Programmes to Foster Research, Development and Innovation - INGENIO 2010

GOBIERNO DE ESPAÑA
MINISTERIO DE ADMINISTRACIONES PÚBLICAS

agencia de evaluación y calidad

Promoting the evaluation of public programmes and policies, developing transparency and improving the use of resources and quality of services to citizens are government priorities. Every year, the Council of Ministers approves a number of programmes and public policies to be evaluated by the National Agency for the Evaluation of Public Policies and the Quality of Services, within the scope of the functions outlined in its action plan.

On the proposal of the Minister of Public Administrations, the Council of Ministers, in its meeting of 30 March 2007, decided on the public programmes and policies to be evaluated in 2007. These included: The National Reform Programme of Spain; the administrative procedures for the creation of enterprises; the national register of greenhouse gas emission rights and the quality of services in state museums.

The evaluation of The Nationl Reform Programme of Spain was to focus on: the effect of measures adopted for the rationalisation of pharmaceutical expenditure, the effectiveness of energy security policies, programmes to foster research, development and innovation, and the financial facilities to boost entrepreneurial activity.

Please note that the English-language version of this text is a translation of the original Spanish-language document and is for informative purposes only. The Spanish text shall be regarded as official in all cases.

First edition: 2008

E04/2007
Programmes to Foster Research, Development and Innovation - INGENIO 2010
Madrid, November 2007

Published by: Ministry of Public Administrations. National Agency for the Evaluation of Public Policies and the Quality of Services

General catalogue of official publications:
http://www.060.es

NIPO: 331-08-021-4

PROGRAMMES FOR THE FOSTERING OF RESEARCH, DEVELOPMENT AND INNOVATION – INGENIO 2010

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GLOSSARY OF ACRONYMS

AETIC	*Asociación de empresas de electrónica, tecnologías de la información y telecomunicaciones de España*
ANEP	*Agencia Nacional de Evaluación y Prospectiva*
BOE	*Boletín Oficial del Estado*
CAS	*Comité de Apoyo y Seguimiento de la CICYT*
CDTI	*Centro para el Desarrollo Tecnológico e Industrial*
CÉNIT	*Consorcios Estratégicos Nacionales en Investigación Técnica*
CIBER	*Centros para la Investigación Biomédica en Red*
CICYT	*Comisión Interministerial de Ciencia y Tecnología*
CSIC	*Consejo Superior de Investigaciones Científicas*
EGEP	eGovernment Economics Project
EIF	European Investment Fund
ENCYT	*Estrategia Nacional para la Ciencia y la Tecnología*
ERDF	European Regional Development Fund
EU	European Union
EUPAN	European Institute of Public Administration
FECYT	*Fundación Española para la Ciencia y la Tecnología*
FEICT	*Fondo Estratégico de Infraestructuras Científico-Técnicas*
GDP	Gross Domestic Product
IAC	*Instituto Astrofísico de Canarias*
ICT	Information and Communications Technology
ISCIII	*Instituto de Salud Carlos III*
LOU	*Ley Orgánica de Universidades*
MPA	Ministry of Public Administration
MES	Ministry of Education and Science
MITT	Ministry of Industry, Tourism and Trade
NSA	National State Administration
NRP	National Reform Programme of Spain
PROFIT	*Programa de ayudas para el fomento de la investigación científico-técnica*
SISE	*Sistema Integral de Evaluación y Seguimiento*
SME	Small and Medium-sized Enterprise

1. Main conclusions and recommendations

Increasing resources invested to create knowledge and improving the mechanisms used to transfer such knowledge so that it benefits society as a whole are top priorities of the European strategy for growth and jobs. INGENIO 2010, the research, development and innovation strategy, implements this priority in Spain, being one of the main pillars in its national reform programme. Its objectives are to reduce the technological gap between Spain and the rest of Europe and to achieve convergence as regards the information society.

Its design and content respond to recent assessments of the science and technology situation in Spain. Among the most notable challenges detected are the limited level of cooperation between actors, and the poor results obtained both with respect to technology transfers and the use made of the knowledge generated by the business community. INGENIO 2010 aims to change the course of the policies implemented to date in the context of national R&D and innovation plans managed by the National State Administration (NSA). Supported by a significant budget increase, it focuses on financing large-scale research projects capable of creating cooperation between actors and fostering greater involvement by the business community. These actions are supplemented by legislative measures and the development of new instruments that seek to improve the management and assessment of concrete initiatives, a key aspect that has been largely overlooked.

Two years on, the data available from the monitoring process show a satisfactory degree of implementation of the main strategic programmes. But it is still too early to measure the impact on the ground of a programme whose main projects, which are due to last four years, have only recently started. In addition, the establishment of the Global Assessment and Monitoring System (SISE - *Sistema Integral de Evaluación y Seguimiento*), a key part of the strategy, has not progressed as quickly as expected, having run into problems caused by the complexity of setting up a central database for all programme managers. All of this has affected the assessment's approach, focused on the analysis of the relevance and design aspects of the chosen measures. That said, wherever possible a more detailed assessment of the implementation of strategic programmes has been made, trying to judge forecast results.

One weakness of INGENIO 2010, launched in June 2005, has been the very limited level of coordination with the national R&D and innovation plan 2004-2007. Over the last two years, new and already-existing programmes have co-existed, and the latter have not been able to assimilate either the new approach or the new strategic objectives. This has limited the concentration of budget increases and frustrated efforts to simplify and improve the management of an excessively complicated aid system. However, INGENIO 2010 has inspired the design and content of the National Science and Technology Strategy (ENCYT - *Estrategia Nacional para la Ciencia y la Tecnología*) agreed by the different Autonomous Regions (*Comunidades Autonomas*)

as well as the new national R&D and innovation plan for 2008-2011. These two programmes provide a platform on which improvements to innovation in Spain can continue to be built.

The proposed legislative measures are a step in the right direction and their application must be a priority. This is an area where further action is required in the future, so that the scope of the proposed measures is extended. Finally, for the future it is vital that the policy of encouraging R&D and innovation is interrelated better with the other main sectoral policies.

First recommendation

The structures of government and management within the National State Administration should be strengthened in order to guarantee the effective implementation of the new national plan for 2008-2011 within which INGENIO 2010 will be fully integrated.

To this end, the continuity of the Monitoring and Support Committee (CAS - *Comité de Apoyo y Seguimiento*), attached to the Interministerial Science and Technology Research Commission (CICYT - *Comisión Interministerial de Ciencia y Tecnología*), should be guaranteed, being mainly responsible for coordinating the national plan within its operational scope. Its functions in relation to the different programme committees should be clearly established and its hierarchical dependence strengthened. Full links between the CAS and CICYT's permanent body should be put in place. Attempts should be made to ensure a more flexible and operative set up for the latter body than that currently existing. Finally, during the implementation of the plan it is important to guarantee the full involvement of the CICYT advisory bodies responsible for liaising with the Autonomous Regions (General Council) and to ensure the participation of the scientific community, stakeholders and public authorities (Advisory Council).

Second recommendation

Greater priority should be given to providing the SISE with the tools it needs to do its job properly.

