



FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

FCT Self-Evaluation Report

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January 2015

Fundação para a Ciência e a Tecnologia (FCT) is the Portuguese funding agency for science, technology and innovation. FCT was established in August 1997, succeeding the Junta Nacional de Investigação Científica e Tecnológica (JNICT). Since March 2012 FCT also coordinates public policies for the Information and Knowledge Society in Portugal, as a result of the integration of the Knowledge Society Agency (UMIC). In October 2013, FCT took over the attributions and responsibilities of the Fundação para a Computação Científica Nacional (FCCN), [Foundation for National Scientific Computation].

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Executive Summary

This Self Evaluation Report was prepared with the aim of describing FCT as a research funding organisation and how it is integrated within the Portuguese scientific environment, providing a critical review as judged by the current Board of Directors. Producing such a report is always a challenge, but also an excellent opportunity to review the activities and methodologies developed and applied within the organisation.

The last few years have been quite unique. Portugal suffered a serious financial crisis and was under an internationally-monitored assistance programme for three years (2011-2014). This programme involved tough austerity measures, which included significant salary reductions for public sector workers. Therefore, the external context has been one of hardship, to which the higher education and research sectors have not been immune. The state budget for FCT started to decrease from 2009 to 2010 and reached a minimum in 2013; this was reversed in 2014 (7% increase vs 2013) and, in 2015, the budget rose by 8% when compared to 2014. For FCT, these conditions are a complete shift from previous years, which had been of significant budget increases year on year. The implications are all the more acute since most of the FCT budget is spent on multiannual commitments. As a consequence, the amount available for "new" commitments decreased until a new equilibrium could be reached. Coincidentally, the Government had set out an ambitious programme of reform aimed at enhancing excellence and the impact of public-funded science, to which the Board of Directors responded by launching a number of new initiatives that considerably changed the established *status quo*. These two factors led to an unprecedented level of debate about science policy and funding in Portugal.

The report is composed of four parts. Part A provides an overall description of the legal status and the position of FCT within the Portuguese Research and Innovation (R&I) system, as derived from Government policy and the Programme for the current term of Parliament.

Part B presents an overview of FCT as a whole, focusing on its present mission, mandate, strategy, budget and allocation of funds. FCT budgets are analysed and compared over the years, in terms of initial budget versus actual spending, and in comparison with total public Portuguese expenditure in R&I, since 2001. Annual budget execution is further analysed by area of activity and by scientific field, from 2009 to the present date. The internal organisation of FCT is described, encompassing all the key areas of activity; governance and associated responsibilities of decision-making are described in detail. Recent strategic reforms are also described with the aim of highlighting the work of the present Board compared with previous FCT practice. In particular, there has been a special emphasis on enhancing excellence, impact and international competitiveness. The main areas of activity and respective funding schemes are described, namely in the areas of People, Ideas, Institutions, Research Infrastructures, Knowledge Transfer and International Cooperation. Key funding instruments have recently been introduced, such as the FCT PhD programmes, the FCT Investigator programme, the evaluation of R&D units that allowed a profound reorganisation of existing R&D units, and the definition of a roadmap of Research Infrastructures. Changes to the operational procedures of the traditional funding schemes have also been introduced, namely via the creation of a central evaluation office and detailed application and evaluation guides. We describe some of the ex-post evaluation of funded research

that has been carried out, including the recent bibliometric studies commissioned by FCT, which highlight the production and impact of Portugal's research base in different scientific areas.

This part of the report also describes FCT's interaction with other stakeholders at national and international level as well as some observations addressing the interaction with society at large. Future challenges facing FCT close this chapter. They include those resulting from implementing an alignment with the new EU framework programme (Horizon 2020) and with the 2014-2020 Structural funds framework (Portugal 2020), as well as new, much needed, policies concerning open access and responsible research conduct.

The third part of the report – Part C - provides a more detailed description of FCT activities, to complement the information given in Part B. In chapter 3 we describe cross-cutting activities, which include the evaluation office, the studies and strategy office, the communications office and information systems. The organisation and operation of the current funding schemes are described in detail in Chapter 4, addressing the main changes introduced in the recent years, and also the evaluation processes, success rates, and, when appropriate, gender distributions. Chapters 5 and 6 describe the recently added units to FCT, namely the Department of Information Society and the Foundation for National Scientific Computation.

A SWOT analysis of FCT makes up Part D, reflecting the views of the current Board of Directors on the strengths and weaknesses of FCT, the upcoming opportunities, as well as possible threats.

The periods of time covered in each section are variable, within 2005-2014, and are illustrated accordingly with data and descriptions of the levels of decision making, according to the specific matter. Overall, the political and decision-making processes concerning the national and international integration of FCT derive from the policies of the government in office and the country's legal framework.

Science and research in Portugal have evolved exponentially over the last couple of decades, so that today the country has a strong research base, with the necessary critical mass in several research fields, both in terms of people, equipment and infrastructure. FCT has played a major role in this evolution, creating and adapting funding schemes, programmes and its internal organisation to the changing environment of national and, in particular, international R&I. This is the first, ever, external review of FCT, in the agency's 20 year history. It comes at time of change. On the one hand, the last few years represented a shift from quantitative growth to fostering qualitative growth (excellence) and the international impact of Portuguese R&I. On the other hand, we are at the start of a new EU Framework Programme (H2020) and Multiannual Financing Framework, which promise to bring significant changes to R&I funding strategies and priorities. The outcome of this review will certainly help FCT in addressing the challenges and fully using the opportunities that the near future will bring, to successfully build on what has been achieved so far.

Miguel Seabra
(President)

Part A - FCT within the Portuguese Research and Innovation (R&I) system

1. THE PORTUGUESE RESEARCH & INNOVATION SYSTEM

1.1. Key players at the national level

The Portuguese R&I system is organised into three levels, as shown in Figure 1. The first (political level) contains the Prime Minister's office and the main ministries in charge of supporting R&I: the Ministry for Education and Science (MEC) and the Ministry for the Economy (ME). Other sectorial ministries also allocate funds for R&I, but their contribution is much less significant. At this level there are four policy advice institutions:

The Parliamentary Commission for Education, Science and Culture (CECC) has as its mission to legislate, oversee and monitor the development of policies in the areas of education, science (research, technological development and innovation) and culture.

The National Council for Science and Technology (CNCT), chaired by the Prime Minister, advises the Government on crosscutting issues in science and technology with a view to setting medium and long term national policies and strategies.

The National Council for Entrepreneurship and Innovation (CNEI), also chaired by the Prime Minister, is an advisory body of the Government for national policy on entrepreneurship and innovation.

The Portuguese Education Council (CNE) is an independent advisory body that produces statements and recommendations on educational matters, according to its own agenda or in response to requests from Parliament or the Government.

Other consultative bodies include the Council of Rectors of Portuguese Universities (CRUP) and the Portuguese Polytechnics Coordinating Council (CCISP).

The second level (operational level) encompasses the major executive agencies that fund the R&I system. The *Fundação para a Ciência e a Tecnologia* [Foundation for Science and Technology - FCT] is the main funding institution for R&I in Portugal; it is a public body accountable to the Ministry for Education and Science, through the Secretary of State for Science (SEC). FCT's role is to advise on the formulation and implementation of policies and secure their execution.

The Agency for Innovation (AdI), a governmental institution accountable both to the ME and MEC (through FCT), has been responsible for the implementation of innovation policy. In 2014, the Government decided to strategically reposition the AdI, reformulate its mission and responsibilities, and change its name to "ANI - National Innovation Agency, SA". The ANI is a platform that instantiates greater alignment of policies for research, innovation and entrepreneurship of technological base in the areas of science and economics. Its main function is to promote the value of knowledge, through improved collaboration and networking among companies and the National Scientific and Technological System (SCTN).

Following the recent development of quality assurance systems in European Higher Education, the Agency for Assessment and Accreditation of Higher Education (A3ES) was created, with the purpose of promoting and ensuring the quality of higher education in Portugal. A3ES is a private foundation in law, independent in its decisions, which must take into account the guidelines prescribed by the State.

Finally, the third level encompasses the research performing organisations. The research units funded by FCT (which are, in general, linked to higher education institutions - HEIs) are the main knowledge producers; they have a multiannual funding programme based on periodical international evaluations and benefit from more flexible rules when applying for projects and managing funds as compared to universities. Core funding is indexed to the number of research staff with a doctoral degree and to the rating that the unit obtained in its evaluations. In addition, some units receive strategic funding to meet specific needs. In 1999, a special statute of *Laboratório Associado* (Associate Laboratory) was granted to some of the units that demonstrated scientific excellence. Since one of the main objectives was to increase the number of science-based positions, the average number of researchers in these units is much higher than in the other units. Many Associate Laboratories resulted from the cooperation between two or more research units that may be hosted by the same or by different universities.

Some R&D units and Associate Laboratories¹ have connections with private, not-for profit research organisations. In addition to FCT-funded units, research-performing organisations include State Laboratories², Foundations and Companies.

¹ Unless otherwise stated, the term R&D unit will be used throughout the report for both types of entities.

² State Laboratories: institutions created mainly between 1930 and 1960 to meet the emerging requirements of industry and to open up research beyond the university system.

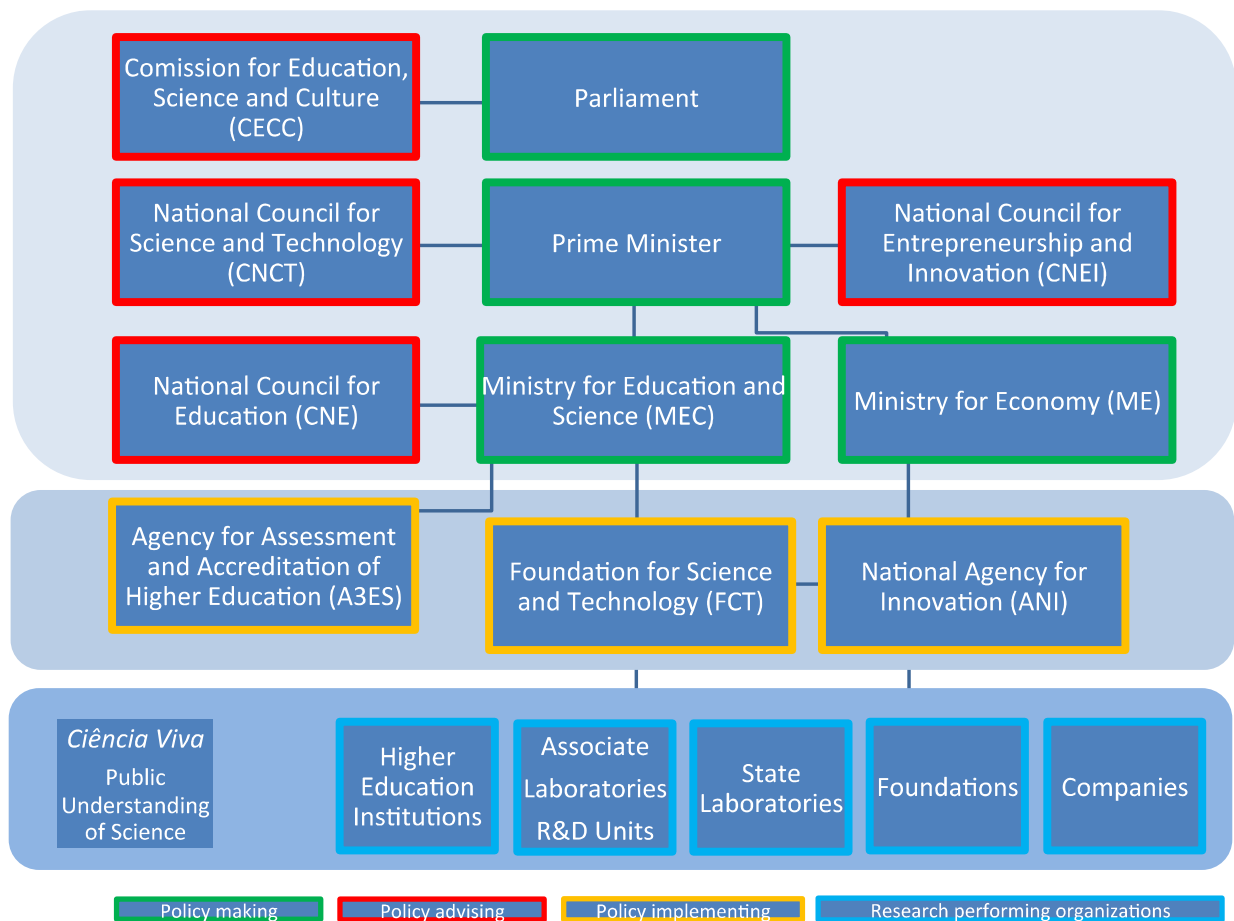


FIG.1. STRUCTURE OF THE PORTUGUESE R&I SYSTEM.

1.2. Main policy frameworks

In the last two decades, the SCTN has experienced a considerable expansion and acquired a diverse profile of competencies and innovative power. For indicators about the evolution of the Portuguese R&I system, see *OECD Science, Technology and Industry Outlook 2014*, OECD 2014, and *Innovation Union Scoreboard 2014*, European Commission 2014.

The Programme of the XIX Constitutional Government and the *Grandes Opções do Plano* (in Portuguese only) identify the reinforcement of the SCTN towards the development of a knowledge-based and high added value economy as a priority. Improving the quality of the R&I system and developing stronger links with the economic sector are identified as the main challenges. This should be achieved by (i) increasing the competitiveness of researchers and research units in every stage of the research life-cycle, from fundamental studies to market innovation; (ii) stimulating the employment of highly qualified human resources by R&D units and companies; (iii) strengthening the international dimension of the system; (iv) directing funds to the scientific domains with existing competencies and with competitive advantages; (v) adjusting policy to the Smart Specialization Strategies defined at national and regional levels. These goals are linked to the programmatic pillars defined by HORIZON 2020, the Framework Programme for EU Research and Innovation (2014-2020), based on increasingly stronger R&I systems.

The Innovation Union and the new European Cohesion Policy flagship initiative, part of the Multiannual Financial Framework (2014-2020), has required Member States to develop strategic planning and programming at multiple levels and to formulate a Research and Innovation Strategy for Smart Specialisation – a prerequisite for using Structural Funds (see details in section 2.10.1). In Portugal, the reflection underpinning the Strategy for Smart Specialisation was launched by FCT and involved a significant number of stakeholders. The process included producing a diagnosis of the national R&I system prepared by FCT, which was published in May 2013. The document, entitled *An Analysis of the Portuguese Research and Innovation System; Challenges, strengths and weaknesses towards 2020* presents a detailed analysis of the Portuguese R&I system, focusing on the observed dynamics in the areas of production and exploitation of knowledge of scientific or technological basis. The report contains a comparison of Portugal with a group of 10 countries and with the EU average, where applicable. Internal strengths and weaknesses as well as the external threats and opportunities were identified.

Part B – Overview of FCT

2. FCT - FUNDAÇÃO PARA A CIÊNCIA E A TECNOLOGIA

2.1. Mission and vision

As the national funding agency for science, FCT's vision is:

- To establish Portugal as a global reference in science, technology and innovation;
- To increase the impact of knowledge generated by scientific research on the economy and society.

FCT's mission today covers a broad range of areas: from funding Portugal's research base, at several levels (from individual researchers, through to large infrastructures), to informing public policies on the Information Society and maintaining the infrastructure for high performance computing and communications that provides services to research institutions across the country.

As set out in the statutory Bylaws (published on 17 April 2013), FCT's mission is:

- Development, funding and evaluation of units, networks, infrastructures, scientific equipment, programmes, research projects and human resources, in all scientific and technological domains;
- Development of international scientific cooperation;
- Coordination of public policies on science and technology;
- Development of the country's scientific computing capacity, by fostering the establishment, use and networking of advanced facilities and services. This latter component is a recent addition, in light of the changes that took place in 2012 and 2013.

With a view to preparing for 2014-2020, and notwithstanding its core mission, in recent years FCT has focused on:

- Developing the agency's funding scheme portfolio;
- Strengthening links between research centres/academia and industry, for greater economic and social impact of research;
- Re-thinking its international relations programmes;
- Establishing FCT as a think-tank for national and international science policy issues

Regarding the **funding portfolio**, the goal is to offer a greater range of funding schemes, better adapted to the current Portuguese research base. After two decades of steady quantitative growth (e.g. in the number of PhD holders and number of publications), emphasis has shifted towards strengthening the **quality** of what has become a mature science base, in which all the major

players are in place. This change in paradigm derives directly from the mandate set out for FCT (described in section 2.2).

To encourage **links between academia or research centres and industry**, PhD programmes in an Industry Setting were established as one of the types of FCT PhD programmes, launched in 2012. To date, seven such PhD programmes have been approved.

Furthermore, the second phase of the US-Portugal partnerships (2012-2017) is much more focused on entrepreneurship: MIT-Portugal, Carnegie Mellon-Portugal and UTAustin-Portugal are following project-based approaches, bringing universities and industry together to solve problems, as described in section 2.6.

The Portuguese agency for innovation – former AdI – was re-structured into the new *Agência Nacional para a Inovação* (ANI). As a 50% stakeholder in ANI, FCT will play a strong role in bridging research and innovation.

In another effort to foster academia-entrepreneurship links, FCT plans to launch seed project grants in 2015, for FCT-grant holders whose results hold potential commercial applications. Similar to the European Research Council Proof-of-Concept grants, they will allow these researchers to enter the first stage of taking their ideas to market.

Concerning **international cooperation**, FCT's goal is to work to define priority partners – from both scientifically mature and emerging nations – that may better align with national priorities, including those deriving from the National Strategy for Smart Specialisation.

Besides its important role as the major funder of science and research in Portugal, FCT also has a strong role in **informing national and European public policies** on science and on the Information Society. FCT's commitment to this goal is manifest in the important role the agency played in developing the National Strategy for Smart Specialisation (see section 2.10.1) for details), which included carrying out the first ever analysis of the Portuguese R&I system.

2.2. Mandate and Strategy

FCT is a public institute, under indirect administration of the State, endowed with administrative and financial autonomy, and with its own assets. FCT carries out duties assigned to it by the Ministry for Education and Science (2011-present)³, under the supervision of the Minister in office.

FCT's mandate derives directly from the programme for science of the Government holding office and is the main mechanism whereby public policies on science, research and technology are executed. Currently, FCT's mandate derives from the Programme of the XIX Constitutional Government, and includes:

- Ensuring training and recruitment of researchers, via instruments such as PhD Programmes and the FCT Investigator programme;

³ Previous ministries: Ministry for Science and Technology (1995-2001); Ministry for Science, Technology and Higher Education (2001-2011).

- Maintaining effective funding for science through regular calls for proposals, across all funding schemes, and improving the execution of allocated budgets;
- Ensuring rigorous and transparent review processes, based on peer review by national and international experts;
- Adjusting funding for science to the transitions between European Multiannual Financing Frameworks;
- Honouring previous multiannual commitments;
- Ensuring Portugal is an active partner in major international scientific organisations, both research performing (e.g. CERN, ESA, ESO, EMBO, ESRF) and policy organisations (Science Europe, OECD, ERAC);
- Preparing the national research and innovation system for the EU Framework Programmes (currently Horizon 2020);
- Bringing science and business together, by encouraging business sector investment in R&I and involving companies in advanced training and recruitment of researchers;
- Being a forum for dialogue with the scientific community and other stakeholders, so as to inform national science policy;
- Coordinating Information Society public policies;
- Supporting access by the education and scientific communities to advanced computing resources and online scientific publications.

FCT's mandate may thus be represented as shown in Figure 2, illustrating different areas of activity (funding schemes and programmes) and crosscutting actions.

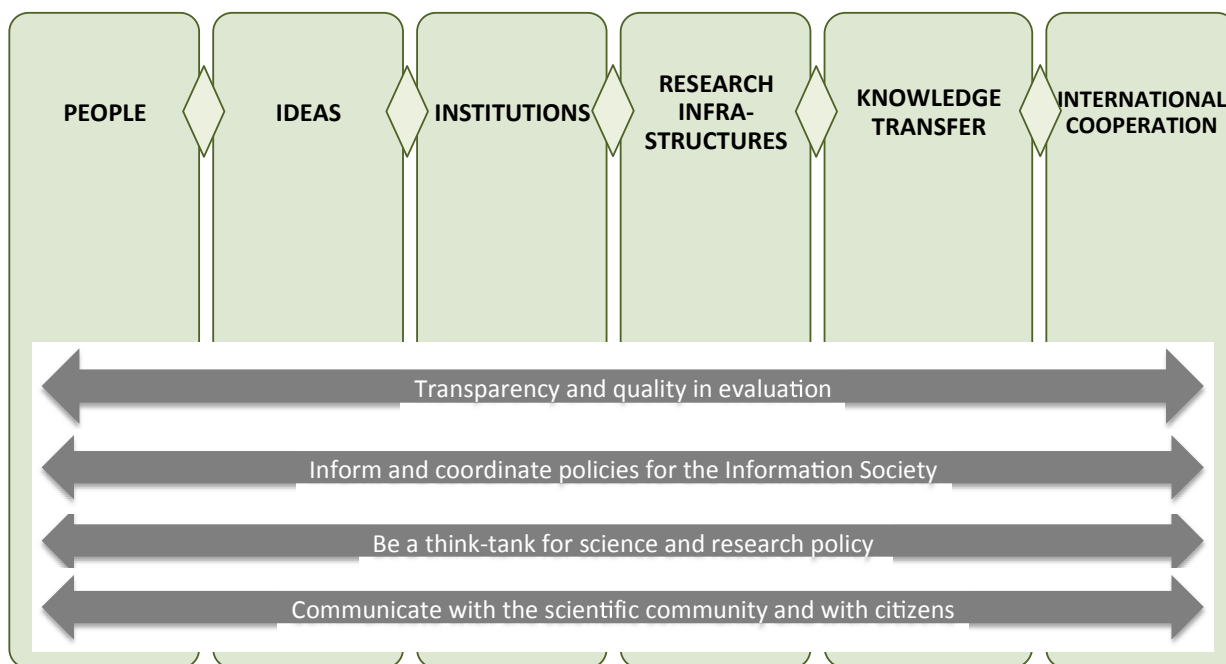


FIG. 2. STRANDS OF ACTIVITY OF FCT: PILLARS REPRESENT AREAS OF ACTIVITY;
ARROWS REPRESENT CROSSCUTTING ACTIONS.

2.3. Budget and funding

As stated above, the Portuguese scientific system has undergone considerable expansion in the last two decades. Figure 3 depicts the total Portuguese public investment in science since 2001, showing that between 2003 and 2010 public expenditure in R&I more than doubled. R&D intensity (GERD as percentage of Gross Domestic Product) reached a maximum of 1.64% in 2009, but still below the 3% target set by the Lisbon Strategy.

This investment has been accompanied by 3.3-fold increase in the number of researchers since 2000, reaching 11.0 full-time equivalents (FTE) per thousand workforce in 2012, above the EU and OECD averages (*OECD Factbook 2014*); the annual number of doctorate degrees awarded by Portuguese universities almost tripled between 2000 (694) and 2012 (2007) (*Doutoramentos realizados ou reconhecidos por universidades portuguesas: 1970 a 2012*, Directorate-General of Statistics of Education and Science, DGEEC, 2012) and the number of publications (indexed in the Web of Science) per million inhabitants rose 3.6-fold from 315 (in 2000) to 1131 (in 2012) (*Produção científica em Portugal, 1990-2012: volume de publicações indexadas*, Directorate-General of Statistics of Education and Science, DGEEC, 2014).

FCT's support for R&I amounts to over €400 million per year (on average), which accounts for approximately 30% of Portugal's annual public funding for science (Fig. 3). The remaining 70% comprises (i) funds from the state budget to pay salaries of HEI and State Laboratory staff and other current expenses; (ii) funds from HEI's own revenues; (iii) European structural funds managed by different ministries; (iv) foreign public funds (including funding obtained competitively within the EU Framework Programmes). Since approximately 90% of the FCT budget is allocated following competitive calls, it follows that a significant percentage of the

country's public funding for R&I is obtained competitively by the research performing organisations.

In 2013, management costs of FCT represented 2.9% of total expenses. The budget derives from the national state budget (approximately two thirds) and from European structural funds. It is agreed annually with the MEC, planned in August and ratified in late November by Parliament. These annual cycles are difficult to reconcile with FCT's multiannual commitments. Another source of constraint is the use of structural funds, especially in transition periods between Multiannual Financing Frameworks (MFFs), such as in 2013/2014.

