only on its size, on the quantity of resources invested and the incentives it promotes, but also on its constituent institutions, whose scientific and technological reputation make it attractive to international talent and investment. Spain's outstanding position in terms of international scientific production should be accompanied by the relative positioning and international visibility of the main scientific research centres and universities. To achieve this, it is important to identify and recognise institutions, centres and scientific and technical units which stand out for being pioneers in their activities, good research practices and management and the potential impact of their results with the objective of strengthening their capacities by providing, in this case, mechanisms for funding highly competitive strategic RDI programmes in those centres and units. The achievement of this objective must also encompass actions designed to improve the governance of institutions and, therefore, the entire public research system, to which reference is made in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION.

### **4. Facilitate access to scientific and technological infrastructures and to scientific equipment, with special reference to large national and international scientific and technical facilities.**

Scientific and technological leadership, research on the frontier of knowledge and the development of highly competitive entrepreneurial R&D activities depends critically on access to the necessary scientific and technological infrastructures. These infrastructures constitute one of the most important assets for maintaining leadership of research groups, training capacities and talent attraction of our country's universities and research centres. Great progress has been made in Spain in this area, although it is vital that measures be established to maintain the existing level of development, generalise access to these by all stakeholders in the *Spanish Science, Technology and Innovation System*, drive their scientific specialisation, encourage their consolidation as one of the stakeholders for performance of RDI activities of the *System* and reduce territorial dispersion. In this context, coordination between *Singular Science and Technology Infrastructures (ICTS)* in the same themed area and driving industrial use and

support for the science industry. To achieve this, the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION establishes, among other aspects and as a priority area, a revision of the map of *Singular Science and Technology Infrastructures (ICTS)*, which should begin during the first months after the entry into force of this [NATIONAL PLAN](#).

#### **5. Drive entrepreneurial leadership in RDI by strengthening the RDI capacities of companies and incorporating SMEs in the innovation process.**

In a highly competitive setting, technological and entrepreneurial leadership skills are essential for driving economic activity and creating employment. The generation, absorption and exploitation of new ideas and technologies and of multiple non-technological innovations has enabled numerous Spanish companies to develop leading capacities in their respective sectors. However, the general evolution of the competitive position of the Spanish economy reveals the gap that still exists in the productive sector, as a whole, to generate and commercialise high added value, competitive products and services in global markets.

To close this gap it is essential that we: (a) drive growth in the number of companies involved in innovation processes; (b) strengthen growth of innovative SMEs both in size and technological ambition; (c) increase spending by large companies undertaking R&D in our country and boost their capacity to mobilise the rest of the production sector, particularly SMEs; (d) promote internationalisation of innovative companies and their participation in bilateral and multilateral collaboration agreements; (e) strengthen the incorporation of RDI human resources in companies and (f) encourage the generation and dissemination of emerging technologies from the production sector as a whole.

#### **6. Encourage the creation and growth of technology based companies and the promotion of efficient networks of investors that give access to new methods of funding RDI activities.**

A competitive and innovative productive sector is key to changing the economic model. For this it is necessary to encourage the creation of new technology-based companies with growth potential which commercially exploit the knowledge generated and generate new knowledge from the application to new products and services. It is therefore necessary to have domestic and foreign funds and investors available to support the creation, sustainability and development of new technology-based businesses and innovative companies.

Therefore, the [NATIONAL PLAN](#) includes: (a) support for creation of Technology-Based Companies, and (b) drive for Venture Capital initiatives to cover the different phases of development, from seed capital and start-up to subsequent rounds and to permit the support, scaled and without discontinuity, at all levels of business projects.

#### **7. Increase collaboration in RDI between the public sector and the business sector.**

The unbalanced evolution in recent years between scientific-technical research, particularly that carried out in the public sector, and R&D and business innovation linked to the nascent culture of public-private collaboration makes it necessary to drive collaboration between public research bodies, companies and other stakeholders such as technology centres and science and technology parks which may contribute to the generation and application of knowledge aimed at meeting business needs.

In order to achieve this objective, the **NATIONAL PLAN** envisages: (a) rolling out RDI projects under collaboration agreements between stakeholders in the public and private sectors with the aim of improving the connection between the RDI activities performed, the purpose of which is to obtain new products, services and technologies; (b) the development of structures for sharing and communication to facilitate effective collaboration between the parties and (c) encourage evaluation and exploitation of the results obtained and foster their capacity to reactivate the needs of the production sector by making it more competitive.

## **8. Stimulate RDI oriented to respond to societal challenges.**

The **NATIONAL PLAN** fosters the **orientation** of scientific research conducted in universities and public research organisations and the RDI business activities to help to resolve our society's present and future needs in accordance with the CHALLENGES contained in the SPANISH STRATEGY and the European Union scheme set out in "Horizon 2020".

In their definition and because of their nature, these CHALLENGES encompass large areas which enable the development of scientific-technical, technological and innovative knowledge by disciplines and sectors, but which basically determine unique areas for multidisciplinary and intersectorial collaboration between the different stakeholders in the *Spanish Science, Technology and Innovation System*. What defines the classification of the actions to fund is not the sector or the discipline in which they are classified but the problem or challenge that the RDI activities conducted are intended to resolve and considering that the ultimate aim is to obtain, in the intermediate to long term, social return, including those deriving from improved competitiveness in the country's production sector.

The CHALLENGES identified for guiding the RDI activities driven by this **NATIONAL PLAN** should be understood as "problems of society to resolve". The search for solutions to respond to global challenges mobilises important research efforts in basic scientific research, technological and innovation research developed by research groups in both the public sector (universities and research centres) the business sector and both in collaboration. In this respect the **PLAN**, and within the area of GLOBAL SOCIETAL CHALLENGES, includes tools designed to encourage scientific-technical specialisation, aggregation of scientific, technological skills of all stakeholders in the System to respond to these challenges and the development of strategic actions.

## **9. Drive internationalisation of RDI activities of stakeholders in the Spanish Science, Technology and Innovation System and its active participation in the European Research Area.**

The **NATIONAL PLAN**, as a whole, has a marked international mission which is reflected in a good number of the different NATIONAL PROGRAMMES. In addition, this international vocation is reflected in the structure of the **NATIONAL PLAN** and its close alignment with the RDI objectives established in "Horizon 2020". The ultimate aim is to drive scientific, technological and entrepreneurial leadership of our *System* at international level and increase participation of the Spanish institutions and companies in European Unión initiatives programmes for which the necessary support measures are available and set out in the corresponding ANNUAL ACTION PLANS.

## 10. Foster a scientific, technological and innovative culture in Spanish society and dissemination of the results of scientific-technical research and innovation financed with public funds.

The purpose of the **NATIONAL PLAN** is to encourage and incentivise the dissemination of science, technology and innovation to citizens by closing the gap between the science and technology and society at large. Public dissemination of scientific and technology advances from R&D activities, encouraging dialogue among Universities and R&D centres and citizens and their surroundings, etc., are activities inherent to the social communication of science and serve to stimulate creativity, curiosity and the scientific vocation among children.

Similarly, the scientific, technological and innovative culture of a society is a variable that has a decisive effect on its capacity to adapt to technological changes, absorb technologies and new uses of these or to be active participants in open innovation processes. Particular attention will be given to disseminating scientific culture among the business community with a view to encouraging dialogue and fostering collaboration between both. Therefore, and by designing specific, horizontal actions, the **NATIONAL PLAN** will encourage values linked to science, technology and innovation in our society; it will improve existing channels of communication and social dissemination of science and foster the construction of a collective identity or image of Spain as a scientific and innovative country.

## 11. Explore RDI policies based on demand

The SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION 2013-2020 makes reference to the need to drive a new model of RDI policies that will enable the anticipation of future demands and the definition of efficient measures to drive research and technological development of stakeholders identified as potential suppliers. Public demand is very important to encourage RDI skills generation, to facilitate the provision of innovative public services and entrepreneurial development in key sectors.

### 3.2. PERFORMANCE INDICATORS LINKED TO THE NATIONAL PLAN OBJECTIVES

The included performance indicators make it possible to measure the impact of the Programmes and Subprogrammes of the **NATIONAL PLAN**, as well as the designed actions during the 2013-2016 period in relation to the specific objectives indicated in the section above. In addition, the correlation between the general objectives in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION for the 2013-2020 period and programmes from the **NATIONAL PLAN** make it possible to evaluate the activities of the **PLAN** as part of the intermediate evaluation exercise of the STRATEGY itself. In **TABLE 2** the main indicators and quantification of these corresponding to the 2013-2016 period has been included.

**TABLE 2.** Correspondence between the general objectives of the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION and the National Programmes of the **NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION**.

PERFORMANCE INDICATORS	2010	2016
PHD GRADUATES AGED 25-34 YEARS COMPARED TO THE TOTAL POPULATION	0.9%	1.2%
SOURCE: OCDE		
INTERNATIONAL STUDENTS ENROLLED ON PHD PROGRAMMES/TOTAL NUMBER OF STUDENTS ENROLLED (%)	10.8%	14%

SOURCE: OCDE		
<b>STAFF EMPLOYED IN R&amp;D ACTIVITIES/TOTAL POPULATION IN EMPLOYMENT (‰)</b>	<b>11.8‰</b>	<b>13.0‰</b>
SOURCE: OCDE		
<b>POPULATION EMPLOYED IN R&amp;D ACTIVITIES WITH PHD QUALIFICATIONS OVER THE ENTIRE POPULATION IN EMPLOYMENT</b>	<b>21.4%</b>	<b>23.0%</b>
SOURCE: EUROSTAT		
<b>PERCENTAGE INCREASE OF PUBLICATIONS IN JOURNALS FOUND IN THE DECILE MOST OFTEN QUOTED IN THEIR AREA AT WORLD LEVEL</b>	<b>-</b>	<b>25%</b>
SOURCE: THOMSON REUTERS, JCR		
<b>INCREASE IN THE NUMBER OF PROJECTS FUNDED BY THE EUROPEAN RESEARCH COUNCIL (STG)</b>	<b>-</b>	<b>50%</b>
SOURCE: ERC		
<b>INCREASED RETURN FROM PARTICIPATION BY RESEARCH GROUPS. SPANISH UNIVERSITIES AND PUBLIC RESEARCH CENTRES IN H2020-WHICH HAVE BEEN FINANCED DURING THE PERIOD OF REFERENCE, BY THE NATIONAL PLAN</b>	<b>-</b>	<b>30%</b>
SOURCE: OWN INFORMATION		
<b>INCREASE IN THE NUMBER OF PROJECTS PERFORMED IN COOPERATION AND SERVICES TO THE PRIVATE SECTOR OF THE ICTS</b>	<b>-</b>	<b>50%</b>
SOURCE: OWN INFORMATION		
<b>INCREASE IN NUMBER OF PATENTS APPLIED FOR IN EMERGING TECHNOLOGIES GENERATED</b>	<b>-</b>	<b>25%</b>
SOURCE: WORLD INTELLECTUAL PROPERTY ORGANIZATION		
<b>INCREASE IN THE NUMBER OF PATENT APPLICATIONS (NATIONAL AND INTERNATIONAL) WITH APPROVAL OF STATE OF THE TECHNIQUE IN EMERGING TECHNOLOGIES</b>	<b>-</b>	<b>25%</b>
SOURCE: EPA; WORLD INTELLECTUAL PROPERTY ORGANIZATION		
<b>INCREASE IN % OF PRIVATE FUNDING ASSOCIATED WITH ACTIONS FUNDED WITH/TOTAL RESOURCES PROVIDED (MOBILISED) BY THE PRIVATE SECTOR</b>		
SOURCE: OWN INFORMATION		
<b>INCREASE IN RETURN ON BUSINESS PARTICIPATION IN H2020</b>	<b>-</b>	<b>40%</b>
SOURCE: OWN INFORMATION		
<b>COMPANIES MAKING TECHNOLOGY INNOVATIONS OVER ALL ACTIVE COMPANIES WITH 10 OR MORE SALARIED EMPLOYEES (%)</b>	<b>18.6%</b>	<b>20.0%</b>
SOURCE: INE		
<b>% OF SME MAKING TECHNOLOGY INNOVATIONS - PRODUCTS AND PROCESSES - OF TOTAL SME</b>	<b>14.6%</b>	<b>16.0%</b>
SOURCE: INE		
<b>% OF MEDIUM AND ADVANCED TECHNOLOGY EXPORTS OVER TOTAL PRODUCT EXPORTS</b>	<b>4.7%</b>	<b>6.0%</b>
SOURCE: INE		
<b>INCREASE IN THE NUMBER OF PATENTS APPLIED FOR IN DIFFERENT FACILITATING AND ESSENTIAL TECHNOLOGIES</b>	<b>-</b>	<b>25%</b>
SOURCE: WORLD INTELLECTUAL PROPERTY ORGANIZATION		
<b>NO. OF COMPANIES WHO HAVE MADE TECHNOLOGY INNOVATIONS - PRODUCTS AND PROCESSES - IN COOPERATION WITH PUBLIC CENTRES AND UNIVERSITIES</b>	<b>23%</b>	<b>30%</b>
SOURCE: INE		
<b>INCREASE IN NO. OF PATENTS REQUESTED AND THEIR SECTOR DEVELOPMENT LINKED TO CHALLENGES FACING SOCIETY</b>	<b>-</b>	<b>25%</b>
SOURCE: WORLD INTELLECTUAL PROPERTY ORGANIZATION		
<b>INCREASE IN THE % OF PUBLICATIONS GENERATED BY PROJECTS FUNDED WITH PUBLIC RESOURCES WITHIN THE CHALLENGES TO SOCIETY FOUND IN THE MOST OFTEN QUOTED DECILE IN ITS AREA AT GLOBAL LEVEL</b>	<b>-</b>	<b>25%</b>
SOURCE: ELSEVIER, THOMPSON REUTERS		
<b>RETURN ON PARTICIPATION OF RESEARCH GROUPS, COMPANIES AND OTHER STAKEHOLDERS IN H2020 AND REST OF EUROPEAN INITIATIVES</b>	<b>8.6%</b>	<b>11%</b>
SOURCE: FECYT; CDTI		
<b>INCREASE IN THE VOLUME OF VENTURE CAPITAL INVESTED (PUBLIC AND PRIVATE, NATIONAL AND FOREIGN) DURING THE PERIOD OF REFERENCE</b>	<b>-</b>	<b>20%</b>

SOURCE: EUROSTAT		
EVOLUTION OF SOCIAL EVALUATION OF SCIENCE AND TECHNOLOGY	53%	59%
SOURCE: FECYT		

As well as the indicators that determine the efficacy of measures and actions taken, there are also indicators for monitoring the results linked to the **NATIONAL PLAN** which reflect the direct results of the activities driven and funded. These indicators and their quantification will be included as part of the **ANNUAL ACTION PROGRAMMES**.

#### 4. STRUCTURAL ELEMENTS OF THE NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016

The structure of the **NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016** responds to the strategic objectives of the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION and its priority areas, taking into account the characteristics of the stakeholders in the *Spanish System of Science, Technology and Innovation* that perform these activities. The structural elements of the **NATIONAL PLAN** include:

**1. NATIONAL PROGRAMMES.** The **PLAN** consists of **FOUR NATIONAL PROGRAMMES**, corresponding to the general objectives established in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION. The **NATIONAL PROGRAMMES** are divided into **SUBPROGRAMMES (TABLE3)** of a pluri-annual nature which are developed primarily through calls for competitive tender in which the modes of participation and funding are detailed.

TABLE 3. National Programmes and Subprogrammes of the **SPANISH NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016**.

