DESCRIPTION OF THE SCIENCE AND INNOVATION ECOSYSTEM IN SPAIN

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DESCRIPTION OF THE SCIENCE AND INNOVATION ECOSYSTEM IN SPAIN

During the last decades, Spanish efforts on science and innovation had a relevant development and catalytic effect on excellent science, transfer of knowledge, business innovation, and the evolution of new technological concepts. If we look at some indicators of our national system, we see that it has reached the group of the most developed countries from a scientific, technological, and innovative point of view:

- Spain is the fourth country receiving the most funds from the Horizon 2020 EU Framework Program 2012-2020, returning a greater amount than it contributes (10.4% of the total allocated budget¹).
- Spain is the eleventh country in the number of scientific publications² and contributes 12.23% of the most cited articles. In percentage terms, Spain produces about 3% (WOS) of all scientific publications in the
- Spanish researchers have published more than 1.48 million scientific documents in two decades. A figure that exceeds the production of countries such as South Korea, Russia, and the Netherlands. In 2020, almost 55% of the scientific documents signed by Spaniards were international collaborations, according to the indicators included in ICONO as Web of Science³.

- According to the National Aggregator for Open Access Repositories, RECOLECTA⁴, Spanish researchers have archived more than 2 million documents in Open Access.
- Spain already has more than two hundred thousand people employed in activities related to Research and Innovation (R&I)⁵.
- Spain has increased its budget dedicated to R&I from 0.81% in 1994 to 1.25% in 2019⁶, with a peak of 1.40% in 2010.
- The Spanish ecosystem is made up of Public Research Bodies, universities (83 Spanish universities: 50 public and 33 private⁷), and a system of internationally competitive research centers throughout the national territory.
- Spain is above the European average and is in the gender balance in terms of people dedicated to R&I. In 2019 there were 231,413 women that represent a 2.5% increase over the previous year and 40.6% of women, and of these more than 143,974 are researchers, 38.9% women⁸.
- The Ministry of Science and Innovation and its agencies and entities with a budget increased 1,383M€ (million EURO), 58.4% compared to 2020, reaching 3,753M€ in 2021. Of the additional € 1,383M€: 1,100M€ will be financed with the Resilience and Recovery Mechanism and 283M€ will have a national funding source.

⁴ https://recolecta.fecyt.es/home?language=en ⁵ 231,413 researchers and people dedicated to R&D in

^{5 231,413} researchers and people dedicated to R&D in 2019 according to INE 2019.

https://services.icono.fecyt.es/indicadores/Paginas/default.aspx?ind=41&idPanel=1

⁶ https://www.ine.es/prensa/imasd 2019.pdf

⁷http://www.ciencia.gob.es/portal/site/MICINN/men uitem.7eeac5cd345b4f34f09dfd1001432ea0/?vgnext oid=42222a27d349b610VgnVCM1000001d04140aRC RD

⁸https://services.icono.fecyt.es/indicadores/Paginas/ default.aspx?ind=41&idPanel=1

¹https://webgate.ec.europa.eu/dashboard/extension s/CountryProfile/CountryProfile.html?Country=Spain

² https://www.scimagojr.com/countryrank.php

³https://icono.fecyt.es/sites/default/files/filepublicaci ones/indicadores 2020 web.pdf

NATIONAL GOVERNANCE FRAMEWORK



The Science, Technology, and Innovation Law (14/2011) (LCTI)⁹ establishes the governance framework for the R&I ecosystem in Spain. The commitment to R&I, as a policy that accelerates progress and facilitates the establishment of synergies, is fully reflected in the Law covering the main aspects of the Spanish Science and Technology System: Governance, Human Resources, the different Agents, the Transfer of results and of course, Internationalization.

Under the Ministry of Science and Innovation, both the General Secretariat for Research and the General Secretariat for Innovation are responsible for the articulation of R&I public policies at the State level.

The LCTI requires the generation of knowledge in all areas, its dissemination, and its application to obtain a social or economic benefit. The LCTI achieves this objective with two main strategic and planning tools, the Spanish Strategy for Science, Technology and Innovation 2021-2027¹⁰ (EECTI 2021-2027) and its State Plans for Scientific and Technical Research and Innovation (PEICTI).