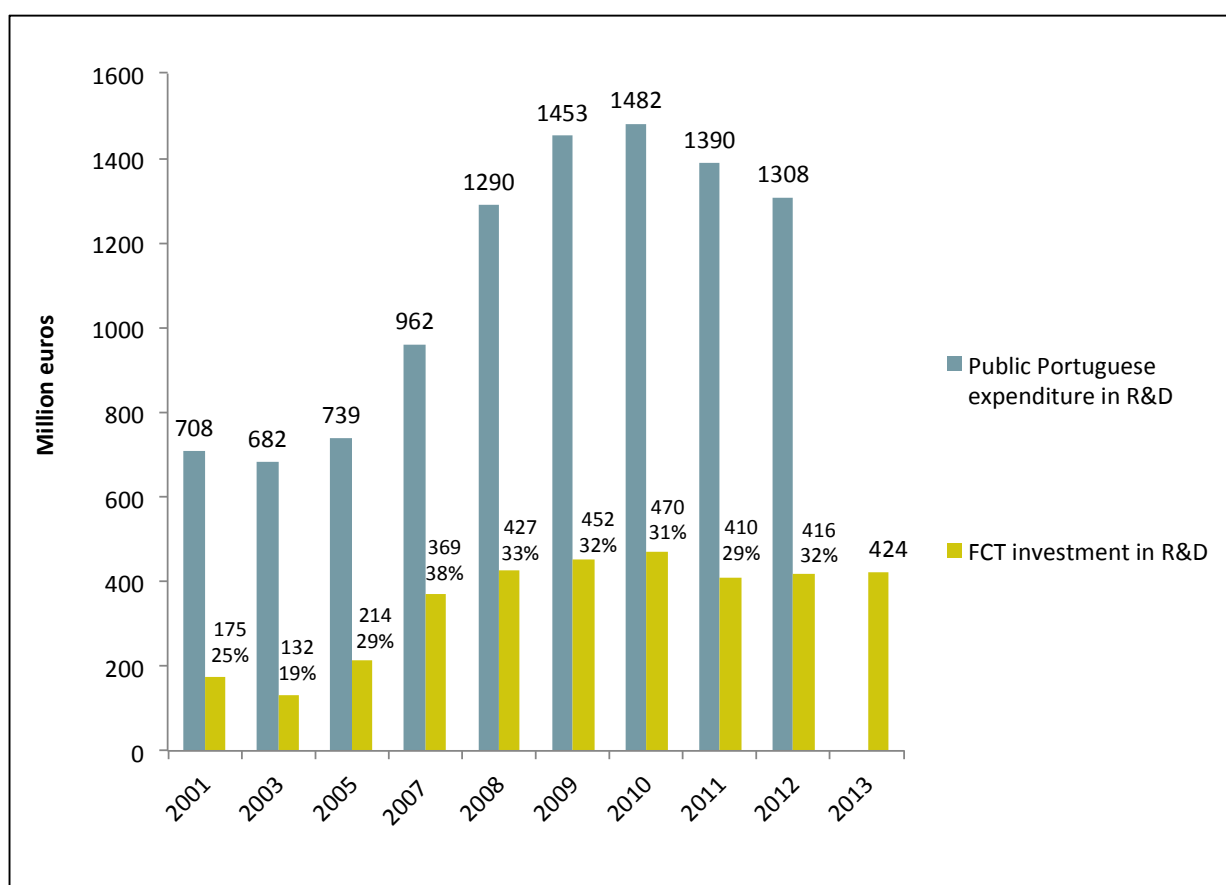


FIG.3. FCT INVESTMENT IN M€ AND AS A % OF TOTAL PUBLIC PORTUGUESE EXPENDITURE IN R&I⁴.

The contextual conditions derived from the financial crisis and the external assistance programme, which Portugal was bound to during the last few years, imposed strict budgetary restrictions. During this period, FCT tried to maintain the level of distributed funds and honour multiannual commitments that had been taken up by the previous Board, through a more efficient administration of EU funds. This effort was successful, as is illustrated in Figure 4: in 2012 and 2013, FCT executed 94% and 91% of its initial budget, respectively.

^{4 4} Public expenditure in R&D - source *Inquérito ao Potencial Científico e Tecnológico Nacional* (IPCTN), a survey carried out annually since 2007 (it had been biennial from 1982-2006), which is the official source of information on human and financial resources for R&D in Portugal. IPCTN 2012 results are provisional; IPCTN 2013 results are not available. Time series breaks occurred in 2007 and 2008.

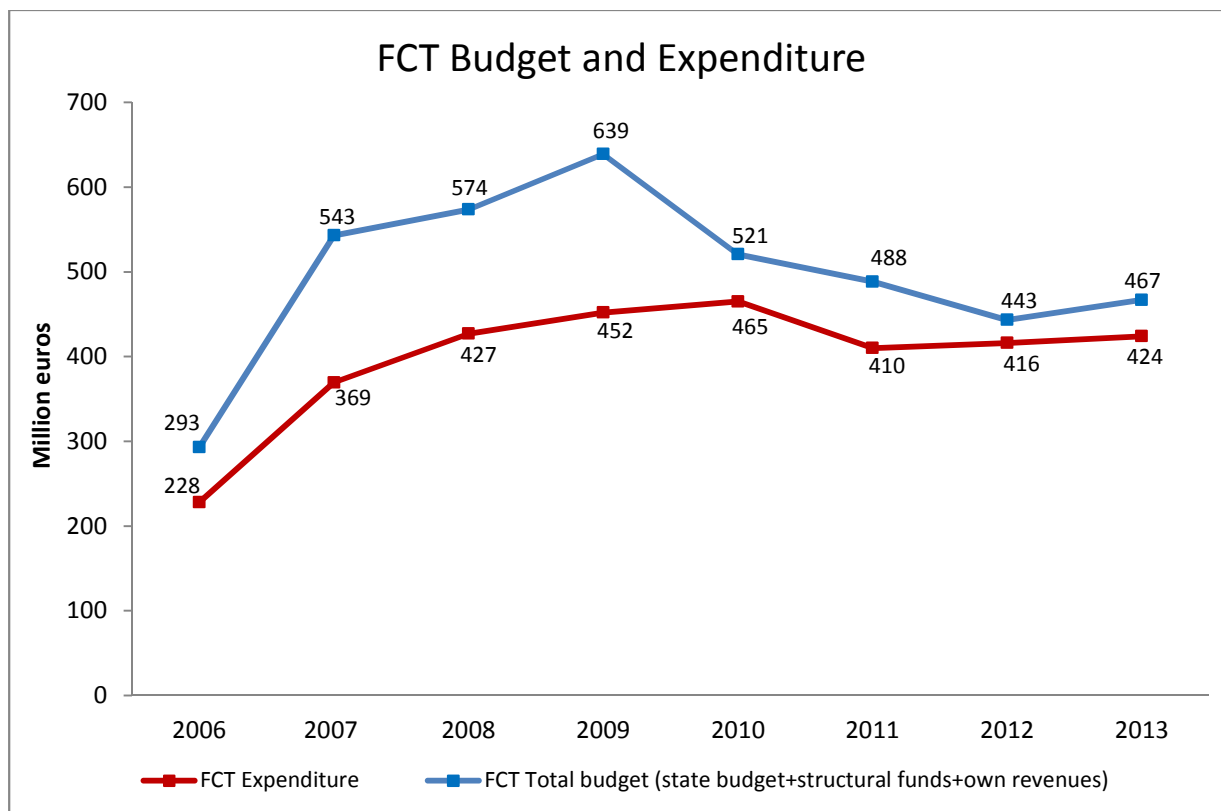


FIG. 4. FCT APPROVED BUDGET AND EXPENDITURE (M€) FOR 2006-2013.

FCT’s expenditure dropped by €59 million from 2010 (€469 million) to 2011 (€410 million). Two key areas were particularly affected by this reduction: project grants and R&D units, mainly by delaying reimbursements. Due to a more efficient use of EU structural funds, described above, FCT expenditure has steadily increased since 2012 - by €6 million (2011 to 2012) and then €8 million (2012 to 2013) despite the decreasing state budget components. The priority since 2012 has been to recover the reduction in project grant and R&D units funding and contribute to relieving the serious cash flow problems felt by research groups. This has been partially achieved: investment in project grants (+60%) and units (+40%) has increased since 2011, leading to a more balanced funding across the different strands of activity.

FCT’s 2014 budget was circa €436 million for direct investment in science and in 2015 it is expected to be €468.1 million.

Table 1. Breakdown of FCT investment budget (M€) in 2013, 2014 and 2015#.

	2013	2014	2015
Total investment budget	467.2	436.0	468.1
State budget	269.1 (57.6%)	287.2 (65.9%)	311.1 (66.5%)
Own revenues	21.3 (4.6%)	6.6 (1.5%)	8.3 (1.8%)
EU structural funds	176.8 (37.8%)	142.1 (32.6%)	148.7 (31.8%)

Predicted

The main activities of FCT may be grouped into the following strands: Graduate Education (studentships, fellowships), Career Development (contracts), R&D Project grants, R&D units, and International Cooperation (bilateral/multilateral cooperation, memberships of international organisations and international partnerships). Other activities include the Science, Technology and Society Network, Information Society, Online Knowledge Library (B-on), Support for Scientific Community Fund (FACC) and Public Understanding of Science. The investment in each strand from 2009 to 2013 is shown in Figure 5. The funding schemes associated with each strand will be described in detail throughout this report.

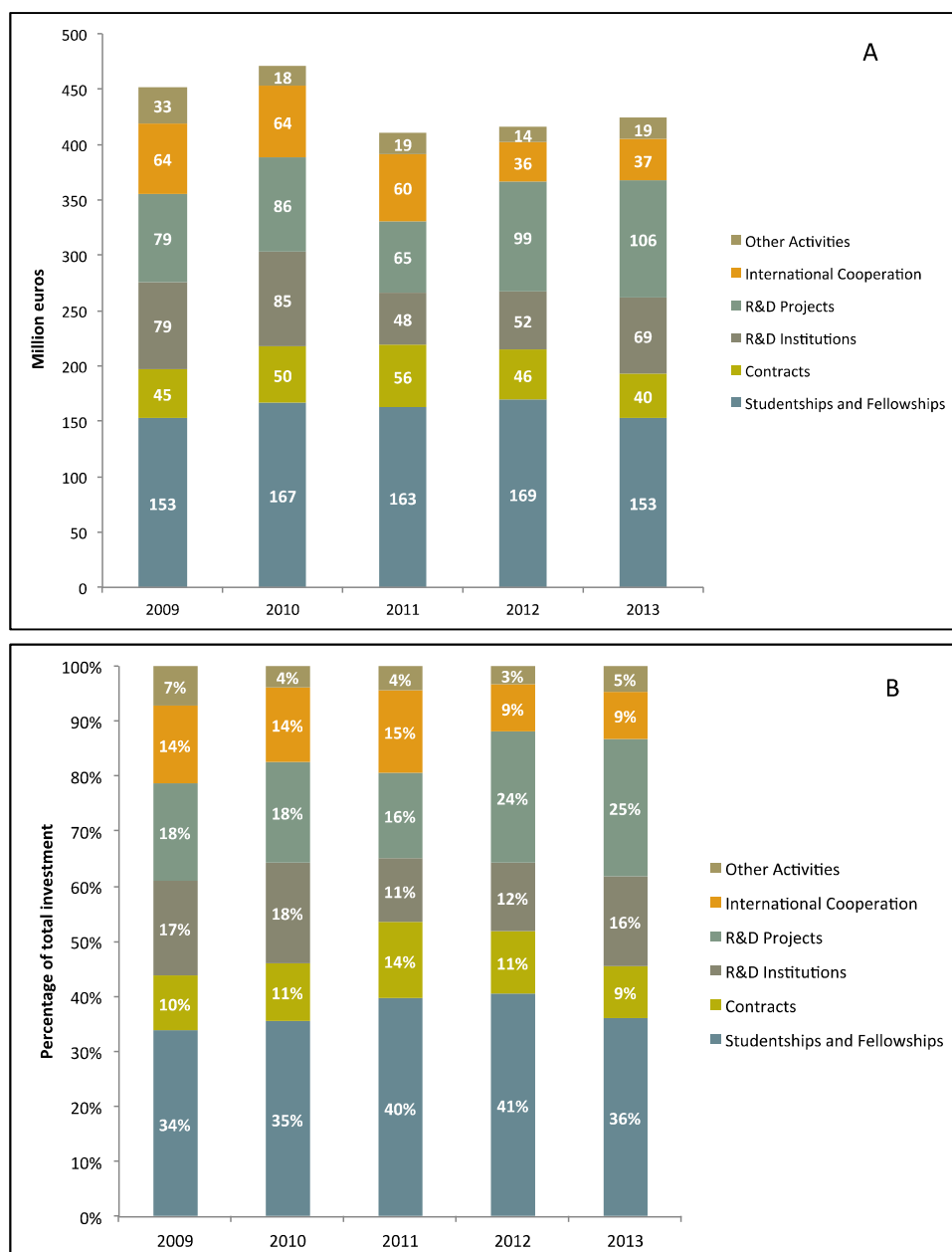


FIG. 5. FCT INVESTMENT BUDGET IN 2009-2013 BY STRAND OF ACTIVITY.

A - IN M€; B - IN PERCENTAGE OF TOTAL INVESTMENT.

Figure 6 shows how the funds for the three main strands of activity⁵ have been distributed per scientific field⁶. There were no significant fluctuations; nevertheless, between 2010 and 2013 there was a slight increase in the funding for Engineering and Technology and a small reduction in funding for the Social Sciences and Humanities.

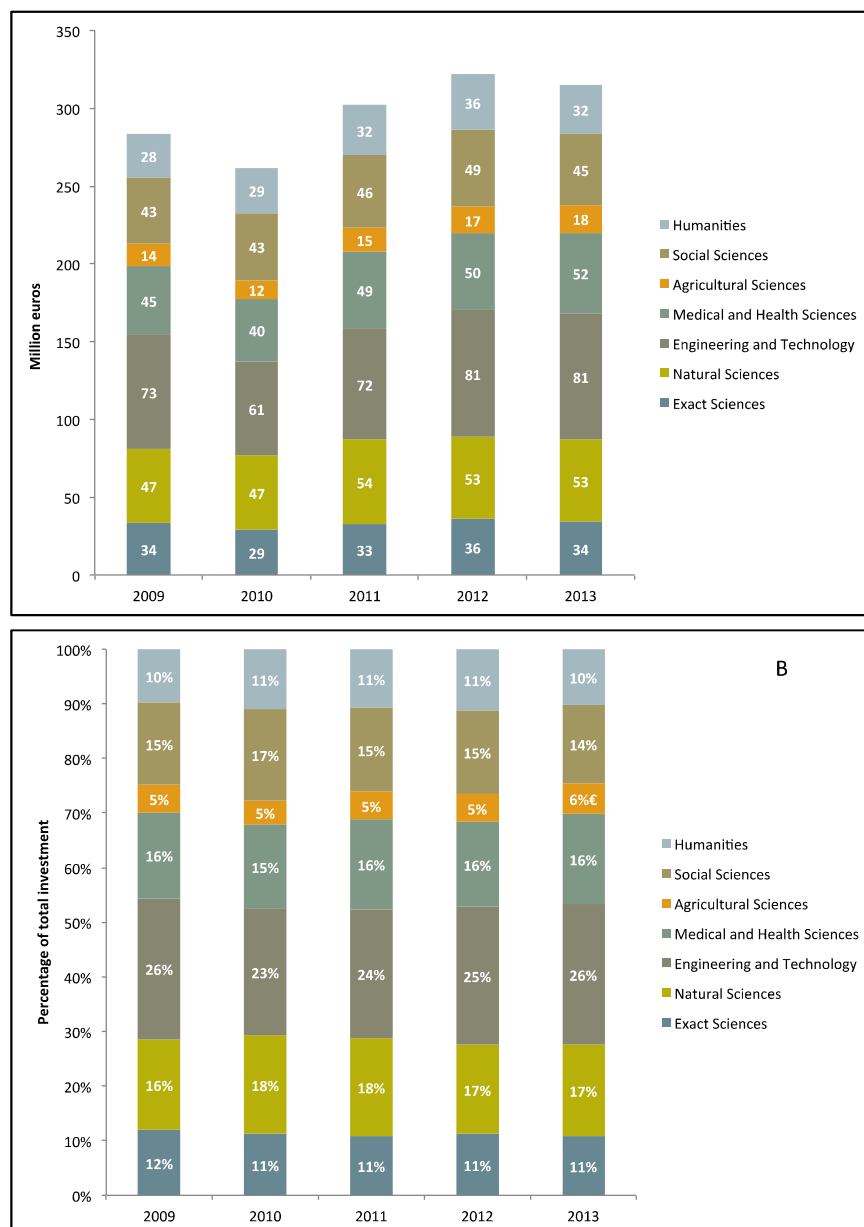


FIG. 6. FCT INVESTMENT IN 2009-2013 PER SCIENTIFIC FIELD.
A - IN M€; B - IN PERCENTAGE OF TOTAL INVESTMENT.

⁵ Includes only fellowships and studentships, R&D Project grants and R&D units.

⁶ Revised Field of Science and Technology (FOS) classification, OECD, February 2007.

2.4. Organisation and governance

The FCT organogram is shown in Figure 7. The FCT bodies, as defined in its Bylaws, include the Board of Directors, made up of the President, the Vice-President and two members; the Statutory Auditor; the Advisory Council for National Scientific Computation, the Scientific Councils, Departments and Divisions.

The Board of Directors:

- Ensures FCT representation on committees, working groups or activities of international organisations, subject to the coordination of the Secretary-General of the MEC and the mandate of the Ministry for Foreign Affairs;
- Deliberates on the funding for each scheme, in alignment with the plans approved by the Government member responsible for the area of science, or submits for his/her approval if not included in the Plan of Activities;
- Decides on the support to be given to the creation and modernization of research infrastructures, in accordance with the preceding paragraph;
- Decides on the granting of funds to scientific and technological events, scientific publications and awards;
- Manages national and international, particularly European, funds attributed to FCT;
- Establishes cooperation agreements with academic, scientific and industry bodies.

The President ensures FCT relations with national and European entities, as well as with international units and counterpart agencies and acts as the sole FCT spokesman. The President may delegate or sub-delegate the exercise of his responsibilities in any of the remaining members of the Board of Directors and senior FCT staff. The Vice-President replaces the President in his absence or disability.

FCT structure includes the six units (Departments) defined in the Bylaws and, since 2013, also the former Foundation for National Scientific Computation:

- Department of R&D Programmes and Projects (DPP)
- Department of R&D Units and Research Infrastructures (DSRICT)
- Department of Graduate Education and Training (DFRH)
- Department of International Relations (DRI)
- Department of Information Society (DSI)
- Department of Finance and Management (DGA)
- National Scientific Computation (FCCN)

There are two flexible units (Divisions):

- Division of Management of Human Resources (DGA-DGRH)
- Division of Technical Support and Document Management (DATGD)

The internal structure also consists of teams (Offices) specialized in particular areas:

- Evaluation Office
- Communications Office
- Space Office
- Studies and Strategy Office
- Polar Office
- GPPQ – Framework Promotion Office
- Technology Office

In August 2014, aiming for faster, more efficient and rational management, the current Board of Directors decided on the following allocation of sectors:

The following units/issues are directly dependent on the current President (Miguel Seabra):

- Department of International Relations;
- Scientific Councils;
- Studies and Strategy Office;
- GPPQ – Framework Promotion Office;
- Division of Technical Support and Document Management (excluding the Science and Technology Archive);
- Harvard Medical School – Portugal partnership.

The following units are directly dependent on the Vice-President (Pedro Carneiro):

- Department of Finance and Management;
- Department of Information Society;
- Technology Office (except the Harvard Medical School – Portugal partnership).

The following units are directly dependent on the member of the board, Paulo Pereira:

- Department of Graduate Education and Training;
- Department of R&D Units and Research Infrastructures;
- Department of R&D Programmes and Projects;

- Evaluation Office.

The following units/issues are directly dependent on the member of the board, João Nuno Ferreira:

- National Scientific Computation;
- Information Systems;
- Science and Technology Archive.

The Statutory Auditor is responsible for the financial control of the Board and its legitimacy.

The Advisory Council for Scientific Computation is a consultative body that supports and participates in defining general FCT policies and lines of action concerning this matter.

The four Scientific Councils (Exact Sciences and Engineering, Life and Health Sciences, Natural and Environmental Sciences, Social Sciences and the Humanities) are advisory bodies that provide strategic advice and recommendations on the planning and implementation of programmes to support R&I, resulting from the perspectives of different stakeholders, including academia, business, third sector organisations and Government. Each Scientific Council is composed of up to 15 members and meets on a regular basis (usually every two months). The members of the Scientific Councils have a detailed knowledge of the SCTN and a broad international perspective.

The Governance Model ensures that the strategic objectives are met through an efficient use of financial, human and patrimonial resources. The Board of Directors can authorize expenses (proposed by Departments, Divisions or Offices) up to €1.5 million; higher amounts must be authorized by the Government member responsible for the area of Science, the Secretary of State of Science (SEC). Other issues that require the approval of SEC include the designation of national delegates or the composition of evaluation panels (if required by the call regulations).

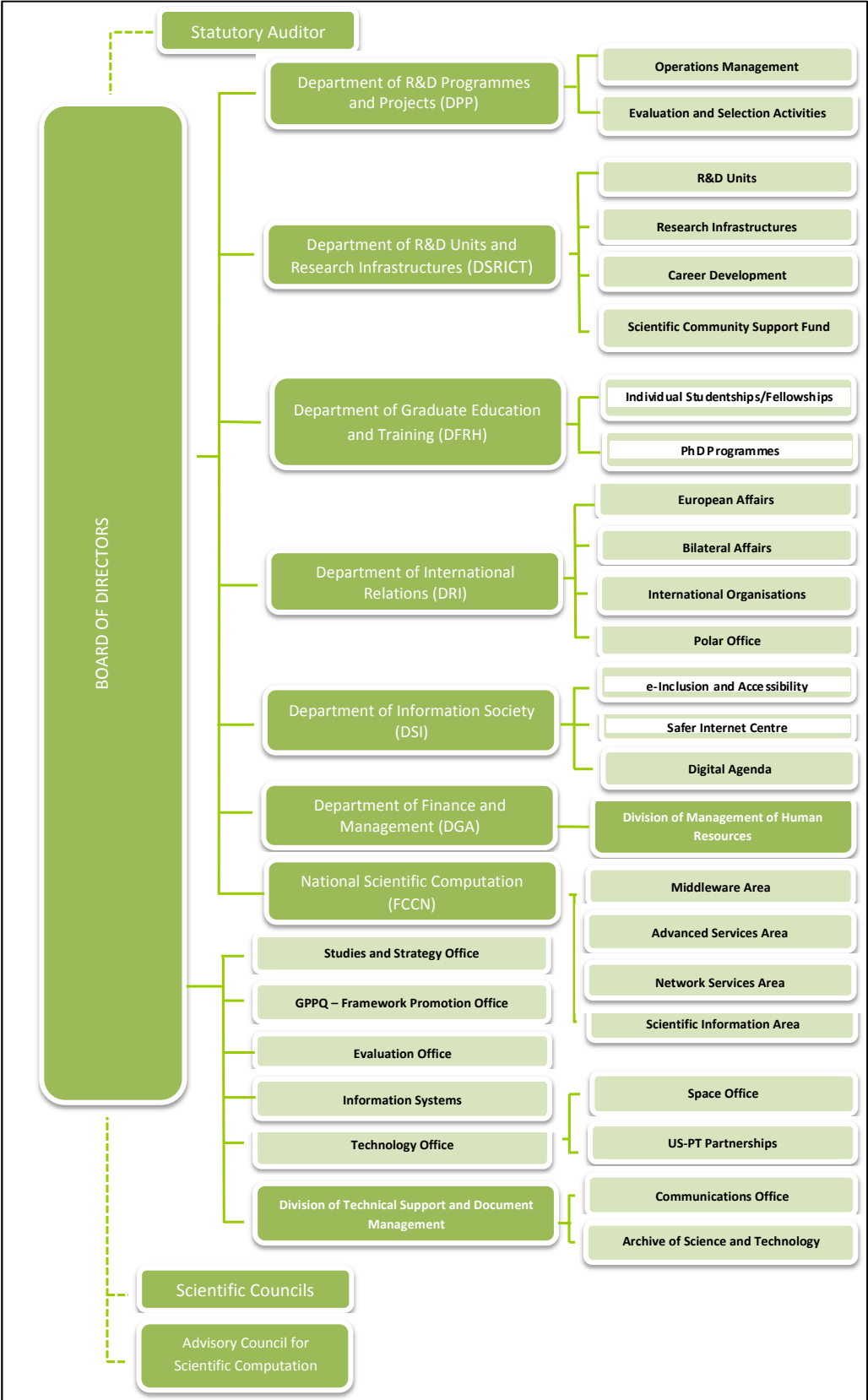


FIG. 7. FCT ORGANOGAM.

2.5. Human resources

On 31 December 2013, there were 256 employees at FCT (Fig. 8). The rise observed from 2012 to 2013 was caused by the restructuring process that resulted in the integration of 61 employees of the former Foundation for National Scientific Computation (FCCN).

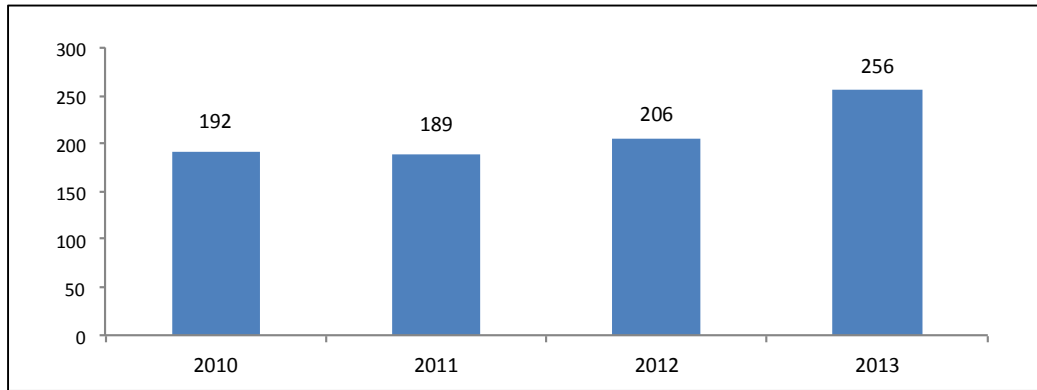


FIG. 8. NUMBER OF FCT EMPLOYEES 2010-2013.