<b>NATIONAL PROGRAMME FOR PROMOTION AND INCORPORATION OF TALENT AND ITS EMPLOYMENT</b>
NATIONAL TRAINING SUBPROGRAMME
NATIONAL INCORPORATION SUBPROGRAMME
NATIONAL MOBILITY SUBPROGRAMME
<b>NATIONAL PROGRAMME TO ENCOURAGE SCIENTIFIC RESEARCH AND TECHNICAL EXCELLENCE</b>
NATIONAL KNOWLEDGE GENERATION SUBPROGRAMME
NATIONAL SUBPROGRAMME FOR THE DEVELOPMENT OF EMERGING TECHNOLOGIES
NATIONAL SUBPROGRAMME FOR INSTITUTIONAL STRENGTHENING
NATIONAL SUBPROGRAMME ON SCIENTIFIC AND TECHNICAL INFRASTRUCTURES AND EQUIPMENT
<b>NATIONAL PROGRAMME ON BUSINESS LEADERSHIP IN R&amp;D&amp;I</b>
NATIONAL ENTREPRENEURIAL RDI SUBPROGRAMME
NATIONAL SUBPROGRAMME OF KEY ENABLING TECHNOLOGIES
NATIONAL SUBPROGRAMME OF COLLABORATIVE RDI AIMED AT THE DEMANDS OF THE PRODUCTIVE FABRIC
<b>NATIONAL PROGRAMME FOR RESEARCH AIMED AT THE CHALLENGES OF SOCIETY 2013</b>
HEALTH, DEMOGRAPHIC CHANGE AND WELLBEING
FOOD SAFETY AND QUALITY; PRODUCTIVE AND SUSTAINABLE FARMING ACTIVITY; SUSTAINABILITY OF NATURAL RESOURCES, MARINE AND MARITIME RESEARCH
SAFE, EFFICIENT, CLEAN ENERGY
SUSTAINABLE, SMART, INTEGRATED TRANSPORT
ACTION ON CLIMATE CHANGE AND EFFICIENT USE OF RESOURCES AND RAW MATERIALS
SOCIAL CHANGE AND INNOVATION
DIGITAL ECONOMY AND SOCIETY
SAFETY, PROTECTION AND DEFENCE

## STRATEGIC ACTIONS

### AE1. STRATEGIC ACTION IN HEALTH

### AE2. STRATEGIC ACTION IN ECONOMY AND DIGITAL SOCIETY

Also included are the **STRATEGIC ACTIONS**, understood as "programmatic actions" which are characterised by organisation of different modes of participation and funding instruments, the thematic scope of targeted interventions. They can also be assigned to a specific management unit. The **NATIONAL PLAN** includes two Strategic Actions in its development, the Strategic Health Action and the Strategic Action in Digital Society and Economy, notwithstanding any strategic actions approved in accordance with the procedure established while it is in force.

The NATIONAL PROGRAMMES encompass several modes of participation and funding mechanisms, designed to take into account the needs and characteristics of beneficiary entities. They will be managed by different business units although their purpose is to limit, in terms of actions of the State Secretariat for Research, Development and Innovation, management and funding of grants to the two RDI Financing Agencies established in the *Science, Technology and Innovation Law* of 1 June 2011; the Centre for Industrial Technological Development (CDTI) and the State Research Agency, which will be created soon.

**2. MODALITIES OF PARTICIPATION and FUNDING INSTRUMENTS.** The modalities of participation include:

- **RDI programmes and projects:** In the form of individual grants or collaborations, including public-private cooperation of any kind, and which can be organised, when appropriate, with joint international programming and, if appropriate, regional programming. These grants are used to encourage the generation of knowledge, its application and innovation of all kinds. The grants are awarded in highly competitive tenders and are awarded on the basis of transparent scientific and/or technical evaluation criteria, which are open and internationally based on peer evaluation.
- **Contracting and grants for Human Resources in R&D&i:** grants awarded on a competitive basis, by applying transparent, open principles and assessment criteria and based on internationally recognised scientific and/or technical merit based on the objectives to be achieved for the training and appointment of doctors, researchers, technologists, technicians and RDI managers in all stages of their careers and in close correspondence with the development of the same, according to Law 14/2011, Science, Technology and Innovation, 1 June and the objectives set out in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION. Also included are grants to doctors, researchers, technologists, technicians and RDI managers to encourage their temporary international and intersectoral mobility.
- **Grants for scientific and technical infrastructures and for acquisition of equipment:** grants awarded on a competitive basis for the purchase and maintenance of scientific and technical equipment necessary to perform RDI activities. The evaluation process and criteria for allocation respond to internationally recognised principles. Also included are specific grants to foster and improve Singular Scientific-Technical Infrastructures, internationalisation and exploitation of these as well as Spanish participation in international installations.
- **Complementary actions:** grants for projects of special importance with a broad spectrum associated with R&D&i, human resources or infrastructures for the development and implementation of activities not covered by the above modalities and which will be awarded on a competitive basis and/or by application of scientific and/or technical, transparent, open and internationally recognised criteria depending on the objectives of these criteria.

- **Revitalisation activities:** grants awarded on a competitive basis for activities a strategic priority nature which, due to their nature are not among activities described in the previous modalities. On the one hand, a set of measures to facilitate internationalisation of stakeholders in the *Spanish System of Science, Technology and Innovation*, including Spanish participation in European Union programmes and bilateral and multilateral collaboration with priority countries and regions outside Europe. On the other hand, this modality is intended to stimulate, in addition to other aspects, a scientific, technological and innovative culture, improving communication of science and innovation, fostering entrepreneurship, facilitating knowledge transfer and management and promoting the creation of an environment conducive to scientific-technical research and innovation.
- **Joint programming activities:** aid to promote scientific and technical research and innovation carried out in our country in transnational collaboration to address major scientific and societal challenges together, particularly within the framework of the European Union. These are grants which make it possible to complete co-funding percentages of European initiatives provided for the purpose of incorporating doctors, R&D projects, and acquisition of infrastructures, innovation and transfer of results, among others. Likewise, Joint Regional Programming Activities are included, following a similar scheme to that proposed at international level makes it possible to undertake activities co-funded by the **NATIONAL PLAN** and the Autonomous Regions through their respective Plans and "Smart Specialisation Strategies in Research and Innovation" in order to ensure proper coordination between the state and the regions emphasising the need to rationalise resources by avoiding duplication.

The funding instruments include: (1) grants; (2) financial loans; (3) venture capital mechanisms of all types (4) other available funding mechanism, including guarantee systems and tax incentives, among others.

**3. ANNUAL ACTION PROGRAMMES** make it possible to develop modalities of participation by assigning financial resources available to the actions programmed. They are a mechanism for continuously updating the **NATIONAL PLAN** while it is in force, therefore it includes the list of actions and calls made by the **NATIONAL PROGRAMMES** annually through the calendar foreseen from public calls, indicating the deadlines for presentation and resolution of proposals, as well as management bodies, new agreements foreseen, development of agreements and other actions. The **ANNUAL ACTION PROGRAMMES** are a basic tool for monitoring and managing the **PLAN** and for coordinating the activities corresponding to the different management units involved.

**4. RESULTS AND MONITORING INDICATORS.** Assessment of the level of compliance with the objectives established for each of the **PROGRAMMES** is a critical aspect for the correct development of the public actions programmed. To do this, the corresponding performance indicators have been established. In addition, the correlation between the general objectives set out in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION for the 2013-2020 period and programmes from the **NATIONAL PLAN** makes possible to evaluate the activities of the **PLAN** as part of the intermediate evaluation exercise of the **STRATEGY** itself. Along with the indicators that determine the efficiency of the measures and actions performed, monitoring indicators are established with regard to: (1) management processes and (2) the direct results of the activities driven and funded by the **PLAN**.

Grants under the **NATIONAL PLAN** are awarded by means of competitive procedures, as foreseen in the General Law 38/2003, of 17 November 2003, on Grants, open procedures, and are only in exceptional cases awarded under other direct mechanisms in accordance with article 22.2 of the aforementioned Law. In addition, grants may be a combination of funds from different sources

including funds from the European Union, other governments, public-private co-financing and any others.

## 5. SCIENTIFIC-TECHNICAL AND SOCIETAL PRIORITIES OF THE NATIONAL PLAN

The **PLAN** sets out the scientific-technical societal and economic priorities established by National Government to encourage RDI which are equally subject to strict principles of competition and evaluation in accordance with internationally established criteria.

The priorities of the **NATIONAL PLAN** are: (a) the generation of knowledge, in any field of research, which contributes to encouraging excellence and international leadership of the *Spanish System of Science, Technology and Innovation*, and (b) the scientific and social priorities integrated in the **NATIONAL RDI PROGRAMME AIMED AT THE CHALLENGES OF SOCIETY** guiding scientific and technical research and business development in RDI to the major challenges faced by Spanish society.

**RDI AIMED AT THE CHALLENGES OF SOCIETY** include: (1) Health, demographic change and well-being, (2) Food safety and quality, productive and sustainable farming, natural resources, marine and maritime research, (3) Safe, efficient and clean energy, (4) Smart, sustainable and integrated transport (5) Action on climate change and efficient use of resources and raw materials, (6) Changes and social innovations, (7) Digital society and economy (8) Safety, protection and defence.

## 6. NATIONAL PROGRAMMES AND SUB-PROGRAMMES

The **NATIONAL PROGRAMMES** dedicated to fostering and coordinating the RDI of the **SPANISH NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION** allow the overall objectives of the **PLAN** itself to be instrumentalised and are consistent with the objectives established in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION. In turn, the National Programmes are developed in Sub-programmes according to the thematic specificity and nature of the actions, they have specific management structures and the subsequent deployment of the methods of participation and financing instruments in line with the characteristics of the activity to be financed and the nature of the beneficiary stakeholders.

Likewise, in order to facilitate it being articulated internationally, the **NATIONAL PLAN** includes a series of measures, integrated into the four National Programmes and their sub-programmes. This context will include: (a) additional financing of RDI projects which are developed in international collaboration including, among others, the ERANETs and Joint Programming Initiatives (JPIs) of the EU Framework Programme; (b) the Revitalisation Activities for providing incentives for the participation of all the Spanish System for Science, Technology and Innovation stakeholders in bilateral and multilateral actions and especially within the European initiatives encompassed within the framework of "Horizon 2020", and (c) the International Joint Programming Actions for fostering international actions, mainly with EU countries, which allow for making use of the community co-financing mechanisms in accordance with the participation criteria and conditions established in the different fields of application.

The **NATIONAL PLAN** also promotes actions, mainly via Revitalisation Activities aimed at: (a) fostering scientific, technological and innovative culture; (b) disseminating creativity and entrepreneurship as key values within our society; (c) improving the scientific and technological education of our society at all levels and (d) promoting the active participation of society in the RDI process.

Lastly, the NATIONAL PROGRAMMES and their sub-programmes, when applicable, include co-financing schemes with the Autonomous Regions as well as with those mentioned for the international sphere.

The **four national programmes** considered are:

1. **NATIONAL PROGRAMME FOR THE PROMOTION OF TALENT AND ITS EMPLOYABILITY IN RDI**
2. **NATIONAL PROGRAMME TO FOSTER EXCELLENCE IN SCIENTIFIC AND TECHNICAL RESEARCH**
3. **NATIONAL PROGRAMME FOR BUSINESS LEADERSHIP IN R&D&I**
4. **NATIONAL RDI PROGRAMME AIMED AT SOCIETY'S CHALLENGES**

Below is a description of each of these, their overall objectives, corresponding to the National Sub-Programmes and the main actions considered in each of them.

## **6.1. NATIONAL PROGRAMME FOR THE PROMOTION OF TALENT AND ITS EMPLOYABILITY IN R&D&I**

The objective of the **NATIONAL PROGRAMME FOR THE PROMOTION OF TALENT AND ITS EMPLOYABILITY IN RDI** is to finance and incentivise, by means of competitive tendering, the training and specialisation of the human resources involved in RDI and promote their employment within public and private sectors, as well as facilitating international mobility and mobility within the public sector, universities and research bodies, and between these and companies.

This **PROGRAMME** is aimed at those who hold the academic and professional requirements established in each of the **SUB-PROGRAMMES** and wish to perform their activities in organisations and institutions within the *Spanish System for Science, Technology and Innovation*, within the public and private sectors, and want to complete their training at centres of internationally renowned prestige.

The **NATIONAL PROGRAMME FOR THE PROMOTION OF TALENT AND ITS EMPLOYABILITY** will be developed in parallel to the actions highlighted in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION aimed at developing a research career within our country as well as simplifying the administrative procedures for incorporating foreign researchers into our singular public R&D centres, universities and scientific and technological facilities.

The **NATIONAL PROGRAMME** is comprised of: (1) the **NATIONAL SUB-PROGRAMME FOR TRAINING**; (2) the **NATIONAL SUB-PROGRAMME FOR INCORPORATION** and (3) the **NATIONAL SUB-PROGRAMME FOR MOBILITY**

### **6.1. NATIONAL PROGRAMME FOR THE PROMOTION OF TALENT AND ITS EMPLOYABILITY**

#### **6.1.1. NATIONAL SUB-PROGRAMME FOR TRAINING**

#### **6.1.2. NATIONAL SUB-PROGRAMME FOR INCORPORATION**

#### **6.1.3. NATIONAL SUB-PROGRAMME FOR MOBILITY**

**6.1.1. NATIONAL SUB-PROGRAMME FOR TRAINING.** By assigning competitive tendering, this sub-programme aims to select and train doctors, researchers, technologists, research personnel, RDI specialised technicians and RDI managers.

It also includes training actions aimed at fostering initiation into research and entrepreneurship for young people who have not yet completed their university studies, for them to be carried out within national and international RDI centres. In general, it also contemplates actions aimed at promoting an educational model that boosts values and attitudes towards innovation, critical spirit, creativity and curiosity throughout the life, and shall mainly include:

- **SUBSIDIES FOR INITIATION AND INTRODUCTION TO SCIENTIFIC AND TECHNICAL RESEARCH** aimed at university students – undergraduates or postgraduates - who are completing their last training stages prior to commencing a doctorate programme, using formulas which allow for compatibility between classroom activities and RDI training.
- **CONTRACTS FOR TRAINING DOCTORS** at national and international universities and public centres, including training within the framework of the “industrial doctorate” programmes considered within the SPANISH STRATEGY in collaboration with the private sector.
- **SUBSIDIES AND CONTRACTS FOR TRAINING RDI TECHNICAL PERSONNEL** aimed at Dual Professional Training students with co-participation of the educational centres, universities, research centres and companies, as well as for higher graduates in Vocational Training and exceptionally for holders of other academic degrees.
- **SUBSIDIES AND CONTRACTS FOR TRAINING RDI MANAGERS** aimed at doctors, degree holders and graduates, including higher graduates in Vocational Training, to acquire abilities within the scope of RDI management, enhancement and marketing of their results and the preparation, consultancy and promotion of projects and other national and international initiatives, especially within the context of the “Support Network for participation in Horizon 2020”.
- **REVITALISATION ACTIVITIES for promoting specialisation and participation of doctors, technologists, higher graduates and technicians** in large international scientific structures of which Spain is a member or is involved in relevant collaborations.
- **REVITALISATION ACTIVITIES** aimed at financing, among other initiatives, activities which contribute towards increasing: (i) the scientific and innovative culture of the faculty; (ii) the dissemination and promotion of the scientific and innovative culture for fostering scientific vocations; (iii) the creation of teaching and training materials aimed at improving our society’s level of scientific culture, fostering creativity and entrepreneurship.

**6.1.2. NATIONAL SUB-PROGRAMME FOR INCORPORATION.** Aiming to promote and finance, by means of competitive tenders, the incorporation of researchers, technologists, technical personnel and other professionals within the field of RDI, facilitating their employment within the public and private sectors in order to contribute to increasing the competitiveness of Spain’s research and innovation. The considered actions mainly include:

- **SUBSIDIES FOR THE INCORPORATION OF DISTINGUISHED PROFESSORS AND RESEARCHERS** aimed at foreign and Spanish researchers who perform their activities beyond our borders, with an internationally renowned research activity for their incorporation into universities and public research bodies within the *Spanish System for Science, Technology and Innovation*.
- **EMPLOYING DOCTORS** with a proven track record, including: i) contracts for employing young doctors within the public research system; ii) “**Ramón y Cajal**” contracts for employment at public universities and centres and iii) “**Torres Quevedo**” contracts for employment in companies, R&D business centres and centres which, regardless of their ownership and legal form, are focused on business RDI.