⁹ https://www.boe.es/diario boe/txt.php?id=BOE-A-2011-9617

https://www.ciencia.gob.es/stfls/MICINN/Ministerio/FICHEROS/EECTI-2021-2027.pdf



Spanish Strategy for Science, Technology and Innovation 20212027

The EECTI 2021-2027 is the basic instrument to consolidate and reinforce the Science. Technology, and Innovation System (SECTI) in the next seven years. The EECTI 2021-2027 is specifically designed to facilitate articulation of our R&I policy with the policies of the European Union, taking into account the regulations approved or in progress, to take advantage of the synergies in the best possible way between programs. In this regard, the strategy adds elements seeking to promote maximum coordination between State and Autonomous planning and programming. The design of the EECTI 2021-2027 was made during the COVID-19 pandemic. For this reason, it includes activities specifically aimed at solving the problems caused by it, and at consolidating and promoting science and innovation as a tool for the social, economic, and industrial reconstruction of our country.

The exit from the global crisis suffered by COVID-19 and the reestablishment of a powerful national R&I system, after the last decade of difficulties, are urgent actions that need to be addressed. For this, the Strategy will be carried out in two phases.

• In the first phase, 2021-2023, the efforts made will be focused on guaranteeing the strengths of the system, reinforcing the current programming, infrastructures, and human resources that will benefit from the design of a well-defined research career, which allows the necessary replacement generational. In this phase it will be essential to support, clearly and forcefully, R&I in the health field, as well as investment in ecological transition and digitalization, based on the science of excellence, through specific programs, strategic actions in the sector's priority, and major driving projects that allow us to face the social, industrial and environmental economic, challenges necessary to achieve sustainable well-being and inclusive growth in our country.

• The second phase of the EECTI, corresponding to the period 2024-2027, will make it possible to place R&I among the fundamental pillars of our State and consolidate its value as a tool for the development of an economy based on knowledge.

In the EECTI, R&I and industry will be at the heart of the initiatives and approaches proposed by the national R&I investment on the public and private sectors. The EECTI focuses on the need to bring science closer to economic and social progress, being at the service of the 2030 Agenda and the political priorities of the EU. To achieve this objective, the Strategy will prioritize and respond to the challenges of the national strategic sectors in specific areas that will be key for the transfer of knowledge and the promotion of R&I in the Spanish business sector. The capillarity of the system will help to mitigate the demographic challenge in our country, promoting the distribution of its agents and infrastructures throughout the national geography.

The national strategic sectors are detailed in the body of the Strategy. Broadly speaking, the map of the strategic sectors of the EECTI and therefore of the Spanish Science and Technology System is as follows:

- Health: new therapies, precise diagnosis, cancer and aging, and special emphasis on infectious diseases.
- Culture, Creativity and Inclusive Society: the genesis of the human being, cognition and language.
- Security for Society: inequality and migration; the market and its tensions; the protection of society and cybersecurity.
- Digital world, Industry, Space and Defence: Al, next-generation internet, robotics,
- Physics, mathematics, communication networks.
- Climate, energy and mobility: climate change, decarbonization, mobility and sustainability



• Food, Bioeconomy, Natural Resources, and Environment: from biodiversity to the food use of the land and seas.

The Governance of the Spanish Science, Technology and Innovation System is constituted by the Council for Scientific, Technological and Innovation Policy (CPCTI) and is articulated with the R&I systems of the Autonomous Communities; the Science Technology and Innovation Advisory Council (CACTI), and the Research Ethics Committee. Finally, the instrument for data collection and analysis for the development and monitoring of the EECTI and the State Plans is the Information System on Science, Technology, and Innovation (SICTI). The Information System is established following the criteria approved by the CPCTI.

The PEICTI 2021-2023 and 2024-2027 are the fundamental instrument of the General State Administration for the development and achievement of the objectives of the EECTI 2021-2027 and the Europe 2020 Strategy. Additionally, this strategic framework gathers, on the one hand, sector initiatives of other ministries such as Industry, Economy, or Health which are articulated through specific Strategic Actions reflected in the State Plans.