The distribution per gender and age group of FCT employees in 2013 is shown in Figure 9.

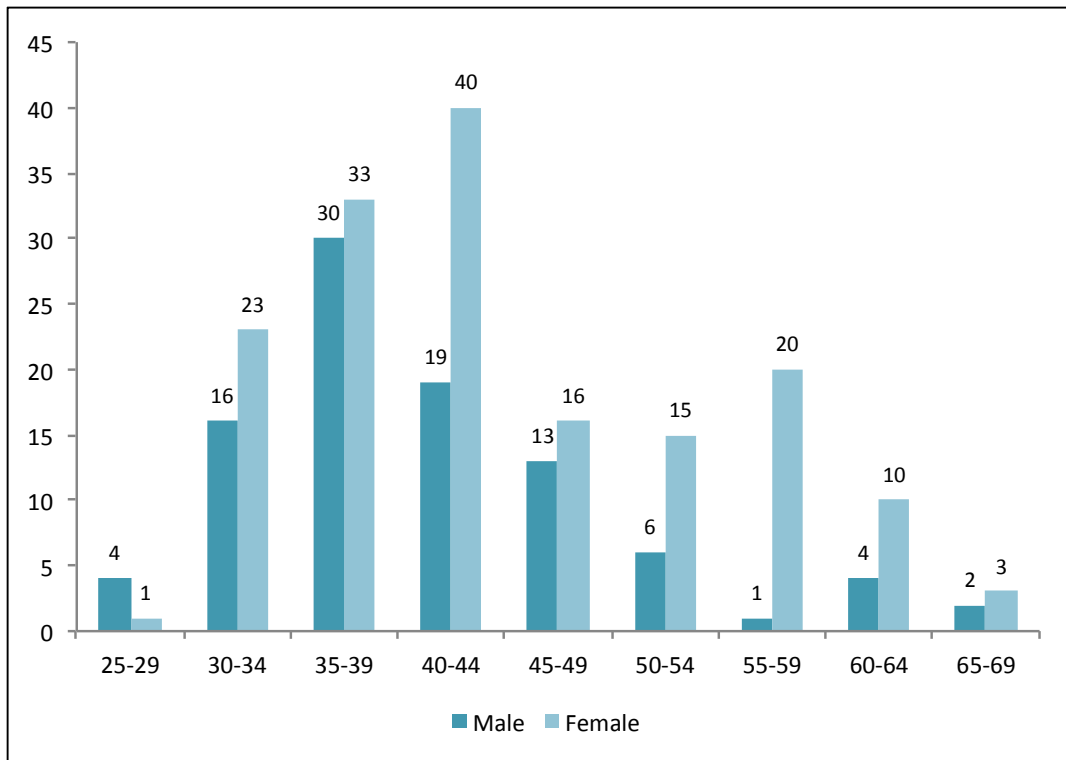


FIG.9. DISTRIBUTION OF EMPLOYEES PER GENDER AND AGE GROUP (2013).

2.6. Scientific quality and impact

2.6.1. Funding schemes

As described above, one of the objectives since 2012 has been to expand the FCT funding portfolio, in order to:

- a) Tailor funding schemes to the current status of Portugal's research base, which may be described as an established, mature community, with many of the key players in place, i.e. talented researchers / highly qualified human resources, R&D units, interface centres (between academia and industry) and industry;
- b) Boost quality and international competitiveness (as measured by scientific, economic and social impact), thus moving from a focus on fostering quantity (as measured by number of PhD holders, number of publications, number of research units);
- c) Balance funding across the different strands of FCT activity, in order to ensure the harmonious growth of the Portuguese research base: invest in talented researchers but also in breakthrough research projects, in well-equipped and forward-looking research units, and in strong international relations, while boosting knowledge transfer (to the economy and society).

Overall, funding schemes are jointly defined by the FCT Board and the Minister/Secretary of State in office, to fulfil the Government's science policy goals and strategy. FCT's role is to put in place the procedures for each funding scheme. This includes drawing up regulations for applications and funding, launching competitive calls, carrying out peer-review evaluations, securing scientific and financial follow-up of approved applications and communicating the results of the funding schemes to the scientific community, decision-makers, and citizens.

The funding schemes currently in place within each area of activity (see Fig. 2) are briefly described below.

2.6.1.1. People

Graduate Education (under the Department of Graduate Education and Training) includes:

- **PhD Studentships and PhD Studentships in Industry**

Offered through annual calls for applications, in all fields of science, these are personal awards for graduates of all nationalities wishing to undertake research towards a PhD in an R&I institution and/or in industry, either in Portugal or abroad (foreign students may only apply for a studentship in Portugal).

- **FCT PhD Programmes**

Biennial competitive calls for research-based PhD programmes, proposed by universities, R&D units and/or industry. Launched in 2012.

Three types of PhD Programmes are funded: National; International; In industry setting. The latter aims to contribute to a greater involvement of industry in training and the take up of highly qualified researchers.

Training (under the Department of Graduate Education and Training) includes:

- **Post-doctoral Fellowships** are offered through annual FCT calls for applications, across all fields of science, as well as within FCT-funded project grants. Fellowships awarded in the annual calls provide 3-years' funding, either in Portugal or partially abroad, and are renewable for a second 3-year term. Researchers of all nationalities may apply (foreign applicants may only apply for fellowships at Portuguese research units).
- **Other fellowships for graduate training include:**
 - **Research Fellowships** – awarded within research project grants or R&D units.
 - **Research Technician Fellowships.**
 - **Traineeships at Scientific Organisations** such as CERN, the European Space Agency (ESA) and the European Southern Observatory (ESO).

Career Development (until 2014, under the Department of Graduate Education and Training; since 2014, under the Department of R&D Units and Research Infrastructures)

FCT's career development programmes aim to promote the uptake of highly qualified and internationally competitive scientists into research and academic institutions in Portugal. They are open to both Portuguese and foreign scientists.

- **The FCT Investigator Programme**, launched in 2012, provides 5-year funding for the most talented and promising researchers, across all scientific areas and nationalities. The programme supports outstanding post-doctoral researchers who wish to make the transition to independent researcher, as well as already independent researchers, with a proven track record, who wish to establish leadership in their research fields. This programme is expected to secure 1 000 positions between 2012 and 2016 (one annual call).
- **The Ciência Programme**, aimed at recruiting 1 000 researchers into the SCTN, via 5-year contracts between researchers and units. In two calls, in 2006/7 and 2008/9, research units submitted proposals outlining the number of positions required. A total of 1 242 PhD holders were recruited.
- **The Welcome II Programme** for European researchers with at least 3 years' experience outside Portugal, wishing to carry out research in Portuguese research units. A total of 38 contracts were established, with researchers from Portugal, Germany, France, United Kingdom, Serbia, Sweden, Hungary and Italy.

2.6.1.2. Ideas

(Under the Department of R&D Programmes and Projects)

FCT launches annual calls for project grants in all research fields, as well as focused, subject-specific calls. A complete list of calls for project grants is available on the FCT website, at

<http://www.fct.pt/apoios/projectos/concursos/index.phtml.en>.

Traditionally, the annual call in all research fields funds a single type of project grants, of €200 000 for up to 3 years.

In 2012, the annual call for project grants encompassed four types of grants:

- **Exploratory Project Grants** - for research proposals that explored an original idea and showed potential to open up a new field of research or strengthen an existing area. These were 1-year grants, of up to €50 000.
- **Project Grants** - support the development of original and cutting-edge ideas that have shown strong potential to significantly advance a research field. Two-year grants of up to €200 000 were awarded. These are the typical project grants awarded in the annual calls.
- **Excellence Grants** - supported proposals that built on a large, well-established body of research by the applicant(s). Proposals needed to be organised into a 5-year plan, made up of distinct research lines. Grants were up to €500 000.
- **Resources Grants** - these grants supported people, equipment or facilities to develop capacity, and bolster competitiveness, namely within international programmes. Five-year research plans were funded, with up to €500 000. It is envisaged that these grants will be suspended, with this type of support being covered by funding for research infrastructures (see section 2.6.1.4).

Due to the transition between EU Multiannual Financing Frameworks (MFF) (the current MFF covers the 2014–2020 period, making 2013 a transition year) it was not possible to launch a large call for project grants in 2013. Thus, a more limited scheme for Exploratory Project grants was put in place in 2013, and the large €200 000 project grant scheme was resumed in 2014 (with a single type of grant). These measures avoided significant breaks in funding for research projects.

Domain-specific project grants are mostly awarded within the framework of protocols with other funding agencies and/or international organisations. Examples include project grants in life sciences and social sciences and humanities (in cooperation with the French *Agence Nationale de la Recherche* – ANR), in high energy physics (in collaboration with the Organisation for Nuclear Research - CERN), and in the history of science.

Project grants are also awarded within the International Partnerships with US universities, namely the Carnegie Mellon-Portugal Programme, the MIT-Portugal Programme, the UTAustin-Portugal Programme, and the Harvard Medical School-Portugal Programme. These have been included in the “International Cooperation” section below.

2.6.1.3. Units

(under the Department of R&D Units and Research Infrastructures)

FCT currently funds 292 R&D Units and 26 Associate Laboratories. Research in the R&D Units and Associate Laboratories funded by FCT encompasses all scientific fields: life and health sciences; social sciences and humanities; engineering and exact sciences and natural and environmental sciences.

Associate Laboratories are either public or non-profit private units that accumulate research activities with contributions to the definition of programmes and policy instruments, thus collaborating in the pursuit of specific objectives within the Government's science and technology policy. Launched in 1999, the title of Associate Laboratory was granted by the Ministry in charge of science for periods of 10 years, upon request. To become an Associate laboratory, a unit needed to demonstrate clear capacity to cooperate competently and efficiently towards achieving the Government's science and technology policy objectives.

R&D units are regularly evaluated by FCT (approximately every 5 years). Evaluation is carried out by independent panels of internationally recognised experts. Funding is granted based on the grade awarded to each research unit, its size (number of PhD holders) and, in the latest review, laboratory intensity and requested budget. The current landscape of FCT-funded research Units and Associate Laboratories was established after the 2007 and 2008 reviews of Units and of Associate Laboratories, respectively. The overall outcome was: 293 Units selected for funding for the 2008-2014 period and 26 Associate Laboratories with funding for 2011-2014.

A new review was launched in 2013, running through to the end of 2014; the final results are expected in early 2015, after the appeals process. The results of this review, at the time of writing this report, are, in summary: 257 research units were selected for funding for the 2015-2020 period, of which 11 have been graded Exceptional and 52 Excellent. A detailed account of the results of the 2007/2008 and 2013-14 reviews is included in section 4.5.4.

The 2013/2014 review of R&D units is the first in which all units were evaluated on an equal level, irrespective of their legal status (i.e. whether an R&D Unit or an Associate Laboratory), and with the same basis for funding (due to their legal status, Associate Laboratories were previously awarded higher funding than R&D Units).

In this latest review, units could keep the previous organisation or reorganise to better achieve their strategic goals. This reorganisation included the creation of new units, as well as the merger or closure of existing units.

Section 4.5.3. includes a detailed comparison of the 2007/2008 and 2013/2014 reviews of research units. Here we highlight the major differences:

- While previous reviews of R&D units were carried out by FCT, for the 2013/2014 review, FCT collaborated with the European Science Foundation (ESF) in establishing the underlying procedures, namely the selection of panel members and of external reviewers;
- In 2013/2014 a two-stage review was carried out, with Phase 1 as a qualifying stage for grades of Very Good and higher, and the corresponding major funding component;

- For the first time in an FCT call/review, a rebuttal phase was included in the 2013/2014 review, following Phase 1;
- Panel members were known after Phase 1, in 2013/2014, in line with to international best practices of peer review. In 2007/2008, panel members were known before the panel meetings.
- A 6-point scale was adopted in 2013/2014 – from Poor to Exceptional – rather than the 5-point scale adopted in 2007/2008 – Poor to Excellent.

Funding of research units encompasses:

- **Institutional funding** – established in 1994, to cover core funding needs and funding of strategic programmes proposed by the research units:
 - From 1994 to 2011, FCT applied the Multiannual Funding model (*Financiamento Plurianual*) in which funding was awarded per PhD holder in each R&D unit, indexed to the grade awarded in the review process. Associated Labs had individually negotiated extra packages of "programmatic funding";
 - From 2011 to 2014, FCT applied the "Strategic Projects" model: units that were graded as "Good" or higher in the 2007/2008 review exercise submitted strategic projects, of public interest and aligned with their activity plans. However funding amounts mirrored the past without significant changes. During this period, the 26 Associate Laboratories secured 60% of total institutional funding; the remaining 292 Units secured 40% of funding.
 - As of 2015, and pending the outcome of the ongoing review, funding for R&D Units shall consist of two parts:
 - **Core funding**, for units graded "Good" or higher, indexed to the size of the unit, an adjustment factor corresponding to its laboratory intensity and the grade obtained in the evaluation process;
 - **Strategic funding**, to be allocated to units graded "Exceptional", "Excellent" or "Very Good", based on the proposed strategic programme and the evaluation by the review panels.

The results (after evaluation) of the 2013/2014 review suggest a wider distribution of funding, since 66% of total funding is secured by 63 units (those with the highest grades).

- **"Incentivo" top-up funding**, aimed at stimulating the international competitiveness of Portuguese research units, either as a reward for those that attract international funding (in 2013) or to support specific strands of research activities, such as recruitment of researchers (in 2014) or strategic restructuring in preparation for the mid-term R&D units review process (in 2015).

2.6.1.4. Research Infrastructures

(Under the Department of R&D Units and Research Infrastructures)

The first Portuguese Roadmap of Research Infrastructures (RI) was set up in 2014, several years after other EU member states submitted theirs. It includes 40 strategically relevant research infrastructures, selected through international peer-review that will be funded until 2020. Twenty-three RIs are aligned with ESFRI (European Strategy Forum for Research Infrastructures).

Stage 1 of this process entailed a national call for proposals (in 2013) aimed at selecting research infrastructures for the National Roadmap and establishing a database of research infrastructures in Portugal. Stage 2 comprises setting up funding (2015-2020) of the research infrastructures included in the National Roadmap, and stage 3 will entail a periodic review of the National Roadmap, with the first review envisaged to take place in 2016.

2.6.1.5. Knowledge transfer

(Under the Technology Office)

FCT is a partner in major technology transfer programmes:

- PTTI – Portuguese Technology Transfer Initiative, funded by the European Space Agency, aimed at transferring knowledge and technology developed for the space sector into non-space sectors. A total of 14 projects, six demonstrators and eight viability studies have been funded to date;
- UTEN – University Technology Enterprise Network;
- Biz.PT – an Austin-based business incubator;
- BGI – Business Accelerator Programme with MIT.

The second phase of the International Partnerships with US universities (2012-2017) aims to promote entrepreneurship-oriented research, focused on innovation and knowledge transfer. This marked a change from the first phase (2006-2011), dedicated to education and training (described in section 4.7).

The funding schemes set up within each partnership reflect this move from an education-based approach to a project-based approach, to work on real economy problems:

- Carnegie Mellon – Portugal Programme
 - Early Bird Projects
 - Entrepreneurial Research Initiatives
- MIT-Portugal Programme
 - Test bed Proposals
- UTAustin - Portugal Programme

- Global Start-up Programme within the University Technology Enterprise Network (UTEN)

2.6.1.6. International Cooperation

(Under the Department of International Relations)

FCT runs and/or contributes to several international funding schemes, to ensure access of researchers in Portugal to European and international networks.

Within the EU Framework Programme Horizon 2020, FCT runs a funding scheme for business plans for the implementation of co-location centres for the Knowledge and Innovation Community (KIC) of the European Institute of Technology (EIT). The aim is to support Portuguese research teams in joining the new KICs, for each EIT call.

FCT is a member of 28 ongoing ERA-NETs (that coordinate research activities between funding agencies), across the exact sciences and engineering, life and health sciences, natural and environmental sciences and the social sciences and humanities. FCT also participates in two “global” ERA-NETS, with India and with Africa.

Portugal is a member of three Joint Programming Initiatives (JPI), in which FCT represents the scientific community and Portugal’s strategic research interests: JPND – Joint Programme on Neurodegenerative Disease Research; JPI Water and JPI Oceans.

In 2006, several partnerships with American universities were established, involving a range of Portuguese universities and research units: MIT-Portugal (in engineering systems), Carnegie Mellon University-Portugal (in ICT), UTAustin-Portugal (in emerging technologies), Harvard Medical School-Portugal (in biomedical and clinical research). A further partnership with the Fraunhofer Institute was set up in applied science. These partnerships develop activities in education and training (Masters, PhD and post-doctoral training), research projects and innovation and entrepreneurship – these latter areas are the focus for the second stage of the MIT-Portugal, CMU-Portugal and UTAustin-Portugal partnerships running from 2012 to 2017.

FCT runs dedicated bilateral funding schemes with key partner countries, in specific areas, with both established (e.g. USA – Post-doctoral Research Fellowships at the National Institutes of Health) and emerging science nations (e.g. Brazil – Project Grants with FAPESP – State of São Paulo, China – Project grants with the Joint Innovation Centre for Advanced Materials and others, India – joint Portugal-India projects within the Indo-Portuguese Programme of Cooperation in Science and Technology).

2.6.2. Evaluation process

International peer-review underpins FCT selection processes. All funding schemes entail the setting up of domain or area-specific review panels, and, in many cases, remote (online) reviews.

Except for the annual calls for PhD studentships and Postdoctoral fellowships, all other review panels are fully international i.e. panel members are scientists from non-Portuguese research centres (independent of nationality). The review panel members for the PhD studentships and

Post-doctoral fellowships are selected from amongst Portuguese and foreign researchers working in Portugal. Since 2013, FCT has launched annual calls to the scientific community for expressions of interest in joining FCT evaluation panels.

Traditionally, reviewers were selected through a mixed FCT-dependent and FCT-independent process: the FCT Board of Directors would assign the panel chair, who would then select the other members of the panel, according to guidelines established by FCT. This process would be overseen by the FCT Scientific Councils. Since 2012, the process of identifying and assigning reviewers for each evaluation is the responsibility of the newly created Evaluation Office (GAV, section 3.1), set up with the aim of harmonising evaluation procedures across the different funding schemes, and ensuring quality control of evaluation procedures.

Besides review panel members, FCT evaluation often entails remote (online) reviews, by anonymous reviewers. The comments of the remote reviewers feed into the panels' final decisions on grading and funding. Evaluation panels meet face-to-face at plenary meetings, to discuss all the relevant information and data gathered during the evaluation process, including the remote reviewers' comments.

All FCT calls have to comply with public administration regulations, as stipulated in the *Código do Procedimento Administrativo*, which entails the following:

- 1) It is required that the names of the reviewers, namely panel members, be released before the final results of the call are announced;
- 2) After each step in the decision process, a mandatory appeals period of 10 working days is launched, followed by assessment of the appeals that are lodged and the new release of results. Thus, appeals periods follow the decision on eligibility of an application and then again the decision of the evaluation panel, for each stage of a multi-stage evaluation process;
- 3) Following the release of the final results, a higher order appeal is available to applicants, directed at the FCT Board of Directors. This appeal does not involve the reviewers.

There are no significant differences between the handling of proposals in different funding schemes, or in different research domains. The procedures for selecting and assigning remote reviewers and panel members are common across funding schemes and research domains. The evaluation criteria differ between funding schemes, adapted to the specificities of each programme, but, within a programme, are the same across research domains. However, in the 2014 call for PhD studentships and Post-doctoral fellowships, the sub-criteria for the applicant's scientific merit were defined with greater precision by each panel, taking into account the specificities of, in particular, the social sciences and humanities (SSH).

Although the evaluation criteria used differ between funding schemes, there are common themes, in particular: scientific merit of the applicant and/or the research team; scientific merit and international impact of the research proposal; the career plan (for FCT Investigators) or strategic programme (for R&D Units); feasibility and reasonableness of the proposed budget (when relevant); impact of the scientific, technological and cultural output.

Besides the relatively few topic-specific funding schemes (e.g. clinical research training for interns, or topic-specific project grants) no scientific area is positively discriminated during the evaluation process. In the latest review of R&D Units, for example, an analysis of the distribution of units' grades across panels was carried out, to allow some degree of normalisation across panels. The use of EU Structural Funds requires compliance with the recommendation to allocate at least 85% of these fund to research areas with potential for innovation and impact on the economy. Although taken into account by FCT, this recommendation has not had significant impact on allocation of funds to specific areas, namely the social sciences and humanities.

2.6.3. Success rates

The success rates across the main funding schemes are summarised in the table below (2008 – 2014).

Table 2. Success rates (2008 – 2014) across the main funding schemes.

	2008	2009	2010	2011	2012	2013	2014
PhD Studentships		54%	45%	42%	28%	12%	Ongoing
Post-doctoral Fellowships		61%	51%	46%	31%	21%	Ongoing
PhD Programmes*	NA	NA	NA	NA	24%	18%	NA
FCT Investigator	NA	NA	NA	NA	13.5%	14%	16%
Project grants in all scientific domains	25%	18%	14%	NA	12%	13%	Ongoing
R&D Units	With funding: 84%						With funding: 80% (pending appeals)
Infrastructures	NA	NA	NA	NA	NA	45.5%	NA

* Two calls were held, but considered two components of a single batch of PhD Programmes to be funded. NA – Not applicable

2.7. Assessment of funded research

Funded projects and R&D units are assessed by FCT on completion of the lifetime of the grant/funding. Assessment encompasses a scientific evaluation, by specific panels, and a financial assessment, carried out by FCT staff. The scientific evaluation is based on a final report submitted by the Principal Investigator of the project or the unit coordinator. If the evaluation panel considers that the aims set out for the research described in the project grant or in the institution programme have not been achieved, the panel may fail the project, in which case the units involved may be required to return funding to FCT.

FCT makes every effort to monitor spending on awarded grants, by carefully analysing the payment requests that research groups and units submit. Except for an upfront minimum payment, the bulk of payments are made on submission of receipts (i.e. proof of expense). Furthermore, FCT draws up the final financial report for project grants and institutional funding, based on payments made to the host and participating units, which the grant holder needs to approve and sign before the final payment is carried out.

2.7.1. Ex-post evaluation of funded research

2.7.1.1. Research evaluation and impact assessment at FCT

Although JNICT - *Junta Nacional de Investigação Científica e Tecnológica*, (FCT's predecessor), in line with leading European countries, was a pioneer in Portugal in introducing project funding and peer-review for research assessment back in late 1970s^{7,8} it is a latecomer to ex-ante, interim, ex-post Research Evaluation and Impact Assessment. In fact, in the 1990s the situation of evaluation in Portugal was experimental, without an established evaluation system. The expectation at the time was that a way to institutionalise this would be through the impact of the regulations for European structural funds, which impose ex-ante and ex-post evaluations for co-funded programmes⁹. Time showed that this expectation was in fact correct, as only programmes funded within the Framework Programmes were systematically evaluated (ex-ante and interim). This situation is similar to that of the other 'Mediterranean' Countries¹⁰.

Ex-ante impact assessment, interim and ex-post evaluation have been carried out at the level of umbrella programmes for the National Strategic Reference Framework (QREN) by the QREN Observatory (See the following link for evaluation reports on [QREN programmes](#)).

For example, the programmes managed by FCT are in most cases co-funded by structural funds (under the QREN umbrella) therefore they have only been evaluated as part of the thematic evaluations which bring together several other programmes and instruments not managed by FCT.

It is worth noting that, despite being few in number, some evaluations were carried out at different levels. For example, at the programme level, JNICT commissioned an ex-post evaluation of the Infrastructures CIÊNCIA Programme (1990-1993), by international teams. At the organisational level, in 1997, the Minister of Science and Technology holding office commissioned the evaluation of State Laboratories by international teams. Finally, at policy level, the OECD carries out periodical reviews of the R&I policies of member countries. Portuguese policies were reviewed twice, in 1983 and 1993.^{11,12}

However, there is a new impetus towards the institutionalisation of an evaluation system in the country, beyond the one implemented for structural funds. FCT is making efforts for the national

⁷ Caraça, J. (1982). Um sistema de avaliação e selecção de projectos de I&D. *Planeamento* 4(2): 45-56.

⁸ Henriques, L. (1999). Os sistemas consultivos associados às estratégias de avaliação e selecção de projectos de I&D: Portugal, os últimos vinte anos. O Futuro Tecnológico perspectivas para a inovação em Portugal. M. M. Godinho and J. M. G. Caraça. Oeiras, Celta Editora pp: 19-42.

⁹ Silva, C. M. D. and L. Henriques (1995). R&D evaluation in Portugal. *Research Evaluation* 5(1): 89-97.

¹⁰ Amanatidou, E. and I. Gareffi (2010). INNO-Appraisal: Understanding Evaluation of Innovation Policy in Europe. Final Report, pp. 307-326.