- **SUBSIDIES AND INCENTIVES FOR EMPLOYING TECHNOLOGISTS, UNIVERSITY GRADUATES AND HIGHER GRADUATES IN VOCATIONAL TRAINING** for developing activities involving technical support and RDI support.
- **SUBSIDIES AND INCENTIVES FOR THE INCORPORATION OF RDI MANAGERS** for developing activities involving management and knowledge enhancement.
- **REVITALISATION ACTIVITIES** for employing experts in international RDI projects, including consultancy tasks to be performed by the Support Network for participation in “Horizon 2020”.
- **JOINT PROGRAMMING ACTIONS** in both of its modalities, a) international for the employment of researchers, co-financed by the EU according to the existing schemes and (b) regional for the employment of RDI human resources by means of competitive tenders which are co-financed by Spain’s National Government and the Autonomous Regions.

**6.1.3. NATIONAL SUB-PROGRAMME FOR MOBILITY.** Aiming to foster, by means of competitive tenders and revitalisation activities, the mobility of researchers, technologists and technicians within the public sector and between this sector and the business sector, as well as mobility at an international level. The following are the main measures considered:

- **SUBSIDIES FOR PRE-DOCTORATE MOBILITY** aimed at university graduates who are studying a pre-doctorate training programme for enabling training courses abroad or at business R&D centres designed to acquire new skills which improve their scientific and technological training.
- **SUBSIDIES FOR POST-DOCTORATE MOBILITY** aimed at doctors to carry out their research activity temporarily at universities, public centres or business R&D centres of renowned prestige, other than those wherethey normally perform their activity. The promotion of international mobility considers: (a) the mobility of doctors who work at Spanish public RDI universities and centres towards international centres, and (b) the mobility of doctors who perform their activities at RDI centres abroad towards Spanish universities and research centres.
- **SUBSIDIES FOR INTER-SECTORAL MOBILITY** of researchers, technologists, technicians, research personnel and RDI managers to acquire new methodologies and skills in handling new research techniques, etc.
- **SUBSIDIES FOR THE MOBILITY OF DISTINGUISHED RESEARCHERS** aimed at: i) foreign and Spanish professors, researchers and technologists who perform their activities outside our borders with an internationally renowned research activity to allow them to work on a temporary basis with public universities and research centres within the *Spanish System for Science, Technology and Innovation* and ii) foreign and Spanish professors and technologists who perform their activities within the Spanish System for Science, Technology and Innovation with an internationally renowned research activity to allow them to work on a temporary basis with public universities and research centres of renowned international prestige.

## **6.2. NATIONAL PROGRAMME FOR FOSTERING EXCELLENCE IN SCIENTIFIC AND TECHNICAL RESEARCH**

The objective of the **NATIONAL PROGRAMME FOR FOSTERING EXCELLENCE IN SCIENTIFIC AND TECHNICAL RESEARCH** is to implement competitive tenders for financing and incentivising complementary actions and revitalisation activities, as well as joint programming actions, the generation of scientific and technological knowledge, without predefined thematic orientation, and including knowledge generation and the development of emerging technologies. It also considers

international cooperation and the acquisition of the necessary scientific and technological infrastructures and equipment as fundamental aspects for developing these activities. Lastly, the strengthening of the institutions, centres and units in which the RDI activities are performed for the purpose of increasing international competitiveness and leadership of Spanish science and technology and its contribution towards social well-being and economic development.

This **NATIONAL PROGRAMME** comprises **four SUB-PROGRAMMES**: (1) **NATIONAL SUB-PROGRAMME FOR KNOWLEDGE GENERATION**; (2) **NATIONAL SUB-PROGRAMME FOR THE DEVELOPMENT OF EMERGING TECHNOLOGIES**; (3) **NATIONAL SUB-PROGRAMME FOR INSTITUTIONAL STRENGTHENING**; and (4) **NATIONAL SUB-PROGRAMME FOR SCIENTIFIC AND TECHNOLOGICAL INFRASTRUCTURES AND EQUIPMENT**.

## 6.2. NATIONAL SUB-PROGRAMME FOR EXCELLENCE IN FOSTERING KNOWLEDGE

### 6.2.1. NATIONAL SUB-PROGRAMME FOR KNOWLEDGE GENERATION

### 6.2.2. NATIONAL SUB-PROGRAMME FOR THE DEVELOPMENT OF EMERGING TECHNOLOGIES

### 6.2.3. NATIONAL SUB-PROGRAMME FOR INSTITUTIONAL STRENGTHENING

### 6.2.4. NATIONAL SUB-PROGRAMME FOR SCIENTIFIC AND TECHNOLOGICAL INFRASTRUCTURES AND EQUIPMENT

**6.2.1. NATIONAL SUB-PROGRAMME FOR KNOWLEDGE GENERATION.** This sub-programme aims to promote, by means of highly competitive tenders, the execution of basic research projects and other activities, the results of which represent a significant advance in knowledge for developing new approaches and methodologies otherwise unachievable and which due to the nature of the knowledge generated are of a significantly transverse and basic nature. The actions considered within this sub-programme preferably refer to:

- **Fundamental R&D PROJECTS**, at individual levels or in collaboration, in which case the pooling of scientific and technological abilities and skills will be promoted, as well as the complementary nature of the same. Participation in large international RDI projects shall be considered in these tenders by means of additional financing for the activities performed by the Spanish research groups participating in ERANETs, JPIs and other similar schemes.
- **EXPLORE SCIENCE PROJECTS** aimed at assessing established paradigms, interdisciplinary theoretical applications and searching for new applications in different fields.
- **COMPLEMENTARY ACTIONS** aimed at financing the activities required for obtaining results and enhancing them, which are not considered in the R&D projects.
- **REVITALISATION ACTIVITIES** aimed at financing, among others: (i) the initial expenses for incorporating the resulting Technologically Based Companies; (ii) proposals which have been given a positive assessment by the European Research Council, but have finally not obtained financing from this body and provided the proposal is not financed via other instruments and modalities included in this **PLAN**; (iii) other activities aimed at increasing the participation of Spanish scientific groups and entities within the EU framework programmes such as subsidies for drafting proposals; (iv) the promotion of scientific culture and innovation within Spanish society; (v) the dissemination of the results of science and innovation and (vi) the social communication of science, technology and innovation.
- **JOINT PROGRAMMING ACTIONS** in both of their modalities (a) international for the execution of RDI projects and other actions by means of existing co-financing schemes within the EU or resulting from other scientific collaboration agreements and (b) regional for carrying out RDI projects by means of competitive tenders which are co-financed by Spain's National Government and the Autonomous Regions.

**6.2.2. NATIONAL SUB-PROGRAMME FOR THE DEVELOPMENT OF EMERGING TECHNOLOGIES.** This **SUB-PROGRAMME** aims to implement competitive tenders for promoting and financing the execution of R&D projects which contemplate: (i) the performance of design tests for the ideas generated during the execution of the projects financed by the **NATIONAL PLAN** within the SUB-PROGRAMME FOR KNOWLEDGE GENERATION and similar tenders in previous Plans; and (ii) the development of technologies which, despite being in exploratory phase, may represent a significant potential impact. The actions included within this sub-programme mainly refer to:

- **R&D PROJECTS** for the development of advanced and cutting edge technologies, done individually or in collaboration...
- **EXPLORE TECHNOLOGY PROJECTS** aimed at assessing technologies and searching for new applications in different spheres or the search and execution of “design tests”.
- **COMPLEMENTARY ACTIONS** aimed at financing the activities required for obtaining results and enhancing them, which are not considered in the R&D projects.
- **REVITALISATION ACTIVITIES** aimed at financing, among others: (i) the initial expenses for constituting the resulting Technologically Based Companies; (ii) the proposals which been given a positive assessment by the European Research Council, but have finally not obtained financing from this body and provided the proposal is not financed via other instruments and modalities included in this **PLAN**; (iii) other activities aimed at increasing the participation of Spanish scientific groups and entities within the EU framework programmes such as subsidies for drafting proposals; (iv) the promotion of scientific and innovative culture within Spanish society; (v) the dissemination of the results of science and innovation and (vi) the social communication of science, technology and innovation.
- **JOINT PROGRAMMING ACTIONS** in both of their modalities (a) international for the execution of RDI projects and other actions by means of existing co-financing schemes within the EU or resulting from other scientific collaboration agreements and (b) regional for carrying our RDI projects by means of competitive tenders which are co-financed by Spain's National Government and the Autonomous Regions.

**6.2.3. NATIONAL SUB-PROGRAMME FOR INSTITUTIONAL STRENGTHENING.** This **SUB-PROGRAMME** aims to promote the competitiveness of the Spanish System for Science, Technology and Innovation and foster the scientific and technological leadership of the institutions, centres and units in the System by providing them with financing. The resources shall be assigned by means of highly competitive tenders based on international standards, which allow for identifying and acknowledging, as well as financing strategic RDI programmes for focusing their activities, strengthening their scientific and technological abilities and promoting synergies among research groups, units and centres with capabilities and international leadership potential. The considered actions shall include, among others:

- **RDI PROGRAMMES FOR STRENGTHENING CENTRES AND UNITS OF EXCELLENCE.** Subsidies destined to identify, acknowledge and finance existing research centres and units in order to promote the international leadership of the Spanish System for Science, Technology and Innovation stakeholders by means of highly competitive tenders, subject to strict international peer assessment processes which contemplate, among others: (i) subsidies for the development of strategic programmes which organise and stimulate scientific and technological lines of research, promote the specialisation and combination of scientific abilities and the creation of highly competitive groups and units on an international scale; and (ii) the acknowledgement, certification and granting of subsidies for “**SEVERO OCHOA**” **CENTRES OF EXCELLENCE** in the public sector for the development of

RDI programmes and strategic actions which increase their scientific leadership, ability for attracting and retaining international talent and their driving role throughout the entire System.

- **REVITALISATION ACTIVITIES** providing the institutions with the strategic resources and tools appropriate for the nature of their activities, foster their specialisation and promote their international impact and visibility, considering, amongst other things, the preparation of International Strategic Action Plans for the System's stakeholders or the strengthening of the RDI networks and structures which increase cooperation, coordination and dialogue between the stakeholders in the territory as a whole and their internationalisation.

**6.2.4. NATIONAL SUB-PROGRAMME FOR SCIENTIFIC AND TECHNOLOGICAL INFRASTRUCTURES AND EQUIPMENT.** This **SUB-PROGRAMME** aims to provide, maintain and update scientific and technical infrastructures for them to be accessible by all stakeholders of the *Spanish System for Science, Technology and Innovation* and facilitate high quality scientific-technical research as well as the development of highly competitive R&D business activities. For this purpose, the following actions are considered:

- **SUBSIDIES FOR SCIENTIFIC-TECHNICAL INFRASTRUCTURES AND EQUIPMENT** for the acquisition and maintenance of scientific and technological infrastructures and equipment, preferably for shared use and for the sustainability and improvement of existing infrastructures and equipment.
- **SUBSIDIES FOR SINGULAR SCIENTIFIC AND TECHNOLOGICAL INFRASTRUCTURES (ICTS)** including measures for their development, maintenance and instrumentation by means of public and private co-participation schemes and joint programming actions. This also includes actions designed to finance the necessary works linked to the design, feasibility study, improvement and planning of the ICTS.
- **REVITALISATION ACTIVITIES** which include, among others, measures for: (i) cross-sector collaboration and start-up of activities which increase the use of ICTS by the business community and (ii) participation in international scientific organisations and for the participation, construction and operation of large international scientific and technological facilities, particularly those included in the ESFRI "roadmap".
- National and international **JOINT PROGRAMMING ACTIONS** which allow for a strengthening of the **SINGULAR SCIENTIFIC AND TECHNOLOGICAL INFRASTRUCTURES (ICTS)** by means of the initiatives existing in this field –incorporation of doctors, start-up of large R&D projects, acquisition of infrastructures, transference of results, etc.- or completing the financing percentages.

### **6.3. NATIONAL PROGRAMME FOR BUSINESS LEADERSHIP IN RDI**

This **PROGRAMME** aims to ensure Spanish companies increase their competitiveness by generating and incorporating knowledge, technologies and innovations designed to improve processes and the creation of technological advanced products and services with increased added value. The actions of this **PROGRAMME** are aimed at: (a) promoting the business stakeholders' ability to carry out R&D activities; (b) facilitate the development and subsequent dissemination and adoption of key technologies, of a transverse nature, the application of which throughout all other manufacturing and services sectors of the Spanish economy contribute decisively towards modernising the business fabric and its competitiveness and (c) promoting public-private collaboration as a result of the early identification of a business interest in the RDI results deriving from the activities performed by public research stakeholders and other public

and private R&D centres, thus promoting the transfer and flow of scientific and technological knowledge and their multiple applications.

Along with the actions designed specifically for the achievement of the specific objectives of each of the indicated Sub-Programmes, this **NATIONAL PROGRAMME** also contemplates a series of critical actions aimed at creating and consolidating a financial environment which favours R&D&i, especially for SMEs, the transfer of knowledge among companies, both cross-sector and inter-sector and between the academic and business environments. It also looks to reinforce the role of large national and international companies as a driving force behind RDI investments and of SMEs and the internationalisation of business RDI activities and those focused on the market.

Within the financing instruments which respond to the objectives of the **NATIONAL PLAN** we highlight the following:

- Financing by means of **VENTURE-CAPITAL AND STIMULI FOR THE CREATION, CONSOLIDATION AND GROWTH OF HIGHLY INNOVATIVE COMPANIES** including: (a) seed capital measures for supporting the start-up of new technological-based companies, especially the spin offs from the public sphere and individual *entrepreneurs*, and (b) venture capital actions specialised in R&D for latter stages and of smart capitalization of highly innovative SMEs by attracting specialised capital and investors.
- **FINANCING BUSINESS INNOVATION** referring to stimuli measures via participative loans and fostering the development of other sources of financing, particularly that offered by “business angels”.

The National Programme comprises **three SUB-PROGRAMMES**: (1) **NATIONAL SUB-PROGRAMME FOR BUSINESS R&D&i**; (2) **NATIONAL SUB-PROGRAMME FOR KEY ENABLING TECHNOLOGIES**; and (3). **NATIONAL SUB-PROGRAMME FOR FOSTERING COOPERATIVE “MARKET FOCUSED” R&D&i**.

### 6.3. NATIONAL PROGRAMME FOR BUSINESS LEADERSHIP IN R&D&i

#### 6.3.1. NATIONAL SUB-PROGRAMME FOR BUSINESS RDI

#### 6.3.2. NATIONAL SUB-PROGRAMME FOR FACILITATING TECHNOLOGIES

#### 6.3.3. NATIONAL SUB-PROGRAMME FOR COOPERATIVE RDI FOCUSED ON THE REQUIREMENTS OF THE PRODUCTIVE SECTOR

#### 6.3.1. NATIONAL SUB-PROGRAMME FOR BUSINESS RDI

This programme aims to increase, extend and systemise investments and the execution of R&D activities and to promote innovation as part of the companies’ competitive strategy. The promotion of business RDI activities includes sectors and segments of high technological content and those which, despite being considered traditional or mature, have a significant source of competitiveness and differentiation in RDI activities, and especially those activities of a strategic nature within the Spanish economy due to their specific importance, notably: tourism, the automotive sector, railway transport, shipbuilding, the aerospace industry, the agrifood sector, the safety industry, activities linked to advanced infrastructures and construction, the chemical sector, the pharmaceutical sector, the energy sector, machine tools, goods and services, textile production and other traditional manufacturing sectors. In general, the specific actions considered include:

- **RDI PROJECTS** which may be executed by one or more companies (individual and consortium projects) The projects will originate from business initiatives, also including those carried out by regional business consortiums and multilateral and

bilateral international technological collaborations. Business RDI projects may include the participation of public R&D stakeholders for executing the specific work packages within the proposed objectives.