It is important that the autonomy and authority of the SISE governing body is strengthened, to facilitate its job of centralising and handling information and its responsibility as advisor for the continuous improvement of the system.

Third recommendation

The managing authorities of major projects financed by INGENIO 2010 must contribute all the resources needed to guarantee project monitoring and assessment (interim and final). As regards *ex ante* assessment of projects, it is important to make progress in the harmonisation of the selection criteria and the standardisation of aid approval procedures, both at national and regional level. The future creation of the State Agency for Monitoring, Financing and Foresight *(Agencia Estatal de Evaluación, Financiación y Prospectiva)*, should play an important role in this respect.

Managers must emphasise the achievement of concrete results measured in terms of transfer of knowledge to the market and impact on the internationalisation of the system. On this latter point, a key indicator will be the number of Spanish companies in charge of projects within the Seventh Framework Programme. Mechanisms to identify and exchange good practices, with full involvement of programme managers and beneficiaries, should be set up for the continuous improvement of programmes. As regards identifying good practices, a key aspect is cooperation with the Autonomous Regions, an area where good examples can already be considered (Avanza Plan, I3 programme). The possibility of creating permanent bodies to guarantee the continuity of the most promising projects within the Consolider and Ciber programmes should be examined.

Fourth recommendation

Implementing the legislative measures and improving framework conditions put forward in INGENIO 2010 is a priority, and the scope of certain key reforms should be extended. In 2008, when the new national plan begins, it would be very useful to undertake the reform of the Science Law (*Ley de la Ciencia*) with a view to consolidating and ensuring the consistency of all legislative reforms, whether under way or planned.

This is particularly important as regards the need to design a consistent research career for all research bodies, capable of both attracting and retaining the best, and of offering young people attractive career prospects. This must be combined with an increase in the level of autonomy and responsibility of universities and public research bodies. It is also essential that for 2008 the government considers extending the measures simplifying the management of R&D and innovation subsidies. Finally, the current draft of new public procurement rules should be examined in detail and a far-reaching consultation process carried out before it

becomes law to ensure that the proposal strengthens some aspects related to the important role that state purchases of technology can play in boosting innovation.

Fifth recommendation

The government should strengthen the cooperation mechanisms between R&D and innovation and other sectoral policies that directly help to achieve established targets. Similarly, the cross-cutting nature of R&D and innovation policy - in particular its contribution to the objectives of the Spanish Sustainable Development Strategy (*Estrategia Española de Desarrollo Sostenible*) - needs to be reinforced.

Policies relating to education, better regulation and reduced bureaucracy when setting up a business and the improvement of competition in services and product markets will help to achieve technological development and knowledge transfer goals. As regards the interaction and complementary nature of these policies, generally well reflected in the drafting of the Spanish NRP, this should be reinforced during the development and implementation stages. In the same way, the success of R&D and innovation policy will be crucial for Spain to meet its growth, employment and sustainability objectives.

2. Investing more in knowledge and innovation, a European and Spanish priority

2.1. The European and Spanish context

Innovation, understood as the practical application of knowledge and technological development to the business sector, is a driving force in the on-going transformation of European economies. This is reflected in the target set by the European Union in the Lisbon Strategy of investing 3% of GDP in R&D and innovation by 2010, of which two-thirds should come from the private sector. Innovation is also one of the four priority areas chosen to give impetus to the Lisbon strategy in the current cycle, 2005-2008. The integrated guidelines for 2005-2008 provide basic guidance on which NRPs are to be based; guidelines 7, 8 and 9 concern R&D and innovation policies.[1]

The EU wishes to boost R&D and innovation policy by encouraging knowledge development, linking it increasingly closely with technology transfer and business innovation. This is an area where the EU lags behind its main international competitors. Boosting business investment continues to be an important challenge for most Member States. In addition, establishing mechanisms that speed up the transfer of scientific and technological advances to the market is a priority if European firms are to remain globally competitive.

Among recent EU policy initiatives, it is worth highlighting the approval in 2006 of a new framework concerning state aid for R&D and innovation[2] and the adoption of a new action plan for innovation[3] based on boosting demand pull instruments (including the role of state purchases). The increased level of financing is strengthened by the creation of new instruments, of which the setting up of Joint Technological Initiatives (JTIs), as part of the Seventh Framework Programme, is worthy of note. These initiatives make it possible to create permanent public-private bodies aimed at putting into practice the strategic research agendas prepared by the European technological platforms.[4] It is also important to mention the creation of a new financial instrument aiding competitiveness and innovation in businesses,[5] largely aimed at SMEs. All of these policies offer new opportunities, and Spain must take full advantage of them.

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[1] "Integrated guidelines for Growth and Jobs (2005-2008)", European Commission 2005; http://ec.europa.eu/growthandjobs/pdf/integrated_guidelines_en.pdf.
[2] "Community Framework for State aid for research and development", European Commission 2006 (EU Official Journal 30.12.2006 Series C - 323/01).
[3] "Putting knowledge into practice: A broad-based innovation strategy for the EU", European Commission 2006 (COM (2006) 502 final).
[4] For more information about technology platforms and JTIs, see: http://cordis.europa.eu/technology-platforms/home_en.html.
[5] For more information on this programme, see: http://ec.europa.eu/cip/index_en.htm

All recent studies carried out about the Spanish Science and Technology System (SECYT - *Estrategia Nacional para la Ciencia y la Tecnología*) reach the same conclusion: the basic weakness of the innovation system – i.e. the mechanism that allows knowledge to be of use to society - is its defective functioning. Despite the enormous progress made since the Science Law was passed in 1986, above all in scientific production and the development of actors in the system, Spain continues to lag seriously behind the EU in all of the key indices on technological development and the innovative capacity of its businesses. In addition, the information society has not grown fast enough in Spain which, amongst other matters, is shown by many companies' failure to make the most of the opportunities offered by new ICTs, a key indicator of an economy's competitiveness and degree of development. Despite improved ICT use in the last two years, Spain has not improved its position in the international league table.[6] Annex II describes the SECYT using a SWOT analysis, presenting its main strengths, weaknesses, opportunities and threats. It also includes an organisation chart reflecting the main actors responsible for defining R&D and innovation policy in Spain.

Recent studies[7] suggest that low productivity growth in the Spanish economy is not so much due to insufficient levels of technological capital accumulation as Spain's failure to translate existing capital into a more efficient use of production factors. This underlines the importance of legislative reform to facilitate the dissemination of already-existing technology to the whole of the productive network and establishing mechanisms that encourage cooperation between actors. In any event, it is vitally important to increase business involvement.

In addition, improving the mechanisms of governance and coordination between those in charge of R&D and innovation policy, both at central and regional government level, is an urgent requirement. The overriding objective is to design a consistent national science and technology policy which helps to meet the challenges of globalisation. Agreements reached with regional governments (national strategy, infrastructure map, establishing regional R&D and innovation investment objectives) are an important first step which must be built upon and specified within the framework of the new national plan for 2008-2011 (e.g. taking advantage of the possibility of joint central-regional government calls). An important point made in recent studies of the SECYT, particularly by the OECD, is the need to coordinate better the project evaluation criteria used by both central and regional government.