¹¹ OECD (1986). National Science Policy Reviews - Portugal. Paris, OECD.

¹² OECD (1993). Reviews of national science and technology policy - Portugal. Paris, OECD.

agenda to incorporate the need for research evaluation and impact assessment. With that aim, the Studies and Strategy Office was created in late 2012, with the responsibility of promoting research evaluation of the programmes and policies concerning FCT. Some initiatives are already being prepared. A conference/workshop is planned for 2015 on the topic, possibly co-organised with the OECD. A ex-post evaluation and impact assessment of the FCT fellowship programmes is planned to be commissioned, in order to assess how these programmes have fulfilled the aim of creating capabilities in the research system at PhD and post-doctoral levels, as well as their impact on increasing the competitiveness of the economy and on creating a knowledge-based economy.

2.7.1.2. Bibliometric analysis of funded research

In 2012, FCT commissioned a bibliometric study from the Leiden University Centre for Science and Technology Studies (CWTS), of the 2007 to 2010 publication output of all the R&D units that received funding from FCT following the 2007/2008 evaluation. This was the first detailed bibliometric characterisation of research units in Portugal. Although limited to the publications indexed in the Web of Science, it provides a snapshot of the country's recent scientific production and impact.

In the analysis that follows, institutions with less than 25 publications indexed in the Web of Science 2007-2010 were excluded, as the reliability of bibliometric indicators is low for small samples. From the universe of 278 research institutions included in the study, 175 had 25 or more publications indexed in the Web of Science for the period under scrutiny.

The percentage of publications of FCT-funded units accounted for 80% of all publications with at least one Portuguese address (32 540). The normalized impact (MNCS)¹³ of these publications was 1.03; FCT-funded output (26 116 publications) and the remaining 6 424 publications (non-FCT funded) had MNCS of 1.04 and 1.02, respectively. For the three sets of documents the impact equals the world average; in spite of the lack of previous comparable studies, data published by the European Commission showed that the impact of Portuguese institutions was well below average a decade ago (*3rd European Report on Science and Technology Indicators*, EC 2003). This means that the growth in the number of publications referred to in section 2.3 was accompanied by an increase in impact.

The 30 Web of Science subject categories of higher production are shown in Figure 10 for Portugal (A) and for FCT-funded research (B). The areas and the respective number of publications and impact are very similar in both graphs. There is a clear dominance of Chemistry and Physics among the subject categories of higher output and impact, which is in agreement with traditional preferential funding for those areas. Some health-related areas with good performance, such as *Neurosciences*, *Clinical Neurology* and *Immunology*, are important outside FCT-funded units; this is probably due to the role of privately funded research carried out in hospitals or other, non-public institutions, such as foundations.

¹³ MNCS - Mean field normalized citation score. Number of citations (without self-citations) divided by the expected number of citations on a paper basis. The expected number of citations is based on the worldwide average citation score without self-citations of all similar papers belonging to the same field.

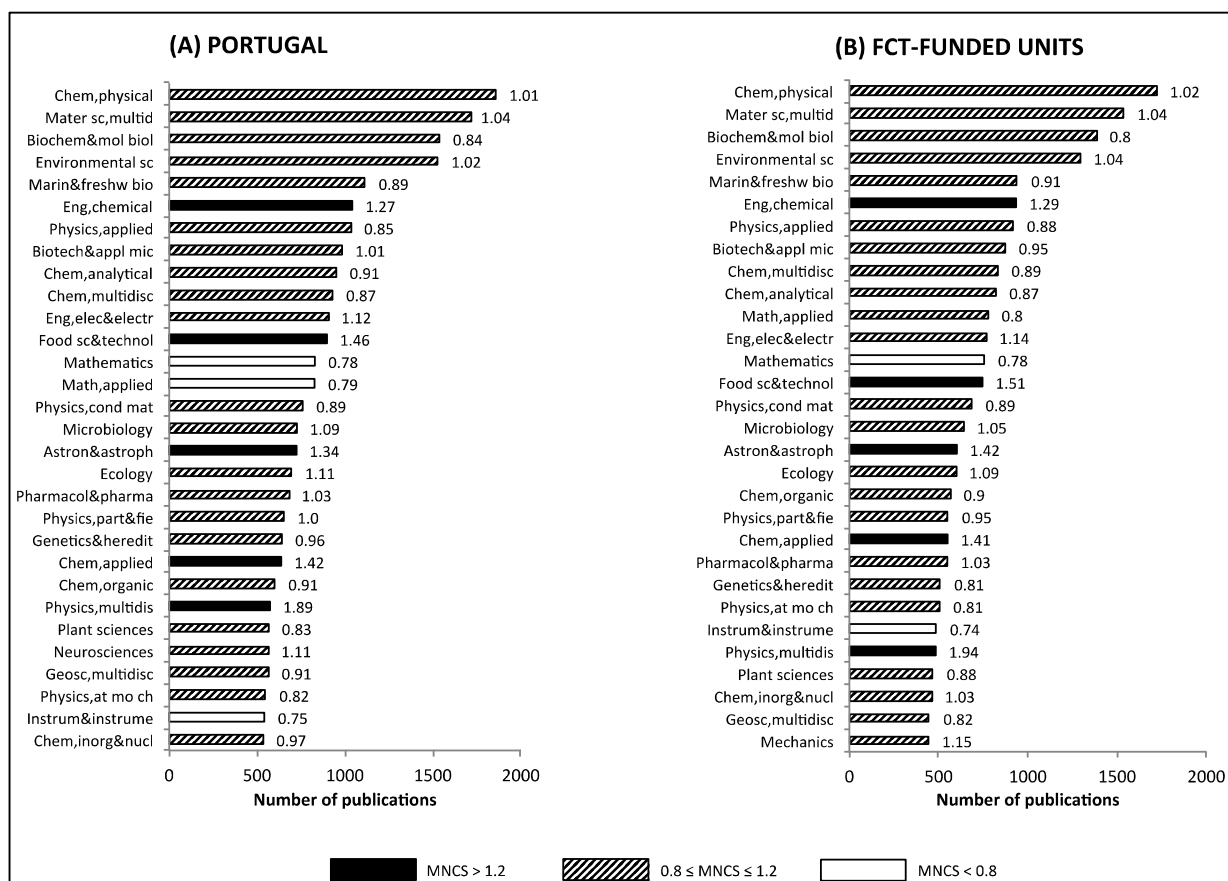


FIG.10. IMPACT OF THE WEB OF SCIENCE SUBJECT CATEGORIES OF HIGHER PRODUCTION.

Looking at the publication/impact distribution of the 30 subject categories for Portugal (Fig. 11), three main groups can be distinguished: one with the highest production which includes *Biochemistry & Molecular Biology*, *Environmental Sciences*, *Multidisciplinary Material Sciences*, and *Physical Chemistry*. There is a second group, which corresponds to subject areas of intermediate production and high impact: *Applied Chemistry*, *Astronomy & Astrophysics*, *Chemical Engineering*, *Food Science & Technology*, and *Multidisciplinary Physics*. The third cluster consists of subject areas with an impact between 0.8 and 1.2 and low to intermediate output (*Neurosciences*, *Microbiology*, *Ecology* and *Electrical & Electronic Engineering* are the areas with highest impact in this cluster).

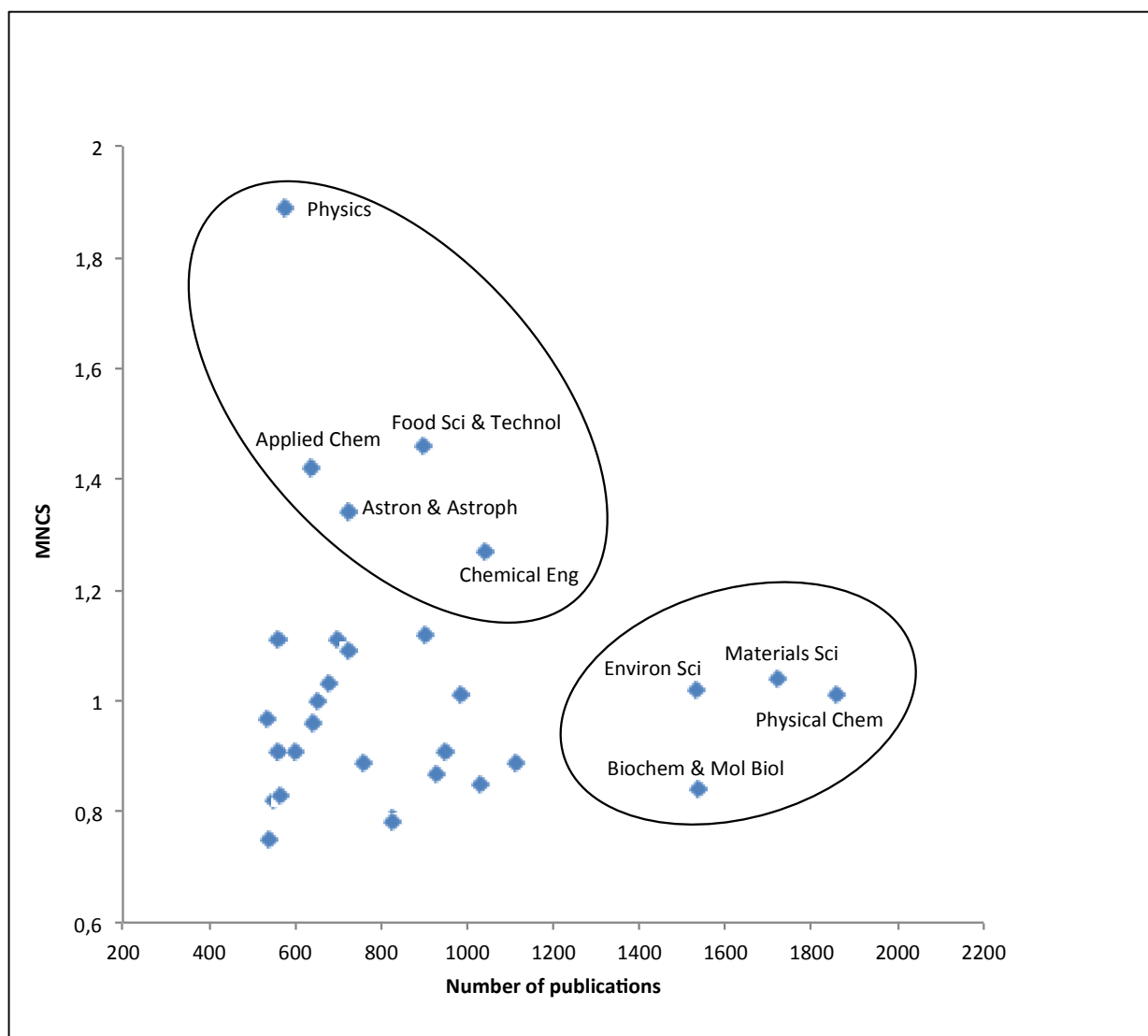


FIG.11. DISTRIBUTION OF OUTPUT/IMPACT.

Portuguese institutions also excel in areas with lower output (not shown), which may be emerging and should be considered in strategic planning and policy implementation.

In 2014, FCT ordered a second bibliometric analysis, from Elsevier, of the 2008-2012 publication output indexed in Scopus of the research institutions under evaluation in the 2013/2014 exercise. The results were made available to the members of the evaluation panels. Aggregate indicators at FCT or country level were not calculated in this study, thus restricting direct comparisons with the former study and a country level characterisation based on more recent publications. However, the data will be valuable for following up the outcome of the evaluation.

2.7.1.3. The specificity of the Social Sciences and Humanities

An ongoing project at FCT aims at the construction of a publication indicator for the Social Sciences and the Humanities. The use of traditional bibliometric tools (i.e. citations) in the evaluation of scientific production in these areas has been severely criticised, since the databases (Web of Science and Scopus) have a low coverage and do not reflect the real outputs.

Similarly to what has been done in Nordic countries¹⁴, FCT, together with the Scientific Council for Social Sciences and the Humanities and the General Directorate of Statistics of Education and Science (DGEEC), is developing an instrument to extract a suitable indicator for these scientific areas.

In short, the methodology is as follows:

(i) a list of journals and publishing houses relevant for the Portuguese scientific community in SSH will be built from the input of researchers; (ii) the journals and publishing houses will be classified in two levels: Level 1, comprising approximately 80%, and Level 2, corresponding to the 20% of higher quality that publish works of excellent quality; (iii) the score of each publication will depend on its type (book, book chapter or journal article) and also on the level of the journal/publishing house.

The goal of this project (completion during the first semester of 2015) is to develop an instrument to extract a suitable indicator for SSH; it will be used, together with peer-review, for the future evaluation of R&D units in these areas.

2.8. Interaction with other stakeholders (national and international)

FCT is under the direct responsibility of and is accountable to the Ministry in charge of science (currently, the Ministry for Education and Science), but liaises with several other ministries and secretaries of state with links to science, research and innovation. These include the Ministry of Economy, the Ministry of Health, the Ministry of Agriculture and Sea and the Minister in the Cabinet of the Prime Minister and for Regional Development. Synergies and collaborations with these ministries range from memberships of joint taskforces (as in developing the National Strategy for Smart Specialisation) to the sharing of Portugal's contribution to international scientific organisations (such as the European Space Agency).

Most of the research that is funded by FCT is carried out in universities and other HEIs, making them crucial stakeholders and even partners in the implementation of programmes and funding schemes. Although FCT does not directly fund universities, a significant proportion of HEI's revenue is derived from indirect costs associated with research projects and institutional funding awarded to research groups. The Council of Rectors of Portuguese Universities (CRUP) and the Portuguese Polytechnics Coordinating Council (CCISP) are key intermediaries between FCT and HEIs.

To support the management of research by all the stakeholders (performing and funding organisations) in the R&D community in Portugal, FCT is developing a Portuguese Current

¹⁴ Sivertsen, G. (2009). A performance indicator based on complete data for the scientific publication output at research institutions. ISSI Newsletter 6:22-28

Research Information System called PTCRIS - Connected Research. PTCRIS aims to be a national integrated ecosystem of research information systems, that is expected to become a hub for all information concerning research being carried out in Portugal (see Fig. 12). The goals of PTCRIS are thus:

- To define the standards framework to be adopted by the various systems;
- To coordinate the integration of FCT systems, in accordance with the standards framework;
- To coordinate the integration of Portuguese and international external information systems with those of FCT, according to the defined standards framework;
- To support and promote the use of the PTCRIS systems within the community.

PTCRIS is currently managed at FCT by its FCCN unit.

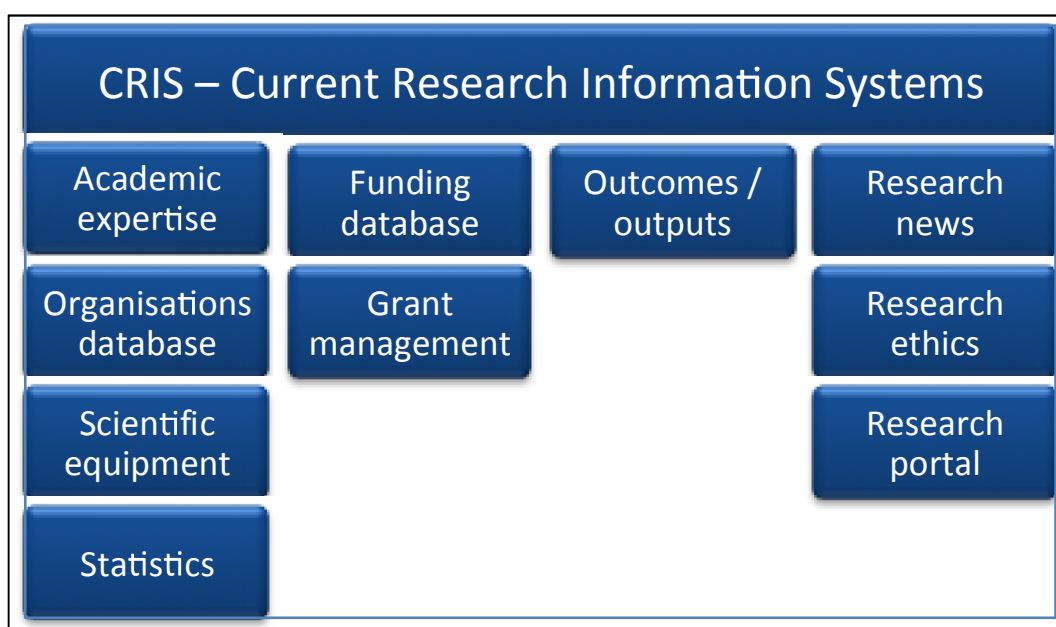


FIG. 12. PTCRIS COMPONENTS.

In terms of international, and in particular, European funding programmes, FCT has long identified European Framework Programmes (FPs) as key to ensuring the international competitiveness of Portugal's research base and has taken two main approaches to catalysing the Portuguese scientific community's chances of success in applying to FPs:

1) The GPPQ - Framework Promotion Office (set up in 2007) has as its main mission to increase awareness among the scientific and industrial communities about opportunities offered by EU R&I programmes, and providing support to academia, research institutions and industry in identifying partners and preparing proposals. The ultimate aim of the GPPQ is to increase participation of Portuguese research institutions and industry in the EU Framework Programmes

in order to cross the break-even point between the country's contribution to the EU budget and the framework programme success rate.

2) Since 2012, FCT has been aligning several of its funding schemes and programmes within the Horizon 2020 pillars of Excellent Science (PhD Programmes, FCT Investigator, Research Infrastructures Roadmap, R&D Units evaluation and funding), Industrial Leadership (PhD Programmes in industry setting, Technology Transfer and entrepreneurship) and Societal Challenges.

FCT also plays a role in interfacing with international science trends at policy level, as a member of several science policy organisations (either as the funding agency FCT, or as the representative of the member state, Portugal). FCT is thus the Portuguese focal point for science and technology at OECD, liaising with the Ministry-appointed Portuguese delegates to the OECD Directorate for Science, Technology and Industry (DTI). FCT is a member of Science Europe, an organisation that brings together 52 Research Funding and Research Performing Organisations from 27 countries, providing them with a platform to collaborate at both policy and activity level. FCT is also an active member of several high-level European groups and *fora* for science policy, including the European Research Area and Innovation Committee (ERAC), the Strategic Forum for International S&T Cooperation (SFIC), the European Strategy Forum on Research Infrastructures (ESFRI) and the EU-Africa High Level Policy Dialogue (HLPD), amongst others.

2.9. Standing in the scientific community/interaction with society at large

For the last 20 years, since its creation, FCT has undoubtedly been the main source of public funds for researchers across all areas of knowledge, and at different career stages, in Portugal.

With 32% (in 2012) of Portugal's public spending in science, FCT's programmes and funding schemes have underpinned the steep quantitative growth of Portugal's SCTN, and will certainly continue to do so in the future, now with greater emphasis on growth in quality and international competitiveness.

Its position as often the sole funder for science means that FCT's standing in the scientific community is very much influenced by the economic environment of the country. In times when the economy slows down, and funding cuts ensue, FCT needs to balance maintaining payments to already awarded grants, fellowships, etc., with launching new programmes that will sustain growth and development of the research base. Since FCT works with an annual budget for multiannual financial commitments this is a delicate juggling exercise.

Since competitive funding and peer-review were first introduced in the 1980s, FCT has also established itself as a guarantor for the quality and merit of the research and development it funds. The role of international peer-review is crucial to ensuring rigorous, robust and transparent evaluation and selection processes. FCT strives to incorporate these features into its funding schemes, and to minimise the errors that are inherent to any evaluation process. The paradigm shift of the last few years, from quantitative to qualitative growth, and the plateauing of the FCT budget, means that calls have become much more competitive, across all funding schemes – currently, success rates are in the range of 10 – 20% for the major calls (see Table 1). This has

also caused concern amongst the scientific community, in particular at a time when recruitment by universities has stalled and alternative sources of funding are scarce.

2.10. Future challenges

No significant changes to the mandate described above are expected: FCT will continue to act as the main public funding agency for science and technological research, encompassing responsibility for the Information Society and the national computing grid and network.

In an ever-changing scientific environment, new challenges arise. The next sections describe some of the most relevant challenges for the next few years.

2.10.1. Aligning funding schemes to 2014-2020 EU Structural Funds

The start of a new EU multiannual financing framework brings new challenges for the Portuguese R&I system as a whole, and for FCT in particular, especially at the operational level.

One of the main challenges will be to create funding schemes that are aligned with the EU-Portugal Partnership Agreement 2014-2020. This agreement establishes the amount of European structural funds that are available for science (more than €1 billion) and the rules and guidelines for the application of those funds.

A key requirement of the partnership is that all funding programmes be strongly aligned with regional and national Strategies for Smart Specialisation (RIS3). After a systematic analysis of the country's R&I system, carried out by FCT, and extensive dialogue with the scientific community and other stakeholders, including industry, Portugal's national RIS3 is ready to be made public. It defines **15 priority themes, grouped into five clusters**, in which Portugal is (or shows potential to become) competitive/specialised economically, scientifically or technologically.

This definition of priority areas is the first ever, in Portugal, and will have implications for the FCT funding schemes that are to be set up in the future. Notwithstanding these priority areas, in which knowledge transfer for economic and societal benefit is implicit, FCT will maintain funding for blue-skies research, possibly making use of national budget funds. These funding schemes will continue to support research across all areas of science.

2.10.2. Open Access

In May 2014 the FCT policies on open access came into force, after a public consultation that informed the drawing up of the policies. They encompass guidelines for free, online access to peer-reviewed publications and data arising from FCT funding for encompasses project grants, studentships and fellowships and career development contracts (FCT Investigator). Implementation of the policies, across FCT funding schemes, is the upcoming challenge for 2015. This will entail incorporating open access principles and requirements into call regulations, funding contracts and procedures for monitoring of funded research, in order to ensure that all FCT-funded researchers comply with the policies.

The core of the policy on open access to publications arising from FCT-funded research is that all publications of research outputs, subject to peer-review or another form of scientific review, should be deposited in one of the open access repositories hosted within the Portuguese national repository RCAAP as soon as possible, preferably immediately on acceptance for publication. An embargo period is allowed, after which the full content of the publications should be made freely available, at no cost. The policy applies to papers in scientific journals, conference proceedings, posters, books and book chapters, monographs, Masters and PhD theses.

The policy on management and sharing of data and other results arising from FCT-funded research encourages researchers to share primary data and other data with the scientific community, by placing the data in open access databases (such as Genbank, for example), within the shortest time possible.

2.10.3. Responsible Conduct of Research

Responsible conduct of research (RCR) includes issues of scientific integrity, issues of ethics in scientific research and issues of social responsibility, of the scientist and the scientific institutions. Responsible research conduct guidelines provide researchers, research institutions, universities and funding agencies with a model for the responsible conduct of research. RCR also ensure that any violations are handled proficiently, fairly and expediently.

Portugal endorses the international definitions and principles agreed by the European Science Foundation Members Forum on Research Integrity (2010) and published as the European Code of Conduct for Research Integrity. However the guidelines of what should constitute responsible conduct in research and how they should be monitored are almost non-existent in Portugal.

In 2014 FCT set up an Ethics Office, with a remit to ethically assess research projects and create a framework for the compliance and monitoring of research integrity. The Ethics Office carried out the ethical review of all proposals submitted in the 2014 FCT Investigator call.

A challenge for the future is to establish a national code between research institutions, universities, funding agencies, scientific societies and decision-makers in Portugal, committing all to the importance of responsible research conduct and to ensuring the highest standards of ethics and integrity in research, for sustained public trust in research.

Part C – Detailed description of FCT

3. CROSS-CUTTING ACTIVITIES AT FCT

3.1. Evaluation Office

With the purpose of harmonising the evaluation processes according to best international practices (quality, professionalism and transparency), the FCT Evaluation Office was set up in September 2012. The Evaluation Office provides expert advice to the FCT board of directors in all matters related to evaluation, promotes and improves the necessary proceedings for assessing applications to the several R&I funding instruments sponsored by FCT.

Due to the heterogeneity of its tasks and the scope of scientific areas covered by FCT calls, the Evaluation Office staff consists of a multidisciplinary team with previous experience in research and a vast knowledge of the scientific communities.

In its main operational activity, and in close partnership with the departments in charge of each call, the Evaluation Office is responsible for the following tasks: defining the evaluation criteria and producing the corresponding evaluation guides and forms; selecting the evaluators (panel members and external experts) and assisting them throughout the evaluation process; preparing and monitoring the evaluation meetings; ensuring quality control of the reports and comments to be transmitted to the applicants; consideration and referral of the preliminary hearings (appeals) and complaints; building and updating a database of evaluators; ongoing tracking of the practices and procedures of counterpart international funding agencies.

The main changes introduced by the Evaluation Office concern the selection of the evaluators and the standardisation of the evaluation processes.

Before 2012, the FCT Board of Directors would typically appoint a chairperson for each evaluation panel, who, in turn, would select the remaining panel members, according to the scientific nature of the applications (Calls for R&D Projects, R&D Units Evaluation, etc.). If needed, the panel chair and the remaining members would designate external experts to assess specific applications.