- **REVITALISATION ACTIVITIES** for: (i) the internationalisation of business RDI activities and (ii) supporting RDI networks and structures which improve cooperation, coordination and dialogue among the system's stakeholders and provide the stakeholders with information, guidance and advice for facilitating access to public and private financing, from national and international sources, favouring the search for technological partners and investors and the provision of technologically advanced services.

### 6.3.2. SUB-PROGRAMME FOR FOSTERING KEY ENABLING TECHNOLOGIES

The aim is to support the progress and dissemination of **KEY ENABLING TECHNOLOGIES** which, in line with those identified in "Horizon 2020", include: photonics, microelectronics and nanoelectronics, nanotechnologies, advanced materials, biotechnology, information technologies and communications in an individual manner and considering the accumulated benefit resulting from the combination of different Key Enabling Technologies. This also includes Key Enabling Technologies which respond to the specific features of our productive sector and without forgetting the broad margin for innovation and the incorporation of cross-sector technologies which can be found in key service sectors within our country, among which we highlight tourism, cultural goods industries and the provision of public and personal services. Within the framework of this sub-programme the following actions shall be financed, among others:

- **RDI PROJECTS** executed by one or several companies (individual and consortium projects) also including those performed by regional business consortiums and those involving multilateral and bilateral international technological collaboration. Business RDI projects may include the participation of public R&D stakeholders for executing the specific aspects within the proposed objectives. These projects shall focus on the development and dissemination of Key Enabling Technologies, including those which, despite being of an exploratory nature, are close to the market.
- **TECHNOLOGICAL INNOVATION AND MODERNISATION PROJECTS** for increasing the capability for technological absorption of companies, especially SMEs, by means of actively adapting and assimilating knowledge, as well as technological modernisation through of the incorporation of technology within mature sectors.

### 6.3.3. SUB-PROGRAMME FOR FOSTERING COLLABORATIVE RDI FOCUSED ON THE REQUIREMENTS OF THE PRODUCTIVE SECTOR

The aim is to increase the application of scientific and technological knowledge and innovations to obtaining new processes, products and services obtained as a result of RDI collaborations between universities, public research bodies and public R&D centres and the business stakeholders and private R&D centres close to the market. The objectives of RDI activities developed within the framework of this sub-programme are to promote collaboration among the stakeholders of the Spanish System for Science, Technology and Innovation for facilitating research orientation towards the productive sector's medium and long term requirements. Public-private collaboration must be reflected when defining the objectives, the development and application of the results and for financing activities to be developed within a co-funding regime, also contemplating participation methods which favour the incorporation of SMEs.

The considered actions mainly include:

- **RDI PROJECTS** developed in collaboration between public sector stakeholders and private sector stakeholders and aimed at applying the results of the RDI activities and which promote the application of the knowledge generated, facilitating transfer processes and increasing the social and economic impact of said results.
- **COMPLEMENTARY ACTIONS** aimed at financing the activities required for obtaining results and valuing these, which are not considered in the R&D projects.
- **REVITALISATION ACTIVITIES** aimed at financing, among others: (i) the initial expenses for constituting the resulting Technological-based Companies; (ii) the protection and exploitation of the knowledge and results, not considered in the R&D projects, favouring its their transference; (iii) the appreciation of the obtained results; (iv) the promotion of the scientific and innovation culture within Spanish society; (v) the dissemination of the scientific and innovative results.
- **JOINT PROGRAMMING ACTIONS** in both of their modalities (a) international for the start-up of RDI projects and other actions by means of existing co-financing schemes within the EU or resulting from other scientific collaboration agreements and (b) regional for carrying our RDI projects by means of competitive tenders which are co-financed by Spain's National Government and the Autonomous Regions.

#### 6.4. NATIONAL RDI PROGRAMME AIMED AT SOCIETY'S CHALLENGES

This PROGRAMME aims to: (1) stimulate the generation of the critical mass in RDI of an interdisciplinary and inter-sectoral nature necessary for advancing in the search for solutions according to the priorities established in each of the Challenges; (2) promote a close relationship between scientific and technical research, the development of new technologies and the medium and long term business application of new ideas and techniques, contributing to their transfers to products and services; (3) reinforce the international leadership capability of the *Spanish System for Science, Technology and Innovation* and its stakeholders, and contributing to improving the competitiveness of the business sector and (4) articulate the RDI capabilities as well as the fostering and financing instruments with other regional and international stakeholders, mainly European, for developing a true joint programming.

Horizon 2020 identifies the challenges which the entire European population faces and which must be faced with a comprehensive and integrated vision of the RDI activities. Consequently, the overall objectives of the SPANISH STRATEGY FOR SCIENCE, TECHNOLOGY AND INNOVATION include the orientation of the RDI activities to respond to the global challenges of Spanish society, which entails coordinated RDI actions involving the following challenges:

- (1) HEALTH, DEMOGRAPHIC CHANGE AND WELLBEING
- (2) FOOD SAFETY AND QUALITY; PRODUCTIVE AND SUSTAINABLE AGRICULTURAL ACTIVITY, SUSTAINABILITY OF NATURAL RESOURCES, MARINE AND MARITIME RESEARCH
- (3) SAFE, EFFICIENT AND CLEAN ENERGY
- (4) SUSTAINABLE, SMART AND INTEGRATED TRANSPORT
- (5) CLIMATE CHANGE AND EFFICIENCY ACTION IN THE USE OF RESOURCES AND RAW MATERIALS
- (6) SOCIAL CHANGES AND INNOVATIONS
- (7) DIGITAL ECONOMY AND SOCIETY
- (8) SAFETY, PROTECTION AND DEFENCE

Aside from the points considered in the CHALLENGE ON SOCIAL CHANGES AND INNOVATIONS, the Social Sciences and Humanities research and the research which incorporates the gender perspective shall have a transversal nature and as such they shall be included in the development of the scientific and technological research and the research into the innovations focused on the search for solutions to all of society's challenges.

In order to meet this objective, the **NATIONAL PLAN** develops the **NATIONAL RDI PROGRAMME FOCUSED ON SOCIETY'S CHALLENGES**, in which each of the challenges also represents an essential part of the scientific and technological and social priorities of the *Spanish System for Science, Technology and Innovation's* stakeholders for the coming years. In the definition of the thematic priorities which develop each of the CHALLENGES the following has been taken into account: (i) the RDI capabilities of the *Spanish System for Science, Technology and Innovation's* stakeholders; (ii) the coordination with the sector policies of Spain's National Government in the creation of a favourable environment within these scopes and (iii) the interest and capabilities of the productive sector for the future development of goods and services linked to these challenges.

The NATIONAL PROGRAMME AIMED AT SOCIETY'S CHALLENGES is comprised of the eight highlighted CHALLENGES and is instrumented via the corresponding tenders, which are aimed at all the System's stakeholders and incorporate the previously described participation modalities and financing instruments. In a general manner, the **CHALLENGES** may include the following actions:

- **R&D PROJECTS** involving fundamental research aimed at resolving some of the thematic priorities, scientific and/or technological, mentioned in the Challenges. Incentives will be offered to guide R&D projects integrated by consortium and interdisciplinary groups with sufficient critical mass to allow complex matters to be addressed.
- **EXPLORE SCIENCE/TECHNOLOGY R&D PROJECTS** which entail a high risk and are designed to reassess established paradigms, searching for design tests, reassessing technologies and searching for new applications in the scopes of the **CHALLENGES**.
- **COLLABORATIVE RDI PROJECTS AIMED AT THE MARKET** which contemplate different public-private collaboration modalities, co-financed by one of several companies and aimed at obtaining results for developing or obtaining new products or services which are of interest for the market within the scope of the Challenges.
- **COMPLEMENTARY ACTIONS** aimed at financing the activities required for obtaining results and which have not been considered in the R&D projects.
- **REVITALISATION ACTIVITIES** for: (a) stimulating and fostering the development of technological tools, collaborative networks and participation structures of public and private surveillance agents, innovation, dissemination and strategic management of knowledge, such as technological platforms, alliances, etc; (b) developing new models, structures and business and internationalisation platforms including designing online tools which favour approximation and integration of entrepreneurs, technologists, inventors and venture capital for the creation of new technologically based companies (start-up, spin-off, etc.); (c) fostering the internationalisation and integration of the stakeholders of the *Spanish System for Science, Technology and Innovation* within the *European Research Area* and improving their participation in "Horizon 2020" for which the series of measures highlighted in the National Talent, Excellence and Leadership Programmes shall be applied, guided towards the scopes corresponding to the Challenges; (d) promoting and consolidating the specialisation and aggregation of capabilities within the scope of the CHALLENGES, which promote the participation of agents of different natures, contemplating territorial aggregations as well as those of a

strategic interest and virtual nature and (e) boost, among other aspects, scientific, technological and innovative culture, foster entrepreneurship, facilitate the transfer and management of knowledge or incentivise the creation of an environment which is mature for scientific, technological and innovative research.

- **JOINT PROGRAMMING ACTIONS (REGIONAL AND INTERNATIONAL)** aimed at financing RDI projects which are developed in collaboration and which may be co-funded by the Autonomous Regions, the EU or third party countries. The regional joint programming actions linked to society's challenges will in so far as possible foster regional specialisation related to RDI of each of the Autonomous Regions.

#### 6.4.1. CHALLENGE OF HEALTH, DEMOGRAPHIC CHANGE AND WELFARE

The demographic changes recorded over the past decades, the constant increase in average life expectancy and the legitimate aspiration to enjoy better quality of life and level of health are factors which condition society's future development and wellbeing, among others.

Research involving Health and the National Health System as a framework of fundamental development, represent a strategic objective for the policies aimed at fostering and coordinating RDI in our country, which must contemplate fundamental aspects such as (a) research into the most common illnesses; (b) clinical research of human illnesses; (c) public health and health services; (d) rehabilitation and development of assisted environments and those designed to address chronic illness; (e) rare illnesses; (f) the biological bases of the illness and (g) the development of nanomedicine and customised medicine for which the challenge involves treating the individual and not the illness.

This innovative approach becomes increasingly necessary when the Health Services must maximize the use of resources to, within a financial sustainability strategy of the system, become capable of implementing activities aimed at the prevention and early detection of pathological processes which would in the long term allow for extending the culture of health and, therefore, for a reduction of the illness's burden on society as a whole.

Among others, the thematic priorities are concentrated in:

- I. **The OMIC AND MEDICAL IMAGING TECHNOLOGIES** as an instrumental base on which to build a customised medical treatment based on the individual's profiles and not on the illness.
- II. **CLINICAL AND TRANSLATIONAL RESEARCH** based on the evidence of scientific and technological knowledge.
- III. **ROBOTIC AND NANOTECHNOLOGICAL SCIENCES** as interventional instruments in diagnostic and treatment processes for human illnesses.
- IV. The development of **NEW MOLECULES AS THERAPEUTIC WEAPONS IN HIGHLY PREVALENT EPIDEMIOLOGICAL DISEASES**.
- V. The description of the **HUMAN INTERACTOME AND THE DISSECTION OF ITS NETWORKS OF MOLECULAR CONNECTION** as an etiological base of the physio-pathological processes involved in health problems.
- VI. The use and dissemination of **INFORMATION TECHNOLOGIES** as the cornerstone of a global e-health space for developing research activities within the fields of Epidemiology, Public Health and Health Services, as well as within the scope of organising and managing the National Health System.

This framework contemplates the capabilities of the entire national health system as a competitive advantage for developing interoperability models and protocols – interoperable

history and prescriptions - and the transmission of international reference information in which Spain acts as a centre for innovation within the health area.

This boost in RDI will include actions designed to maximise: (a) the potential of technologies such as genomics, proteomics, biotechnology, nanotechnology, bio-information and ICT, among others, and (b) the returns derived from the use of existing scientific and technological infrastructures. Mainly promoting proposals which contribute towards increasing the sustainability of the healthcare system, such as those aimed at the collaborative development and use of ICT within the area of chronic illnesses, of the strategy for promotion and prevention of health, including health eating habits and prevention of obesity, healthy ageing, etc and those which contribute towards creating an inclusive and accessible society for disabled and dependent people.

Also promoting innovation in the provision of services, in the development of scientific and technological research and the collaborative innovation which includes participation of businesses from technological and industrial sectors which will clearly converge in the future, as in the case of the pharmaceutical, biotechnology, health technologies, e-health, imaging, diet, cosmetics, veterinary, chemical, engineering, materials and equipment industries, among others.

Finally, consideration will be given to social innovations as a critical element for future technological advances linked to health and demographic changes.

This CHALLENGE includes the **STRATEGIC ACTION FOR HEALTH**, the content of which is listed in section 7.1.

#### **6.4.2. CHALLENGES ON FOOD SAFETY AND QUALITY; PRODUCTIVE AND SUSTAINABLE AGRICULTURE, SUSTAINABILITY OF NATURAL RESOURCES, MARINE AND MARITIME RESEARCH**

Responding in a sustainable and smart manner to the challenges related to food safety, the quality and harmlessness of foods, the competitiveness of the agrifood, forestry and fishery sectors in national and international markets, to the need for creating jobs, improving the management of the natural resources used by the different productive sectors, as well as of the coasts, seas and oceans, all of which belong to the area of bio-economy.

Dealing with increasing the production and the added value of foods, food products and non-food products and to reduce overseas dependence on raw materials, consumer goods and technologies; of adapting the foods to new consumer demands, by means of research, innovation and developing new processes for production, transformation, packaging and distribution and guaranteeing safety and quality throughout the entire food chain.

There is also a need to advance in the preservation of natural resources, especially the efficient use of water, combating soil erosion, droughts, forest fires, protecting our agro-ecological systems, its biodiversity and the preservation of seas, oceans and the coast line.

So, the RDi-related priorities considered include:

**I. COMPREHENSIVE, EFFICIENT AND SUSTAINABLE PRESERVATION AND MANAGEMENT OF THE AGRO-ECOLOGICAL SYSTEMS AND OF THE AGRO-FORESTRY, WATER AND FISHING RESOURCES**, including relevant aspects such as: (i) technological improvements, improvements in management, handling and efficient use of water for irrigation, in agro-forestry and agro-industrial systems and

in all industrial production processes; (ii) comprehensive management of agricultural land; (iii) optimisation in managing forest fires and adopting advanced solutions regarding the prevention, extinction, restoration and assessment of impacts; (iv) the impact of global change on the expansion of colonising species, plagues and crop diseases as well as the determination of efficient techniques for controlling them; (v) application of the GIS, remote sensing and ICTs in the management of natural resources and agrifood, forestry and fishery systems and (vi) sustainable management and handling of water resources.

**II. SUSTAINABLE IMPROVEMENT OF THE AGRICULTURAL, LIVESTOCK AND FORESTRY PRODUCTION SYSTEMS:** (i) productive and reproductive efficiency and genetic improvement of agricultural, livestock and forestry species, promoting the knowledge and application of biotechnology and genetic, genomic and molecular tools and the development of new sources of plant proteins and the development and improvement in the efficiency of consumable goods; (ii) plant-diagnostic protection, epidemiology and integrated plague and disease control and models in the use of phytosanitary products; (iii) animal and plant health; (iv) animal and plant production systems, including consumable goods, machinery, technologies and systems; (v) production of biomasses, bioproducts and bioenergy and (vi) economic, environmental and social valuation and modelling of agri-forestry systems.

**III. IMPROVEMENT AND DEVELOPMENT OF NEW SYSTEMS, PROCESSES AND TECHNOLOGIES FOR AGRI-INDUSTRIAL PRODUCTION AND CONTROL, BIOPRODUCTS AND BIOREFINERIES:** (i) processes and technologies for preparing, transforming and preserving foods, forestry and fishery products and agri-industrial bioproducts; (ii) bioproducts, biolubricants, biofuels and others for human and animal consumptions and other industrial uses; (iii) integration of industrial and production engineering, including new biorefineries; (iv) use of residual biomass as raw material in biorefineries for obtaining biofuels, fine chemical products or petrochemical raw materials; (v) smart, flexible and sensitive production systems, within minimum processing technologies and other emerging technologies and (vi) new designs, formats, materials and technologies for bottling, packaging and packing as well as developing containers with specific functionalities (active and smart).