Finally, the Ministry of Science and Innovation, based on scientific knowledge and innovation capacities, gives specific strategic and technical orientation on R&I policy in areas of technological or socio-economic interest such as the Spanish R&I Strategy in Artificial Intelligence¹¹ or the Bioeconomy Strategy.

At the same time, other sectoral policies identified by the Government such as the Digitization Strategy of the Agri-food and Forestry Sector and the Rural Environment¹²or the future Integrated National Energy and

Climate Plan 2021-2030¹³ that are part of the current government's roadmap, the Agenda of Change, and that identify R&I in their lines of action.

This strategic framework gives a clear vision of the strategic importance, both social and economic, of R&I, clearly indicating the transversality of R&I as a State policy.



¹¹http://www.ciencia.gob.es/stfls/MICINN/Ciencia/Fi cheros/Estrategia Inteligencia Artificial IDI.pdf

https://www.mapa.gob.es/es/ministerio/planesestrategias/estrategia-digitalizacion-sectoragroalimentario/default.aspx

¹³ https://www.idae.es/informacion-y-publicaciones/plan-nacional-integrado-de-energia-y-clima-pniec-2021-2030



Shock Plan for Science and Innovation

The Shock Plan for Science and Innovation¹⁴, presented by the President of the Government on July 9th, 2020, responds to the urgent need to promote and strengthen the public and private research, development, and innovation systems through a series of measures of immediate application in the short term, between the years 2020 and 2021. The Shock Plan for Science and Innovation of the Government of Spain is articulated in three Axes:

- Axis 1: Research and innovation in Health.
 Strengthen the bio sanitary and public health research system, mainly through the mobilization of resources in favour of the Carlos III Health Institute, and the reform of the Biosanitary Research Law to promote the professional career of biomedical researchers and support for young talented researchers.
- Axis 2: Transformation of the science system and attraction and retention of talent. On the one hand, it is a question of facing structural reforms to provide stability to the professional career of scientific personnel in all areas of knowledge. On the other, it is proposed to provide more funds to the main competitive financing instruments for science in any of its disciplines - calls for contracts for research projects, personnel, and scientific equipment and infrastructures.

 Axis 3: Promotion of business R&I and the science industry. Strengthen the foundations of our innovative productive fabric as one of the pillars of the economic and social reconstruction of the country. New instruments are proposed to boost the innovative capacity of our companies with specific measures of a transversal nature and in strategic sectors.

The 17 measures of the Shock Plan are involving investment commitments in 2020 and 2021 for a total of € 1,056 million in direct aid to the science and innovation system, both to scientific institutions, as well as to university and clinical research groups, as well as R&I in strategic business sectors. In 2020, the Shock Plan mobilizes a total of € 396.1 million, with the remainder for 2021. To this investment must be added a total of 508M€ in loans under conditions advantageous innovative companies, from the new instruments for promoting private R&I. These instruments will make it possible to increase loan execution, which has been very low in recent years due to the low-interest rate situation in the financial sector.

The measures of the Shock Plan are designed to align and complement the medium and long-term reforms and programs of the "Investment Plan and Reforms for the Recovery of the Economy", and are part of the EECTI.

¹⁴https://www.ciencia.gob.es/stfls/MICINN/Ministeri o/FICHEROS/Plan_de_choque_para_la_Ciencia_y_la_ Innovacion.pdf



Recovery, Transformation and Resilience Plan for the Spanish Economy in Science and Innovation

To overcome the current situation, our country will take advantage of the European Recovery and Resilience Facility¹⁵ with which the necessary measures will be put in place to guide Spain and Europe towards a resilient, sustainable, and fair recovery path. To ensure the success of this response, recovery at the European level will be articulated through the Multiannual Financial Framework (MFF) 2021-2027, and the Next Generation EU, the European Recovery Instrument whose funds will provide an extraordinary investment boost aimed at financing the recovery of Europe. The Next Generation EU proposal encompasses a series of instruments whose lines of action are focused on the recovery and economic transformation of the EU. For Spain, and for the rest of the EU countries, the acquisition of these funds is subject to the presentation of an Investment and Reform Plan. This effort will allow us to adopt the necessary measures to modernize our economy, a process in which R&I will act as a driver of productivity and competitiveness.