Finally, national and regional R&D and innovation policies should become more closely linked with those aimed at encouraging development and strengthening key sectors for the future of the Spanish economy. Spain must also be in a position to make the most of opportunities arising from the global demand for new technologies.

[6] In the study on ICT usage carried out by the World Economic Forum covering 115 countries, Spain has slipped back from 25th position in 2002 to 31st in 2006.

[7] "El problema de la productividad en España: ¿Cuál es el papel de la regulación?" "la Caixa" Economic documents – no. 1. June 2006.

All of this means that the most important sectoral policies must be more closely linked (particularly those relating to boosting entrepreneurial activity, health, transport, energy, and the environment) and specific initiatives should be more consistent and complement each other (e.g. programmes such as CÉNIT and the "clusters" policy promoted through the Innovative Business Groupings (*Agrupaciones Empresariales Innovadoras*).[8] Also required are new forms of government that guarantee the increased participation of actors, above all the permanent involvement of businesses and knowledge-generating bodies, not only as regards design but also in the application of R&D and innovation support policies. The activities of the Spanish technological platforms[9] are very important in this regard.

2.2. Ingenio 2010: the answer

Taking the existing situation as its starting point, INGENIO 2010 identifies as a priority the need to increase R&D and innovation investment, particularly from the business sector. Reducing the technology gap with Europe and making up the significant ground lost with respect to the information society are the preconditions for improving productivity levels and achieving medium- and long-term sustainable growth in the Spanish economy. INGENIO 2010 therefore has a central role to play in the Spanish NRP (fourth pillar of priority action).

[8] Chapter 2 of the COTEC Report 2007 analyses this policy promoted by the Ministry of Industry, Tourism and Trade.

[9] For more information on European and Spanish technology platforms, see: http://www.madrimasd.org/empresas/Plataformas-Tecnologicas/default.asp

OBJECTIVES 2010	MEASURES
Double investment in R&D to 2% of GDP. *1.12% in 2005 , interim objective in 2008: 1.6%* Increase the private sector R&D investment to 55% *47% in 2005, interim objective in 2008: 52.5%* Information society convergence with Europe: Allocate 7% of the GDP to the ICT sector. *4.8% in 2004, interim objective in 2008: 6.4%*	More resources dedicated to R&D and innovation in the national budget New strategic actions: Consolider and Cénit Programmes and Avanza Plan Legal reform to favour R&D and innovation activities New integrated system for monitoring and assessing R&D and innovation policies (SISE)

The strategy emphasises the need to channel a substantial part of new budget resources into the financing of large-scale projects capable of having a knock-on effect on the system. The aim is to obtain greater levels of cooperation between actors, a multiplier effect on the levels of investment and business participation, and levels of excellence and a critical mass that make the system more international. Finally, to improve the efficiency of resources used, a series of legal reforms and a new assessment and monitoring system are also needed.

3. Two years of Ingenio 2010: an assessment

The following analysis is based on the principal data obtained from monitoring INGENIO 2010 two years after it was launched. It also takes into account the views of the actors involved (managers and beneficiaries) and experts. The analysis is based on the four pillars which make up the programme: the budget increase, strategic actions, legal reform and the new global monitoring and assessment system, the SISE. Essentially of a qualitative nature, the assessment focuses on the predicted degree of success of the programme in achieving its overriding objective: making good the main failings detected in the Spanish innovation system.

3.1. The budget increase

INGENIO 2010 is based on a significant increase in national budget funding. The commitments to increase the annual budget have been met in the 2005-2007 period; civil R&D and innovation investment levels in 2007 topped 6,500m euro, double the amount for 2004. For the 2008 budget, an increase of 17% is forecast, a similar figure to the annual increase objective in the new R&D national plan for 2008-2011 (16%). Only a part of this total budget is channelled through the INGENIO 2010 programmes (over 2,000m euro per year, as the table in Annex II shows). A large part of the increases have been used to boost funding for programmes that do not fully include INGENIO's new objectives and philosophy. The aid system has become more complicated (more than 300 calls in the first half of 2007).

There has been an increase in loans granted (chapter 8), which have a higher relative weight (53%) than subsidies (chapter 7). The low amount of the loans, too short repayment periods, and excessive bureaucracy for beneficiaries have undermined their potential to boost business investment in innovation. The first SISE report in 2006 highlighted this problem. INGENIO 2010, with the CÉNIT programme as its focal point, is an important new approach, since it encourages a high degree of subsidy in an attempt to encourage large-scale and high-risk projects and a high degree of commitment from the promoter businesses. Another important new feature of INGENIO 2010 is for the main strategic programmes to be planned over a number of years (pluriannual planning). Previously, the annual formulation of budgets - and by ministries - within the context of national plans prevented the process of establishing subject priorities being interrelated with that of resource allocation. The new national plan for 2008-2011 will extend this practice to cover all programmes.

As regards the capacity of actors to absorb the significant budget increases, to date the results have been very positive. However, it is important to anticipate possible saturation situations, above all as regards certain research bodies and sectors (some experts have already pointed out problems in the ICT sector). It is therefore vital that the reforms affecting the functioning and management of universities and public centres are implemented more quickly, so that they can adapt their resources to

meet demand in a fast and effective manner.[10] As a complement to the legal reforms, which are analysed later, the planned institution-building programme may prove to be especially important. The design and funding of this programme must meet the needs of the system, while scrupulously complying with the criteria of excellence in the selection of beneficiaries. In the same way, continuing to encourage the creation of technology-driven SMEs capable of absorbing the growing funding available is also vitally important. Instruments such as Neotec risk capital and new measures - such as the programme for the creation of technology-driven enterprises (CEIPAR) or the creation of the Young Innovative Enterprise Statute (*Estatuto de Joven Empresa Innovadora*) - are steps in the right direction.

It is worth examining the role of tax incentives in increasing the resources available to companies. Through the system of normal deductions for R&D and innovation in 2006, businesses are expected to obtain tax reductions of over 260m euro. The system of certifications set up by the Ministry of Industry, Tourism and Trade (MITT) has had a positive effect on the number of companies joining this system. However, there are limitations on the present system's ability to incorporate a greater number of companies into the innovation system, above all SMEs.[11] For this reason, in 2007 the government has introduced a new system of social security contribution allowances when SMEs contract research staff, giving companies the chance to choose between this and the already-existing system. This new system has certain advantages when trying to encourage the creation of innovative companies and support the development of technology-driven SMEs that do not have sufficient profits to enable them to make tax deductions. It is important that, in the review of the R&D and innovation tax deduction systems that the government will carry out in 2011, an in-depth analysis is made of the pros and cons of the different methods before they are either eliminated or reformed. The following are some of the key points that should be looked at: the elasticity of response to R&D and innovation investment incentives for different sizes of firms, the sectoral impact of changes to incentives (the figures show that the system of deductions is more favourable than that of allowances for sectors where R&D is more labour-intensive), the impact that allowances may have had in the setting up of new businesses and the analysis of the incentives in relation to other ancillary measures (above all with regard to SMEs, where tax incentives are not in themselves sufficient).

[10] On this point, an interesting proposal was made by the Funding Commission of the University Coordination Council (*Consejo de Coordinación Universitaria*) to create a fund to foster R&D and innovation in universities plus a fund for the recognition of results: Financing the Spanish University System ("*Financiación del Sistema Universitario Español*") Report - Madrid, 20 April 2007. Ministry of Education and Science.