Since 2012, all the participants in the process are directly selected by the Evaluation Office and approved by the Board of Directors. Furthermore, the composition of the panels must always be ratified by the ministry. All evaluators are selected according to the following criteria: scientific expertise, experience of participation in evaluation panels, scientific production, absence of collaborations and co-publications with Portuguese scientists in the last three years (for foreign evaluators), institutional and geographical diversity and gender balance. The panel chairs are chosen among the panel members. The inclusion of external experts is decided upfront for each process and the external experts are carefully chosen according to the specific proposals that they will assess.

Evaluation panels are composed of international members except for the evaluation of individual PhD studentships and post-doctoral fellowships (all Portugal-based members) and for the 1st

stage of the FCT Investigator call, where one third of the panel are Portugal-based members (as of the 2014 call).

Every evaluation process requires a preliminary remote (online) assessment of all the proposals. Each proposal is evaluated by two panel members, a 1st and a 2nd reader, with the 1st reader being in charge of drafting a consensus report based on the 1st and the 2nd readers' comments and scores. After the remote evaluation phase, a plenary meeting takes place where each proposal is discussed by the panel and the final decisions are collegially made. Previously, in calls like those for studentships and fellowships, face-to-face meetings by the two panel members for each application were promoted.

Finally, the preliminary hearings (appeals) and the complaints procedures were also normalised and now encompass both a scientific and an administrative component in each phase.

Since its foundation, the Evaluation Office has been involved in 10 full evaluation calls (Studentships and Fellowships, PhD Programmes, Career Development, Project Grants, R&D units, Research Infrastructures), entailing the recruitment of over 10 000 external evaluators, the setting up of around 90 evaluation panels and the organisation of more than 100 evaluation meetings. Figure 13 shows the chronogram of recent evaluations (Studentships/Fellowships, Investigator FCT and R&D Projects).

Call	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9
Studentships/Fellowships 2014	Submission period		Evaluation		Results				
FCT Investigator 2014	Submission period	Evaluation				Results 1st stage	Evaluation		Results 2nd stage
R&D Projects 2014	Submission period	Eligibility check	Evaluation				Results		

FIG. 13. CHRONOGRAM OF RECENT EVALUATIONS.

3.2. Studies and Strategy Office

The Studies and Strategy Office (GEE), created at the end of 2012, is the answer to FCT's need for in-house strategic intelligence and policy and programme formulation capacities. The GEE embodies a return to a former planning function that had existed at JNICT since the early 1970s, linked with support for policymaking in R&I.

To contextualise, JNICT was divided into three autonomous organisations: the International Cooperation Department became the Institute for Scientific and Technological Cooperation - ICCTI, the R&D Statistics Department was transformed into the Observatory for Science and Technology - OCT, and the departments related to research funding remained and were relabelled as FCT. Probably due to these changes, support for policy formulation was almost non-existent at FCT for a long time and the main focus was on the allocation of resources through competitive funding. However, with the devolution of JNICT to FCT (except for its statistics component) and with the increased complexity of the SCTN and its integration into the European Research Area, the need for evidence-based policy, strategic thinking and studies became a priority in 2012, and the GEE was set up within the institution.

The GEE is designed as a think-tank and a mediation arena for reflection and exchange of knowledge with national R&I communities, and also with the EU and international organisations (OECD), concerning R&I public policies.

The main functions of the GEE are the following: to carry out studies on the R&I system and design methodologies for research evaluation and impact assessment; to explore the synergies with international organisations, with special emphasis on the OECD (the GEE is the coordinator and the national focal point for R&I areas of collaboration with the OECD); to monitor the evolution of the European Research Area and promote common practices for R&I policies, including with other national sectorial ministries and the regions.

Since it was set up, the GEE has delivered the SWOT analysis and the diagnosis of the SCTN (http://www.fct.pt/esp_inteligente/diagnostico) with the collaboration of other FCT services. As a result of its involvement in the preliminary steps towards the definition of a national strategy for research and innovation, FCT/GEE was invited to participate in the working group that formulated the National Research and Innovation Strategies for Smart Specialization (<http://www.fct.pt/gabestudosestrategia/ENEI/>), as the representative of the Ministry for Education and Science, with representatives of the Ministry for the Economy (IAPMEI) and the support of the Innovation Agency and the COMPETE Programme.

In addition, some work was carried out in collaboration with the OECD, such as the participation in the report 'Promoting Research Excellence: New Approaches to Funding' (<http://www.oecd.org/sti/sci-tech/promoting-research-excellence.htm>). The reorganisation of the Portuguese delegation to the relevant committees and OECD R&I working parties has been concluded and spaces for sharing information and alignment of positions were established and are working in order to maximise the return on investment of Portugal's participation, in terms of the preparation of the future agenda for R&I.

3.3. Communications Office

The FCT Communications Office's main objectives are to inform the scientific community and other R&I stakeholders of FCT funding schemes and other programmes and initiatives, to raise public awareness of the role of FCT in promoting science and research in Portugal and, thus, to contribute to greater awareness of the economic, social and cultural impact of scientific research in modern societies.

Set up in 2011, the Communications Office has evolved to currently align its activities along three strands: institutional communication, internal communication and science communication. The Communications Office works closely with all FCT departments to develop consistent and integrated communication approaches that may contribute to building a solid and well-recognised institutional image.

The FCT website is a crucial tool for institutional communication and has been significantly developed, both in terms of structure (for easier navigation) and, in particular, for content. A large effort is put into ensuring up-to-date information, on all aspects of FCT's function, in a language that is adapted to the target audience. The website is bilingual, so that the vast majority of content is available in Portuguese and in English.

The Communications Office is involved in the final revision, compilation, branding and online publication of information on calls and other FCT programmes, including results and outcomes. This entails communicating through the website (preparing copy, graphs, summaries and listings), but also via e-mail to relevant stakeholders and press and media.

In a large organisation such as FCT, internal communication is core to building a consistent institutional image and reputation with its different stakeholders. The Communications Office set up a weekly in-house news bulletin, covering FCT-related news and other news that might be relevant for FCT staff.

In recognition of the importance of returning to citizens the results of public investment in science, the FCT Communications Office regularly publishes science news stories on the FCT website (in a new section created in 2013) and also an online bimonthly newsletter, which contains feature articles and short news pieces. Other science communication initiatives include the production of short videos on the participation of Portuguese research institutions and companies in space science and the space sector as well as science communication workshops for scientists.

3.4. Information Systems

The Information Systems (IS) team supports the main FCT activities in terms of development and maintenance of the applications for funding research in Portugal. Information Systems (IS) supports all phases of the major funding activities, namely:

- Submission of Applications
- Evaluation of Applications
- Grant Management

3.4.1. Major systems

The major IS are:

- [FCT Sig](#): FCT's information system (FCTSig) enables the use of several systems available at FCT, as well as updating individual profiles and accessing information;
- [FCT Sig CV](#) and [Curriculum DeGóis](#): Researcher CVs can be registered on this platform and later used in application forms for FCT calls;
- [Science and Technology Portal \(PCT\)](#): The Science and Technology Portal (PCT) gathers management applications for R&D Units, R&D Projects and Fellowships as well as communication tools for the scientific community;
- [Portal for Studentship/Fellowship calls](#): Applications for individual studentships/fellowships, after registering on FCTSig;
- [Portal for R&D Projects](#): Applications for R&D Projects, after registering on FCTSig;
- [Euraxess](#): This website gathers support information for researchers planning to move to and from Portugal;
- [Era Careers Portal](#): Advertisements for grants within R&D Projects and units;
- [FCT Investigator Portal](#): Applications for FCT Investigator calls and more information about this programme;
- SEGA: Document management system;
- SAM – *Sistema de Atendimento Multicanal*: Customer relationship management (CRM) system.

Most significant developments in recent years

- 2012 - Submission of Applications, Evaluation and Grant Management for two new calls: FCT Investigator Programme and FCT PhD Programmes.
- 2013 - Submission of Applications for Evaluation of R&D Units, Submission of Applications and Evaluations for Research Infrastructures, Preparation of SAM - Customer relationship management (CRM) system, preparation of the development of data analysis solutions.

Users

- 250 internal users
- More than 100 000 external users including applicants, evaluators, researchers, project managers, etc.

3.4.2. Current strategy and roadmap

The current IS were created on an *ad hoc* basis, using technology and resources available at the time; some of these are now more than 10 years old. As a result, there are systems which are not integrated, with problems in terms of usability and with high maintenance needs.

To address this scenario, planning and preparation is taking place to adopt a technologically state-of-the-art new generation platform for developing IS, following the best-practices for software development and aligned with the PTCRIS.

The objectives of this new generation platform are the following:

- Offer better response to current FCT and community IS requirements;
- Significantly improve the quality and usability of the software produced;
- Build an integrated research management system with unified processes and interfaces;
- Have all the developers working on the same platform, with industry best practices and reducing dependency on individuals;
- Be prepared to escalate using external resources when needed.

The plan is to manage the inherited applications until the end of the cycle of the currently supported programmes and gradually introduce new programmes into the new platform. We expect that this transition will be made in two years, bringing clear and measurable benefits to FCT and the community it serves.

4. FUNDING SCHEMES

4.1. STUDENTSHIPS AND FELLOWSHIPS

4.1.1. General description

The Department of Graduate Education and Training (DFRH) organises an annual call for applications for:

- PhD studentships that support research projects for graduates who comply with the requirements to apply for PhD studies in academia or in an industry setting. All PhD studentships have a maximum duration of 4 years, and a minimum of 3 consecutive months.
- Post-doctoral fellowships, with a maximum duration of 6 years, upon mid-term approval and budget availability.

Within the framework of the International Partnerships with US universities, namely MIT, UT Austin, and Carnegie Mellon University, FCT has launched annual calls for PhD studentships. These studentships are now included in the PhD Programmes awarded to these international partnerships (see section 4.2).

Other fellowships for graduate training include: research fellowships – awarded within research project grants or R&D units; research technician fellowships; traineeships at scientific organisations such as CERN, the European Space Agency (ESA) and the European Southern Observatory (ESO); support for doctoral training in clinical research for medical interns. Moreover, FCT awards fellowships to invited scientists and for sabbatical leaves.

4.1.2. Strategic goals

FCT aims to support the best graduate investigators who wish to pursue research leading to a PhD degree in an academic or industry setting, and the most creative post-doctoral researchers in pursuing cutting-edge research, in any scientific domain.

Portuguese applicants to PhD studentships can choose to pursue their training activities exclusively in a Portuguese host institution, in a foreign institution or in a combination of both (in which case they have both a national and a foreign supervisor).

FCT works to attract post-doctoral researchers by awarding individual fellowships to foreign citizens to carry out research in Portuguese research institutions.

4.1.3. Evaluation processes and criteria

The evaluation process relies on the assessment of proposals by panels of national experts, organised according to the scientific domain indicated by the candidates.

Until 2013, the evaluation criteria were merit of the applicant, merit of the work programme, and merit of the host institution. The applicants were ranked according to the weighted average of the three criteria. The weighting factors were defined in each of the call notices, available at <https://www.fct.pt/apoios/bolsas/concursos/index.phtml.en>. In the 2014 call, only the merit of the applicant and the merit of the work programme were rated (with equal weighting).

Applicants are ranked according to the weighted average of the scores for each criterion.

As of 2013, panel members are selected by FCT from a list of experts created after compiling the results of a call for manifestations of interest in becoming a panel member (<https://www.fct.pt/manifinteressepaineis/paineisavaliacao.phtml.en>). Gender, institutional and career stage balance is taken into consideration in setting up the panels, as well as the experience of the expert - a minimum of 5 years of experience after obtaining a PhD degree is required. Furthermore, experience in the supervision of PhD students (minimum 2) and in the coordination of research projects is necessary. Moreover, for the 2014 call, the panel members may not be supervisors or co-supervisors of applicants being evaluated by their panel.

The evaluation undertaken by each panel is coordinated by one of the evaluators, who has the responsibility of deciding which two panel members will remotely review each application in the capacity of 1st reader or 2nd reader (first evaluation phase) ensuring that the opinions that underpin the panel decisions in the final joint meetings (second evaluation stage) are in accordance with the Evaluation Guide (<https://www.fct.pt/apoios/bolsas/concursos/docs/BolsasGuiãoAvaliação2014.pdf>, available only in Portuguese) and the remaining regulations.

Since the calls cover all scientific domains, the different panels decide on the tailored sub-criteria and their valorisation. This task is finalised prior to the evaluators' access to the applications, and follows the guidelines provided by FCT.

A single multidisciplinary panel was established for the evaluation of the 2014 call for PhD in Industry Studentships.

4.1.4. Success rates

Table 3. Success rates of individual studentships and fellowships calls.

Call	Submitted proposals	Awarded	Success rate
BD 2013	3596	440	12.2%
BDE 2013	77	18	23.4%
BPD 2013	2322	493	21.2%
BD 2012	4367	1198	28%
BDE 2012		23	
BPD 2012	2123	677	32%
BD 2011	3774	1549	42%
BDE 2011		35	
BPD 2011	1509	688	45.6%
BD 2010	3702	1642	45.1%
BDE 2010		28	
BPD 2010	1405	717	51%
BD 2009	3717	1954	53.7%
BDE 2009		43	
BPD 2009	1139	691	60.7%

PhD Studentships (BD), Post-doctoral fellowships (BPD), PhD in Industry Studentships (BDE)

4.1.5. Differences between scientific areas/Gender issues/Specific funding of applied research and/or interdisciplinary research

FCT publishes detailed information on the studentships and fellowships awarded and funded (<https://www.fct.pt/apoios/bolsas/estatisticas/index.phtml.en>), including data on success rates; active studentships and fellowships; annual funding, gender, host institution, and breakdown by scientific domain.

4.2. PhD PROGRAMMES

4.2.1. General description

FCT contributes to training the next generation of highly qualified researchers and higher education faculty by supporting internationally competitive, research-based PhD Programmes.

The FCT PhD Programmes are expected to bring together HEIs, research units and industry (when relevant), to: (i) promote world-class graduate education and research-based training; (ii) foster collaboration and sharing of resources between Portuguese units, bolstering their international quality and status; (iii) equip students with the necessary transferable skills to become excellent scientists as well as active members of the communities in which they may find themselves.

FCT PhD Programmes may be of three types: **National** – should involve at least one HEI and one R&I institution (both Portuguese); **With Industry** – should involve at least one R&I institution, one industrial R&I partner, and one Portuguese HEI; **International** – should involve at least one HEI and one R&I institution (both Portuguese) and an international HEI or R&I institution.

Funding for the FCT PhD Programmes covers the costs of PhD studentships and courses, laboratory rotations or other types of fieldwork that may be necessary to achieve the scientific aims of the programme.

4.2.2. Strategic goals

By supporting individual PhD programmes and commissioning the responsible institutions to select the PhD students, FCT enables the setting up of tailored recruitment strategies that best serve the individual PhD Programmes. The promotion of mobility is assured by both the existence of national and international programmes and the freedom given to the institutions to recruit students of any nationality.

4.2.3. Evaluation processes and criteria

Applications are assessed by an evaluation panel made up of leading researchers at an international level and/or with a proven track record and commitment to graduate education and training. The panels assess the overall capacity of the proposed PhD programme to provide the best conditions for students, according to international best practices. Particular aspects include: (i) an effective and non-cumbersome governance structure, which should include the programme Director and at least one member of each participating institution; (ii) the scientific merit of the research team(s) linked to the programme; (iii) the conditions provided by the host institutions; (iv) student selection criteria based solely on quality and merit; (v) well-structured and interdisciplinary educational approaches, that are not extensions of undergraduate teaching modules; (vi) an ability to create critical mass in the chosen area and to collaborate with international institutions.

A detailed description of the evaluation process and the full list of the evaluation criteria may be found in the Evaluation Guide: (http://www.fct.pt/apoios/programasdoutoramento/concursos/2013a/docs/guiaoavaliacao_en_2013.pdf).

4.2.4. Success rates

Table 4. Success rates for the PhD Programmes calls.

Call	Proposals	Selected Programmes	Studentships proposed	Studentships Awarded	Programmes success rate	Studentships success rates
2013 call National & International	199	34	7660	906	17.1%	11.8%
2013 call Industry setting	13	6	430	168	46.2%	39.1%
2012 call	238	58	8274	1622	24.4%	19.6%
2012 call Industry setting		1				

4.2.5. Differences between scientific areas/Gender issues/Specific funding of applied research and/or interdisciplinary research

The distribution of the number of PhD Programmes and funding per scientific area is available at http://www.fct.pt/apoios/programasdoutoramento/concursos/2013a/docs/PDF-aprovadosAposAvaliacao_EN.pdf.

Out of a total of 96 PhD approved programmes, seven take place in an industry setting and involve 192 PhD studentships.

4.3. CAREER DEVELOPMENT

4.3.1. General description

The career development programmes are under the responsibility of the Department of R&D Units and Research Infrastructures (DSRICT).

One of the principal objectives of FCT's mandate is to ensure training and recruitment of researchers. Since 2006 FCT has launched two major career development programmes for PhD holders of all nationalities and across all research fields who have proven to be capable of carrying out independent research and becoming leaders in their fields:

- **Ciência Programme.** Through the Ciência 2007 and Ciência 2008 calls, FCT aimed at recruiting 1 000 researchers by 2009, through 5-year contracts celebrated between the selected researchers and research units. The first call for this programme was opened in 2006, for units within the SCTN. In 2007, FCT signed contracts with the selected host institutions, awarding a first set of positions. A second call was opened in 2008. As a result

of these two calls, a total of 1 242 positions were funded, with active contracts in 2009. This programme was not followed by any other call.

- **FCT Investigator Programme**, which was launched in 2012 as a highly competitive scheme with the aim of recruiting 1 000 outstanding researchers by 2016, hosted by research institutions across Portugal and providing 5-year individual employment contracts. In addition to a work contract, FCT Investigator grants include start-up funding for those researchers without ongoing research funding.

To date, three calls were opened (in 2012, 2013 and 2014); 369 FCT Investigators were selected in the 2012 and 2013 calls; 228 applications have been approved for funding in the 2014 call (the appeals process is under way).

With regard to this programme, FCT is the sole body responsible for the evaluation and selection processes while in the *Ciência* programme the responsibility for the applicants' selection rested with the host institution. The application and selection procedures for both programmes are described in section 4.3.3.

4.3.2. Strategic goals

The XIX Portuguese Government Programme's strategic guidelines for science emphasised the importance of a sustainable investment in scientific research as a fundamental pillar towards progress and social development, especially regarding advanced training and impact of highly qualified human resources. The resulting objectives are:

- A preferential investment in human capital and in the quality of individuals, particularly the youngest, but not without neglecting the material and institutional conditions essential to the highest effectiveness of their work;
- The permanence in the country of the most talented and promising researchers currently working in Portugal while attracting outstanding individuals from abroad;
- The guarantee of suitable conditions for effective career development and assurance of the required stability and financial planning throughout their scientific activities;

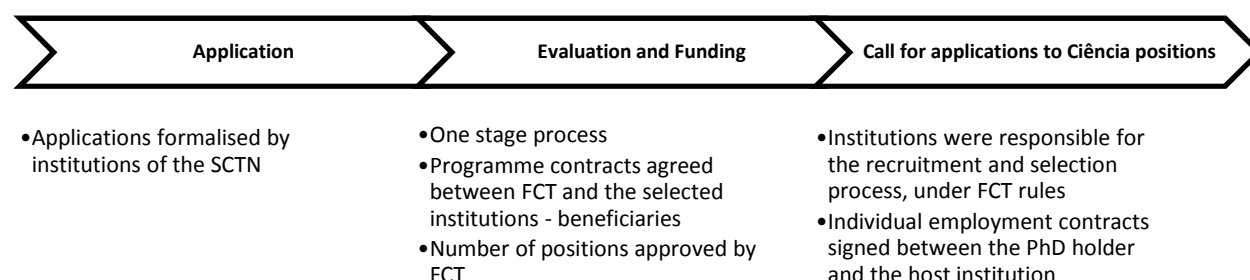
In accordance with these objectives, the career development programmes carried out by FCT over the past years are one of the major instruments to incorporate and promote that policy, enabling the creation of a critical mass of excellent resources and consolidating the steady growth of the SCTN.

4.3.3. Evaluation processes and criteria/main changes between programmes

Although the *Ciência* and FCT Investigator Programmes are both career development instruments, they have different approaches in their evaluation and selection processes. The main steps in both programmes are highlighted below (Fig. 14 and Table 5).

It is important to stress that each call under these two programmes had/has its own regulations and therefore, for more detailed information regarding the specificities of the criteria, weighting and proceedings, consultation of the corresponding evaluation guidelines is also essential (for the last Investigator FCT call see http://www.fct.pt/apoios/contratacaodoutorados/investigador-fct/2014/docs/EvaluationGuide_IF2014.pdf).

CIÊNCIA Programme:



FCT Investigator Programme:

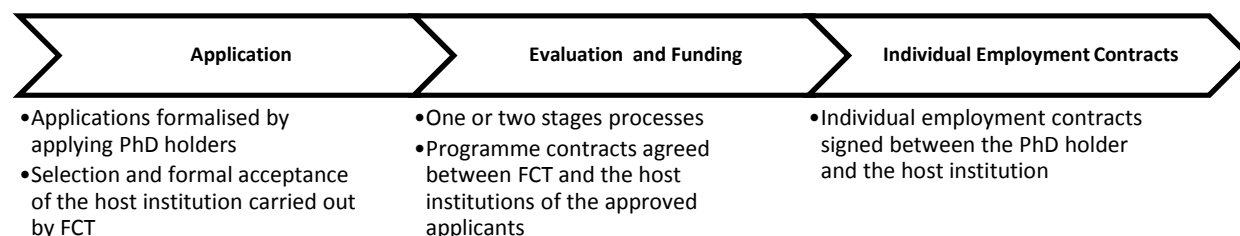


FIG. 14. COMPARISON OF THE CIÊNCIA AND FCT INVESTIGATOR CAREER DEVELOPMENT PROGRAMMES.

Table 5. Detailed comparison between Ciência and FCT Investigator Programmes.

	CIÊNCIA 2007 and 2008	FCT INVESTIGATOR 2012, 2013 and 2014
Recipients & Applicants	<p>Institutions from the SCTN, namely:</p> <ul style="list-style-type: none"> • HEIs in partnership with FCT-accredited R&D units; • Associate Laboratories; • State Laboratories; • Companies recognised for their R&I activities; • Other public or private institutions engaged in R&I activities recognised by FCT. <ul style="list-style-type: none"> • Researchers who did not find a programme framework suitable for their activities in the scientific institutions that presented proposals for contracts could submit an individual application to FCT (only for Ciência 2008 call) 	<p>PhD holders:</p> <ul style="list-style-type: none"> • Portuguese or foreign nationality (or stateless, since the 2013 call); • In any scientific area; • With a scientific and professional CV certifying the scientific ability suited to the level they applied for. <p>The call was intended for PhD holders considering three levels of grants, defined by the number of years after obtaining this degree</p>

	CIÊNCIA 2007 and 2008	FCT INVESTIGATOR 2012, 2013 and 2014
		and/or the merit and distinction of the applicants' scientific career, and also by the degree of scientific independence demonstrated (generally applied to the 3 calls): <ol style="list-style-type: none"> 1. Starting Grant 2. Development Grant 3. Consolidation Grant
Application Components	1. A formal proposal written in English and submitted using the online form available for that purpose	<ol style="list-style-type: none"> 1. Curriculum Vitae 2. Career development plan 3. Research Project
Evaluation Criteria	<ul style="list-style-type: none"> • Installed scientific capacity and relevant scientific production during the last 3 years, especially those that had received very positive international evaluations; • Plan of work and scientific employment as well as any partnerships and supportive networks contemplated; • Host conditions development and co-funding available, as well as the contribution they expected to make towards increasing critical mass relative to quality and national or international cooperation networks; • In the selection of individual applications for PhD research positions, the intrinsic merit of the candidate was based on his/her CV, as well as the work plan to be carried out (only for Ciência 2008 call). 	<p>Without prejudice to the criteria specifically defined in the call's Announcement, the following evaluation criteria were mandatory:</p> <ul style="list-style-type: none"> • Merit of the candidate; • [Quality of] the scientific research project; • [Adequacy of] the applicant's career development plan.
Evaluation Panel	FCT undertook the review and selection of proposals to be granted support with the collaboration of a panel of specialists of recognised merit designated by the FCT President.	<p>2012</p> <p>1st Stage: carried out by the FCT scientific councils, which were assisted, where necessary, by panels appointed by the respective chairperson.</p> <p>2nd Stage: carried out by Evaluation Panels consisting of international experts of recognised merit from the four scientific areas corresponding to the FCT scientific councils.</p>

	CIÊNCIA 2007 and 2008	FCT INVESTIGATOR 2012, 2013 and 2014
		<p>2013</p> <p>The Evaluation Panels consisted exclusively of international experts of well-established merit, amply representing the different scientific domains.</p> <p>2014</p> <p>1st Stage: Pre-selection Panels were designated by decision of the FCT Board of Directors and could include national specialists of well-established merit in the respective scientific area.</p> <p>2nd Stage: Evaluation Panels were composed exclusively of international experts of well-established merit while ensuring the representativeness of the different scientific areas corresponding to the FCT scientific councils.</p>

4.3.4. Success Rates

It is not possible to supply an accurate success rate for the Ciência Programme because the entities responsible for the recruitment and selection process were the research units; the positions were awarded directly to the institutions and, in case of waiver or rescission of an individual employment contract, a request for the replacement of the researcher was possible. Even so, it is important to underline that the programme aimed at the recruitment of 1 000 researchers by 2009 and, at that time, 1 242 contracts were ongoing.