Within the National Recovery, Transformation and Resilience Plan, Component 17, focused on Science and Innovation, includes institutional reforms and investments aiming at strengthening the capacities of the national science, technology, and innovation system. Its challenges and objectives include, among others, the institutional reform, strengthening of the capacities of the SECTI and its adaptation to international standards and the current state of the country's capacities and resources. This will be reached through the implementation of rapid changes that adapt and improve their efficiency, coordination, and capacities, thus being able to face the economic and social

recovery of the country in the short term. Likewise, this reform will increase and accelerate investment in R&I in a sustainable way in the long term, until reaching the European average in 2027, directing investment to strategic areas of R&I and doubling the volume of public aid to innovation in priority sectors.

The reform of the SECTI will allow to accompany and promote a sustainable increase in public and private investment in R&I, through the State Research reinforcement of calls for the hiring of research personnel and the implementation of R&I projects; fostering public-private collaboration, the renovation of large national infrastructures, participation international infrastructures; the reinforcement of regular financing of business projects and its evaluation capacity; new centres of excellence; new instruments of innovation; and the digitization of R&I management. Among other investments, almost 900 million euros will be allocated to new Public-Private R&I projects. Likewise, specific plans will be developed to promote Science and Innovation in key priority areas: transition, biomedicine ecological promotion of innovation and research in health and vaccines, aeronautical and automotive industries, advanced computing technologies.

To achieve these objectives, the EECTI will be implemented between the years 2021-2027, and further measures will be implemented, such as the advanced development of the Science, Technology, and Innovation Information System, a new model of corporate participation in technology-based SMEs arising from knowledge-generating centers, or the reorganization of Public Research Bodies.

¹⁵ https://ec.europa.eu/info/business-economyeuro/recovery-coronavirus/recovery-and-resiliencefacility en

BUDGET AND EXPENDITURE ON R&I



Regarding the General State Budgets that are initially allocated to investment in R&I, in 2020, 1.2% of the total budget was specifically allocated to R&I. However, if only non-financial expenses are considered, the Central Administration's non-financial budget is 3.194M€ (the highest in history) allocated to spending on R&I which is a 59.4% increase compared to 2020. In this sense, in 2020, non-financial budget reaches 53.3%, it should be considered that in 2018, 39.9% of the budgetary expenditure in public investment is non-financial expenditure and that 60.1% is financial expenditure.

The expenditure on internal Research and Development amounted to 15,572 million euros in 2019, which represented an increase of 4.2% compared to the previous year. Said expenditure represented 1.25% of the Gross Domestic Product (GDP), compared to 1.24% in 2018. By sector of execution, the Companies sector represented the highest percentage of expenditure on internal R&I, with 56, 1% (which meant 0.7% of GDP). It was followed by the Higher Education sector, with 26.6% (0.33% of GDP). For its part, internal R&I spending in the Public Administration sector accounted for 17.0% of national spending (0.21% of GDP). The remaining 0.3% corresponded to the Private Non-Profit Institutions (IPSFL for the Spanish acronym) sector. Spending on R&I increased 3.5% compared to the previous year in the Companies sector, 4.9% in Higher Education and 5.3% in Public Administration.

The Europe 2020 Strategy sets an investment goal for all the Member States of the European Union, of 3% of R&I spending on GDP in 2020. At the national level, as expressed in the EECTI 2021-2027, the objective is to achieve the European average in 2027, 2.12%. This makes it necessary, therefore, to try to compromise with the EU and with our Law, trying to recover the volume of the science and technology system and investment in R&I towards levels similar to those of countries of our European environment, with tangible and lasting agreements with all the actors involved and where collaboration between public and private matters is especially relevant.

INNOVATION INDICATORS ON SPAIN

Spain is a country of moderate innovation¹⁶ according to the classification of the European Innovation Scoreboard of the European Commission. In 2019, the number of companies with technological innovation was 10,843. Complementary, according to the latest INE data, in the 2016-2018 period, one in five Spanish companies was innovative, reaching a total of 33,800 innovative companies in that period, of which only 10.5% were product innovators and 18,4% were innovative in business processes. Spending on innovative activities in 2019 stood at 19,389M€.