**IV. INCREASE THE QUALITY AND SAFETY OF THE FOODS AND NEW FOOD PRODUCTS:** (i) developing safe foods, new functional foods, “nutraceuticals” and other products adapted to the market and techniques for standardisation and certifications; (ii) preservation processes, repercussion on food and nutritional safety, useful life of the food products and relation with sensory quality; (iii) nutritional quality of foods and bioactive substances, relation between the foods and the health and wellbeing of the consumers (iv) diet and nutrigenetics and (v) developing new systems for early detection of emerging risks, as well as the optimization of food safety management systems.

**V. ARTICULATION AND OPTIMISATION OF THE AGRI-FOOD CHAIN** for generating and improving the distribution of added value developing new organisation and management and marketing models and new distribution chains, as well as to increase its flexibility and safety to advance in environmental sustainability of the chain, improving the efficiency in the use of raw materials, waste reduction and reuse, use and valuation of sub-products, energy efficiency and carbon and water footprint.

**VI. SAFETY, TRACEABILITY, ALERT AND RISK MANAGEMENT:** (i) safety and harmlessness of the foods, identification and assessment of emerging risks, most efficient sanitisation technologies throughout the chain; (ii) smart traceability models, alert systems, crisis management, new

labelling technologies, etc. and (iii) research into agriculture, livestock and forestry insurance models.

**VII. IMPROVING COMPETITIVENESS AND SUSTAINABILITY IN THE FISHERY AND AQUACULTURE SECTORS** using measures designed to promote RDI in: (i) efficiency in food, reproductive capacity and handling aquatic species; (ii) development and production of new aquaculture species and marketing presentations for fishery products; (iii) technologies for exploiting seaweeds for human consumption and for producing bioenergy and bioproducts; (iv) energy efficiency on vessels; (v) new distribution technologies incorporating advanced smart packaging techniques.

**VIII. MARINE RESEARCH:** (i) obtaining knowledge on the seabed to use our seas appropriately and implement correct environmental protection which includes aspects such as bathymetry, bionomics of the seabed, natural resources and others; (ii) maritime spatial planning and integrated management and the compatibility of uses of the seas and coast lines, and (iii) prevention of marine geological risks.

#### **6.4.3. CHALLENGE ON SAFE, EFFICIENT AND CLEAN ENERGY**

Sustainable generation and environmentally-friendly energy distribution which is economically affordable and socially acceptable, is the basis for ensuring a sustainable, competitive and safe energy supply which allows for adequate economic growth and social well-being. This CHALLENGE'S specific objective is to promote the transition towards an energy system which allows for reducing dependence on fossil fuels in a scenario in which we simultaneously contemplate a lack of these fuels, a global increase in their demand and their environmental impact.

In the area of energy, and taking into account the international commitments acquired, it is mandatory to coordinate the actions derived from the **NATIONAL PLAN** with the different European initiatives and especially with the STRATEGIC ENERGY TECHNOLOGIES PLAN (SET Plan), proposed by the European Commission in 2007 and endorsed by the Member States and the European Parliament.

Spain's priority energy-related RDI activities refer to three critical aspects: (a) sustainability for actively combating climate change, reducing greenhouse gas emissions, and favouring the development of technologies for geological capturing and storing of CO<sub>2</sub> and energy sources such as wind, solar, bioenergy, marine, geothermal, hydrogen and nuclear energy, and energy efficiency; (b) competitiveness for improving the efficacy of the Spanish and European network by developing the domestic energy market; (c) supply security for improved coordination of the national energy offer and demand within an international context and (d) social and technological impulse towards lower energy consumption patterns.

The scientific and technological and business priorities proposed for the 2013-2016 period mainly include the following areas:

- I. SOLAR ENERGY -THERMOELECTRIC, PHOTOVOLTAIC AND THERMAL:** (i) study and incorporation of new components linked to hybridisation for energy production; (ii) development and incorporation of new materials; (iii) performance, duration and costs in photovoltaic energy production and development of advanced component manufacturing processes; (iv) implantation of new applications for solar thermal energy, such as integration into buildings, water decontamination and desalination, etc; (v) development of energy storage systems and

technologies (industrial and residential), and (vi) management and integration of renewable energy in conventional grids.

- II. **WIND ENERGY:**(i) developing components and turbines; (ii) network integration; (iii) adapting wind turbines to the extreme conditions found in marine environments; (iv) building materials for structures such as platforms and supports for wind turbines in deep waters; (v) techniques for transporting, maintaining and operating wind platforms, and (vi) characterisation of the locations including geotechnical studies such as environmental (physical and chemical) and biodiversity-related (fauna, species, etc).
- III. **BIOENERGY:**(i) production of land and sea biomass for uses in industrial processes and energy production; (ii) fuel production systems and conversion technologies for sustainable production and supply of solid, liquid and gas fuels obtained from biomass; (iii) high added value biofuels, and (iv) production, storage and distribution of biofuels.
- IV. **TREATMENT OF WASTE FOR ENERGY PURPOSES:** (i) treatment of urban solid waste and waste from water treatment systems and recycling plants, and (ii) study and development of gas handling technologies.
- V. **HYDROGEN AND FUEL CELLS:** i) H<sub>2</sub> production; (ii) research and development of hydrogen and fuel cell technologies; (iii) storage and distribution of H<sub>2</sub>; and (iv) portable and stationary hydrogen uses.
- VI. **MARINE ENERGY:** Wave power and tidal power, saline gradient and ocean thermal energy conversion.
- VII. **GEOTHERMAL ENERGY:** (i) study of high, medium and low temperature geothermal resources and (ii) processes and techniques for exploring and assessing geothermal energy.
- VIII. **SUSTAINABLE NUCLEAR ENERGY:** (i) reactors, safety, prevention and designing new fuels; (ii) support for managing spent fuels and highly active waste; (iii) waste reduction by means of separation and transmutation techniques and (iv) treatment and management of medium and low activity waste.
- IX. **CO<sub>2</sub> REDUCTION, CAPTURE AND STORAGE:** (i) reduction in CO<sub>2</sub> emissions; (ii) technologies for capturing CO<sub>2</sub>; (iii) materials for capturing CO<sub>2</sub> including materials of renewable origin (biocarbons); (iv) conversion and use of CO<sub>2</sub> in new products and materials; (v) assessing locations for storing CO<sub>2</sub>; (vi) technological feasibility of storing in stable and safe conditions and (vii) storing CO<sub>2</sub> on the seabed (sea and ocean acidification).
- X. **SMART ELECTRICITY GRIDS:** supporting the incorporation of technological developments related to both software and hardware and in the use of new materials and enhancing information and communication systems, forecast and optimisation systems, power electronics, materials and sensors and the integration of resources and active distribution.

Given the transverse nature of energy regarding the areas of scientific and technological knowledge which are affected and comprise anything from materials, construction, telecommunications to humanities and social sciences, the actions articulated via the corresponding actions in the **NATIONAL PLAN** will consider a boost for international leadership of the existing capabilities in relation to building techniques, development, introduction and application of new materials and systems aimed at improving energy efficiency.

#### 6.4.4. CHALLENGE ON SUSTAINABLE, SMART AND INTEGRATED TRANSPORT

The stimulus for operational and technological innovation within the transport sector represents a priority in order to strengthen the Spanish economy's international leadership. For this there is a need to reinforce inter-administrative coordination, collaboration between the Administrations and the business sector, as well as with third party countries, given the need for increased coordination in order for the sector to evolve in a balanced manner.

The CHALLENGE mainly aims to promote the development of a transport system and of its linear and hub infrastructures for them to make efficient use of the resources and be competitive, safe and affordable, supporting balanced economic growth and improved competitiveness, reinforcing territorial cohesion and accessibility and favouring functional integration by means of an intermodal approach. As far as energy-related matters are concerned, priority shall be granted to RDI initiatives which focus on reducing costs and allowing for an efficient use of energy resources in this scope and considering the quality requirements of the citizens, preserving the environment and advancing towards a gradual replacement of the use of non-renewable and intensive resources in CO2 emissions. In general, the RDI activities must contribute to:

- The development and incorporation of emerging and key enabling technologies for building infrastructures and vehicles and especially for the development of "smart cities", as well as for the development of global positioning, navigation and observation systems.
- The development of models for advancing, among others, in the scopes of real-time management, the network theory, intermodal connections and logistics.
- The development of transport systems that improve territorial and citizen accessibility and facilitate the inclusion of disabled people.

The requirements shall be adapted to the specific nature of each transport modality, among which the following main thematic priorities shall be identified:

- I. **THE DEVELOPMENT OF INFORMATION TECHNOLOGIES AND SMART TRANSPORT SYSTEMS** which contribute towards: i) increasing efficiency in transport and use of the infrastructures, improving traffic management and promoting and facilitating intermodal transport; ii) developing Information Systems and real-time control, as well as smart transport systems to facilitate the intermodality of freight transport (land, sea and air), cooperative and safe mobility and driving aids, and iii) advancing towards new technological solutions which guarantee rail interoperability and increased integration of the network, including its maritime intermodal connection.
- II. **THE DEVELOPMENT OF TECHNIQUES, METHODS AND TOOLS** for assessing and reducing risks, implementing contingency plans when faced with extreme situations and natural or technological disasters.
- III. **THE DEVELOPMENT OF NEW TECHNOLOGIES AND APPLICATIONS** based on European satellite navigation programmes (EGNOS and Galileo), which guarantee the compatibility, interoperability and robustness of the solutions. Considered within this scope is the development of RDI activities focused on modernising air traffic management inside Europe (Single European Sky ATM Research -SESAR) within the framework of the Single European Sky initiative.
- IV. The promotion of research and development of new **MORE ENERGY EFFICIENT AND/OR CLEANER MEANS OF TRANSPORT** in relation to technologies and fuels.

- V. The research and application of **NEW ADVANCED MATERIALS FOR TRANSPORTATION**, paving and building infrastructures including those for recovery and recycling.
- VI. The development of new technologies designed to reduce the **ENVIRONMENTAL IMPACT** of the different transport systems and means as well as acoustic and environmental contamination.
- VII. **ENERGY EFFICIENCY**. The search for innovative technologies and solutions which allow for adapting the transport infrastructures to efficiently using alternative energies for the purpose of reducing operating costs.

#### **6.4.5. CHALLENGE ON ACTION ON CLIMATE CHANGE AND EFFICIENCY IN THE USE OF RESOURCES AND RAW MATERIALS**

The CHALLENGE on action on climate change is to promote the generation of scientific knowledge regarding the causes and effects of climate change and its mitigation including the processes, mechanisms, operation and interaction of oceans, land and marine ecosystems and the atmosphere. It also considers the analysis of alternatives for adapting and mitigation in relation to climate change, the horizontal nature of which leads to the need for promoting the creation of synergies among the different existing research groups, companies and social players.

The guided RDI activities must allow for a response to the questions put forward in the “Spanish National Climate Change Adaptation Plan (PNACC)” and drive the RDI actions related to climate change mitigation which are of a horizontal nature impacting on nearly all the sectors of economic activity, including transport, residential, commercial and institutional, waste, forestry, energy, agriculture and livestock, etc. Thus, the RDI activities along with the sector policies share the final objective of favouring the transition towards an economy which is low in carbon emissions and allows for advancing towards sustainable development.

The RDI thematic priorities associated to this CHALLENGE mainly include:

**I. CLIMATE CHANGE:** (i) development and optimisation of systematic climate observation networks in its three domains: atmospheric, oceanic and terrestrial, along with the data analysis and modelling techniques; (ii) modelling regionalised climate scenarios for Spain; (iii) research applied to assessing the impact, vulnerability and adaptation to climate change in areas such as: areas of high biodiversity, coasts, forests, agriculture, fishery and marine ecosystems, water resources, soils, health, tourism, transport, industry and energy; (iv) research into social sciences and humanities associated to the adaptation and mitigation of climate change, particularly focused on processes involving environmental, economic, technological and social adaptation relevant to Spain and Europe; (v) estimating and monitoring greenhouse gas emissions in Spain and developing projection models including uncertainty analysis and the cost-benefit of the different mitigation options in Spain, (vi) developing a knowledge exchange and integration platform which provides visibility to Spanish climate change science and allows for reinforcing existing initiatives; (vii) adapting to climate change in critical infrastructures (transport, electrical and information networks), fostering its reaction capability, robustness and resilience, and (viii) research applied to developing and modelling data and scenarios focused on the permanent optimisation of surveillance and alert services when faced with natural risks.

**II. EFFICIENCY IN THE USE OF RESOURCES AND RAW MATERIALS:** (i) comprehensive management and sustainable use of water resources, analysis, assessment and monitoring of water, forecasting droughts, floods and natural or man-made catastrophes (ii) the supply and operability of Global Earth Observation Systems (GEOS); (iii) safety in hydraulic infrastructures; (iv) forestry hydrological correction and combating erosion and desertification; (v) biodiversity and natural heritage; (vi) RDI in biodiversity focused on preservation, management and sustainable use in coordination with other sector measures; (vii) RDI in less contaminating industrial processes and products, reducing the volume of emissions into the atmosphere, water and soil and efficient from the point of view of raw material and energy consumption; (viii) reducing industrial impact on the environment, on human and animal health, on plants and on natural and cultural heritage, as well as emission factors of the main contaminants in production processes and other activities caused by man or the formation of secondary contaminants; (ix) development and validation of quantitative models regarding the status of the quality of air and the influence of climatic and geographic variables, among others; (x) promoting RDI in the search for alternatives to persistent organic contaminants, heavy metals, and in general, restricted chemical substances and compounds; (xi) research into the geological and geotechnical risks associated with natural disasters and climate change, in relation to transport infrastructures and building; (xii) obtaining measures and parameters which are representative of the quality of the air and for support in identifying sources of contamination and processes for forming and transforming atmospheric contaminants; (xiii) developing new products, technologies and chemical and biological processes and designing new catalysts/biocatalysts, which require lower energy consumption, allow for using renewable raw materials, reduce or eliminate the use of hazardous substances and the generation of waste which represents a major environmental impact; (xiv) synthesising and developing new biodegradable solvents and plastics based on renewable sources.

#### **6.4.6. CHALLENGE ON SOCIAL CHANGES AND INNOVATIONS**

In recent years we have seen major social transformations involving significant challenges for Spanish society. Highlighting educational expansion, new configuration of the employment structure, the gradual inclusion of women into the world of paid work and the social, economic and cultural impact of migratory flows. On the other hand, the globalisation processes of the economy and Europeanisation of public policies show their contribution towards deepening the financial crisis, debt crisis and recession and the impact on economic growth and job creation. The aforementioned changes and trends can be classed as structural and bring with them new realities, questions and issues to which scientific research in Social Sciences and Humanities must try to respond in order to improve our understanding of the reality, the quality of public policies and the strategies of the economic and social actors.

These are just some of the more current matters which are part of the RDI addressing this CHALLENGE, which also include the promotion of multidisciplinary works which contemplate the individual and collective variables which favour RDI development aimed at society's remaining Challenges. Within this **NATIONAL PLAN**, research into social sciences and humanities has a transverse nature which facilitates diagnosis as well as the adaptation of scientific, technological and innovative solutions to the social environment in which they are developed and must be disseminated. In this sense, the scientific, technological and social priorities which are listed below often constitute spaces for collaboration with other research groups as well as with companies which are responsible for developing technologies associated to the purpose of the research.