Table 6. Success rates of the Investigator FCT Programme.

2012 FCT Investigator Call					
Evaluated Applications: 1175		Approved Applications: 159		Success Rate 13.5%	
Applications per Typology					Success Rate
Starting	Evaluated	726	Approved	67	9.2%
Development		352		79	22.4%
Consolidation		97		13	13.4%
Applications per Scientific Domain					Success Rate
Life and Health Sciences	Evaluated	154	Approved	39	25.3%
Exact Sciences and Engineering		515		64	12.4%
Natural and Environmental Sciences		271		30	11.1%
Social Sciences and Humanities		235		26	11.1%
2013 FCT Investigator Call					
Evaluated Applications: 1479		Approved Applications: 209		Success Rate: 14.1%	
Applications per Typology					Success Rate
Starting	Evaluated	986	Approved	126	12.8%
Development		445		74	16.6%
Consolidation		48		9	18.8%
Applications per Scientific Domain					Success Rate
Life and Health Sciences	Evaluated	249	Approved	48	19.3%
Exact Sciences and Engineering		529		75	14.2%
Natural and Environmental Sciences		381		56	14.7%
Social Sciences and Humanities		320		30	9.4%
2014 FCT Investigator call*					
Evaluated Applications: 1389		Approved Applications: 228		Success rate: 16.3%	
					Success Rate

Applications per Typology					
Starting	Evaluated	902	Approved	152	16.9%
Development		457		68	14.9%
Consolidation		39		8	20.5%
Applications per Scientific Domain					Success Rate
Medical and Health Sciences Panel	Evaluated	218	Approved	43	19.7%
Exact Sciences Panel		205		43	21%
Engineering and Technology Panel		173		26	15%
Environmental and Agricultural Sciences Panel		255		33	12.9%
Natural and Animal Sciences Panel		144		42	29.2%
Social Sciences Panel		240		22	9.2%
Humanities Panel		163		19	11.7%

* Appeals process under way.

4.4. PROJECT GRANTS

4.4.1. General description

Of particular importance as part of FCT's mission (through the Department of R&D Programmes and Projects, DPP) is the promotion and reinforcement of the competencies of R&D units, through the involvement of their research teams in scientific research and technological development projects (SR&TD) in all scientific domains.

The general conditions explaining access to and awarding of funding for SR&TD Projects as well as the rules concerning their execution are specified in the *Regulations concerning Access to Funding for Scientific Research and Technological Development Projects — 2010* (with the 2011 alterations), available at <http://www.fct.pt/apoios/projectos/regulamento.phtml.en>.

4.4.2. Strategic goals

FCT supports research teams in exploring innovative ideas or applications, through annual calls in all scientific areas, or calls aimed at research targeted at more specific themes.

The following table shows the number of approved R&I project grants and the funding involved in the last five major calls for projects in all scientific domains (the most representative of the activity of DPP). In addition, the number of project grants approved and awarded in specific calls (mainly within the international partnerships with US universities) is also shown. The application, evaluation

and selection processes for these projects are coordinated by FCT with the support of the Scientific Boards of each international partnership.

Table 7. Number of approved projects and funding awarded (2008-2013).

Call	Number of projects approved	Total funding awarded
All Scientific Domains – 2008, 2009, 2010, 2012, 2013	3669	€ 447 111 483
Specific calls (including International Partnerships)	343	€ 49 388 740
Transnational	181	€ 23 456 386

As part of its remit, FCT also participates in various transnational networks and programmes (see section 4.8). These networks/programmes encompass calls for collaborative projects involving teams from several countries. The application, evaluation and selection processes for these projects involve the international structures of the programmes/networks, in line with that outlined in the respective Memoranda of Understanding and in the terms of each call for proposals. As such, these projects are not mentioned in section 4.4.4. (Success rates) given that the evaluation and decision process for these applications is the responsibility of international bodies, with FCT ensuring the corresponding national funding component.

4.4.3. Evaluation processes and criteria/main changes introduced in recent calls

The evaluation of applications is carried out by panels of independent national (provided they are affiliated to foreign institutions) or international renowned evaluators, along with the possibility of asking opinions from external experts.

The evaluation panels are formed per scientific area for each call and their composition is public (see <http://www.fct.pt/apoios/projectos/consulta/avaliacoes.phtml.en> - constitution of evaluation panels since the 2006 call).

The ranking methodology is based on the Project Merit Indicator, which in turn is based on the following criteria, outlined in the Regulations mentioned in section 4.4.1:

- A. Scientific merit and innovative nature of the project from an international perspective;
- B. Scientific merit of the research team;
- C. Practicability of the work programme and budget reasonableness;
- D. Contribution towards the accumulation of knowledge and competencies for the SCTN (expected effects and results);

E. Economic valorisation potential of the technology (where appropriate).

In order to make funding selections and decisions, the projects are ranked in decreasing order of the classification obtained during the evaluation process.

In general terms, it can be stated the main alterations which occurred in evaluation procedures resulted from the creation of an additional structure in 2012, the Evaluation Office (GAV), supervised by the FCT Board of Directors, which produced a set of alterations at the level of procedures and responsibilities in evaluation.

The process of recruiting and selecting evaluators to make up the evaluation panels for the 2012 and following calls, as well as the identification of the external experts involved in considering the applications was thus handed over to GAV (see section 3.1).

It is important to clarify that until the 2012 call, evaluation involved two distinct stages consisting of the following components:

1st Stage - Individual on-line evaluation

Distribution of the applications to be evaluated by each panel member and external expert was carried out by the coordinator(s)/chair(s) of each evaluation panel. All those involved in the process had access to the applications available on the Internet through the use of electronic credentials, with at least two individual opinions per application being drawn up in the stage prior to the panel meeting.

2nd Stage - Panel Evaluation / Face-to-face Meetings

Based on the individual opinions and the classifications awarded, the panels classified, ranked and selected the applications for funding. All applications were discussed by the evaluation panel.

After the setting up of GAV in 2012, the evaluation process consists of the following stages:

1st Stage - Individual on-line evaluation

The individual evaluations are preferably carried out by external experts. The distribution of applications to each evaluator is carried out by GAV. All those involved in the process have access to the applications that are available online, through the use of electronic credentials, with at least two individual opinions per application being drawn up in the stage prior to the panel meeting.

A 1st Reader and a 2nd Reader from amongst the panel members are designated for each application being evaluated. The 1st Reader has the responsibility of reading the two evaluations of the external members and drawing a draft consensus report to be communicated to the principal investigator, which is discussed during the panel meeting. The 2nd Reader has the responsibility of formulating an opinion for each application, based on the two individual external evaluations.

2nd Stage - Panel Evaluation / Face-to-face Meetings

Based on the individual opinions, the classifications awarded and the analyses carried out by the 1st and 2nd Readers, the panels then classify, rank and select the applications for funding. All applications are discussed by the evaluation panel.

A detailed description of the procedures linked to the evaluation processes (including issues of confidentiality and possible conflicts of interest) can be found in the Guide for Peer Reviewers, available at http://www.fct.pt/apoios/projectos/guioes.phtml.en#todos_avalicao, concerning calls from 2008 onwards.

4.4.4. Success rates

Table 8. Success rates of calls in all scientific domains (2008-2013).

Call	Evaluated Applications	Funded Applications	Funding Requested	Funding Granted	Success rate - applications	Success rate - funding
2008	5698	1405	€ 827 091 530	€ 185 506 666	24.7%	22.4%
2009	4273	765	€ 624 510 053	€ 91 176 251	17.9%	14.6%
2010	4499	634	€ 623 710 733	€ 68 930 381	14.1%	11.1%
2012	5147	633	€ 697 047 043	€ 91 331 033	12.3%	13.1%
2013 Exploratory	1831	232	€ 81 838 083	€ 10 167 152	12.7%	12.4%

Table 9. Success rate of specific calls (2008-2013).

Call	Evaluated Applications	Funded Applications	Funding Requested	Funding Granted	Success rate - applications	Success rate - funding
Specific Calls	998	343	€ 207 050 491	€ 49 388 740	34.4%	23.9%

4.4.5. Differences between scientific areas and funding of applied or interdisciplinary research

The projects funded by FCT cover all scientific domains, with the beneficiary entities mainly being R&D units and non-profit private institutions, which carry out scientific research. The projects supported within the scope of these calls are mainly projects with a length of 3 years and a maximum funding of €200 000.

Companies may constitute themselves as benefiting agents provided they are part of projects led by non-profit public or private R&D institutions and may not be Proponent Institutions, except within the framework of calls which form part of EU programmes especially designed for industry.

The introduction of four new distinct project typologies in the 2012 call should be noted, with these being differentiated in terms of the organisation of activities and their average size and materials and human resources needs.

A description of these project typologies can be found in section 2.6.1.2.

In 2013, the call launched by FCT sought to support exploratory one-year projects, with the objective of promoting the development of emerging scientific areas and/or the consolidation of excellence in already established areas. These projects had a maximum funding limit of €50 000 per year, and were aimed at researchers who had obtained their doctorate between 2003 and 2009.

The distribution of funding granted by FCT to SR&TD projects in the different scientific areas is available at <http://www.fct.pt/estatisticas/proyectos/ResumoEstatisticasProyectosEN.pdf>.

Finally, it should be emphasised that the evaluation and ranking of applications submitted has been carried out on the basis of the criterion of scientific quality, which runs through all scientific domains, with the evaluation process not being *a priori* based on funding quotas per domain.

4.5. R&D UNITS

4.5.1. General description

The funding schemes for R&D units are under the responsibility of the Department of R&D Units and Research Infrastructures (DSRICT).

The Portuguese legal framework (*Regime Jurídico de Instituições de Investigação Científica*) states that institutions pursuing scientific research and technological development activities are distributed into different categories, including public or private research units as well as the R&D units that benefit from the status of Associate Laboratory.

As FCT is the Portuguese public agency for funding science and technology, its mandate includes regular evaluation of the scientific, technical and financial performance of the publicly funded R&D units through a coherent and independent evaluation system. The legal framework foresees an external evaluation under the following principal conditions:

- That it should cover both evaluation of applications to public funding and periodic evaluation of the R&D units;
- That it should be carried out by evaluation panels, consisting predominantly of experts from foreign institutions, in order to promote reciprocity and internationalisation. The panels' composition should be published and periodically reviewed;
- That it should be based, as appropriate, on units' applications or activity reports, focusing on their scientific and financial components, but also on meetings of evaluation panels and on-site visits.

Most research in Portugal takes place in R&D units financed and evaluated by FCT, and those evaluations take place regularly, approximately every five years.

R&D units have an essential role in both advancing research and national development, while establishing themselves as international centres of excellence that address issues of national and

global relevance. The research subjects encompass all scientific fields, from life and health sciences to social sciences and humanities, from engineering and exact sciences to natural and environmental sciences.

4.5.2. Strategic goals

The SCTN has steadily grown over the last decades. A full commitment to excellence is now a decisive objective for the near future. The importance of sustainable investment in scientific research is the cornerstone of the Government's strategic guidelines for science and, therefore, for the FCT funding scheme for research units. The main objectives are: to enable the right conditions to increase the competitiveness, quality and internalization of the R&D units; to facilitate partnerships and knowledge transference between the private and R&D units to be funded by FCT are expected to:

- Present evidence of internationally recognised scientific production;
- Exhibit critical mass;
- Promote a rational use of infrastructures, technical and human resources;
- Contribute to differentiation, competitiveness and wealth creation in the region;
- Contribute to dissemination activities and knowledge and technology transfer.

4.5.3. Evaluation processes and criteria

The table below compares the evaluation processes of the R&D institutions funded by FCT in 2007/2008 (2008 for the Associate Laboratories) with the overall exercise that took place in 2013/2014. This exercise will soon be completed and allowed units to keep the previous organisation or, alternatively, to reorganise their configuration to better achieve their strategic goals. This reorganisation could include the creation of new units, as well as the merger or closure of existing ones.

In 2007/2008 the evaluation procedure was all conducted by FCT. However in the 2013/2014 exercise the guidelines for the reorganisation of the system, as well as for the application process was conducted by FCT, but the evaluation process was fully done independently of FCT, under the auspices of ESF.

Table 10. Main differences between the 2007/2008 and 2013/2014 evaluations of R&D units.

	2007/2008 Evaluation	2013/2014 Evaluation
WWW	http://www.fct.pt/apoios/unidades/avaliacoes/anteriores/index.phtml.en	http://www.fct.pt/apoios/unidades/avaliacoes/2013/index.phtml.en
Beneficiaries	<p>Public R&D units, with the exception of state laboratories, as well as private entities integrated into long-term public funding programmes, or those wishing to undergo the evaluation process</p> <p>Associate Laboratories were evaluated separately, in 2008.</p>	<p>Public R&D units, with the exception of state laboratories, as well as private entities integrated into long-term public funding programmes, or those wishing to undergo the evaluation process</p> <p>Units could keep the previous organisation or reorganise (creation of new units, mergers or closures)</p>
Scientific Domains and Areas	<p>25 scientific areas under evaluation:</p> <ol style="list-style-type: none"> 1. Mathematics 2. Physics 3. Chemistry 4. Biological Sciences 5. Earth and Space Sciences 6. Marine Sciences 7. Agricultural Sciences 8. Health Sciences 9. Civil Engineering 10. Mechanical Engineering 11. Materials Science and Engineering 12. Chemical Engineering and Biotechnology 13. Electrical and Computer Engineering 14. Economics and Management 15. Law and Political Sciences 16. Sociology Anthropology Demography and Geography 17. Educational Sciences and Policies 18. Psychology 19. Linguistics 20. Communication Sciences 21. Literature Studies 22. Art Studies 23. Philosophy 24. History 25. African Studies 	<p>4 scientific domains corresponding to the FCT Scientific Councils, consisting of 47 scientific areas:</p> <p>Life and Health Sciences:</p> <p>Neurosciences, Ageing and Degenerative Diseases/Immunology and Infection/Diagnostic, Therapies and Public Health/ Clinical Research/Biomedicine/Biochemical Sciences/Experimental Biology</p> <p>Exact Sciences and Engineering;</p> <p>Materials Science and Engineering/ Civil Engineering/Electronics and Electrical Engineering/Computer Science and Engineering/Chemistry</p> <p>Biotechnology/Chemical Engineering/ Bioengineering/Nanoscience and Nanotechnology/Mechanical Engineering and Engineering Systems/Physics/Mathematics</p> <p>Natural and Environmental Sciences:</p> <p>Animal Science and Veterinarian Science/ Agricultural and Forestry Sciences/Bio-Based Product Technology or Food Sciences/ Marine Sciences and Technologies/</p>

	2007/2008 Evaluation	2013/2014 Evaluation
		<p>Geosciences/Biological Sciences or Environmental Biology/Environmental Sciences</p> <p>Social Sciences and Humanities:</p> <p>Economics/Finance/Business/Geography/ Demography/Architecture and Urbanism/ Sociology/Anthropology/Political Science/ Law/Educational Sciences/Communication and Information Sciences/Linguistics/ Archaeology/Philosophy/History/Heritage and Museology/Literary Studies/Art Studies/ Design/Psychology</p>
Application Components	<p>Submission of an Activity Report for the last four years (2003-2006) and an Activity Plan for 2007-2010. Reports organised into two parts:</p> <ul style="list-style-type: none"> • Part A concerning the R&I Unit as a whole, including its organisation, objectives, main achievements, outreach activities and key aspects of its activity planning for 2007-2010; • Part B concerning each research group within the R&I Unit, listing the Principal Investigator, other PhD holders involved, objectives, funded projects, meaningful achievements, 10 relevant publications, MSc training and/or PhD programmes, organisation of conferences, patents or prototypes, links to industry and internationalization projects or activities. Groups should identify goals to be attained during the period 2007-2010, as well as specific needs. 	<p>Applications submitted online via a specially designed FCT web platform. A single submission of the full proposal followed by a two-step evaluation process.</p> <p>The two main elements provided in the application were:</p> <ul style="list-style-type: none"> • Part A, including the main results and performance outputs of the R&I unit for the 2008-2012 period (Performance Indicators); • Part B, including the strategic programme of the R&I unit for 2015-2020, objectives, implementation process, advanced training opportunities, internationalization activities, knowledge transfer, expected outputs and duly justified budget proposal. Part B also includes the organisational structure, the composition and the unit's objectives (Strategic Programme).
Evaluation	Nomination of a National Scientific Coordinator whose main functions comprised the preparation of all evaluation supporting documents, selection of the panels'	Contract with the European Science Foundation (ESF) for conducting the review, including the selection of the external experts and evaluation panels.

	2007/2008 Evaluation	2013/2014 Evaluation
	<p>coordinators, participation in the preliminary panels' meetings, organisation of the site visits and preparation of the final evaluation reports (the global report and one for each scientific domain).</p> <p>A single stage evaluation, encompassing a preliminary on-line assessment of the submitted documents (namely the Activity Report and Plan) followed by visits and meetings in the R&D units.</p> <p>Units' comments on the outcomes of the evaluation process sent to the panels' coordinators for reconsideration, with the possibility of an amendment proposal to be approved by FCT and authorized by the responsible Ministry.</p> <p>When the number of complaints on a scientific area exceeded 50% a reassessment by a new evaluation panel was foreseen.</p>	<p>1ST STAGE OF THE EVALUATION</p> <p>The 1st stage of the evaluation focused only on the application forms submitted by each unit and consisted of a pre-selection procedure to identify the R&D Units that gather the minimum requirements for the more detailed assessment to take place in the second stage of the evaluation.</p> <p>Rebuttal phase: The evaluation of the units began with three external reviews. The reports of the external reviewers were sent to the coordinators of units, who had the opportunity to comment, reply or clarify critical issues raised by the reviewers (rebuttal). The rebuttals submitted by the unit coordinators were included in the information presented by the rapporteurs at the panel meetings.</p> <p>2ND STAGE OF THE EVALUATION</p> <p>The 2nd stage of the evaluation consisted mainly on a more detailed assessment – preferentially undertaken under the form of site visits or through interviews with the units' directors – to all the units pre-selected in the first stage of the evaluation, and the corresponding reports and final qualitative overall grading.</p>
Criteria	<p>Evaluation of individual research groups:</p> <p>A. Productivity: total output of the group in its many different forms, including publications, patents, prototypes and products</p> <p>B. Relevance: Refers to the scientific, technical and/or socio-economic impact of the work</p>	<p>A high level of scientific merit, in terms of international standards, is the main standard used to assess and to prioritize funding. This criterion applies to past and future planned research activities as well as to the R&D Unit's research team.</p> <p>Evaluation takes two major aspects into</p>

	2007/2008 Evaluation	2013/2014 Evaluation
	<p>carried out by the group. Research choices with regard to current trends at the international level were an essential component. Organisation of conferences and seminars, as well as collaborative international publications were considered.</p> <p>C. Feasibility: capacity of the group to transform interesting plans into practical projects relevant at the international level.</p> <p>D. Training: Training of PhD and MSc students and participation in graduate programmes.</p>	<p>account:</p> <p>(1) The scientific and technological activities undertaken since the last evaluation (2007/2008);</p> <p>(2) Research strategies and planned work for the next six years, consolidated as a strategic programme.</p> <p>Evaluation is based on the following main criteria:</p> <p>A. Productivity and contribution to the National Scientific and Technological System;</p> <p>B. Scientific and technological merit of the research team;</p> <p>C. Scientific merit and innovative nature of the strategic programme;</p> <p>D. Feasibility of work plan and requested budget reasonability;</p> <p>E. Impact of its scientific, technological and cultural output (this criterion only applies to the 2nd Stage).</p>
Grading	<p>Rating of Individual Groups (5-point Rating Scale):</p> <p>5) Internationally recognised outstanding research, which contributes to the advancement of the field.</p> <p>4) High quality international research, which leads to some contributions to the field.</p> <p>3) Good, solid research at the international level which might lead to incremental contributions to the field.</p> <p>2) Satisfactory research at the international level, which will not necessarily lead to, recognised contributions to the field.</p> <p>1) Unsatisfactory research, which is unlikely to contribute to advancement of the field at any level.</p>	<p>1. The first evaluation stage assigned grades of “Good”, “Fair” or “Poor”.</p> <p>2. The second evaluation stage assigned grades of “Exceptional”, “Excellent”, “Very Good”, “Good”, “Fair”, or “Poor”.</p> <p>Exceptional R&I Unit recognised as an international reference for its scientific and technological output and exceptional contributions to its area of research.</p> <p>Excellent R&I Unit distinguished by the high quality and international merit of its scientific and technological outputs and with significant contributions to its area of research.</p> <p>Very Good R&I Unit with high quality and national merit and with significant</p>

	2007/2008 Evaluation	2013/2014 Evaluation
	<p>Overall grading of the units</p> <p>Excellent - Unit in which one or more groups carried out internationally recognised outstanding research which contributed to the advancement of the field while most others did high quality international research which lead to some contributions to their specific fields.</p> <p>Very good - Unit in which most groups did high quality international research which lead to some contributions to the field and the remaining did good, solid research at international level leading to incremental contributions to their fields.</p> <p>Good - Unit in which one or few groups did high quality international research, which leads to some contributions to the field while most groups did good, solid research at international level leading to incremental contributions to the field.</p> <p>Fair - Unit in which few groups did good solid research at the international level leading to incremental contributions to the field while most groups did satisfactory research which will not necessarily lead to any significant contributions to the field.</p> <p>Poor - Unit in which few groups did satisfactory research at the international level which will not necessarily lead to recognised contributions to the field and most groups carried out research that is unsatisfactory and unlikely to contribute to advancement of the field at any level.</p>	<p>contributions of international relevance in its area of research.</p> <p>Good R&I Unit with quality at the national level, reduced internationalization and some contributions to its area of research domain.</p> <p>Fair R&I Unit without significant contributions to its area of research.</p> <p>Poor R&I Unit without contributions to its area of research and with other weaknesses.</p>

	2007/2008 Evaluation	2013/2014 Evaluation
Funding	<p>Multiannual Funding assigned to the units classified as “Excellent”, “Very Good” and “Good”, based on the Full Time Equivalent (FTE) number, until 2010. For the 2011-2014 period this funding scheme was replaced by a Strategic Project.</p> <p>Programmatic Funding assigned to all the R&D Units with the Associate Laboratory status, which was replaced for the 2011-2014 period by a Strategic Project in addition to core funding.</p>	<p>Funding for units consists of two major components:</p> <p>A. A core funding component, to be allocated to units classified as “Good” or above according to the classification obtained in the evaluation, indexed to the size of the unit (considering the number of integrated PhD holders) and to a correction factor corresponding to the level of laboratory intensity;</p> <p>B. A strategic funding component, to be allocated to units classified as “Exceptional”, “Excellent” or “Very Good”, based on the proposed strategic programme and its evaluation by the review panel.</p>
Mid-term Evaluation	Never occurred.	R&D units will be subject to a mid-term evaluation, to take place within three years, which can result in a proposal to change the obtained classification and, therefore, the funding awarded.

4.5.4. Results of the two last evaluations

Table 11. Results of the 2007/2008 evaluation.

R&D units			Associated Laboratories		
378 units evaluated (out of 382 applications)			25 evaluated		
	Grade	% of units			
With Funding	Excellent	14.4 %	With Funding	Excellent + 2 new ALs approved	24
	Very Good	36.7 %			
	Good	30.9 %			
	Grade	% of units			
Without funding	Fair	16.0 %			
	Poor	2.1 %			

Table 12. Results of the 2013/2014 evaluation (before appeals process).

Evaluated applications: 322			
		Units	% of units
Stage 1	Proceeding to Stage 2	178	55.3%
	Not proceeding to Stage 2 (Poor, Fair, Good)	144	44.7%
	With funding (Good, Proceeding to St. 2)	259	80.4%
	Without funding (Poor, Fair)	63	19.6%
After Stage 2	Exceptional	11	3.4%
	Excellent	52	16.1%
	Very Good	104	32.3%
	Good	90	28%
	Fair	33	10.2%
	Poor	32	9.9%
	With funding	257	79.8%
	Without funding	65	20.2%

4.6. RESEARCH INFRASTRUCTURES

4.6.1. General description

Funding for research infrastructures is under the responsibility of the Department of R&D Units and Research Infrastructures (DSRICT).

The National Programme for Scientific Equipment Renewal (PNRC) was launched by FCT in 2001/2002 specifically to support the expansion, update and acquisition of scientific equipment. The PNRC rules prescribed the sharing amongst national institutions of expensive, large-scale equipment to be used in a linked manner by the scientific community. Accordingly, a significant number of such equipment was incorporated within national networks, based on the recommendations of evaluation panels and the needs and capabilities of national institutions. PNRC implementation lasted until the end of 2011. The major results of this programme are available at www.fct.pt/apoios/equipamento/indicadores.phtml.en.

In 2012, four distinct R&D project grant typologies were created (section 2.6.1.2), one of which (Resources Grants) being intended to support research activities strongly depend on equipment, material resources or qualified human resources which, through their absence or insufficiency, would limit production and scientific growth in specific areas. This project typology allowed PNRC proponents to apply for funding according to their needs, bearing in mind that a call for a national roadmap of research infrastructures was being setup (description below).

The call for a National Roadmap of Research Infrastructures (RNIE) was launched by FCT in 2013. The funding (2014-2020) for the infrastructures included in the roadmap is ensured within the scope of structural funds.