However, it should be noted that throughout the Horizon 2020 Program, Spain is the country with the highest number of projects and entities financed in the "SME Instrument" Program¹⁷, focused on supporting SMEs in their development through innovation.

Private sector investment in R&I accumulates three years of increase -the last one above that observed in GDP-, but the intensity of growth has not been enough to reduce the gap with the European average where the support of the companies for R&I is double compared to that observed in Spain¹⁸.

It should also be noted that, in Spain, there are more jobs with a high risk of automation than the OECD average: 21.7% of Spanish workers¹⁹.

¹⁶ https://ec.europa.eu/docsroom/documents/41891

¹⁷ https://sme.easme-web.eu/

¹⁸ http://informecotec.es/media/INFORME-COTEC-2019 versionweb.pdf

¹⁹ https://www.oecd.org/spain/

AGENTS OF THE PUBLIC R&I ECOSYSTEM



As defined in the LCTI²⁰, the Spanish System of Science, Technology, and Innovation is made up by a set of public and private coordination, financing, and execution agencies and entities and its relationships, structures, measures and actions for the promotion, development, and support of the R&I policy in Spain.

As mentioned above, the Council for Scientific, Technological and Innovation Policy is the general coordination body for scientific and technical research, which is attached to the Ministry of Science and Innovation and is made up of the heads of the ministerial departments designated by the Government and representatives of each Autonomous Community competent in this matter.

²⁰ https://www.boe.es/diario boe/txt.php?id=BOE-A-2011-9617



R&I funding bodies

The main financing agents of the state system are:

The State Investigation Agency (AEI)²¹

The State Research Agency, attached to the General Secretariat for Research, of the Ministry of Science and Innovation is an instrument for the management and financing of public funds destined for R&I activities with a full portfolio on R&I funding instruments and purpose is to guarantee accountability, improve and extend the monitoring of actions, rationalize management of available funds, reduce administrative burdens, and simplify and standardize procedures. This new management model allows a substantial improvement in the planning of actions and endows calls with the stability required by research activities.

The Center for Industrial Technological Development (CDTI)²²

The CDTI is a Public Business Entity attached to the General Secretariat for Innovation, of the Ministry of Science and Innovation, which promotes innovation and technological development in Spanish companies. It is the entity that channels requests for financing and support for R&I projects of Spanish companies at the national and international levels.

CDTI has a network of offices abroad with 9 delegates to support companies in their international technological activities. CDTI's Foreign Network is present in 24 countries:

Japan, South Korea, China, India, USA, Morocco, Chile, Brazil, Mexico, Egypt, Algeria, Argentina, Colombia, Peru, Taiwan, Malaysia, Australia, Singapore, Indonesia, Thailand, Russia, Switzerland, Belgium, and the Netherlands. In addition to the 7 Delegates that the CDTI has, the Network is completed with the CDTI office in Brussels

Carlos III Health Institute (ISCIII)²³

Besides, the Carlos III Health Institute, a Public Research Organization, with a double affiliation, to the Ministry of Science and Innovation and the Ministry of Health, carries out financing activities for scientific and technical research, managing the calls that are part of the Strategic Action of health and leading a forefront Spanish Strategy on Personalized Medicine.



²¹ http://www.ciencia.gob.es/portal/site/MICINN/aei

²² https://www.cdti.es/

²³ https://www.isciii.es/Paginas/Inicio.aspx



Spanish Foundation for Science and Technology (FECYT)²⁴

Finally, the FECYT, attached to the Ministry of Science and Innovation, through the General Secretariat for Research, fosters R&I citizen science, science culture and open science. FECYT manages the call for the Promotion of Scientific Culture that finances actions aimed at increasing scientific communication and the recognition of the value of science by society and another call finances access to specialized scientific information data bases.

R&I executing bodies

The main R&I executing agents are entities of the AGE and the CCAA that allow social and economic progress based on knowledge. Spanish agents have a demonstrated capacity and activity in R&I and include Public Research Bodies (OPI, coming from the Spanish: Organismos Públicos de Investigación); public universities, their university institutes, and private universities; public R&I centers of the central and regional administration; public and private health institutions and health research institutes; public and private non-profit entities that carry out R&I activities; the companies; state-level technology centers and state-level technological innovation support centers; private R&I centers and, of course, Innovative Technology-Based Companies.