The scientific, technological and social priorities which are considered within this CHALLENGE include the following, among others:

- I. **ECONOMIC GROWTH AND JOB CREATION:** (i) analysis of the labour market, mainly focusing on unemployment, occupation and flexible forms of employment; (ii) labour market, integration and social disparities (iii) the adjustment between education and employment and improvements to the educational system; (iv) female employment rates; women and scientific, technological and innovative development; (iv) transformation, evolution and future of the welfare state.
- II. **DESIGN, ASSESSMENT AND IMPACT OF PUBLIC POLICIES:** (i) European governance and that of the European institutions; (ii) Europe, national states and federalism; (iii) improvements to the educational system; (iv) fundamental rights and liberties; (v) effects of public policies on economic and social development; (vi)
- III. **SOCIAL CHANGES AND THEIR IMPACT:** (i) migratory movements; (ii) inequality, exclusion and poverty; (iii) impact and evolution of cultural, social and territorial identities on social and institutional change and transformation processes; (iv) individual characteristics, social values and collective dynamics.
- IV. **INNOVATION, TECHNICAL CHANGE, PROGRESS AND WELFARE:** (i) new organisational models; (ii) internationalisation and globalisation of economic, business and competitiveness activities of the Spanish economy; (iii) social behaviour and acceptance of the technology, innovation and risk; (iv) business and competitiveness leadership models.
- V. **PROTECTION AND PRESERVATION OF CULTURE AND HERITAGE:** (i) artistic, cultural and archaeological heritage as a source for developing new scientific and technological capabilities and models for sustainable operation; (ii) culture industries and job creation; and (iii) individual learning and collective values.

#### 6.4.7. CHALLENGE ON DIGITAL ECONOMY AND SOCIETY

Over the coming years no sector will remain on the sideline of this transformation which will change the way we do business, the products and services available, the sales channels or relationship mechanisms with the consumer. The use of industrial and commercial opportunities and the provision of services in relation to this evolution process represents one of the main challenges for Spain's economy.

ICTs as key factors for improving the competitiveness of companies and the efficiency of the Administrations are included in the National Sub-Programme for Key Enabling Technologies, which promotes their adoption and use, especially by the business fabric. However, ICTs and associated services represent an intensive RDI sector, the advances of which have a transverse and multiplying effect on a significant number of key activities within the Spanish economy. Therefore, ICTs are a future area from the point of view of scientific, technological and innovative advances and also represent a factor of modernisation for all other economic sectors including those such as tourism, construction, building or transport, among others, which are considered to be mature.

The thematic and scientific and technological priorities mainly refer to:

- I. **INTERNET OF THE FUTURE.**
- II. **MOBILE NETWORKS AND SYSTEMS** and development of technologies, services and products based on mobility.

- III. Development, innovation and adoption of **SOLUTIONS AND TECHNOLOGIES** linked to: (i) “*cloud computing*”; (ii) *Open/Linked/Big Data* and reusing public sector information generating value and knowledge.
- IV. **ICT APPLICATIONS AND SOLUTIONS**: (i) business and especially focused on SMEs; (ii) environmental management; (iii) efficiency and energy management; (iv) climate change and CO2 emissions, etc.; (v) electric vehicle; (vi) health and social welfare; and (vii) smart transport systems, among others.
- V. **SMART CITIES**: technological development, sustainability models and advanced provision of services, communications and other applications.
- VI. Systems and devices based on environmental intelligence.
- VII. **CYBER SECURITY AND DIGITAL CONFIDENCE**: (i) use of electronic applications; (ii) development of safe environments linked to citizens’ rights and (iii) protection of especially vulnerable collectives.
- VIII. **SOCIAL NETWORKS** as vehicles for the provision of services and potential business development.
- IX. **SYSTEMS, PLATFORMS, SERVICES AND PROCESSES AIMED AT**: (i) content and digitals, i.e. design, production and packaging, and (ii) audio-visual broadcasting.

This **CHALLENGE** involves a transformation process which involves businesses, institutions and civil society, and also includes the **STRATEGIC ACTION ON DIGITAL ECONOMY AND SOCIETY** (section 7.2) linked to the Digital Agenda for Spain, as well as to the series of current national, European and international strategic plans.

#### 6.4.8. CHALLENGE ON SECURITY, PROTECTION AND DEFENCE

The globalisation process which started in previous decades is finally resulting in a growing interdependence which increases our society’s vulnerability and that of the citizens as well as the institutions, principles and values which have enabled the development of the principles of coexistence and governance of European societies. This **CHALLENGE** is of a global nature and of crucial importance due to the international events and processes involving social, political and strategic change which have taken place.

This **CHALLENGE** aims to contribute to the development of technologies and innovations which reinforce security and defence capabilities at a national level and allow for developing an internationally competitive technological security and the defence sector.

Among the main references which are aligned with the programmatic actions and technological objectives considered in this **CHALLENGE** it is worth highlighting the “Technology and Innovation Strategy for Defence (ETID)”, the Ministry of Defence strategy for developing technology for application to security and defence.

The scientific and technological priorities which are considered within this **CHALLENGE** include the following, among others:

- I. **TECHNOLOGIES OF INFORMATION AND COMMUNICATION SYSTEMS** for command posts and control centres; cyber security for networks, systems and software, especially in critical infrastructures; sensors and information processing and distribution for intelligence, surveillance and reconnaissance.
- II. **SIMULATION TECHNOLOGIES FOR SUPPORTING DECISIONS AND TRAINING.**

**III. TECHNOLOGIES FOR APPLICATION TO PROTECTING PEOPLE**, especially when faced with bullet impacts, explosive artefacts and NBQ threats and protection for critical platforms and facilities and border control, as well as support technologies for the operational conditions of people such as physical toll, connectivity and other human factors including biometric factors.

**IV. TECHNOLOGIES FOR APPLICATION TO PLATFORMS** especially those related to materials, energy solutions and their unmanned operation (UAV, UGV).

The considered actions will include initiatives designed to promote collaboration between: (1) the System's stakeholders for obtaining demonstrators and prototypes of systems related to the equipment and systems of interest for security and defence by means of national scale programmes (i.e. National Programmes of the Ministry of Defence) and international (i.e. R&D Programmes in cooperation, and the Programmes of the European Defence Agency-EDA); (2) the Technological Defence Centres and the national technological fabric for developing innovative solutions related to security and defence; (3) the national technological community within the scope of R&D related to security and defence via the Technological and Innovation Portal of the Ministry of Defence.

Likewise, and in close coordination with the COINCIDENTE Programme of Spain's Ministry of Defence, leading to an increase in the use of existing research and developments, mainly in University and SMEs, for incorporating innovative technological solutions into security and defence applications.

## **7. STRATEGIC ACTIONS**

### **7.1. STRATEGIC ACTION FOR HEALTH 2013-2016**

The **STRATEGIC ACTION FOR HEALTH** is a set of programmatic actions forming part of the **NATIONAL PROGRAMME FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION**. It is designed to meet societal challenges by articulating a set of instrumental actions whose aim is to find solutions for public demands in the area of human health, while transforming these solutions into growth opportunities for the social and economic fabric as a whole.

The challenge in health forms a critical space in which collective responsibility and social commitment act as drivers of development and social modernisation and ensure that the **NATIONAL PLAN** defines specific actions to address this challenge; by using activities designed to improve the health and the quality of life of the general public we strengthen social cohesion, promote responsibility between generations and contribute to improving the quality and capacity of the Spanish National Health System.

Consequently, the principle driving force behind the **STRATEGIC ACTION FOR HEALTH 2013-2016** is a desire to promote the health and well-being of the general public, and to develop aspects of prevention, diagnosis, cure, rehabilitation and mitigation of diseases by strengthening and increasing the international competitiveness of the RDI of the Spanish National Health System (SNS is the acronym in Spanish) and the companies connected with the sector. The aim here is to place Spain at the forefront of health care, with health acting as a fundamental pillar of economic and social development.

The structure of the **STRATEGIC ACTION FOR HEALTH 2013-2016** is a space for interaction built around a set of instrumental synergic and complementary actions which emanate from the NATIONAL PROGRAMMES of the **PLAN** itself, insofar as they respond to the principles outlined in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION. The aim is for the results of these to contribute to the Spanish National Health System by consolidating its position as a world benchmark in terms of its scientific, technological and innovation skills, and consequently in the provision of efficient and quality health care services.

The unprecedented advances in scientific and technological knowledge in the field of biomedical research and health, with such significant milestones as the sequencing of the human genome and the stimulus for the characterisation of the proteome deriving from this, have led to a reconsideration of the thematic priorities which promote the design of the instruments comprising the **STRATEGIC ACTION FOR HEALTH 2013-2016**.

The Carlos III Health Institute, which is affiliated organically with the Ministry of the Economy and Competitiveness (Royal Decree 345/2012) and functionally affiliated with both the latter and the Ministry of Health, Social Services and Equality (Royal Decree 200/2012), will be the body responsible for managing the activities in the **STRATEGIC ACTION FOR HEALTH 2013-2016**.

**THE STRATEGIC ACTION FOR HEALTH 2013-2016** will take the form of a single competitive call every year; it will encompass all the instrumental actions in the different NATIONAL PROGRAMMES which are coordinated through the **STRATEGIC ACTION FOR HEALTH**. These actions, to be developed in the corresponding ANNUAL ACTION PROGRAMMES, will include:

#### **AES 1. NATIONAL PROGRAMME FOR PROMOTION OF TALENT AND ITS EMPLOYABILITY**

**AES 1.1. NATIONAL SUB-PROGRAMME FOR TRAINING.** The actions encompassed in this SUB-PROGRAMME include:

- **TRAINING OF DOCTORS** in the field of Biomedicine and the Health Sciences.
- **TRAINING OF SPECIALISTS** in Health Sciences WITH **SPECIALISED HEALTH TRAINING** in the field of biomedical, clinical and translational Research through “Rio Hortega” contracts.
- **TRAINING OF TECHNICAL PERSONNEL AND RDI MANAGERS** in the field of biomedical research and innovation in health technologies and services.

**AES 1.2. NATIONAL SUB-PROGRAMME FOR INCORPORATION OF RDI HUMAN RESOURCES.** The actions will comprise:

- **THE HIRING OF DOCTORS, INCLUDING:**
  - a. **CONTRACTS FOR THE RECRUITMENT OF RESEARCHERS** with a track record showing a high degree of excellence in the accredited Health Research Institutes.
  - b. **MIGUEL SERVET CONTRACTS FOR THE RECRUITMENT OF RESEARCHERS** with a proven track record in SNS centres.
  - c. **SARA BORRELL CONTRACTS FOR THE RECRUITMENT OF YOUNG DOCTORS** in the SNS centres.
- **RECRUITMENT IN THE SNS HEALTH CARE CENTRES** of medical personnel with research experience.
- **RECRUITMENT OF SPECIALISTS WITH SPECIALISED HEALTH TRAINING, UNIVERSITY GRADUATES AND OTHER TECHNICAL PERSONNEL** to support research in the SNS, including management activities for RDI in Biomedicine and Health Sciences.

**AES 1.3. NATIONAL MOBILITY SUB-PROGRAMME** which includes:

- **OPPORTUNITIES FOR FURTHER STUDY** for professionals in the health system and SNS researchers, to learn techniques, technologies or procedures in research, development and technological innovation in the field of biomedicine in national or foreign institutions.
- Assistance to promote **MOBILITY BETWEEN AND WITHIN INSTITUTIONS** and sectors, both nationally and internationally, for researchers, as an integral part of the development of the biomedical researcher's career in the SNS.
- Aid to promote the **MOBILITY OF RESEARCH TECHNICAL SUPPORT PERSONNEL AND RDI MANAGEMENT PERSONNEL** in the SNS.

## **AES 2. NATIONAL PROGRAMME FOR PROMOTION OF EXCELLENCE IN SCIENTIFIC AND TECHNOLOGICAL RESEARCH**

**AES 2.1. NATIONAL SUB-PROGRAMME FOR STRENGTHENING OF INSTITUTIONS.** The actions to be included are:

- Strategic programme for the accredited **HEALTH RESEARCH INSTITUTES (IIS)**
- **STRENGTHENING OF NETWORK RDI STRUCTURES** as stable synergic structures for technical and technological scientific research and innovation in services within the SNS.
- Actions to **ENCOURAGE THE PARTICIPATION OF SNS CENTRES** in international cooperation activities.

**AES 2.2. NATIONAL SUB-PROGRAMME FOR GENERATION OF KNOWLEDGE.** The actions to be included are:

- **INTEGRATED PROJECTS** for excellence in the accredited IIS.
- **HEALTH RESEARCH PROJECTS** of different kinds.
- **NON-COMMERCIAL CLINICAL RESEARCH PROJECTS.**
- **COMPLEMENTARY ACTIONS** to **ENCOURAGE TRANSFER ACTIVITIES** in the SNS.
- Necessary **REVITALISATION ACTIONS** for dealing with scientific or technological policy situations in the health field, which are of particular urgency or interest.

### **AES 2.3. NATIONAL PROGRAMME FOR SCIENTIFIC AND TECHNICAL INFRASTRUCTURES**

- Aid to acquire and maintain scientific and technological infrastructures and equipment in SNS centres.
- Actions relating to international infrastructures.

Finally, the actions which are the subject of the annual calls in the Strategic Action for Health may include those in a number of Sub-programmes or those which may be necessary to meet the objectives set out in the **NATIONAL PLAN** and the Joint Programming Actions and others.

## **7.2. STRATEGIC ACTION FOR THE ECONOMY AND THE DIGITAL SOCIETY 2013-2016**

The Strategic Action for the Economy and the Digital Society brings together a set of measures designed to promote the adoption of digital technologies and the development of the Information Society, thereby enabling the economy and society in general to be transformed into a digital environment which moves forward progressively and takes root in all sectors of business activity. The aim is for the digital environment to become the dominant one for economic transactions, providing effective and efficient public services while defining a new model for the organisation of labour and social relations.

The Strategic Action includes the measures set out in the “**Digital Agenda for Spain**”, designed to provide a boost for the Spanish System for Research, Development and Innovation in the field of information technologies, communications and the information society. The Agenda is built on six pillars: i) to promote the rollout of networks and services to guarantee digital connectivity; ii) to develop the digital economy for growth, competitiveness and internationalisation of Spanish companies; iii) to improve the e-Government and adopt digital solutions for the efficient provision of public services; iv) to boost confidence in the digital field; v) to promote the system of RDI in Information and Communication Technologies; and vi) to stimulate inclusion and digital literacy and the training of new ICT professionals.

The **STRATEGIC ACTION FOR THE ECONOMY AND THE DIGITAL SOCIETY** includes measures derived from the Digital Agenda for Spain which are fully aligned with the State Programmes under the **PLAN**; they respond to the principles highlighted in the Spanish Strategy for Science and Technology and Innovation and clearly reflect the strategic priorities defined in the Strategy.

The State Secretariat for Telecommunications and the Information Society (SETSI), which is subordinate to the Ministry of Industry, Energy and Tourism, will be the body responsible for managing the activities in the Strategic Action for the Economy and the Digital Society 2013-2016. In particular, it will be responsible for approving, monitoring, assessing and controlling the measures implemented under this Strategic Action and for coordinating them with the rest of the measures in the **PLAN**.

The Strategic Action for the Economy and the Digital Society will be articulated through a number of operating instruments, which include the following notable examples: competitive calls for assistance, both domestic and international, agreements with third parties, loans, venture capital, innovative public procurement, dissemination activities, direct execution programmes and other European financing instruments. In addition, there are also plans to draw up Annual Plans to develop the measures as a whole to be implemented, specifically, the planned financing for each of them.

The actions to be implemented will include principally the following:

## **AEESD 1. NATIONAL PROGRAMME FOR TALENT AND EMPLOYABILITY**

### **AEESD 1.1 NATIONAL SUB-PROGRAMME FOR TRAINING**

- **SPECIALISED TRAINING** of researchers, technicians, technologists and other RDI personnel in specific areas of ICT, including ultra high-speed networks, e-commerce, digital marketing, cyber security, digital content and others.
- **REVITALISATION ACTIVITIES** and other assistance in the field of ICT destined for: (i) the development of innovation-oriented structures and itineraries, professional skills and promotion of entrepreneurship and (ii) public-private cooperation structures to promote the transfer of knowledge to the business fabric, and particularly SMEs.

### **AEESD 1.2. NATIONAL SUB-PROGRAMME FOR RECRUITMENT OF HUMAN RESOURCES IN R&D&I**

- **CONTRACTING AND ASSISTANCE** for retaining and attracting doctors, technologists, technicians and specialists to join the Spanish RDI System, both public and private, in the field of ICTs.
- **REVITALISATION ACTIVITIES** for social awareness and to promote early vocation to RDI in ICTs.