[11] Different experts point to the need to reform the existing system. See "Los incentivos fiscales a la innovación en España y en el ámbito comparado", Carlos Rivas Sánchez, University of Malaga – Published by the Instituto de Estudios Fiscales, Collection Documents DOC nº 10/07.

Finally, a sign of the success of the increased budget provision will be its impact in extending the philosophy of innovation to as many sectors as possible and, hand-in-hand with EU structural funds, of being a means of aiding territorial cohesion. In this regard, it will be important to assess the coordination of actions financed by the new Technology Fund and the Knowledge Economy Operational Programme (both part of the ERDF for 2007-2013 and managed by the NSA) with the national and regional plan programmes. The proposed future network of R&D and innovation authorities, inspired by the existing network of environmental authorities, could play an important role here.

3.2. The strategic programmes

This section assesses the four programmes that cover the strategic actions of INGENIO 2010: CONSOLIDER (excellence in basic research), CÉNIT (improved public-private sector cooperation), AVANZA (information society convergence) and EUROINGENIO (increase in the returns from the Seventh European Framework Programme). The main monitoring data corresponding to the first two years' functioning of the programmes are included in Annex II.

3.2.1. CONSOLIDER Programme

CONSOLIDER Projects

These projects consist of the stable financing (5-6 years) of research networks with sufficient capacity to tackle large-scale projects, preferably in areas close to the knowledge frontier. Funding is 1-2m euro and may be acquired as a subsidy or a loan. In certain cases, where projects are properly justified, permanent research bodies may be created.

Consolider projects mobilise groups of prestigious researchers who agree to develop together a research project. This is a significant improvement in a country which has been traditionally characterised by fragmentation and limited cooperation between national groups. However, in view of the resources available per researcher and the subject matter of many of the projects approved, some experts doubt whether these projects genuinely mark a significant leap forward, particularly as regards new areas of research. Furthermore, the excessive number of participants in each project and the fact that researchers continue to be attached to their original institutions causes administrative difficulties that may affect the projects' chances of success.

For future calls, stricter selection criteria should be laid down as regards the functional ability of the group and the integrated nature of their lines of research. The possibility of setting up permanent bodies should be given greater encouragement. The objective should be the creation of new centres of excellence in promising areas where Spain can compete on a global level and attract top researchers. One way of providing continuity to the most successful Consolider

3. Two years of Ingenio 2010: an assessment.

projects could be to allow them, when they end, to be beneficiaries under the new national institution building programme that forms part of the new 2008-2011 national R&D plan.

It is very important that the monitoring of approved projects is guaranteed, above all in relation to the expected results and their practical application. Coordination mechanisms with other aid instruments also need to be set up, in particular the CÉNIT projects. In addition, the impact of Consolider as regards access to the EU's Seventh Framework Programme, above all projects financed through the new European Research Council, should be an essential tool in measuring how successful they are.

CIBER Projects

The objective of CIBER projects is to encourage quality research in Biomedicine and Health Sciences which is carried out within the National Health System through the development and encouragement of permanent cooperative research bodies (Network of Biomedical Research Centres).

The establishment of permanent bodies with common management and staff methods is an important new feature that aims to overcome the failures and problems encountered with traditional network cooperation projects already existing in the health sector. The means of assessing participants, based on international evaluators, are instruments which it is hoped will help achieve a more efficient use of resources. Placing greater emphasis on the transfer of basic research knowledge to clinical practice should also make possible a better assessment of results and a greater involvement of hospitals and the pharmaceutical industry, enabling this instrument to have a multiplier effect.

Keeping the network character of the CIBER projects, which means that participants stay attached to their original institutions, reproduces one of the problems with traditional network projects. Furthermore, their limited duration casts serious doubt on the future of those centres that have been set up. These projects should be continued through the creation of permanent research bodies, at least in those areas where Spain has the capacity to become a world leader.

I3 Programme

This programme is run in cooperation with the Autonomous Regions through cooperation protocols and specific agreements. In addition, agreements have been signed with seven state research bodies. Its objective is to bring Spanish or foreign lecturers-researchers with a prestigious research track record into the Spanish science and technology system and to support the best researchers by reducing their teaching hours. Since it is run in conjunction with the Autonomous Regions, it is one of the instruments that may help improve central-regional government cooperation.

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3. Two years of Ingenio 2010: an assessment.

The part of the I3 programme used to fund the permanent incorporation of researchers is viewed positively by most public research bodies and universities. One example that illustrates its degree of success is its close relationship with the Ramón y Cajal programme and the resolution of the problems that occurred when establishing the beneficiaries of that programme at the end of the fourth year. I3 funding supported 64% of those forming part of the Ramón y Cajal programme in 2001. The part of the programme relating to attracting top-quality researchers from abroad requires strengthening and some experts note that its effectiveness is reduced by the lack of flexibility in setting genuinely competitive pay packages. Nevertheless, the number of professorships is increasing (19 in 2006), which is the category with which foreign researchers with fixed posts are contracted. Analysing the programme's functioning with respect to intensifying the research activities of already contracted staff is complicated given the lack of data.

In any event, the impact of I3 on the whole system is still limited and in the future it should form part of a general programme for managing human resources that meets the system's strategic needs.

Strategic Scientific Technological Installations Fund (FEICT - Fondo Estratégico de Instalaciones Científico Tecnológicas)

The objective of this recently established fund is to support the creation of special permanent infrastructures that encourage public-private cooperation and provide large-scale scientific and technological installations with adequate resources for use in an international context. It is forecast that 1,000m euro will be allocated over 4 years, to be co-financed on a 50/50 basis with the Autonomous Regions. The government's intention is to start ten new installations in 2008, for which it will provide funds of 376m euro.

The medium and long-term planning (2006-2020) of large-scale scientific infrastructures linked to the establishment of this fund is a positive development. Until now the approach has typically been fragmented and short term. The Spanish map of special infrastructures approved in January 2007 by the Conference of Regional Government Presidents (*Conferencia de Presidentes Autonómicos*) is a major step forward. The amount in this fund set aside for subsidies should be increased and backing needs to be given to the rapid implementation of those infrastructures with greater strategic value for Spain and a greater demand-pull capacity for the technological development of businesses. In addition, its execution should be planned in the light of other strategic objectives, such as the participation of Spain in the European Strategy Forum on Research Infrastructures (ESFRI).

3.2.2. CÉNIT Programme

CÉNIT Projects

The objective of the National Strategic Consortia of Technical Research (CÉNIT - *Consorcios Estratégicos Nacionales de Investigación Técnica*) is to improve the technological level of the Spanish economy through the financing of large-scale industrial research projects that cover strategic technological areas with a potential global impact. The consortia aim to improve public-private cooperation and to extend the culture of cooperation among all actors in the science-technology-business system. The programme is designed to meet such ambitious objectives and is based on a high level of public subsidy (up to 50%) granted to the lead company in the groups set up to develop the project (at least two large companies and two SMEs). A minimum of 25% of the subsidy must be sub-contracted to research bodies.