4.6.2. Strategic goals

The main strategic goal of PNRC was the renewal the national research infrastructures, by financing the expansion, update and acquisition of scientific equipment. The support of FCT was exclusively devoted to direct costs of equipment acquisition.

The main PNRC strategic goal was the renewal of national research infrastructures, by financing the expansion, updating and acquisition of scientific equipment. FCT support was exclusively devoted to equipment acquisition direct costs.

The main objectives of RNIE are: assess national research infrastructures for the creation of a roadmap of strategic interest; structure the planning horizon with a medium-term (six years) investment of a strategic nature - discouraging redundancies and promoting synergies; prioritise funding, identify areas and potential beneficiaries; build a national infrastructures database.

4.6.3. Evaluation processes and criteria

PNRC: The evaluation process was concluded in 2004, and applications were evaluated in all scientific areas by panels consisting almost exclusively of foreign experts or Portuguese experts

residing abroad. The reports produced by the evaluation panels were analysed by the FCT Board, assisted by the Presidents of its Scientific Councils. The following parameters were considered in each scientific field: a) Quality and originality of the scientific activity that would be made possible through the acquisition of the equipment; b) Scientific merit of the research team and the results of previous evaluations of the institutions involved; c) Level of previous use of equipment purchased with public funds and results achieved with it; d) Feasibility of the work programme and budget reasonableness; e) Contribution of the project to PNRC objectives.

RNIE: The evaluation and selection process considered both the scientific merit and the strategic relevance of the applications. The evaluation of the scientific merit of the proposals was carried out by an international panel of 105 evaluators, and was based on: (a) Scientific and technological excellence of the infrastructure; (b) Governance capacity and implementation feasibility; (b) Budget and sustainability. The strategic panel only assessed the applications after the scientific merit panel had finished its work and considered its result as a key basis for any further recommendations. The strategic assessment considered the contribution of the infrastructures to the development of national and regional policies, the contribution towards the strengthening of national and international competitiveness (including the capacity to link to European research infrastructures, within the framework of the ESFRI - European Strategy Forum on Research Infrastructures), and the potential of the infrastructures for economic and social development and the implementation of public R&I policies.

4.6.4. Success rates

The implementation of PNRC lasted until the end of 2011. Out of 421 applications, 241 were approved (57% success rate) corresponding to 96.9% of predicted maximum total funding allocated.

RNIE: Out of the 121 evaluated applications, 55 applications (45.5%) were included in 40 research infrastructures within the roadmap, following FCT's proposal for the fusion of several infrastructures to avoid duplication and to increase critical mass. A summary of the results can be found at <https://www.fct.pt/estatisticas/infraestruturas/index.phtml.en>.

4.6.5. Differences between scientific areas and funding of applied or interdisciplinary research

PNRC: this programme was open to all scientific areas.

RNIE: To develop the landscape of RIs within their specific scientific fields, seven scientific areas were defined, in line with the areas of the European Strategy Forum on Research Infrastructures (ESFRI): Social sciences and humanities; Physical sciences and engineering; Environmental sciences; Biological and medical sciences; Materials and analytical facilities; Energy; E.infrastructures.

4.7. KNOWLEDGE TRANSFER

4.7.1. General description

In order to maximise the economic impact of public investment in science, the FCT Technology Office manages programmes facilitating knowledge transfer to industry. The Technology Office is sub-divided into four units dealing with the following themes:

Unit 1 – Industrial Liaison Officer for Industrial Policy matters at CERN, ESO, ESA and ESRF

As a Member State at CERN-ESO-ESA and Associate Member at ESRF, Portugal benefits from the scientific participation and advanced training to its national research community. In order to justify such a significant investment, Portugal may leverage its participation by having an active industrial policy with clear returns to the national economy. To this end, the Industrial Liaison officer at FCT has the responsibility of identifying and promoting technology based Portuguese companies able to be reliable and innovative suppliers of products and services to these international organisations.

Unit 2 – Space Technology Transfer and Intellectual Property Policy

Space Technology Transfer

At FCT, Space Technology Transfer is envisioned by a close collaboration with the European Space Agency (ESA). To this end, the Portuguese Technology Transfer Initiative (PTTI) brings together the *Instituto Pedro Nunes* (IPN), FCT and ESA within an institutional collaboration with the goal of strengthening the competitiveness of the Portuguese Space Industry by supporting and facilitating the transfer of space technologies to non-space markets. This collaboration is within the scope of the ESA Technology Transfer Programme Office (TTPO) to support technology transfer initiatives in certain ESA Member States through National Technology Transfer Initiatives. In the project, while all funding is made available by ESA, IPN is charged of the management and implementation of the project, with FCT support. This innovative instrument for space technology transfer has enabled FCT to pursue the same collaboration model to support the creation of the ESA Business Incubation Centre (BIC) and an Integrated Applications Platform (IAP) in Portugal, starting from 2015, enabling entrepreneurs to receive comprehensive business and technical support to set up their business using space technology for non-space industrial and commercial uses.

Intellectual Property Policy

In order to ensure that FCT public funding for R&D projects, scholarships, and other instruments may impact economic growth, an intellectual property (IP) policy is of paramount importance to monitor the IP developed from fundamental and applied research. The IP policy designed for FCT is endorsed by the Portuguese Institute for Industrial Property (INPI), and aims to monitor the R&D projects, scholarships and FCT investigator programmes in order to quantify the IP created, preferentially with an envisaged commercial path. Furthermore, the IP policy will enable FCT, on a case-by-case basis, to decide on owning the created IP or if it is of no interest to the national research community and ecosystem.

Unit 3 – International Partnerships

Launched in 2006, the International Partnerships promote the strengthening of the Portuguese scientific institutions, fostering innovative research projects and highly qualified human resources that contribute to strengthening Portuguese scientific and technological competencies.

The partnerships include the following institutions: Massachusetts Institute of Technology (MIT), Carnegie Mellon University (CMU), University of Texas at Austin (UTAustin) and Fraunhofer Portugal.

The first stage of the International Partnerships ended in 2012. After an independent external evaluation, led by the Academy of Finland, a second stage was recommended given the demonstrated potential of this model for promoting R&I and cultural change.

The second stage of the partnerships is now in progress until 2017. The activities undertaken by the several programmes have the common goal of promoting research with an entrepreneurial objective. Promoting scientific research focused on innovation and with a technology transfer component is now the mission of these programmes.

The R&I research project calls promoted by FCT, under these partnerships, have as main objective to develop innovation research with a strong economic impact, showing a strong link between academia and industry.

Unit 4 – International programmes for Industrial R&I – EUREKA, Eurostars

FCT manages these two programmes, acting as the National Project Coordinator. The EUREKA Initiative consists of 40 European countries, the European Commission and two associated states: South Korea and Canada, based on equality of cooperation between all its members. Portugal is a member country of EUREKA. This aims to boost the productivity and competitiveness of European industry, research and development institutions and universities to jointly develop market oriented research and development projects at a European and global level.

The Eurostars programme is a joint initiative between EUREKA and the European Commission and the first European funding and support programme to be specifically dedicated to research-performing SMEs. Eurostars, now proceeding to the second edition, stimulates international collaborative research and innovation projects by easing access to support and funding. Through this joint initiative, Eurostars aims to combine the best of two worlds with a bottom-up approach, a central submission and evaluation process, and synchronised national funding.

4.7.2. Strategic goals

Unit 1 – Industrial Liaison Officer for Industrial Policy matters at CERN, ESO, ESA and ESRF

- Reach a positive industrial return for Portugal.
- Ensure targeted marketing of Portuguese institutional and industrial stakeholders as scientific and industry partners of excellence.

Unit 2 – Space Technology Transfer and Intellectual Property Policy

- Support the implementation of the ESA BIC and IAP platform in Portugal for space entrepreneurship
- Design an IP policy for FCT and raise awareness of IP matters within FCT Directors, Heads of Office and general staff through a series of workshops.

Unit 3 – International Partnerships

- Launch Calls for Entrepreneurial Research Initiatives and Test-Beds that involve industry partners
- Consolidate key performance indicators that show the impact of the International Partnerships in the Portuguese scientific and innovation ecosystem.

Unit 4 – International programmes for Industrial R&I – EUREKA, Eurostars

- Ensure the financial commitment of Portugal to participate in the 2nd Edition of the Eurostars programme

4.7.3. Outcomes

Unit 1 – Reach a positive industrial return for Portugal. Between 2000 and 2013 more than €206 million in contracts (products and services) returned to Portugal. Portugal has a significant industrial return and an active industrial policy.

Unit 1 – Ensure targeted marketing of Portuguese institutional and industrial stakeholders as excellence partners. Two catalogues produced describing key stakeholders in Portugal from academia and industry, one for the space sector and another for Portugal participation in Large Scale Research Facilities. The catalogues will be disseminated among the national and international scientific and industrial community.

Unit 2 – Support the implementation of the ESA BIC and IAP Platform in Portugal for space entrepreneurship. ESA BIC and IAP Platform in Portugal, announced its launching at a major event in November 2014, Lisbon. The initiatives will kick-start at the beginning of 2015.

Unit 2 – Design an IP policy for FCT and raise awareness of IP matters within FCT Directors, Heads of Office and general staff through a series of workshops. The IP Policy document is ready to be implemented at the beginning of 2015. A series of awareness workshops on IP matters will start in December 2014.

Unit 3 – Launch Calls for Entrepreneurial Research Initiatives and Test-Beds involving industry partners to develop projects with impact. Calls were launched in 2013-2014 involving several major Portuguese industry players. Projects are ongoing.

Unit 3 – Set key performance indicators showing the impact of the International Partnerships in the Portuguese scientific and innovation ecosystem. A first time integrated event between MIT, CMU and UT Austin was agreed during 2014. It will take place in April 2015 to show the return on Portuguese public investment of this scientific and technological endeavour. In addition, two platforms for Technology Transfer and International technology-based business

development for global markets are under the Partnerships' spill overs and results, namely The University Technology Enterprise Network (UTEN) and the Global Start-up Programme.

Unit 4 – Ensure the financial commitment of Portugal to participate in the 2nd edition of the Eurostars programme. The Ministry for Education and Science agreed to financially commit to this programme for the Portuguese technological community, with an envisaged option of an additional contribution from the Ministry for Economy.

4.8. INTERNATIONAL COOPERATION

4.8.1. EU Framework Programmes

4.8.1.1. General description

The Framework Promotion Office (GPPQ), created on the 1st of August 2007, has as its main mission the fostering of the participation of the Portuguese research community, as well as industry, namely SMEs, in EU Framework programmes, i.e. FP7 (2007-2013) and Horizon 2020 (2014-2020), including EURATOM and EIT, as well as other specific programmes, such as COST, International cooperation, Coal & Steel, etc.

GPPQ has a dedicated staff of 16 experts in the various thematic areas of the EU FPs (National Contact Points). The NCPs are in charge of:

- Supporting national delegations in the discussion of the annual Work Programmes of the FP themes at all EC levels;
- Coordinating national expert advisory groups to support the decision making process by national delegates to the EU FPs;
- Monitoring the results of the calls launched by EU FPs, both from the EU and Portuguese perspectives, and design and implementing improvement and corrective measures for all shortcomings that might be identified;
- Informing the national scientific and entrepreneurial communities of the opportunities offered by the EU FPs, through a variety of means, notably the web, personal meetings, publications, newsletters, workshops, information sessions and training actions;
- Mobilising the national scientific and entrepreneurial communities towards participation in the EU FPs, providing all necessary support and clarification, including reviewing the proposals to be submitted, should the proposers so wish (but short of actually writing the proposals);
- Offering support to Portuguese participants in their dealings with the European Commission during the life of the projects, during the final reporting phase, and during audits, should problems or disagreements arise;

- Informing national authorities, namely the FCT Board of Directors, of EU trends in R&I, to allow them to decide about a possible alignment between national and EU policies.

In many cases, NCPs also themselves act as national Delegates to the FP Committees and, in any case, NCPs always attend the programme committees as national experts. This is essential for NCPs to be fully aware and well informed about even the most minor details that can make a difference between the success and failure of proposals submitted.

4.8.1.2. Strategic goals

GPPQ was created with the stated goal of increasing the low success rate that Portuguese participants had achieved in the 6th EU Framework Programme (1.01% of EU funds obtained by all national participants together) by at least 20%. Given the results obtained for FP7 (see section 4.8.1.3), the goal has been revised at the end of 2013 to reach a break-even between Portuguese contribution to the EU budget and the H2020 success rate at the end of the programme (1.24% of H2020 funding, or ca. 1.5% of the amounts available for competitive calls).

Beyond these quantitative goals, GPPQ also set a strategic objective of achieving a much increased awareness of the Portuguese scientific and industrial communities about opportunities offered by EU R&I programmes and the benefits of international R&I cooperation towards excellence and innovation.

4.8.1.3. Outcomes

Indicators show that the FP7 success rate for Portuguese participants represented 1.22% of the available EU funds, just about the initial target which had been set. However, it should be noted that GPPQ did not play during the first two years of FP7, due to its late start (mid 2007, with most NCPs starting to work in 2008). For calls 2009-2013, when GPPQ started its support and promotion work, results were much improved and, in the last two years of FP7, 2012 and 2013, they averaged 1.35%, well above the initial target. See <http://www.fct.pt/estatisticas/prog-quadro/index.phtml.en> for a summary of the Portuguese participation in FP7.

For H2020, it is still too early to draw any meaningful conclusions, but, for the 2014 call results known so far (ca. €2 000 million EU funds), Portuguese participants obtained €44 million, i.e., 2.23% of the available EU funds, much above the best FP7 years and well above the break-even target that was set in 2013.

The effect of the GPPQ support is well demonstrated by the success rates (in 2012 and 2013 calls) of the proponents who contacted NCPs versus those who submitted proposals completely on their own (Table 13).

Table 13. Comparison of success rates in FP7 (2012 and 2013 calls) with and without GPPQ advice.

	General support			Detailed advice		Proposal check		No contact with GPPQ	
	PT Proposals submitted	Nr of proposals	Success rate	Nr of proposals	Success rate	Nr of proposals	Success rate	Nr of proposals	Success rate
2012	862	226	30%	66	55%	30	65%	540	11%
2013	1049	281	23%	61	54%	21	62%	679	12%

4.8.2. Multilateral/Bilateral Programmes, Scientific Networks, International Organisations and *fora* of European S&T Policy

4.8.2.1. General description

The FCT Department of International Relations implements international R&I cooperation activities within and outside the European Union, promoting excellence and the internationalisation of Portuguese science. It ensures the active membership and representation of Portugal or FCT in international science organisations and operates a vast portfolio of bilateral agreements and multilateral programmes in R&I cooperation (overall involving over 60 countries). The achievements and goals of the Department fall strictly in line with FCT's strategic goals, notably as regards continued stimulus to the enhancement of international competitiveness and visibility of the Portuguese scientific research community. This has been fostered over the years not only through growing intensive participation in transnational calls for proposals in different R&I fields, but also through the organisation and co-organisation of international networking events.

4.8.2.2. Strategic goals

One of the key strategic goals for the DRI is to bolster its core activities of fostering, consolidating, and optimising international R&I cooperation. This is attained, on the one hand, through FCT participation as funding partner in transnational calls for project proposals, thus enabling the participation of national teams of excellence in international consortia and bilateral research collaborations. Considering FCT's role in the SCTN system, this funding is a very crucial means for the internationalisation of the national scientific community. As such, FCT has significantly increased its financial commitment for multiannual collaborative project funding with other countries in recent years (in 2015, a total €11 097 000 has been allocated to this line of funding, an increase of 204% relative to 2013).

Active participation of R&I policy in European high level groups and *fora*, on the other hand, further enhances the international profile of the national research community and the SCTN. Indeed, the Department contributes importantly at national and international levels to the implementation of the European Research Area, as well as to forward-looking public research policies, representing Portugal in key international science and technology *fora* such as the Strategic Forum for International Cooperation (SFIC), the High Level Group for Joint Programming (GPC), and others with a focus on European target-regions (EU-Africa High Level Political

Dialogue in STI [HLPD], EU-India Group of Senior Officials [EU-India GSO], EU-CELAC Policy Dialogue [EU, Latin American and Caribbean Countries], among others).

Another strategic goal is to increase the number of communication and dissemination events to promote and support the internationalisation of the community. Both through direct communication of funding and cooperation opportunities and in close articulation with other relevant FCT departments and its international counterparts, the Department strives to increase the number of international participations of national research teams, as well as to broaden their scope to new areas and forms of collaboration - emerging and with estimated large potential, or consolidated areas demanding higher levels and numbers with Portuguese expertise. At the same time, it promotes Portugal abroad as an R&I destination (for example, supporting national participation in international events such as Destination Europe, Tours of Scientific Counsellors (European Commission), and within bilateral contexts.

Growing emphasis is given to reflection on and assessment of the outcomes of the international cooperation activities and instruments in which FCT is involved. Further development of these internal assessment exercises, including indicators of the impacts of these instruments on the internationalisation of the Portuguese R&I system must also be considered a strategic goal, to be pursued over the coming years

4.8.2.3. Outcomes

The analysis of investment carried out by FCT to support the internationalisation of the Portuguese scientific community in recent years shows some clear trends. Where only European cooperation instruments are considered, mainly co-funded by the EU Framework Programmes, namely Joint Programming Initiatives (JPI), Coordination Support Actions (CSA)/ERA-NETs and Joint Technological Initiatives (JTI), the collaboration networks of Portuguese scientists, identified through the composition of the consortia in the funded transnational proposals, are stronger with Germany, France, Spain and Italy, with a noteworthy presence of collaborations with Israel and India (Fig. 15).

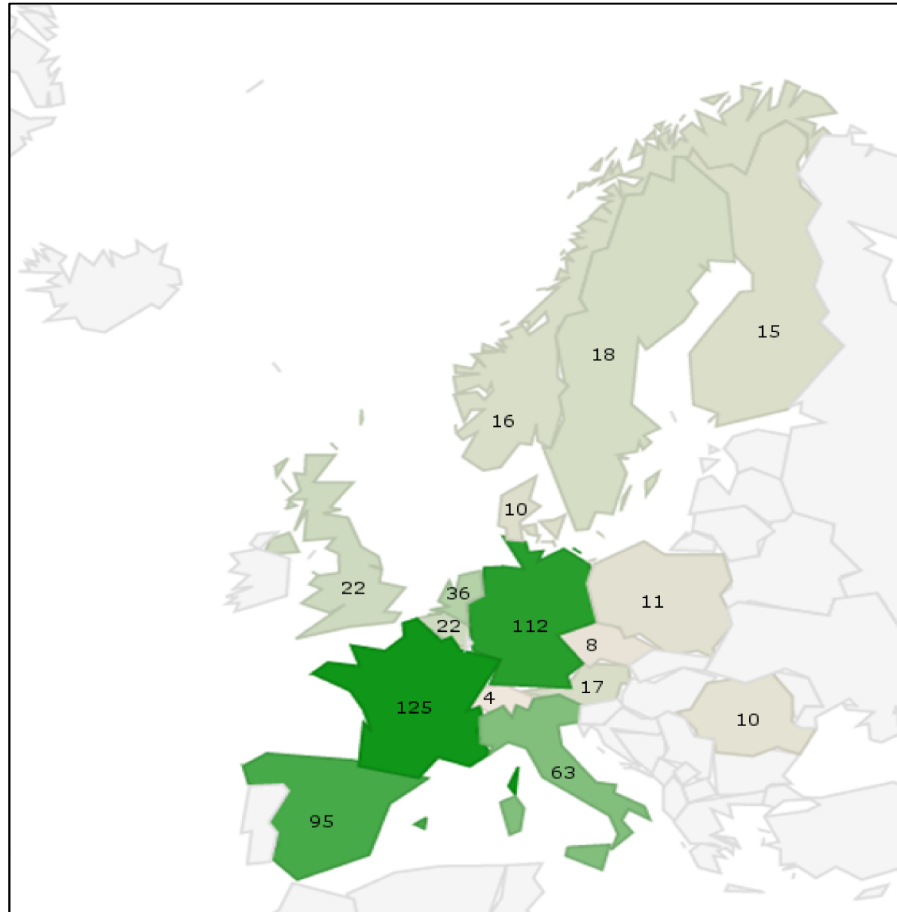


FIG. 15. INTENSITY OF MULTILATERAL COLLABORATION WITHIN THE ERA (PROJECTS FUNDED BY FCT IN JPI, JTI AND ERANET, PER COUNTRY), 2007-2015.

The same analysis performed for bilateral cooperation agreements shows that the country with the strongest link within these is Brazil, followed by France, Tunisia, Spain and Germany. Even though these seem to be the most prominent partners in the cooperation networks of Portuguese scientists, an increasingly wide array of countries can be identified in these collaboration networks, with a growing presence of China. The data suggest a strong internationalisation of the SCTN, which reveals already robust networks of cooperation abroad already well in place. It is noteworthy that in recent years the paradigm of bilateral cooperation has been gradually shifting from mobility of researchers funding schemes to increased funding of joint research projects, opening up opportunities for more diversified internationalisation of the national research teams.

Nevertheless, and considering the essentially collaborative and globalised nature of modern science, supporting its consolidation as well as the creation of new networks of collaboration must remain a priority policy.

Another important aspect is the access given to the scientific community to world-class, international scientific organisations, such as the European Organisation for Nuclear Research (CERN), the European Southern Observatory (ESO), the European Synchrotron Radiation Facility (ESRF), the European Molecular Biology Organisation (EMBO) and the European Space Agency (ESA), among many others. Portugal's membership to these organisations, ensured by FCT, represents an investment of approximately €44 million per year. This not only creates the

opportunity for national researchers to be involved in cutting-edge research environments, but also represents significant indirect support to the national high-technology industry, through the policies of *juste retour* that are implemented in the majority of these organisations.

Looking into the approximately 60 active international cooperation instruments, there is a dominance of instruments related to the environment, followed by health, materials, knowledge-based bio-economy and energy. At the bottom end are active instruments in the social sciences and humanities area, followed by ocean sciences (Fig. 16). This latter result, even acknowledging that the oceans can be a transversal theme - thus covered by other instruments - deserves some careful analysis when considering the national policy priorities for scientific, but also for economic, development.

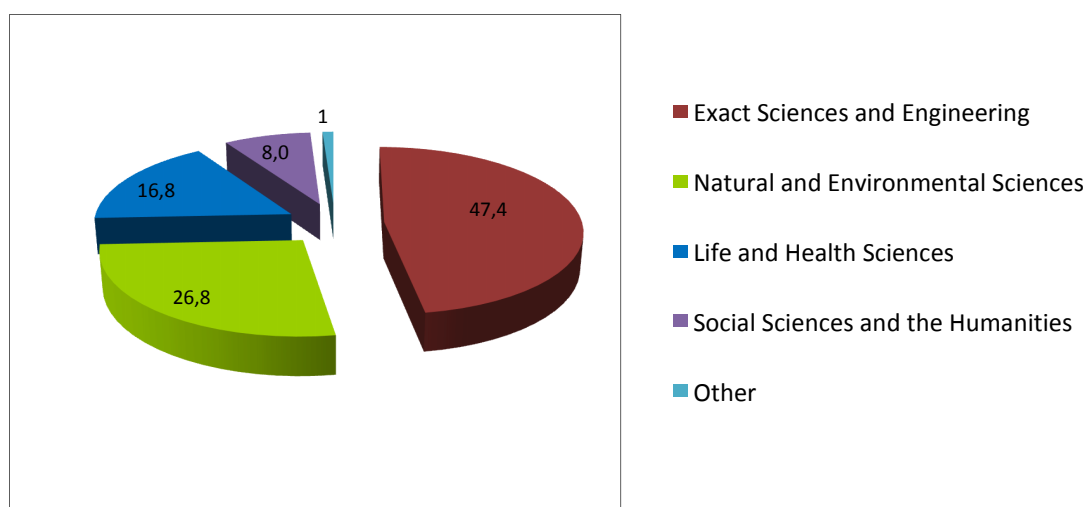


FIG. 16. DISTRIBUTION OF FUNDING (%) PER SCIENTIFIC DOMAIN, ALL COOPERATION INSTRUMENTS, 2007-2015.

Particularly when considering funding intensities, the current profile of international cooperation under the aegis of the Department already reflects the pattern of specialisation recently highlighted by policy makers, buttressing most of the areas where Portugal has comparative advantage, critical mass and clear potential.

4.9. SCIENTIFIC COMMUNITY SUPPORT FUND

4.9.1. General description

The Scientific Community Support Fund (FACC) provides selective funding for initiatives by the scientific community and institutions in Portugal that are excluded from other FCT funding schemes and programmes. FACC supports proposals from all fields of research, aimed at promoting the development and internationalisation of the scientific community. It exists for over 25 years, was restructured in 2012 and, in 2013, reopened with new Regulations.

The types of support specified within the Regulations are:

- Operation of scientific societies or other similar scientific institutions (one annual call);

- Organisation of scientific meetings in Portugal (ongoing open call);
- Publication of scientific non-periodical publications (ongoing open call);
- Participation of researchers in preparatory meetings for presenting applications to competitive international projects (ongoing open call).