Public Research Bodies

The Public Research Bodies, OPI, are the main executors of R&I of the General State Administration, attached to the General Research Secretariat of the Ministry of Science and Innovation (Except for the INTA, attached to the Ministry of Defence). They carry out scientific and technical research activities, technological service provision activities, and those other activities of a complementary

²⁴ https://www.fecyt.es/en/science-for-everybody

nature, necessary for the adequate scientific and technological progress of society. They have the status of Public Investigation Bodies of the General State Administration:

The State Agency Higher Council for Scientific Research (CSIC)²⁵

It is the seventh public research institution in the world and one of the top 5 in Europe. It has more than 11,000 researchers and managers in its staff in more than 120 centers spread throughout the Spanish geography. CSIC's research covers all areas of knowledge from the humanities and social sciences to natural sciences and astrophysics.

The Carlos III Health Institute (ISCIII)²⁶

The ISCIII is the Spanish entity of international reference in matters of Public Health and Biomedical Research. It has more than 15 centers of its own and works closely with the entire health system in Spain.

The Center for Energy, Environmental and Technological Research (CIEMAT)²⁷

CIEMAT works mainly in the fields of energy and the environment. It occupies an intermediate position in the chain that goes from the creation of basic knowledge to the industrial application so that its scope of activity always seeks to serve as a bridge between R&I and social interest objectives.

²⁵ https://www.csic.es/

²⁶ https://www.isciii.es/Paginas/Inicio.aspx

²⁷ http://www.ciemat.es/



The National Institute for Agricultural and Food Research and Technology (INIA)²⁸

INIA investigates to face the challenges of the agri-food and forestry sector: demand for food, climate change, and sustainability, as well as contributes to the improvement of the competitiveness of companies in the Spanish agri-food and forestry sector, through innovation.

The Spanish Institute of Oceanography (IEO)²⁹

The IEO is dedicated to marine science research, especially concerning scientific knowledge of the oceans, the sustainability of fishery resources, and the marine environment.

The Geological and Mining Institute of Spain (IGME)³⁰

The IGME's mission is to provide the General Administration of the State and the Autonomous Communities that request it, and to society in general, the knowledge and precise information about Earth Sciences and Technologies for any action on the territory.

The Instituto de Astrofísica de Canarias (IAC)³¹

The research activity at the IAC is structured around astrophysical research projects. The Observatories of the Instituto de Astrofísica de Canarias - the Teide Observatory, in Izaña

²⁸http://www.inia.es/IniaPortal/verPresentacion.action_

(Tenerife), and the Roque de Los Muchachos Observatory, in Garafía (La Palma) - are located in two of the most privileged places in the world for astronomical observations³².

The National Institute of Aerospace Techniques (INTA)³³

The National Institute of Aerospace Technology is the Public Research Organization (OPI) under the Ministry of Defence. INTA is specialized in research and technological development of a dual nature, in the fields of aeronautics, space, hydrodynamics, security, and defense.

Public R&I centers

As mentioned above, it is important to highlight that in addition to public research organizations, the R&I ecosystem in Spain includes other research centers, such as health organizations (including university hospitals), technology centers, science and technology parks, transfer offices of research results, foundations for science, unique scientific and technical infrastructures (ICTS) and companies with R&I activity. The Spanish Observatory for R&I maintains an online Map of Institutions that gives an account of the list and contacts of all of them³⁴.

Highlight the National Supercomputing Center (BSC)³⁵, the Institute of Photonic Sciences (ICFO)³⁶, the Basque Center for Climate Change (BC3)³⁷, the National Center for Cancer

²⁹ http://www.ieo.es/es/

³⁰ http://www.igme.es/default.asp

³¹ https://www.iac.es/en

³² The exceptional quality of the sky in the Canary Islands for astronomical observation is protected by Law 31/1988, known as the "Sky Law".