Spanish industry has shown great interest in this programme. CÉNIT represents an opportunity for companies to share knowledge and risks, enabling them to tackle much larger and more ambitious projects than those carried out in Spain to date. Giving SMEs the opportunity to work with industrial partners – an opportunity which they would not otherwise have - is a particularly positive feature of this programme. Its catalyst effect on the spirit of cooperation between companies, even in highly competitive sectors, is very positive. In addition, the expected attraction of private investment is taking place; in the projects financed to date, there is already a better private-public investment ratio than in the whole of national R&D investment. Moreover, the situation where different consortia are operating in similar or complementary areas could give rise to new cooperation projects,[12] thus creating a virtuous circle which would extend the beneficial effects of greater cooperation between companies.[13]

Another interesting effect is the improved cooperation between regions. The regional representation of participants, both enterprises and public research bodies, covers almost all of Spanish territory. For the first two calls, the average number of regions involved in a CÉNIT project has been seven, quite an achievement when compared with previous research projects. The fact that most of the firms, especially among the leaders, are from Madrid and Catalonia can be explained by the type of industry in these regions, which is more active in those areas identified as 'strategic' in the programme, plus the presence of foreign multinationals operating there. The net result is that some Spanish regions with a strong industrial tradition have a lower

[12] This point was made by those responsible for various consortia during the meetings organised by the CDTI on 21-22 June 2007 in the Menéndez Pelayo International University entitled "Proyectos CÉNIT: la investigación industrial estratégica a debate".

[13] For more information on the beneficial effects of cooperation on innovation between companies and the experience in Spain of the role of state aid see the study led by Joost Heijs and Mikel Buesa, published in 2007 by the Instituto de Estudios Fiscales.

profile in the CÉNIT projects than would be expected.[14] It is expected that this will be corrected once this same type of programme adapted to SMEs forms part of the R&D national plan for 2008-2011.

The leading companies, in charge of running the projects, have requested greater flexibility in resource allocation rules (between different items and annual amounts) and in current approval procedures for amendments. This is a very important point, one linked to the need for a correct and exhaustive implementation of the new general subsidies law, which will be analysed later in this report. As regards the obligation of consortia to sub-contract half of the subsidy received to research bodies, which some consider to be excessive and difficult to comply with, mechanisms should be introduced that simplify the procedure. Given the complexity of the technical, operational and financial documentation to be presented in proposals, and the complicated legal matters to be dealt with when setting up consortia, it would be useful for the programme manager to create a detailed guide for those considering submitting their proposals. The management of intellectual and industrial property, something which is left to the consortia to decide, is a particularly sensitive subject, one where SMEs and public research bodies often feel prejudiced by their very limited power to negotiate vis-à-vis the lead companies. In addition, in future calls the assessment of proposals should place greater emphasis on the design of the consortia and the allocation of tasks and responsibilities among the participants (the consortia created to date are composed, on average, of ten companies and more than 15 research bodies or groups).

Although CÉNIT R&D projects do not cover the market launch of new products and services, steps should be taken - through supplementary support instruments - to help companies launch more quickly their products and services resulting from the research undertaken. In this regard, full advantage should be taken of the greater flexibility offered by the new EU State aid framework for R&D and innovation. Another key element will be the extent to which the critical mass and the level of excellence generated by these consortia are reflected by increased levels of Spanish participation in the EU's Seventh Framework Programme, in particular the number of Spanish companies leading European consortia. Finally, the ultimate success of programmes will be measured by their socio-economic impact, in terms of their expected added value, potential market and job creation capacity. Interaction between CÉNIT and other initiatives already in place needs to be encouraged to guarantee a consistent approach to the development of key industrial sectors, such as the policy of supporting clusters (Innovative Business Groupings).

[14] For example, the percentage of leading companies from the Valencia Autonomous Region involved in CENIT (3%) is below that of the percentage of its innovative companies (13%) for the whole of Spain.

Neotec risk capital fund (fund of funds)

Based on the new risk capital legislation passed at the end of 2007, Neotec Risk Capital is a new state instrument aimed at encouraging the creation and development of technological firms. Managed by the European Investment Fund (EIF) and with mostly private capital, the investment policy of the Funds Company and the Co-investment Company that channel funding are strictly based on profitability criteria. Potential operations are subjected to the EIF's rigorous selection procedures and decisions are taken by an investment committee whose members are carefully selected in order to maintain its independence. The emphasis on professional management which focuses on obtaining returns for private investors has been rewarded by the quality of the operations carried out.

It is important that the fund's success is judged on its medium and long-term impact. A fundamental objective of this instrument, which in quantitative terms represents a tiny part of the risk capital market in Spain, is to increase the level of interest of large private investors in supporting the growth of technology-driven SMEs with good profit prospects. It would be very helpful to carry out a mid-term detailed evaluation of the fund functioning (end of 2009) in order to envisage a possible increase of funds available. In any event, this action should be seen as a supplement to other existing and future measures on risk capital in Spain. The segment which requires most support and development is that which finances the formation of new technology-driven companies, including spin-offs from public bodies.

Torres Quevedo Programme

This programme supports procedures to improve the mobility of researchers between the public and private sectors, at the same time as trying to encourage the demand for doctors and technicians among businesses. It is therefore an important means of encouraging cooperation among those active in the Spanish science and technology system.

The reason for including this programme (in existence since 2001) in INGENIO was to boost its resources and improve its management. The results have proved very positive, with 850 researchers having joined companies by 2005, thus reaching in advance the target for 2006. The efforts made to disseminate the programme and its flexible implementation have made it an important reference point for companies when planning their R&D and innovation activities. The fact that two-thirds of the contracts have been signed with SMEs is very positive. Coordination with other aid instruments contained in the new R&D national plan, such as encouraging the creation of R&D departments in companies, will be of great importance.

3.2.3. AVANZA Plan

The Avanza Plan 2006-2010 for the development of the information society in Spain is based on five areas of action whose scope goes beyond activities for the fostering of research, development and technological innovation.[15]

It is worth mentioning the efforts made by Avanza as regards monitoring and assessment. These include the establishment of specific objectives and statistics for each area of action and the setting up of a technical office managed from Red.es, a public business entity attached to the MITT, which also plans to monitor actions carried out by the Autonomous Regions. In 2006, covenants signed between regional and central government have made it possible to mobilise regional aid worth 135m euro, in addition to the 38m euro contributed by the NSA.

The next section includes a brief analysis of the two areas that, within the Avanza Plan, are most directly related to the Spanish NRP fourth pillar: competitiveness and innovation, and digital public services.

Competitiveness and innovation (SMEs)

This line of action aims to boost the ICT sector in Spain and the adoption of advanced technology solutions by SMEs. Beneficiaries and the representatives of companies in the ICT sector have a positive opinion of the actions taken, particularly of the large-scale projects financed through the PROFIT programme with demand-pull capacity, which aim to encourage cooperation between firms and research bodies. The dialogue and interaction with those involved in implementing and monitoring the plan is positively valued.[16] It is still too soon to judge the success of the measures, and more data to assess how the statistical indicators have evolved is also required. For the new national R&D plan 2008-2011, it is recommended examining in-depth the results of the ICT loans channelled to firms through financial intermediaries.