In addition, FACC supports other initiatives of the scientific community with recognised merit and impact, which seek to promote R&I activities and/or transmission of knowledge in any scientific area. Such support, designated as Special Support, is decided by the President of FCT, following the submission of a proposal to FCT and its subsequent formalisation. The support granted through FACC partially funds the proposed activities; co-funding by the beneficiary institution or by other entity is mandatory.

The following prizes are also funded through FACC:

- Pulido Valente Science Prize, in partnership with the Professor Francisco Pulido Valente Foundation. This annual prize distinguishes the best article published in the Biomedical Sciences.
- L'Oréal Portugal Medals of Honour for Women in Science, a joint initiative with L'Oréal Portugal and the UNESCO National Committee, to support and motivate women scientists at the start of their career to carry out projects in the areas of health and environment.
- Fernando Gil International Prize in Philosophy of Science, a joint initiative with the Calouste Gulbenkian Foundation, created to honour the Portuguese philosopher Fernando Gil, which seeks to acknowledge a work of outstanding excellence in the domain of the Philosophy of Science.

4.9.2. Strategic objectives

The strategic objectives of FACC follow on from its definition. It should be emphasised that FACC is very different from other FCT programmes, not only in terms of its objectives, but also on the way applications are submitted, the continuous nature of most of the supports, and the FCT response time.

4.9.3. Results (2013 and 2014)

The number of funding requests is high (around 500 applications per year), with an average of 70% being supported. This number is significantly lower than in years prior to the FACC restructuring (around 1400 applications per year).

The applications submitted are mainly for the Organisation of Scientific Meetings in Portugal (61-64%); 16-19% for Special Support, 6-7% Funding for the Operation of Scientific Societies, 11-12% for Scientific Publications and Stimulating Internationalisation (participation of researchers in preparatory meetings for international projects).

It should be emphasised that after 2012, funding of scientific non-periodical publications is restricted, since the regulations exclude support for publications by R&I Institutions funded by FCT and/or by their members, as well as academic theses and collections of texts.

5. INFORMATION SOCIETY

5.1. General description

We live in a global Information Society, where the creation, distribution, use, uptake and manipulation of information underpin economic, social, political, scientific and cultural activities.

At the core of FCT's mission statement is the coordination of Information Society public policies. Since 2012 the Department of Information Society (DSI) has reaffirmed this commitment as it succeeded the public institute UMIC – Knowledge Society Agency. This institutional shift does not mean less consideration is given to Information Society Policy and to the sector, as ICT policies are essential building blocks for societal change, and for competitive and sustainable knowledge economies.

DSI promotes e-inclusion, digital literacy and web accessibility including the Safe Internet; it fosters Research, Development and Innovation (R&I) in ICT and with ICT in priorities areas such as Future Internet, Cloud Computing and Cyber-security; it promotes and modernises, at the policy level, digital infrastructures that support scientific research and technological development, and education (e-Science). The implementation and development of the Internet Governance multi-stakeholder model is one of DSI's core activities. To that effect, it pursues a multi-stakeholder approach on an ongoing basis for the development of public policies in this area.

5.2. Strategic goals

The main policies targeted to promote the use of new technologies are envisaged in the Digital Agenda for Portugal (APD – *Agenda Portugal Digital*) which defines the role of the Information Society within the vision expressed by the “Europe 2020 Strategy”, combined with “Portugal 2020” (the national strategic policy programming tool for the European Union Structural and Investment Funds, 2014-2020), which act as a key driver for national modernisation and international competitiveness.

Regarding international policy in this area, DSI ensures international cooperation and participation within the European Union (EU) and multilateral organisations, as well as bilateral cooperation, affirming the voice of Portugal in the main international public policy *fora* in the Information and Knowledge Society.

Other important aspect is the intense intervention of DSI regarding Internet Governance-related policies within an open and transparent multi-stakeholder model at a worldwide level.

Support is also given to e-Science policy with special focus on Open Access that aims to increase the creation and transfer of knowledge by making available scientific research publications and research data that result from projects supported through public funds.

Information Society future development will also depend on our capacity and ability to power and to boost R&I (installed and/or emerging) through: national political coordination (linking and

conciliation of policies with support/incentive instruments); the enhancement of the relationship between scientific and technological knowledge production centres and enterprises; the affirmation and growth (in terms of dimension and market) of Portuguese enterprises (with special attention given to start-ups) and the promotion of international leadership for Portuguese R&I teams in the areas where their capacity and quality are recognised.

One of the flagship initiatives of DSI is its support for Digital Inclusion, Literacy, Accessibility and e-Skills. Digital literacy covers a variety of skills that range from basic awareness and training to fostering informed citizens and building consumer and user confidence. The latest aim of its action is to reduce the digital divide by acquisition and/or development of digital skills (e-skills) and to decrease the number of people who have never used the Internet by ensuring citizens have the resources to learn how to access, use, understand and create with digital technology. With regard to Web Accessibility, the participation of disabled people is encouraged where assistive products, assistive services and digital contents are defined as spheres of action.

Moreover, DSI proposes the actions necessary to participate in the promotion of cyber-security and trust in the use of Internet. “*Internet Segura*” is the Portuguese Safer Internet Centre that focuses on enhancing the capacity building of Portuguese society towards a safe use of the Internet and the awareness of society to Internet associated risks.

5.3. Outcomes

A proper investment in the ICT sector contributes positively to the affirmation and expansion of the National Innovation System by giving competitive advantage to Portugal to become a leader instead of just following European and international policies, although these are also fundamental for joint coordinated activities and projects as they make available funding instruments such as Horizon 2020, Ambient Assisted Living (AAL), Connecting Europe Facility (CEF) and Erasmus+.

R&I are seen as strategic assets for Portugal. Portuguese teams participating in ICT projects under the 7th FP have an average awarded funding similar or higher than the European average in the following themes: Future Networks and Internet; Cognitive Systems and Robotics; Trustworthy ICT; ICT for Energy Efficiency; ICT for the Enterprise; Digital Libraries; ICT for Health; Embedded Systems; ICT for Transport; Software, Services and Internet connected objects.

Partnerships between the government and leading universities and research institutions worldwide, namely via the MIT Portugal Programme and the Carnegie Mellon Portugal Programme, have been an enabler for the development of the Internet of Things (IoT) and Machine to Machine (M2M) projects.

Supporting policy dialogues for ICT in the framework of Africa-European Union strategic partnerships and through cooperation with Southern Mediterranean, African and Middle Eastern countries (UfM) also contributes to enhancing cooperative research links in this field.

Within the context of the Community of the Portuguese-speaking Countries (CPLP), political relations that reinforce cultural ties and allow the exchange of ideas through the signing of memoranda of understanding (Brazil, Cape Verde, and Mozambique) are of significant importance.

FCT policies on Open Access encompass guidelines for free online access to peer-reviewed publications and data arising from FCT funding. These policies came into force on 5 May 2014.

A National Digital Literacy Programme (planned to be launched in the first term of 2015) aims to overcome the digital divide, enable and qualify human resources and provide an impetus to the Digital Economy. Its main instrument, the ICT and Society Network, a multistakeholder network based on bottom-up governance, seeks to increase the Portuguese population's overall level of digital skills, through extensive and systematic training and ICT certification. Highly meritorious best practice projects for digital inclusion and digital literacy will be recognised through an award for ICT and Society Network members.

Moreover, the celebration of protocols and partnerships between different actors enables work in several key-areas, such as the massive digitalization of contents in the Portuguese language, and the introduction of digital learning materials in job (re)qualification or awareness raising campaigns.

It is crucial that the national investment in broadband infrastructure, which nowadays covers 100% of the country, be mirrored in its access by households and the population in general.

A National Coalition for Digital Jobs is about to be launched which envisages a better matching of supply and demand for digital jobs and skills. It is specifically aimed at young people entering the labour market, as well as for unemployed people that need re-qualification, re-adapting them to the real needs of the digital economy or the employed that need to update their ICT skills.

Following 10 years of continuous efforts, in 2013 the DSI "*Unidade Acesso*" received a prize for its good practices in mobility and digital accessibility. Additionally, the Published Authorized Translations of WCAG 2.0 into European Portuguese and Brazilian Portuguese were for the first time officially recognised by W3C in 2014.

Three of the activities of the Safe Internet Centre were considered by the European Commission Project Reviewers as "Best European Practices".

Reinforcing the Portuguese participation and involvement in the national and international discussion on internet governance is considered to be a high priority, in order to reinforce the multistakeholder model, which encompasses policy issues related to key elements of Internet Governance, such as the sustainability, robustness, security, stability and development of the Internet, Domain Name System (DNS) management, freedom of speech, multilingualism, right to privacy and data protection in the digital age, Net Neutrality, protection of consumers, capacity building and social inclusion, R&I, etc.

The DSI also plays an important role in international organisations such as ICANN's Governmental Advisory Committee, OECD groups (Working party on Measurement and Analysis of the Digital Economy; Committee on Digital Economy Policy and Working Party on Security and Privacy in the Digital Economy) and the United Nations (Commission on Science and Technology for Development -CSTD; World Summit on Information Society Process -WSIS +10; UNESCO; Internet Governance Forum -IGF- and the International Telecommunication Union -ITU).

The success of our response implies a vision for the future where ICT and the digital are fundamental and unavoidable variables in the development of society and the economy, which includes the affirmation of the Portuguese Language at a worldwide level.

6. NATIONAL SCIENTIFIC COMPUTATION

6.1. General description

FCCN was originally established in 1986 as a private foundation by the *Junta Nacional de Investigação Científica e Tecnológica* (JNICT), *Laboratório Nacional de Engenharia Civil* (LNEC), *Instituto Nacional de Investigação Científica* (INIC) and *Conselho de Reitores das Universidades Portuguesas* (CRUP). INIC was later integrated into JNICT and JNICT gave place to *Fundação para a Ciência e a Tecnologia*. FCCN was created as a private institution subject to private law. In 2013 FCCN was integrated within FCT by decision of the Government. That integration became effective on the 1st October 2013. Since then FCCN has been operating as a FCT unit under a public law framework.

The main activity of the FCCN unit is the operation of the Science, Technology and Society Network (RCTS). RCTS is the Portuguese Research and Education Network (NREN) and is one of the infrastructures included in the National Roadmap of Research Infrastructures of Strategic Interest. RCTS is a dedicated high-performance network intended to serve researchers, teachers and students with greater demands. It also acts as a test platform for advanced communications services and applications (Fig. 17). RCTS is interconnected with the overall research and higher education communications platform through GÉANT - the pan European research and education backbone. In this context, RCTS provides a privileged collaboration channel for Portuguese researchers to access foreign research infrastructures, data sets and services.

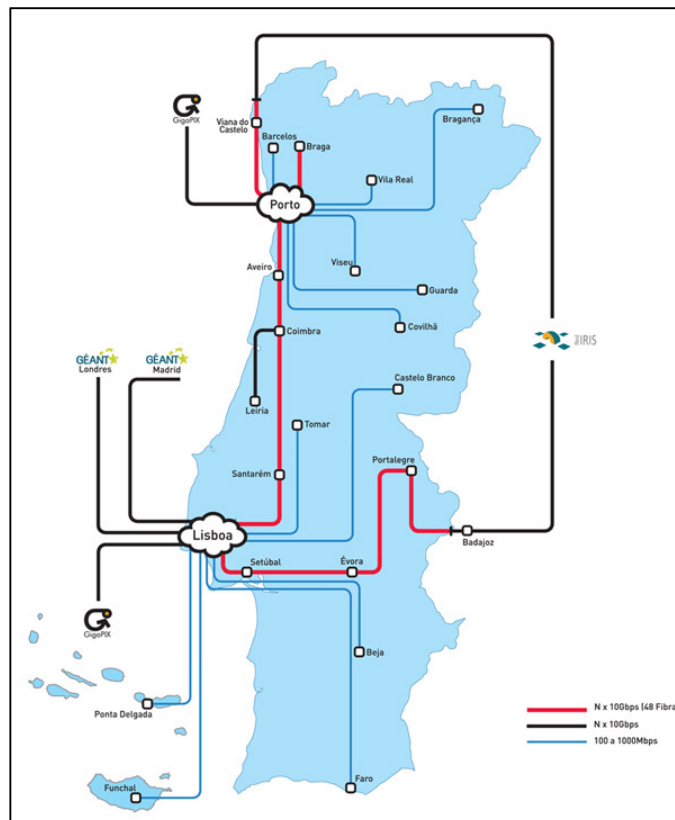


FIG. 17. THE PORTUGUESE EDUCATION AND RESEARCH NETWORK INFRASTRUCTURE ALLOWS ADVANCED AND HIGH-SPEED COMMUNICATION.

The goals that RCTS strives to achieve are: to provide a set of continually evolving services suitable for the research community; to meet their special demands in terms of core services; to reach out to every research unit and every researcher in Portugal; and to enable cooperation and collaboration between researchers.

6.2. Services

The main services provided by FCCN unit to its community are the following:

6.2.1. Connectivity

RCTS IP - This is the oldest and main connectivity service that RCTS provides. It allows direct communication between all entities connected to the network in a practical and efficient way using the IP protocol. RCTS IP network has connections to the GÉANT network and to a national neutral exchange point for IP traffic, named *GigaPix*, also operated by the FCCN unit.

RCTS Plus - This service provides a set of advanced features designed to serve applications requiring high performance switched connectivity. RCTS Plus is able to build Ethernet point-to-multipoint overlay VPNs. RCTS Plus may include entities from other European academic networks connected to GÉANT, through the equivalent service GÉANT Plus, as long as there are end-to-end Ethernet services available.

RCTS Lambda - This is the most advanced offer for dedicated communications within RCTS. It allows establishing direct high speed links between two optical enabled entities. Where possible, it can also be used for international links using the Iberian optical ring. It is suitable for applications that demand burst throughput, very low latency or constant jitter.

Eduroam (education roaming) - Eduroam is the secure, worldwide roaming access service developed for the international research and education community. Eduroam allows students, researchers and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions by simply opening their laptop. Eduroam is one of the most successful cross-border services provided to the research and education communities.

RCTSaai - This is the distributed authentication and authorization infrastructure federation for the Portuguese research community. It comprises both identity and service providers that agree to exchange in a secure way user attributes for the purpose of authentication and authorization for services and contents. RCTSaai provides transversal Single-Sign-On for services within the federation. RCTSaai is part of eduGAIN, the pan-European research and education AAI confederation managed by Géant.

6.2.2. Computation

Cloud and GRID - the FCCN unit is, together with the *Laboratório de Instrumentação e Física Experimental de Partículas* (LIP) and LNEC, part of the National Distributed Computing Infrastructure, an infrastructure for national GRID and Cloud computing, integrated with

European computing networks, whose mission is to satisfy leading edge research needs concerning huge data processing and computing capacities that cannot be provided by isolated research centres. It aims at an integrated approach to the delivery of information technology services across multiple locations interconnected by state-of-the-art networks. This infrastructure is included in the National Roadmap of Research Infrastructures of Strategic Interest. The FCCN unit houses the Grid Central Node in collaboration with LIP and LNEC. It also manages the technical room where the node is installed and where Grid calculation computing and the housing of Grid computers services are provided.

Datacentres - Firstly, they comprise the physical area to house equipment that supports communications and other ICT services offered by RCTS; secondly, a datacentre external housing service is provided for equipment important for advanced research, scientific or educational purposes. The datacentre external housing service consists of managed rack space connected at Giga-bit-per-second speeds to the RCTS Network.

6.2.3. Collaboration

VoIP - The goal of this service is to provide a data and voice convergence solution for higher education institutions and the research community, by promoting the widespread use of Unified Communications. Participants form a private network where all voice and data traffic flows within RCTS, supported by more recent VoIP technologies, such as SIP (Session Initiation Protocol) and ENUM (E.164 Number Mapping). VoIP@RCTS peers with 21 other NRENs.

Videoconferencing - With more than 100 terminals, the existence of a common addressing scheme, directory and central video services, such as MCU and Recording Infrastructure, reduce the effort of call setup and resources needed by each terminal, reducing overall costs across all terminals. The central addressing scheme allows high quality videoconferencing with peer networks in the 5 continents. The FCCN unit also runs an advanced video conference infrastructure available in two HD rooms (Lisbon and Oporto) available for usage by the community served by RCTS.

Multimedia Collaborative Environment - Although audio and video is provided within the platform, this service seeks to go further and provides a rich digital environment where peers can also share documents, pictures and data while working together using shared on-line applications and resources within a federated secure environment. Highly flexible, convenient and always available on any kind of device, this environment nowadays supports virtual workgroups across institutions and countries.

Educast@RCTS - This service is a fully integrated Lecture Recording suite that synchronously records audio, video and presentations. It is based on a full on-line editing system that allows authors to edit and choose the content they want to share. The system produces content for multiple devices for on-line and off-line viewing. Built over a secure environment, it allows audience selection and restricted access to the content.

HD Video Studio - With state-of-the-art HD equipment, and experienced professionals, it is possible to broadcast live streams or produce content to be viewed on demand. On set, a generous Chroma background is the base for full 3D virtual scenarios. Capable of handling broadcast quality

audio and video, the studio is the “one stop shop” to record lectures, create “video papers” and learning or promotional materials.

6.2.4. Information

PTCRIS - Connected Research – Already presented before in this document, the PTCRIS programme is being managed at FCCN unit, as one of its scientific knowledge activities.

Online Knowledge Library (B-on) – B-on provides research and HEIs with unlimited and permanent access to thousands of international scientific journals and e-books published by some of the major international scientific content providers.

Open Access Repositories (RCAAP): RCAAP’s main mission is to promote, support and facilitate the adoption of the open access movement in scientific knowledge in Portugal. The RCAAP initiative aims to collect, aggregate and index Open Access scientific contents from Portuguese institutional repositories. RCAAP constitutes a single entry point for the searching, discovery and recall of thousands of scientific and scholarly publications, namely journal articles, conference papers, theses and dissertations, distributed by several Portuguese repositories.

The Portuguese Web Archive – This archive’s main goal is the creation of a service that allows online published information of interest to the Portuguese community to be preserved. The Portuguese Web Archive’s distinctive feature is the possibility to conduct searches on past published information no longer available online. It enables the preservation of information which has the Web as its source.

6.2.5. Security

CERT.PT - To foster the security of RCTS services the computer security incident response team – CERT.PT – was established in 2000. It was accredited by the Trusted Introducer for Europe in 2004, and by the international Forum of Incident Response and Security Teams (FIRST) in 2011. CERT.PT provides a set of proactive and reactive security services to its constituency with the objective of minimizing the impact resulting from incidents in networks and information systems.

TCS Service - The Terena Certificate Service allows students, teachers and researchers free access to server digital certificates. The FCCN unit acts as a registration entity for the national academic and scientific community.

Linha Alerta – This is a service that fights illegal contents, particularly child pornography, incitement to violence and incitement to racism on the Internet, under the *Internet Segura* Project which is co-funded by the European Commission.

Part D - SWOT ANALYSIS OF FCT

INTERNAL FACTORS	EXTERNAL FACTORS
<p>STRENGTHS</p> <ul style="list-style-type: none"> • Single body in Portugal for research policy and implementation. • Ability to intervene in the definition of science policies, namely in international <i>for a</i>. • Ability to implement coherent policies across funding schemes and scientific domains. • Ability to define and implement dynamic/strategic trade-offs between different funding schemes and instruments. • High pace of reforms introduced since 2012. 	<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Funds available for science in the new EU multiannual financing framework. • Definition and future implementation of a national Strategy for Smart Specialisation (RI3S). • Existence of a young generation of highly-qualified and internationalised researchers. • Maturity and international standing of several research units. • Positive public attitude towards science. • Emergence of new international information standards like ORCID, CERIF and CASRAI.
<p>WEAKNESSES</p> <ul style="list-style-type: none"> • Excessive political dependency, in contrast with a typical international research council. • Dependency on annual budgets for multiannual commitments. • Lack of true administrative and financial autonomy. • Lack of specialised in-house human resources. • Obsolescence of Information Systems platforms and technologies. • Pace of reforms not matched by the existing operational structure. 	<p>THREATS</p> <ul style="list-style-type: none"> • Impossibility of recruiting specialised human resources in the last three years. • One third of the budget comes from structural funds with specific utilisation rules that must be combined with national rules. • Resistance to change from the scientific community. • Private sector still unable to fully profit from FCT's funding schemes designed to transfer knowledge to economy and society.

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ABBREVIATIONS

A3ES – Agency for Assessment and Accreditation of Higher Education (Agência de Avaliação e Acreditação do Ensino Superior)

AdI – Agency for Innovation (Agência de Inovação)

ANI – National Innovation Agency (Agência Nacional de Inovação)

BIC – ESA Business Incubation Centre

CCISP - Portuguese Polytechnics Coordinating Council (Conselho Coordenador dos Institutos Superiores Politécnicos)

CECC – Parliamentary Commission for Education, Science and Culture (Comissão Parlamentar de Educação, Ciência e Cultura)

CERN – European Organisation for Nuclear Research

CMU – Carnegie Mellon University

CNCT – National Council for Science and Technology (Conselho Nacional de Ciência e Tecnologia)

CNE – Portuguese Education Council (Conselho Nacional de Educação)

CNEI – National Council for Entrepreneurship and Innovation (Conselho Nacional para o Empreendedorismo e Inovação)

COMPETE – Operational Competitiveness Programme (Programa Operacional Factores de Competitividade)

CPLP – Community of the Portuguese-speaking Countries (Comunidade dos Países de Língua Oficial Portuguesa)

CRUP - Council of Rectors of Portuguese Universities (Conselho de Reitores das Universidades Portuguesas)

CSA – Coordinating Support Actions

CWTS – Centre for Science and Technology Studies, Leiden University

DGEEC – Directorate-General for Statistics of Education and Science (Direcção Geral de Estatísticas de Educação e Ciência)

EIT - European Institute of Technology

EMBO – European Molecular Biology Organisation

ERA – European Research Area

ERAC – European Research Area and Innovation Committee

ERA-NET – European Research Area Network

ESA – European Space Agency

ESF – European Science Foundation

ESFRI – European Strategy Forum on Research Infrastructures

ESO - European Southern Observatory

ESRF – European Synchrotron Radiation Facility

EU – European Union

FACC - Scientific Community Support Fund (Fundo de Apoio à Comunidade Científica)

FCCN – Foundation for National Scientific Computation (Fundação para a Computação Científica Nacional)

FCT – Fundação para a Ciência e a Tecnologia

FoS – Fields of Science
FP – Framework Programmes
FP7 – Seventh Framework Programme for Research and Technological Development
FTE – Full-Time Equivalent

GAV – Evaluation Office (Gabinete de Avaliação)
GDP – Gross Domestic Product
GÉANT – Pan-European data network for the research and education community
GERD – Gross domestic expenditure on research and development
GPPQ – Framework Promotion Office (Gabinete de Promoção do Programa-Quadro)

HEI – Higher Education Institutions

IAP – ESA Integrated Applications Platform
ICT – Information and Communication Technologies
INPI – Portuguese Institute of Industrial Property (Instituto Português da Propriedade Industrial)
IP – Intellectual Property
IPCTN – National Survey of the Scientific and Technological Potential (Inquérito ao Potencial Científico e Tecnológico Nacional)
IPN – Instituto Pedro Nunes
IS – Information Systems

JNICT – National Directorate for Scientific and Technological Research (Junta Nacional de Investigação Científica e Tecnológica)
JPI – Joint Programming Initiatives
JTI – Joint Technological Initiatives

KIC – Knowledge and Innovation Communities

LA – Associate Laboratories (Laboratórios Associados)
LIP – Instrumentation and Experimental Particle Physics Laboratory (Laboratório de Instrumentação e Física Experimental de Partículas)
LNEC – National Laboratory for Civil Engineering (Laboratório Nacional de Engenharia Civil)

ME - Ministry for the Economy (Ministério da Economia)
MEC – Ministry for Education and Science (Ministério da Educação e Ciência)
MFF – Multiannual Financing Framework
MIT – Massachusetts Institute of Technology
MNCS – Mean Field Normalized Citation Score
NCP – National Contact Point (Ponto Nacional de Contacto)

NREN – National Research and Education Network

OECD – Organisation for Economic Cooperation and Development

PNRC – National Programme for Scientific Equipment Renewal (Programa Nacional de Re-Equipamento Científico)

PTCRIS – Portuguese Current Research Information System
PTTI – Portuguese Technology Transfer Initiative

QREN – National Strategic Reference Framework (Quadro de Referência Estratégica Nacional)

R&D – Research and Development

R&I – Research and Innovation

RCAAP – Open Access Repositories (Repositório Científico de Acesso Aberto de Portugal)

RCR – Responsible Conduct of Research

RCTS – Science Technology and Society Network (Rede Ciência, Tecnologia e Sociedade)

RI – Research Infrastructures

RIS3 – Research and Innovation Strategy for Smart Specialization (Estratégia de Investigação e Inovação para a Especialização Inteligente)

RNIE – Portuguese Roadmap of Research Infrastructures (Roteiro Nacional de Infra-estruturas de Investigação de Interesse Estratégico)

SCTN – National Scientific and Technological System (Sistema Científico e Tecnológico Nacional)

SEC – Secretary of State for Science (Secretaria de Estado da Ciência)

SSH – Social Sciences and Humanities

TTPO – ESA Technology Transfer Programme Office

UMIC – Knowledge Society Agency (Agência para a Sociedade do Conhecimento)

UT Austin – University of Texas at Austin

UTEN – University Technology Enterprise Network



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