³³ http://www.inta.es/

³⁴<u>http://icono.mapainstituciones.fecyt.es/frontendmapas/</u>

³⁵ https://www.bsc.es/

³⁶ http://www.icfo.eu/

³⁷https://www.bc3research.org/quienes_somos.html



Research (CNIO)³⁸, and the National Center for Cardiovascular Research (CNIC)³⁹ among many others, and which are positioned as world-class scientific institutions.

Singular Scientific and Technical Infrastructures (ICTS)⁴⁰

As mentioned above, Spain has an extensive Network of Singular Scientific and Technical Infrastructures (ICTS for the Spanish Infraestructuras Científico-Técnicas Singulares) at the highest scientific level in Europe. These are large facilities, resources, equipment, and services, unique in their kind, which are dedicated to cutting-edge technology research and development of the highest quality, as well as promoting the transmission, exchange, and preservation of knowledge, technology transfer, and innovation. These ICTS provide services within the framework of the State Plan for Research, Development and Innovation and the framework program of the European Union.

The ICTS are distributed throughout the national territory and are included in what is called the "Map of Singular Scientific and Technical Infrastructures (ICTS)". Among others, the ALBA Synchrotron, the Marenostrum and MinoTauro supercomputers (BSC-CNS), the Calar Alto Astronomical Observatory, the Gran Telescopio Canarias, the Spanish Antarctic bases, the oceanographic fleet (10 vessels including the BIO Hespérides), the Biological Reserve stand out. de Doñana, or the Solar Platform of Almería.



Severo Ochoa and María de Maeztu aid program

The distinctive "Severo Ochoa Center of Excellence" and "Maria de Maeztu Unit of Excellence", aims to finance and accredit public research centers and units, in any scientific area, that demonstrate impact and scientific leadership at an international level and that collaborate actively with their social and business environment⁴¹.

These are organizational structures with highly competitive frontier research programs that are among the best in the world in their respective scientific areas. The evaluation and selection process is carried out independently, by an international scientific committee made up of researchers of recognized prestige and impact.

³⁸ https://www.cnio.es/

³⁹ https://www.cnic.es/

⁴⁰ http://www.ciencia.gob.es/portal/site/MICINN/menuite m.eed4570ef37d2c8fbaa777b9026041a0/?vgnextoid=928d 5ef3677c4610VgnVCM1000001d04140aRCRD

⁴¹http://www.ciencia.gob.es/portal/site/MICINN/menuite m.7eeac5cd345b4f34f09dfd1001432ea0/?vgnextoid=d4c3e aabb4bb5510VgnVCM1000001d04140aRCRD

PARTICIPATION IN INTERNATIONAL R&I PROGRAMS



The EECTI 2021-2027 as a state and regional tool to enhance the capacities of the Spanish Science, Technology, and Innovation System approaches the internationalization process from a triple perspective:

- The relevance acquired by international scientific and technological cooperation for the generation and attraction of quality knowledge of social and economic relevance.
- The need to create a favorable environment for the detection of new disruptive technological processes, as well as the strengthening of innovative investment flows to our country, and the increase in the presence of Spanish entities in other countries.
- Public-private cooperation to maximize synergy and establish partnerships with other entities outside of Spain.

The creation of a favorable environment for the strengthening of innovative investment flows will force Spain to:

- Create the conditions for the location in Spain of research centers and R&I entities from other countries (whether of multinational business groups or public bodies) facilitating access to human resources and local infrastructures.
- Support the presence of Spanish entities in other countries, providing specific Spanish delegations with personnel specialized in R&I who detect technological disruptions that may be incorporated into national strategic areas, facilitate the attraction of talent and facilitate the administrative processes that allow you to create units in other countries.
- Support the synergy between Spanish public and private institutions to complement their strengths in actions against a country or international organization identified as a specific objective (in the sector or priority thematic area).
- Take advantage of existing relationships from the public system to serve as a spearhead to increase the presence of Spanish technology-based SMEs internationally.

RESEARCH
FRAMEWORK
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AND HORIZON
EUROPE



The European Research and Innovation Framework Program (FP) is an excellent opportunity to complement the research and innovative activity carried out through the State and Regional Programs and Plans, in addition to strengthening and promoting the internationalization of Research Systems of our country. In recent years, the need to seek joint solutions to major global challenges has become increasingly clear and the need for coordination in research programs has been reinforced.