**AEESD 1.3. NATIONAL SUB-PROGRAMME FOR MOBILITY** including:

- **REVITALISATION ACTIVITIES** and assistance to promote mobility of researchers, technologists and technicians between institutions, sectors and organisations in the public and private sectors.

**AEESD 2. NATIONAL PROGRAMME TO PROMOTE EXCELLENCE IN SCIENTIFIC RESEARCH AND TECHNIQUES**

**AEESD 2.1. NATIONAL SUB-PROGRAMME FOR GENERATION OF KNOWLEDGE.** The actions will include:

- **RDI PROJECTS** designed to generate new knowledge and reduce development times for ICTs and technologies in the electronics field. Participation in major international RDI projects will be provided for through additional financing of the participating Spanish groups and companies.
- **REVITALISATION ACTIVITIES** necessary to deal with situations of technology policy in the field of economics and the digital society which are of particular urgency or interest.
- **JOINT PROGRAMMING ACTIVITIES** in two forms (a) international and (b) regional, to roll out RDI projects and other actions through co-financing schemes.

**AEESD 2.2. SUB-PROGRAMME FOR THE DEVELOPMENT OF EMERGING TECHNOLOGIES.**

- **RDI PROJECTS** of all types, designed to develop design and development tests for ICTs.
- **REVITALISATION ACTIVITIES** aimed at financing, amongst other things: (i) the initial costs required to set up Technology Based Companies which might be created in the field of ICTs; (ii) the implementation of technological forums in an open and participative context, the creation of highly-skilled research groups and the provision of Advanced Technology Platforms, shared use of the spectrum and innovative technologies for using it, and participation in European Union-wide technology initiatives.

**AEESD 2.3. SUB-PROGRAMME FOR STRENGTHENING OF INSTITUTIONS.** The actions to be included comprise:

- **RDI PROGRAMMES AND REVITALISATION ACTIVITIES** to provide institutions and centres - National Reference Centres – in the field of digital confidence, e-commerce and digital marketing amongst others, with resources and tools of a strategic nature to strengthen and increase their impact.
- **REVITALISATION ACTIVITIES** to: (i) strengthen leadership and Spanish institutional presence in the international ICTS context; (ii) finance actions by stakeholders in the Spanish System to carry out far-reaching RDI projects with an international impact in strategic sectors and (iii) increase coordination with international bodies devoted to research and thereby strengthen research activity.

**AEESD 2.4. NATIONAL SUB-PROGRAMME FOR SCIENTIFIC AND TECHNICAL INFRASTRUCTURES:**

- **RDI PROJECTS** of all types and assistance for the development of the National Strategy for Ultra High Speed Networks, promoting the rollout, consolidation and expansion of advanced technological infrastructures in areas of ICT knowledge,

specifically the Advanced Communications Network for Spanish Research (the Iris Network) which increases the scientific and technological potential of universities, research centres and other strategic environments.

### **AEESD 3. NATIONAL PROGRAMME FOR BUSINESS LEADERSHIP**

#### **AEESD 3.1. SUB-PROGRAMME FOR BUSINESS R&D&I.**

- **RDI PROJECTS** in all types of ICTs which may be carried out individually or with help, which are led by companies and may include the participation of public stakeholders to address specific aspects within the set objectives. This also includes projects to increase the technological capacity of innovative companies, providing goods and services for which the public market is one of their principal launch or benchmark clients.

Also included, designed to increase private investment in R&D&I, are measures to promote innovative public procurement, co-investment, venture capital, *crowdsourcing*, *crowdfunding* and participative credits, to name a few.

#### **AEESD 3.2. SUB-PROGRAMME FOR KEY ENABLING TECHNOLOGIES**

- **RDI PROJECTS AND REVITALISATION ACTIVITIES** which encourage innovation in general, and in SMEs in particular, through the incorporation of innovative ICT technologies and (ii) improve the technological skills of businesses in issues of cyber-security and digital confidence.

#### **AEESD 3.3. SUB-PROGRAMME FOR COOPERATIVE RDI DESIGNED TO MEET THE NEEDS OF THE PRODUCTIVE SECTOR**

- Public-private RDI cooperation Projects and aid for dissemination, stimulation of demand and promotion and adaptation of innovative ICT developments to specific needs of the business fabric and the Public Administrations.

## **8. FINANCIAL AND BUDGET FRAMEWORK**

In order to meet the objectives set out in the **NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION**, and achieve the scheduled results in social well-being and scientific, technological and economic development, it is vital to promote investment in RDI in Spain. The financing of RDI activities to be implemented must be the result of an efficient distribution of effort and a stable commitment between different sources of financing, both public and private, national and international.

In recent years, the Public Administrations as a whole (**TABLE 4**) have increased their contribution to the financing of total R&D costs, especially of costs generated by the public sector itself. This percentage distribution is due fundamentally to high growth rates recorded over the last ten years. Nevertheless, business participation in the financing of total R&D spending is clearly lower in Spain than the figure recorded in the countries around us, and it is one of the objectives of this **NATIONAL PLAN** to achieve convergence with the European Union average (**TABLE 5**).

TABLE 4. EVOLUTION OF R&D SPENDING BY SOURCE OF FINANCING OF THE ACTIVITIES CARRIED OUT 2004-2011. THOUSANDS OF EUROS (CURRENT PRICES).

	2004	2005	2006	2007	2008	2009	2010	2011
<b>SPENDING FINANCED BY THE PUBLIC ADMINISTRATIONS</b>	4,038.6	4,803.8	5,486.1	6,269.1	7,173.3	7,371.9	7,380.3	6,873.3
<b>(% FINANCED BY THE PA/TOTAL SPENDING)</b>	45.1%	47.1%	46.4%	47.0%	48.8%	50.6%	50.6%	48.5%
<b>SPENDING FINANCED BY THE PRIVATE SECTOR</b>	4,356.2	4,807.3	5,627.7	6,137.7	6,690.0	6,413.8	6,371.6	6,363.5
<b>(% FINANCED BY THE PRIVATE SECTOR/TOTAL SPENDING)</b>	48.7%	47.2%	47.7%	46.0%	46.1%	44.0%	43.7%	44.9%
<b>SPENDING FINANCED BY OVERSEAS</b>	550.9	585.7	701.4	935.5	838.1	796.0	836.6	947.5
<b>(% FINANCED BY OVERSEAS/TOTAL SPENDING)</b>	6.2%	5.7%	5.9%	7.0%	5.7%	5.5%	5.7%	6.7%

Source: INE, 2013.

TABLE 5. PRIVATE/BUSINESS FINANCING OF TOTAL SPENDING ON R&D (% OF TOTAL SPENDING).

	2004	2005	2006	2007	2008	2009	2010	2011
<b>EU-27</b>	53.7%	53.8%	54.7%	54.6%	54.4%	53.3%	53.0%	52.7%
<b>EU-15</b>	54.3%	54.4%	55.4%	55.3%	55.2%	54.2%	54.0%	54.0%
<b>SPAIN</b>	48.7%	47.2%	47.7%	46.0%	46.1%	44.0%	43.7%	44.9%

Source: OECD, 2012.

TABLE 6 shows the forecasts for R&D spending to be made while this **NATIONAL PLAN** is in force. It is therefore an R&D spending objective which represents the joint effort which must be made by each of the different financing stakeholders to meet the **NATIONAL PLAN** objectives and guarantee the sustainability of the *Spanish System of Science, Technology and Innovation*, in accordance with the social and economic needs and priorities of our country.

TABLE 6. EVOLUTION OF THE FINANCING FRAMEWORK AND R&D SPENDING PROVIDED FOR IN THE **NATIONAL PLAN**

	2013	2014	2015	2016
<b>TOTAL SPENDING ON R&amp;D/GDP (%)</b>	1.33%	1.37%	1.41%	1.48%
<b>TOTAL SPENDING ON R&amp;D BY THE PUBLIC ADMINISTRATIONS/ GDP (%)</b>	0.61%	0.61%	0.61%	0.61%
<b>TOTAL SPENDING ON R&amp;D BY THE PRIVATE SECTOR/GDP (%)</b>	0.62%	0.64%	0.67%	0.73%
<b>TOTAL SPENDING ON R&amp;D FROM OVERSEAS/GDP (%)</b>	0.10%	0.12%	0.13%	0.14%
<b>% OF THE TOTAL SPENDING ON R&amp;D FINANCED BY THE PUBLIC ADMINISTRATIONS</b>	45.5%	44.3%	42.7%	41.4%
<b>% OF THE TOTAL SPENDING ON R&amp;D FINANCED BY THE PRIVATE SECTOR</b>	46.4%	47.1%	48.1%	49.0%
<b>% OF THE TOTAL SPENDING ON R&amp;D FINANCED FROM OVERSEAS</b>	8.1%	8.6%	9.2%	9.6%

This means that spending on R&D is expected to represent 1.41% of Gross Domestic Product. The forecasts were made based on the premises set out in the Stability Plan for the Spanish economy 2012-2015 and its recent revisions, while taking into account the behaviour of spending and R&D investment recorded in recent years. In this context, and bearing in mind the sizeable adjustment in spending control and financing needs of the Public Administrations, a budget scenario has been defined that reflects the content of this Stability Plan: as a result of the adjustment, GDP is expected to shrink in 2012 and 2013 – albeit less so in the latter – with a slow recovery from 2013 on. Consequently, from the figures for the evolution of public budgets devoted to R&D&i, the projections given below may be established.

The evolution of **NATIONAL PLAN** spending envisages a large increase in financing from the private sector in order to bring Spain's figures closer to the EU average for the period 2013-2016.

Furthermore, and in order to optimise the financial resources available and increase their impact on the Spanish System of Science, Technology and Innovation in this **NATIONAL PLAN**, special attention is paid to: (a) the development of instruments for public-private cooperation to allow an increase in the participation of private financing destined for activities carried out in conjunction with universities and public R&D centres; (b) the adoption of measures encouraging access to bank financing and other instruments by innovative companies, especially companies with a technological base and young innovative companies; (c) the creation of an environment which is favourable to the development of venture capital, both national and international, public and private, and access by innovative companies to these funds.

The funding set aside for the financing of the activities in the **NATIONAL PLAN** is complemented with a significant increase in the contributions from overseas, which includes both those coming from European Union funds and part financing of the RDI activities by foreign companies.

Finally, the State resources earmarked for research policy will be established on an annual basis when drawing up the respective General Budgets; the actions designed to meet the objectives set out in the **PLAN** are subordinated, in terms of the resources they require, to compliance with the principle of budget stability. This means that the distribution of the budget resources will be fixed in the ANNUAL ACTION PROGRAMMES of this **PLAN** as well as its distribution depending on the scientific-technical and social priorities established.

## 9. GOVERNANCE OF THE NATIONAL PLAN

### 9.1. PRINCIPLES FOR MANAGEMENT AND GOOD GOVERNANCE OF THE NATIONAL PLAN

The structure of and the management model for the **NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016** observe the following principles of management and good governance:

1. **THE INTEGRATION** of research, development and innovation. The actions, participation methods and financing instruments included allow a constant thrust to be given to the RDI process, facilitating the development of actions from the idea stage to the market.
2. **THE AGGREGATION OF PARTICIPATION METHODS AND FINANCING INSTRUMENTS.** Through the design of coordinated instruments, co-financing instruments and other agreed methods which Central Government makes available to the players in the *Spanish System of Science, Technology and Innovation* with the actions of the Autonomous Regions and the instruments of the Union European and other international initiatives.
3. **THE SIMPLIFICATION** of the participation methods and the administrative procedures to allow more effective and efficient management of budgetary resources, speeding up the call decision process and the transfer of funds to the beneficiaries and facilitating management, processing and the reduction of administrative burdens, both from the point of view of external users and from the point of view of the internal management of the aid. The use of simple and common rules of participation to all the actions will be fostered.

4. **CONCILIATION** between the times for publication of calls and the real financing needs of the stakeholders carrying them out; this means that the calls for aid are used to promote continuous R&D actions, with no interruptions deriving from public management administrative procedures.
5. **ASSESSMENT AND MONITORING** of the actions. The public funds will be allocated according to a competitive procedure and the proposals to be financed will be selected taking into account scientific-technical and other criteria. These may include technological, business and commercial viability criteria covered by internationally validated principles and responding to standardised and transparent evaluation processes based on assessment committees between peers. The scientific-technical and economic-financial monitoring *ex post* of the financed actions will also be strengthened, awarding special importance to scientific-technical monitoring as a fundamental part of the process of assessment and allocation of public resources associated with the calls for competitive procedures envisaged in this **NATIONAL PLAN**; these are incorporated as a regular activity in the monitoring process through the creation of a uniform, effective, transparent and quality-based system and the scientific-technical and socio-economic impact of the financed actions.
6. **REALISM** with the design of scenarios which can be executed with a high degree of compliance with the proposed objectives and **FLEXIBILITY** in the annual programming of the actions considered, to adapt to a changing strategic and budgetary environment, through annual review of these actions in the form of the appropriate **ANNUAL ACTION PROGRAMMES**.
7. **COORDINATION** between the responsible departments for managing programmes providing assistance for R&D&i, through the simplification and homogenisation of procedures to achieve higher rates of effective and efficient spending.

## 9.2. ORGANISATIONAL AND MANAGEMENT STRUCTURES IN THE NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016

According to Royal Decree 1823/2011 of 21 December 2011, the Ministry of the Economy and Competitiveness is responsible, amongst other functions, for proposing and executing the Government's policy in scientific research, technological development and innovation in all sectors; together with the other sectoral initiatives of the different ministerial departments, form the programmes which make up this **NATIONAL PLAN**.

Currently, the principal ministerial departments, together with the Ministry of the Economy and Competitiveness, which manage the majority of the budget resources set aside in the General State Budgets for RDI policy are: the Ministry of Industry, Energy and Tourism, the Ministry of Education, Culture and Sport, and the Ministry of Health, Social Services and Equality. Other ministries with activities related to scientific and technical research and innovation are the Ministries of Foreign Affairs and Cooperation, Defence, Development, Home Affairs, Agriculture, Food and Environment and the Prime Minister's Office, which obviates the need to strengthen the levels of coordination and cooperation between ministries.

This means that the **PLAN** must be well articulated with the Government's sectoral policies, as well as with the Autonomous Regions and the European Union, to leverage the available resources, avoid redundant actions and increase the efficiency of public investment in R&D&i.

### 9.3. MANAGEMENT OF THE NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION 2013-2016 AND THE STATE AGENCIES

Listed below are the principal ministerial departments, management units and agencies which currently have competences in the management of public aid related to the principal methods of participation in the **PLAN**, such as human resources, RDI programmes and projects and infrastructures, and scientific-technical equipment. These methods, together with the Additional Actions, Revitalisation Actions and the Joint Programming Actions, are designed to promote excellence in scientific-technical research, stimulate and incorporate talent in the Spanish System of Science, Technology and Innovation as a whole, encourage business leadership in RDI and promote RDI in relation to the challenges faced by society; they form the four National Programmes in the **PLAN**.

**TABLE 7** lists the units, at Directorate General level, responsible for the management of each of the state programmes and sub-programmes.