Public digital services

The development of public digital services is one of the main areas of action under the Moderniza plan 2006-2008 for the improvement of the Administration.[17] In order to ensure a consistent approach between the actions fostered by the MITT under the Avanza plan and those promoted by the Ministry of Public Administrations (MPA) under the Moderniza plan, in 2006 it was decided to sign a cooperation protocol

[15] An overview of all areas covered is included in Annex II, on presenting the monitoring data.
[16] On 24 July 2007 a cooperation framework agreement for the promotion and dissemination of the Avanza plan was signed by the MITYC and AETIC, the business association for the ICT sector.
[17] For more information on the Moderniza plan, see the MPA's webpage: http://www.map.es/iniciativas/mejora_de_la_administracion_general_del_estado/moderniza.html

under which the management of resources earmarked to this area of the Avanza plan was transferred to the MPA. In addition, a mixed MPA-MITT monitoring committee was set up. This is an excellent example of cooperation between different management units pertaining to the NSA and a good practice to take into account for the future implementation of the national R&D plan 2008-2011. The statistics relating to the progress of electronic administration in Spain reflect a positive rate of change and it is expected that the implementation of the Avanza plan in this field, helped by the relevant new legislation (analysed in the next section), will make it possible to achieve the objectives fixed by the EU for 2010.

It is also worth pointing out the importance of the implementation of the one-stop shop for all R&D and innovation public support schemes, expected for 2009, which is closely linked to the project to modernise the public administrations. This is a central part of improving the efficiency of the actions contained in the future national R&D plan 2008-2011, which without doubt will also help the carrying out of the tasks entrusted to the SISE. Its extension to regional programmes could also play an important role in coordinating all actions.

Finally, in relation to the Avanza plan and its scope, the possibility of its actions being grouped together on a stand-alone basis in a future version of the Spanish NRP should be examined. This would mirror the approach at EU level, where the i2010 plan promoting the information society is a policy area in its own right.

3.2.4. EUROINGENIO Programme

Euroingenio started in 2007, and therefore it is too early to assess how well it is functioning, although the impression is that actions are excessively fragmented. The recent decision to centralise the management of the territorial fund agreed with the Autonomous Regions in the Technological and Industrial Development Centre (CDTI - *Centro para el Desarrollo Tecnológico e Industrial*) is to be applauded. However, the application of Euroingenio programmes is still hindered by the excessive number of intermediaries involved in preparing proposals for the Seventh Framework Plan. In any event, steps will have to be taken to ensure the coordination of this aid with the Cénit, Consolider and Ciber projects, whose objectives include acting as a platform for access to EU funds.

3.3. Legislative measures

Legislative measures are a fundamental part of INGENIO 2010. Their aim is to support the effectiveness of R&D and innovation policies, by eliminating existing legal barriers and developing new instruments that encourage and support the innovative activities of enterprises. It is still too early to measure the impact of the legislation passed in 2006 and 2007. Some proposed legislation, such as new public procurement rules, has yet to be passed. This section looks at some of the most

significant measures, assessing their scope and, where appropriate, pointing out possible improvements and areas where they could be extended.

Regulation implementing the General Subsidies Law (Reglamento de la Ley General de Subvenciones)[18]

Beneficiaries of R&D and innovation incentive programmes often criticise the excessive bureaucracy involved in the granting of subsidies. The impact of the new regulation is positive, since its new rules and procedures should simplify and speed up the administrative procedure. However, a more detailed analysis of the changes shows that certain aspects will have a limited effect when applied to R&D and innovation projects, which have their own special features as well as being more complex in terms of time limits, budgets and implementation. Yet, with the exception of the twelfth additional provision (whose application is also limited to projects managed by the CDTI), the Regulation does not specifically mention the special features of such projects. For example, new features such as those relating to advanced processing of subsidies (Article 56) should be more flexible or apply automatically to R&D and innovation projects where advanced investment is crucial to their success.

Further, there are no rules enabling greater flexibility of the budgetary distribution between different items in the initial budget. One possibility would be to introduce a flexibility that is similar to that existing with respect to pluriannual subsidies (Art.57) for distribution over time. This is something requested by those running pluriannual projects, such as the CÉNIT. With such projects, it is extremely difficult - if not impossible - to give *a priori* a detailed breakdown of a budget many years in advance. This increased initial flexibility would avoid the need for many of the current procedures for approving changes, which place a significant additional burden on beneficiaries and managers, as well as potentially delaying or paralysing projects. Finally, article 81 – "Use of electronic media in the justification of subsidies" – should be amended so that using such media in subsidy procedures is always allowed (and not just when the tender conditions allow this). This would be in line with the new legislation on citizens' electronic access to public services.

The new national R&D plan 2008-2011 refers to the need to incorporate specific rules into the different conditions of the programmes with a view to reducing even further the bureaucratic burden of managing subsidies for researchers and public administrators. The most effective solution, however, would be to consider as soon as possible an amendment of the current General Subsidies Law to remedy some of the deficits identified and to introduce specific rules for R&D and innovation projects. Meanwhile, it is very important that the managers and auditors responsible for applying the Regulation to R&D and innovation projects receive specific training that allows them to apply effectively all of the advantages and alternatives contained in the new legislation.

[18] Royal Decree 887/2006 of 21 July.

Public procurement law (Ley de contratos públicos)

Harnessing the demand pull possessed by public authorities as a user of technologies is the subject of debate in both the EU and the USA. In fact, a growing number of governments have shown an interest in this question and are drawing up strategies designed to exploit as much as possible this potential method of boosting R&D and innovation. Public procurement in Spain in 2004 was worth almost 3.5% of the GDP,[19] which shows the significant purchasing power of the different public authorities. It is precisely this capacity that should allow the public sector to lead the demand for innovative solutions in its contracts, thus indirectly boosting national R&D and innovation. If the main clients in a market demand innovative solutions, supply will adapt to their needs as far as possible.

The current draft public procurement legislation includes new features aimed at defining clearly the concepts involved in public procurement, including certain new notions: public-private cooperation contracts and competitive dialogues. These elements, together with other aspects such as the admissibility of variations and improvements to the tender specifications and the consideration of specific risk management clauses in contracts between the public and private sector, are positive developments compared to the current legal framework. However, further progress is required if the aim is to put in place a public procurement strategy for innovation in Spain that is in line with that being developed by our most advanced EU partners.

While the article 11 of the draft legislation mentions technological innovation, which introduces the concept of "cooperation agreement between the public and private sector", no specific and detailed measures are laid down for the "public procurement of innovation" or "public purchases of technology". These concepts are not present in the current text. As regards the management of intellectual and industrial property rights, for example, mechanisms could be set up that allowed their transfer to the company making the winning bid, thus increasing incentives for the private sector and reducing the costs (by sharing the risk) to the Government. Similarly, the Government needs to establish communication channels with businesses, researchers and universities that would allow them to propose potentially interesting new solutions. New standard-form contracts should also be drawn up to include conditions precedent or subsequent thus reducing the risk to public authorities with respect to innovative or technologically advanced projects.