The future framework program, called Horizon Europe, will pick up the baton from the previous Horizon 2020 Program to continue supporting science, technology, and innovation activities in the EU from 2021 to 2027. Like its predecessors, the Horizon Europe Program will finance activities with high added value European since, for the most part, these are R&I projects executed by consortia that bring together participants from multiple countries and are awarded in competitive competition based on peer evaluations with independent international experts.



The concluded Framework Program for Research and Innovation of the European Union, Horizon 2020 (H2020), has been key for Spain in the 2014-2020 period. The European Commission publishes all the information on participation in the Research Framework Program, both the 7th Framework Program and Horizon 2020 through the Commission's DashBoard:

https://webgate.ec.europa.eu/eCORDA/. The participation profile of each country is shown by the EC through predefined reports with the most relevant data. The report for Spain can be found at this link: https://ec.europa.eu/research/horizon2020/index.cfm?pg=country-profiles-detail&ctry=Spain.



Spain is the fourth EU country⁴² in financing obtained in Horizon 2020 with a return achieved of 10.26% on the total of distributed financing⁴³. In Spain, the CDTI is the entity in charge of analyzing the Spanish participation in the Horizon 2020 and Horizon Europe Programs and carries out a follow-up through the Participation Database in which the results of the competitive calls of the Program are uploaded. It also performs an analysis by type of entity and by Autonomous Communities. According to this Database, in 2020, companies, with 36.5%, and universities, with 20.5%, are the institutions that get the most funding for the Program. The Autonomous Communities of Catalonia, Madrid, and the Basque Country are those that accumulate most of the return.

Regarding the results in the areas/themes that form H2020, Spain is very well positioned in many areas, especially highlighting the first place in "Innovation in SMEs", with a return of 16.7% EU-28 thanks to the excellent results in the "SME Instrument", and in "Science with and for Society" (12.2% EU-28) and also the magnificent second position in "Nanotechnologies, advanced biotechnology and advanced manufacturing and transformation (NMBP)" (15.0% EU-28) and the social challenge "Action for the climate, environment, resource efficiency and raw materials" (13.1% EU-28).

Following the line of promoting the presence of the entities of the Spanish R&I System, Spain through the State Plan for Scientific, Technological Research and Innovation 2021-2023 aims to improve the participation and leadership of the different agents of the Spanish System to respond to the great challenges of society and facilitate the acquisition of new skills, leadership, and

⁴²http://eshorizonte2020.cdti.es/index.asp?TR= A&IDR=1&iddocumento=8022

⁴³ https://webgate.ec.europa.eu/dashboard/ext ensions/CountryProfile/CountryProfile.html?Co untry=Spain



international collaboration, as well as the participation of society and its organizations in the innovation process. In this sense, the PEICTI will implement some of the measures of this **Incentive Plan** to ensure that the necessary resources are guaranteed for its correct operation and the attraction of European funds.

The objective of this Incentive Plan⁴⁴ is to promote Spanish participation and leadership in European R&I programs, optimizing the use of available resources, following the priorities, strengths, and interests of our country. The document contains the main measures that will be managed by the funding agencies of the Ministry of Science and Innovation and that are aimed at improving and facilitating the participation of the national science and innovation system in Horizon Europe. These actions include the coordinated and structured use of financial aid and specialized services by agents specifically dedicated to helping increase the success of proposals, such as the State Research Agency, the CDTI, the Carlos III Health Institute and the European Office of the Spanish Foundation for Science Technology. The Plan contemplates a set of actions that will be financed by the PEICTI. In total, 26 measures will be implemented structured in four main axes that will develop the following activities:

- Promotion of R&I management networks.
- Promotion of scientific and technical research with the capacity to participate in European programs and the European Research and Innovation Councils.
- Support for the presence of personnel from the Spanish Science, Technology and Innovation System in European institutions and their participation in training programs in areas of interest.
- Participation in the Communication Plans established at the state and regional level to connect science and society, valuing the capabilities of the Spanish system at the international level.



⁴⁴ https://www.ciencia.gob.es/stfls/MICINN/Ministerio/FICHEROS/Plan Incentivacion Horizon te Europa.pdf



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