<b>NATIONAL PROGRAMME FOR PROMOTION OF TALENT AND EMPLOYABILITY</b>	
<b>NATIONAL SUB-PROGRAMME FOR TRAINING</b>	<ul style="list-style-type: none"> <li>- DG. for Scientific and Technical Research.</li> <li>- DGfor Innovation and Competitiveness.</li> <li>- State Agency Higher Council for Scientific Research (CSIC).</li> <li>- National Institute for Agricultural and Food Research and Technology.</li> <li>- Carlos III Health Institute</li> <li>- DG for University Policy.</li> <li>- Spanish Agency for International Development Cooperation.</li> </ul>
<b>NATIONAL SUB-PROGRAMME FOR INCORPORATION</b>	<ul style="list-style-type: none"> <li>- DG for Scientific and Technical Research.</li> <li>- DGfor Innovation and Competitiveness.</li> <li>- National Institute for Agricultural and Food Research and Technology.</li> <li>- Carlos III Health Institute.</li> </ul>
<b>NATIONAL SUB-PROGRAMME FOR MOBILITY</b>	<ul style="list-style-type: none"> <li>- DG. for Scientific and Technical Research.</li> <li>- DG. for Innovation and Competitiveness.</li> <li>- Carlos III Health Institute.</li> <li>- DG for University Policy.</li> </ul>
<b>NATIONAL PROGRAMME FOR PROMOTION OF EXCELLENCE IN SCIENTIFIC AND TECHNICAL RESEARCH</b>	
<b>NATIONAL SUB-PROGRAMME FOR GENERATION OF KNOWLEDGE</b>	<ul style="list-style-type: none"> <li>- DG for Scientific and Technical Research.</li> <li>- Carlos III Health Institute.</li> <li>- National Institute for Agricultural and Food Research and Technology.</li> <li>- DG for Promotion of the Information Society/State Secretariat for Telecommunications and the Information Society.</li> </ul>
<b>NATIONAL SUB-PROGRAMME FOR THE DEVELOPMENT OF EMERGING TECHNOLOGIES</b>	<ul style="list-style-type: none"> <li>- DG. for Scientific and Technical Research.</li> <li>- DGfor Innovation and Competitiveness.</li> <li>- Centre for Industrial Technological Development (CDTI).</li> <li>- S.G. for Promotion of the Information Society/State Secretariat for Telecommunications and the Information</li> </ul>

<b>NATIONAL SUB-PROGRAMME FOR STRENGTHENING OF INSTITUTIONS</b>	<ul style="list-style-type: none"> <li>- DG for Scientific and Technical Research.</li> <li>- DG. for Innovation and Competitiveness.</li> </ul>
<b>NATIONAL SUB-PROGRAMME FOR SCIENTIFIC AND TECHNICAL INFRASTRUCTURES AND EQUIPMENT</b>	<ul style="list-style-type: none"> <li>- DG for Scientific and Technical Research</li> <li>- DG for Innovation and Competitiveness.</li> <li>- National Institute for Agricultural and Food Research and Technology.</li> <li>- Carlos III Health Institute.</li> <li>- General Directorate for Industry and Small and Medium-Sized Enterprises.</li> <li>- DG for Promotion of the Information Society/State Secretariat for Telecommunications and the Information Society.</li> </ul>
<b>NATIONAL PROGRAMME FOR BUSINESS LEADERSHIP IN R&amp;D&amp;I</b>	
<b>NATIONAL SUB-PROGRAMME FOR BUSINESS RDI</b>	<ul style="list-style-type: none"> <li>- Centre for Industrial Technological Development</li> <li>- DG. for Innovation and Competitiveness.</li> <li>- DG for Industry and Small and Medium-Sized Enterprises.</li> <li>- DG. for Promotion of the Information Society/State Secretariat for Telecommunications and the Information Society.</li> </ul>
<b>NATIONAL SUB-PROGRAMME FOR KEY ENABLING TECHNOLOGIES</b>	<ul style="list-style-type: none"> <li>- DGfor Innovation and Competitiveness.</li> <li>- Centre for Industrial Technological Development.</li> <li>- DGfor Industry and Small and Medium-Sized Enterprises.</li> <li>- DG. for Promotion of the Information Society/State Secretariat for Telecommunications and the Information Society.</li> </ul>
<b>NATIONAL SUB-PROGRAMME FOR COOPERATIVE RDI ORIENTED TOWARDS THE DEMANDS OF THE PRODUCTIVE SECTOR</b>	<ul style="list-style-type: none"> <li>- DGfor Scientific and Technical Research.</li> <li>- DGfor Innovation and Competitiveness.</li> </ul>
<b>NATIONAL PROGRAMME FOR RDI ORIENTED TOWARDS GLOBAL SOCIETAL CHALLENGES</b>	
<b>STRATEGIC ACTION FOR HEALTH. THE CHALLENGE IN HEALTH, DEMOGRAPHIC CHANGE AND WELL-BEING</b>	<ul style="list-style-type: none"> <li>- DG. for Scientific and Technical Research.</li> <li>- DGfor Innovation and Competitiveness.</li> <li>- National Institute for Agricultural and Food Research and Technology</li> <li>- Centre for Industrial Technological Development (CDTI).</li> <li>- Carlos III Health Institute.</li> </ul>
<b>STRATEGIC ACTION FOR THE CHALLENGE FACED IN ECONOMY AND THE DIGITAL SOCIETY.</b>	<ul style="list-style-type: none"> <li>- S.G. for Promotion of the Information Society/State Secretariat for Telecommunications and the Information Society.</li> </ul>

Management of the **NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION**, without prejudice to the functions attributed to other units of the State General Administration, is the mission of the financing stakeholders affiliated with the Ministry of the Economy and Competitiveness and in accordance with the terms of Chapter II of Title IV of Law

14/2011, of 1 June, on Science, Technology and Innovation, which are: *the State Agency for Research* and the *Centre for Industrial Technological Development* (CDTI). Both agents will develop their financing activity in a coordinated manner, in the areas in which they work, and according to the principles of autonomy, objectivity, transparency, accountability and management efficiency.

Consequently, the management of scientific and technical research will be subordinated to a great extent to the implementation of the **STATE AGENCY FOR RESEARCH**, scheduled for 2013. This Agency, affiliated with the Ministry of the Economy and Competitiveness, will be responsible for managing a large part of the programmes, sub-programmes and actions which at the time this **PLAN** is approved correspond to the State Secretariat for Research, Development and Innovation, including all those actions assigned to the General Directorate of Scientific and Technical Research; those carried out by the General Directorate of Innovation and Competitiveness correspond to the management in its own area of the functions of the State Agency for Research. The Agency will deal with the financing, evaluation and inspection of the scientific and technical activities promoted by Central Government on its own initiative or together with other Administrations or bodies from within Spain or from other countries or international bodies. It will also be the Agency's objective to stimulate scientific and technical research for knowledge generation in all areas of know-how through competitive and efficient allocation of public resources by incorporating best international practices in development and scientific and technical evaluation; advice on defining and planning public research policies, development and innovation; improved financing, evaluation, execution and monitoring of the plans, actions and initiatives through which Central Government's policies in research, development and innovation are instrumented; the obtaining of resources for financing scientific and technological research and innovation, and promotion of a culture of science and technology in society.

The creation of the State Agency for Research is a major step forward in streamlining public management of aid and the budgetary implementation of the resources that Central Government allocates to RDI activities, which translates into an efficient use of the available resources which must reach the responsible stakeholders for their implementation in a timely and appropriate manner.

The separation of powers of the State Agency for Research and the CDTI is established according to the purpose itself and the evaluation methods and criteria which apply to the allocation of public resources. It is the State Agency for Research's mission to promote scientific and technical research and the CDTI's to promote innovation. In turn, the former will allocate the public resources using internationally validated criteria in relation to the scientific or technical merits of the proposals and will take into account their potential socio-economic impact. Meanwhile, to promote innovation the CDTI will allocate the resources with evaluation criteria based on technological merit, innovation and opportunity, applicability and industrial viability, the proximity of the market and the socio-economic impact of the results. On this point, the actions aimed particularly at promoting technological innovation and the creation of an innovative business sector will remain under the jurisdiction of the CDTI.

This requires effective coordination between the two agencies, which will encourage a more effective and efficient management of resources and an optimisation of the time taken by the stakeholders to formalise, process and justify proposals.

#### **9.4. THE COORDINATION OF THE NATIONAL PLAN AND AGE'S RDI POLICIES**

Law 14/2011, of 1 June, on Science, Technology and Innovation acknowledges the need to promote coordination of scientific and technical research in Central Government (AGE), attributing to the Government Delegate Committee for Science, Technology and Innovation Policy the functions of planning and monitoring science and technology policy and innovation and coordination between the ministerial departments.

In addition, assignment of management for the programmes in the **PLAN** will be updated by means of the Annual Work Programme which, as an instrument for ongoing updates of the **PLAN** for the period 2013-2016, will be briefed by the Government Delegate Committee for Science, Technology and Innovation Policy prior to its approval.

Furthermore, the aim is to strengthen the levels of coordination and cooperation between ministries, with particular emphasis on joining up the actions set out in the **NATIONAL PLAN** and those associated with the implementation of the Government's sectoral policies, also involving the Autonomous Regions and the European Union, to achieve better use of the resources available, avoid redundant actions and guarantee the creation of synergies.

For the governance of this **PLAN** it is proposed that the Government Delegate Committee create a Permanent Working Group to monitor the actions associated with the **NATIONAL PLAN**. This will also allow (i) enhanced coordination of the action of Central Government in this matter; (ii) integration for the whole Central Government of monitoring and evaluation of results and the impact of each of the RDI public intervention programmes of the different ministerial departments and (iii) technical support for the process of reviewing and drawing up the STRATEGY and the **NATIONAL PLAN FOR SCIENCE, TECHNOLOGY AND INNOVATION**, including its ANNUAL ACTION PROGRAMME.

Finally, if the set objectives are to be met, it requires a stable framework for the actions of the different Administrations involved and the establishment of procedures and channels of communication and information to ensure appropriate representation of the interests of all the territories, their institutions and stakeholders. As far as the international stage is concerned, particularly the European Union, the articulation mechanisms refer to:

- Spanish positioning on European policies to support research and innovation, in particular the "Horizon 2020" programme.
- Alignment of national objectives with those designed to promote the competitive ability of the European economy.
- Establishment of joint initiatives with European Union countries and third countries.
- Adoption of European Union mechanisms and administrative procedures, in addition to internationally approved monitoring and evaluation systems.
- Adoption of temporary joint programming scenarios, with similar planning horizons.

## **10. MONITORING AND EVALUATION OF THE RESULTS OF THE NATIONAL PLAN**

The **INFORMATION SYSTEM FOR SCIENCE, TECHNOLOGY AND INNOVATION** (SICTI) provided for in Law 14/2011, of 1 June, is created as an instrument for obtaining data and analysis to draw up and monitor the SPANISH STRATEGIES ON SCIENCE, TECHNOLOGY AND INNOVATION and the plans which develop them, including this current **NATIONAL PLAN**.

This means that the SICTI will be the instrument that the data enables to be gathered and the available information to be subsequently analysed, to create a unified and uniform system of

information which generates robust information which is accessible to Central Government and the Autonomous Regions. This Information System is a fundamental tool for defining the mechanisms of articulation and coordination between the public stakeholders responsible for management, as set out in the SPANISH STRATEGY ON SCIENCE, TECHNOLOGY AND INNOVATION.

The **INFORMATION SYSTEM FOR SCIENCE, TECHNOLOGY AND INNOVATION** will produce and disseminate information about the actions financed under the guidance of the **NATIONAL PLAN** in an objective, verifiable way. This information is aimed at public decision-makers, the stakeholders in the system and, finally, society in general.

The **NATIONAL PLAN** will establish, on one hand and through the corresponding ANNUAL ACTION PROGRAMME, the evolution and quantification of the monitoring indicators and those for impact of the results which will correspond to each of the instruments executed. This will allow the corresponding valuation of the task carried out; the data provided by the monitoring work will allow the degree of compliance of the previously set objectives to be determined.

Monitoring of these actions also makes it compulsory to standardise, homogenise and integrate all the information generated in the processing of the administrative dossiers to ease the use of the principal variables for statistical exercises, which will be reflected in the corresponding **ANNUAL ACTIVITY REPORTS** in the **NATIONAL PLAN FOR SCIENTIFIC AND TECHNICAL RESEARCH AND INNOVATION**. The **ANNUAL ACTIVITY REPORTS** will analyse the results and performance of both the financing stakeholders and those carrying out RDI activities, whether they are the procedures installed for the management of aid, administrative processing, *ex ante* and *ex post* monitoring and evaluation systems, or the demand for resources by the public sector (public R&D centres, including universities) and the private sector (companies), cooperation initiatives, the economic and financial returns associated with aid, and the scientific-technical impact of the financed results and the medium and long-term social and economic impact of the latter.

## APPENDIX

### THE RDI STAKEHOLDERS IN THE SPANISH SYSTEM OF SCIENCE, TECHNOLOGY AND INNOVATION

The new **NATIONAL PLAN** adopts an inclusive and integrated approach, opening up the calls for aid to all public and private stakeholders responsible for carrying out RDI activities in the System; these include those stakeholders whose principal activity is to provide support for scientific and technical research and innovation (article 3.4 of Law 14/2011, of 1 June, on Science, Technology and Innovation).

In addition, the actions and instruments will include all the phases of research, development and innovation; proposals and actions will be championed that are capable of generating added value through actions beginning with the design of the project until its introduction on the market, promoting the necessary international dimension these actions must have.

The following are considered stakeholders suitable for participation in the actions financed under the **NATIONAL PLAN**:

- **Individuals.**
- **Public research agencies** according to the characteristics outlined in article 47 of Law 14/2011 of 1 June, on Science, Technology and Innovation.

- **Universities.** Public universities, their university departments and institutes, and private universities with an ability and proven activity in R&D, as provided for in Organic Law 6/2001 on Universities, modified by Organic Law 4/2007, of 12 April.
- **Other public R&D centres.** Public bodies and centres with their own legal personality, dependent on or linked to the State Administration, and those dependent on or linked to the territorial public administrations and their agencies, regardless of the legal nature, whose purpose and business purpose comprises the direct execution of scientific and technical research activities, or others of a complementary nature which are necessary if society is to make the appropriate scientific and technological progress. Included in this concept are the consortia created by cooperation agreements between the State and the Autonomous Regions.
- **Public and private health organisations and institutions** linked to or associated with the National Health System, which carry out research activity.
- **Health Research Institutes** accredited as set out in Royal Decree 339/2004, of 27 February, and additional regulations.
- **Public and private non profit-making organisations** which carry out and/or manage R&D activities, generate scientific or technological knowledge, facilitate their application and transfer or provide services to support innovation for business entities.
- **Companies**, whatever their legal form, which perform an economic activity and which are validly incorporated at the time the request for help is presented. Included under this heading are public trading companies, public business organisations and individual entrepreneurs. Within the companies heading, small and medium-sized enterprises (SME) are considered differently.
- **State technology centres.** Non profit-making organisations, legally incorporated and resident in Spain, which have their own legal personality and were created with the aim of contributing to the general benefit of society and to improving the competitiveness of companies by generating technological knowledge, carrying out RRD activities and developing the application thereof.
- **State-wide centres to support technological innovation.** Non profit-making organisations, legally incorporated and resident in Spain, which have their own legal personality and were created with the aim of making it easier to apply the knowledge generated in universities and research bodies, including technology centres, by acting as intermediary between the latter and the companies, providing services to support innovation.
- **Business groupings or associations** which include: joint ventures (JV); economic interest groupings, formed by companies or companies with other entities (EIG); Non profit-making sectoral business associations whose activities include projects and R&D actions for their sector.
- **Innovative business groupings and technological platforms.** Groups constituted by independent organisations — companies, small, medium-sized and large research bodies — which are active in sectors and specific regions, whose objective is to contribute effectively to technology transfer, the creation of networks and the divulgation of information between the companies forming the grouping.
- **Organisations supporting technology transfer, technology and scientific dissemination and dissemination** and which include science and technology parks, technology transfer offices, offices transferring results of research, CEIs and innovation and technology centres.

Finally, bearing in mind the European Union Framework on State Aid for Research, Development and Innovation, below is the definition of the research bodies which are potential beneficiaries of

the aid under this **PLAN**. They are research organisations, such as universities or research institutes which, regardless of their legal status (incorporated according to public Law or private), have as their principal objective the conducting of fundamental research, industrial research and experimental development and disseminating the results of the latter through teaching, publication or technology transfer. In these research bodies, all the profits will be reinvested in these activities, the divulgation of the results or teaching. In addition, companies which can exercise an influence on these entities, for example, in their capacity as shareholders or members, shall not have preferential access to the entity's research capacities nor to the research results generated.