Finally, the implementation of the new legislation must be accompanied with plans to train the staff of the different public authorities in the new procedures as well as the creation of indexes to measure innovation in public procurement, and for the

[19] According to data taken from the Public Register of Contracts and GDP forecasts produced by the Spanish National Statistics Institute.

government to develop mechanisms relating to monitoring and technological foresight, with regard to public procurement (market intelligence).

Universities Organic Law (Ley Orgánica de Universidades)[20]

Universities play a vital role in any R&D and innovation strategy, since a large part of the available resources are channelled through them. In fact, in 2005 higher education accumulated almost 50% of total R&D employment in Spain, and approximately a third of total internal R&D spending. The European Commission's 2006 analysis of the situation of European higher education systems and the need for reform applies equally to Spain; in fact, in some areas the problems are worse.[21] A recent report of the Bruegel think tank on this issue concludes that there are two key factors for successfully encouraging the role of research and the knowledge transfer of European universities: (i) universities need more autonomy to manage their own resources and (ii) sufficient funding.[22] Similar conclusions are reached in Spanish studies, in particular the report of the Finance Committee of the University Coordination Council (*Comisión de financiación del Consejo de Coordinación Universitaria*) referred to in section 3.1 above.

The new Universities Organic Law (LOU in its Spanish initials) introduces some aspects that may help improve the situation in Spain. As regards research, innovation and knowledge transfer, the LOU lays down the foundations for a regulation for research personnel which includes, as an important criterion when determining their effectiveness, both a rating of their research and how their research results have been put into practice. An important new feature of the law in this regard is the possibility of teaching or research staff taking sabbaticals of up to 5 years to create technology-driven companies. Among the new features opening the door to increased flexibility in the functioning of all research bodies is the possibility of entering into indefinite and full-time contracts for excellent researchers. They are also allowed to create Mixed Research Institutes (*Institutos Mixtos de Investigación*), which researchers from other universities can join.

The new national R&D plan 2008-2011 recognises the need for these reforms to go further. A key point will be to achieve the necessary cooperation of the Autonomous Regions, to whom competences regarding education and universities have been transferred. Among the most urgent measures required are those relating to designing a research career which is consistent and homogeneous for all research bodies and universities, one that is capable of attracting young people and which truly aims for excellence. Measures tending to make universities more autonomous should be taken further, including the assessment of own effort in R&D and

[20] Organic Law 4/2007 amending the Universities Organic Law 6/2001 (BOE 89 13 April 2007).
[21] *Frequently Asked Questions: why European higher education systems must be modernised?* MEMO/06/190. Brussels, 10 May 2006.
[22] *Why Reform Europe's Universities?* September 2007. Available at www.bruegel.org

innovation, budget transparency and more flexible procurement procedures and management of research staff.

Citizens' Electronic Access to Public Services Law (LAECSP - Ley para el Acceso Electrónico de los Ciudadanos a los Servicios Públicos)

The LAECSP is completely consistent with the objectives and actions of the Avanza Plan, in line with the Public Digital Services. The objective is to modernise Spanish public administrations by improving the quality, speed and performance of services to its citizens, efficiency in the use of public resources in terms of costs and user satisfaction, interdepartmental integration and administrative simplification. To this end, it will encourage the intensive use of ICT in the internal processes of the public authorities.

The expected economic impact of implementing electronic administration in the NSA (estimated at more than 10 times the investment made, all measured as a percentage of the GDP),[23] leads one to think that the overall result of the LAECSP in the whole of the public administration will have similar results, in proportion to the investment made, and be profitable in terms of the return on that investment. A major weakness of the new legislation is its limited binding nature in relation to compliance within the period fixed (2010), other than as regards the NSA. Implementation for other public authorities is conditional upon what is referred to as "their budget possibilities", which gives them a great deal of discretion. The Avanza Plan aims to give financial support to local entities through Avanza Local Solutions and Digital Town Councils (a continuance of the Digital Cities Programme). While the financial resources are limited, this is a good example of how, taken together, a financial aid programme and the development of legislation strengthen the possibilities of objectives being achieved.

3.4. The monitoring and assessment system (SISE)

The SISE is a fundamental tool in the rapid and efficient modernisation of the Spanish system of science and technology. The objective is to establish a continuous assessment mechanism that makes it possible to revise and correct the existing actions and identify new needs. In addition, one of its objectives is to integrate the assessment and foresight tasks of both central and regional government into a common platform. This may make it a key instrument in improving coordination between public authorities.

[23] Estimates elaborated for the Agency by *Analistas Financieros Internacionales* (AFI). The methodology used is that of the eGEP study group (European Commission 2006) which analyses the impact of the implementation of electronic administration on economic growth. It takes as a reference the investments associated with the Law that, according to the MPA, amount to 310m euro between 2008-2010, solely taking into account the NSA's investments.

Alter two years of INGENIO 2010, the SISE is still far from being able to fulfil its task of improving the system. Centralising the monitoring data of the different management units into a unified database is proving to be more complicated than first thought. The body entrusted with setting up the SISE, the Spanish Science and Technology Foundation (FECYT) attached to the Ministry of Education and Science, needs to be given all the support it needs to complete, as quickly as possible, the important task of establishing an integrated and operational database, at least for the programmes run by the NSA. That said, the first report in October 2006 was very well received. Giving specific recommendations is an element of undoubted value in the design and improvement of actions. The content and effectiveness of these reports will undoubtedly improve once the tools for the collection and treatment of management data are in place.

It is expected that the SISE will play an important role in applying the specific monitoring statistics provided for each programme of the new national plan. As regards the INGENIO 2010 programmes, the statistics produced by the SISE are very useful.[24] For the moment, despite already having available some data in relation to the first projects launched in 2005 and 2006, these statistical indicators have not been used.

Apart from the tasks covered by the SISE, a relevant question as regards evaluation concerns the selection of projects submitted in calls. Despite the improvements made to the INGENIO 2010 programmes, those consulted have underlined the need to increase the transparency of the process, fixing clearer selection criteria and procedures adapted to the nature of the projects to be financed, and to establish mechanisms to give feedback to participants so that they can understand why they were unsuccessful and thus learn useful lessons. For the future, certain best practices should be applied generally, such as the use of recognised international assessors to evaluate large strategic projects, and progress must be made in homogenising assessment criteria according to the type of programmes and objectives pursued. It would also be useful to make available to the different programme managers a common pool of assessors. The future creation of the State Agency for Assessment, Financing and Foresight (*Agencia Estatal de Evaluación, Financiación y Prospectiva*) should play an important role in this regard.

Finally, in relation to the monitoring of INGENIO 2010 being one of the pillars of the NRP's actions, it should be noted that the proposed series of statistical indicators largely refers to the use of Internet by citizens and companies and is not used as an instrument for monitoring the proposed measures. This shortcoming needs to be remedied in future versions of the NRP. The statistics established in the framework of the ENCYT and transferred to the new national plan and its programmes are an excellent starting point.

[24] These statistics are available online at: http://ingenio2010.fecyt.es/

4. Conclusions and recommendations

The INGENIO 2010 strategy is consistent with the development of R&D and innovation policy in the EU and is a response to the main problems detected with science and technology in Spain. Only by the end of 2008 will the impact of INGENIO 2010's strategic programmes be reflected in the main statistical indicators. The monitoring data available to date show a satisfactory degree of implementation. The same is true of the planned legislative measures, although it is clear that the reforms being undertaken need to go further. The strategy's main weak point is as regards the monitoring and assessment system, SISE, whose implementation has not met expectations.

A serious problem with INGENIO 2010 is that it has been added to the actions launched within the framework of the national R&D and innovation plan 2006-2007, without there being any clear coordination between the two. It must be recognised, however, that the aim of stimulating the system as a whole has been effective, as can be seen from the documents that will govern future intervention in this regard: the ENCYT and the new National Plan 2008-2011. The conclusions and recommendations that are set out below take into account this new strategic framework of which INGENIO 2010 is fully integrated part, and emphasise the need to guarantee effective implementation.

First. The main priority for the new period which starts in 2008 should be the establishment of solid governance structures within the National State Administration to guarantee the correct implementation and monitoring of the national plan. A key aspect will be to ensure continuous coordination with the Autonomous Regions. In this regard, it is vital that the coordination structures that currently make up the Interministerial Science and Technology Committee (CICYT - *Comisión Interministerial de Ciencia y Tecnología*) are strengthened and remain active during the implementation of the plan. These include the Support and Monitoring Committee (CAS - *Comité de Apoyo y Seguimiento*), as the main body responsible for coordination at the operational level, the permanent body, as the main decision-taking body and the advisory bodies of the CICYT responsible for coordination with the Regional Governments (General Council) and the participation of the scientific community, stakeholders and the administration (Advisory Council).

Second. Greater priority should be given to providing the SISE with the tools it needs to do its job properly. It is important that the autonomy and authority of the SISE governing body is strengthened, to make easier its job of centralising and handling information and its task of assessing the ongoing improvement of the system.

Third. The managing authorities of major projects financed by INGENIO 2010 must contribute all the resources needed to guarantee project monitoring and assessment (interim and final). Three key factors to measure the degree of success of INGENIO 2010 programmes will be (i) the impact on the level of business investment in R&D,

(ii) the improvement in the use made by the market of the results obtained in the projects and (iii) the increase in the number of Spanish companies that are leaders in projects benefiting from the EU's Seventh Framework Programme. The system of statistical indicators for monitoring must be perfected so that a direct relationship is established between the general objectives, the specific objectives of each programme or line of action and the measurement of results.

Fourth. Mechanisms to identify and exchange good practices, with full involvement of programme managers and beneficiaries, should be set up for the continuous improvement of programmes. As regards identifying good practices, a key aspect is cooperation with the Autonomous Regions, an area where good examples can already be considered (Avanza Plan, I3 programme). The objective should be to maximise the possibilities of the new NRP in relation to the establishment of joint central-regional government calls.

Fifth. The transparency and effectiveness of the procedures for assessing and selecting projects needs to be guaranteed. The experience accumulated by managers, such as the CDTI, in technology transfer and innovation projects should be exploited for the benefit of the whole system, so that progress is made in establishing homogeneous assessment criteria and transparent selection procedures. The creation of the State Agency for Assessment, Financing and Foresight - which will include, amongst others, the current functions of the National Agency of Evaluation and Foresight (ANEP - *Agencia Nacional de Evaluación y Prospectiva*) - should play an important role in adapting uniform criteria, and it should be set up without further delay.

Sixth. In relation to the strategic programmes included in INGENIO 2010, while it is still too early to evaluate their degree of success in terms of their impact on the main statistical indicators, some provisional conclusions and suggestions are possible. The most important conclusions are: the need to guarantee the continuity of the most promising Consolider and Ciber projects, examining the possibility of creating new stable centres; whether it is convenient to guarantee the resources allotted to implement the infrastructures included in the map agreed with the Regional Governments; the mid-term assessment of the results obtained by the Neotec risk capital Fund with a view to a possible increase in its funding and the need to coordinate the CÉNIT programme with all actions destined to encourage the development of key industrial sectors (such as the policy of supporting innovative business groupings).

Seventh. A very important aspect of INGENIO 2010 has been the inclusion of legislative measures to complement the financial aid programmes. The analysis of the measures passed or pending confirms their appropriateness while at the same time revealing that they do not go far enough, hence the need for further reform in line with the provisions of the new NRP 2008-2011. The government must insist on the need to implement the legislation and to improve the framework conditions in INGENIO 2010, taking certain key reforms further. In 2008, when the new national

plan gets under way, it would be very useful to start the reform of the Science Law with a view to consolidating and ensuring the consistency of the series of legislative reforms both under way and planned.

Eighth. Establishing an attractive research career is a particularly urgent priority for all research bodies, which need to be able to attract and retain the best in their field, and of offering young people attractive career prospects. This needs to be combined with an increase in the level of autonomy and responsibility of universities and the public research bodies so that they can fulfil properly their task of generating knowledge for society as a whole.

Ninth. In 2008, the government should consider adopting new measures to simplify the management of R&D and innovation subsidies in order to extend the general improvements already introduced in the new regulation implementing the general subsidies law. Meanwhile, it is important that the discretion allowed by the regulation in force is used as much as possible. This could be achieved by, for example, providing those auditing such subsidies with complete information and training on the extent of their discretion.

Tenth. The draft Public Procurement Law recognises the importance of the innovation demand pull possessed by public authorities as a user of technologies. However, its scope should be expanded if best use is to be made of this instrument. The Government is invited to examine in detail the draft legislation and to carry out wide-ranging consultation in order to consider possible amendments to the draft.

Eleventh. Supporting R&D and encouraging innovation have become vitally important instruments in Spain's new industrial policy. There are a wide range of different instruments in existence providing support to businesses, and it is important that they complement and are consistent with each other. In the same way, an effective innovation policy requires a favourable business environment. This underlines the importance of certain sectoral policies, particularly those aimed at promoting business capacity, reducing the barriers involved in setting up businesses and guaranteeing compliance with the competition rules, and eliminating the barriers to entry faced by firms entering protected markets.

Twelfth. R&D and innovation policy is also a key part of the search for solutions to sectoral problems related, for example, to transport or the efficient use of natural resources and energy, to name but the most important areas. This explains the importance of fostering the cross-cutting nature of R&D and innovation policy and in particular its contribution to the objectives of the Spanish Sustainable Development Strategy (*Estrategia Española de Desarrollo Sostenible*). Agreements such as that entered into by the Ministry of the Environment and the Autonomous Regions during the sectoral conference of February 2007 for the coordination of R&D and innovation programmes concerning water in INGENIO 2010, or the R&D and innovation measures included in the Climate Change and Clean Energy Strategy (*Estrategia de*

Cambio Climático y Energía Limpia), are a benchmark for other important sectoral programmes or plans, in areas such as transport.

Finally, it is important that the Ministry of Economic and Fiscal Affairs, in close cooperation with all other central and regional government actors, ensures the complementariness of the actions financed through structural and cohesion funds aimed at strengthening R&D and innovation activities in convergence regions (by means of the Technology Fund, in particular) and financial assistance under the NRP.

ANNEXES

ANNEX I

THE SPANISH SCIENCE AND TECHNOLOGY SYSTEM:

STRENGTHS WEAKNESSES, OPPORTUNITIES AND THREATS

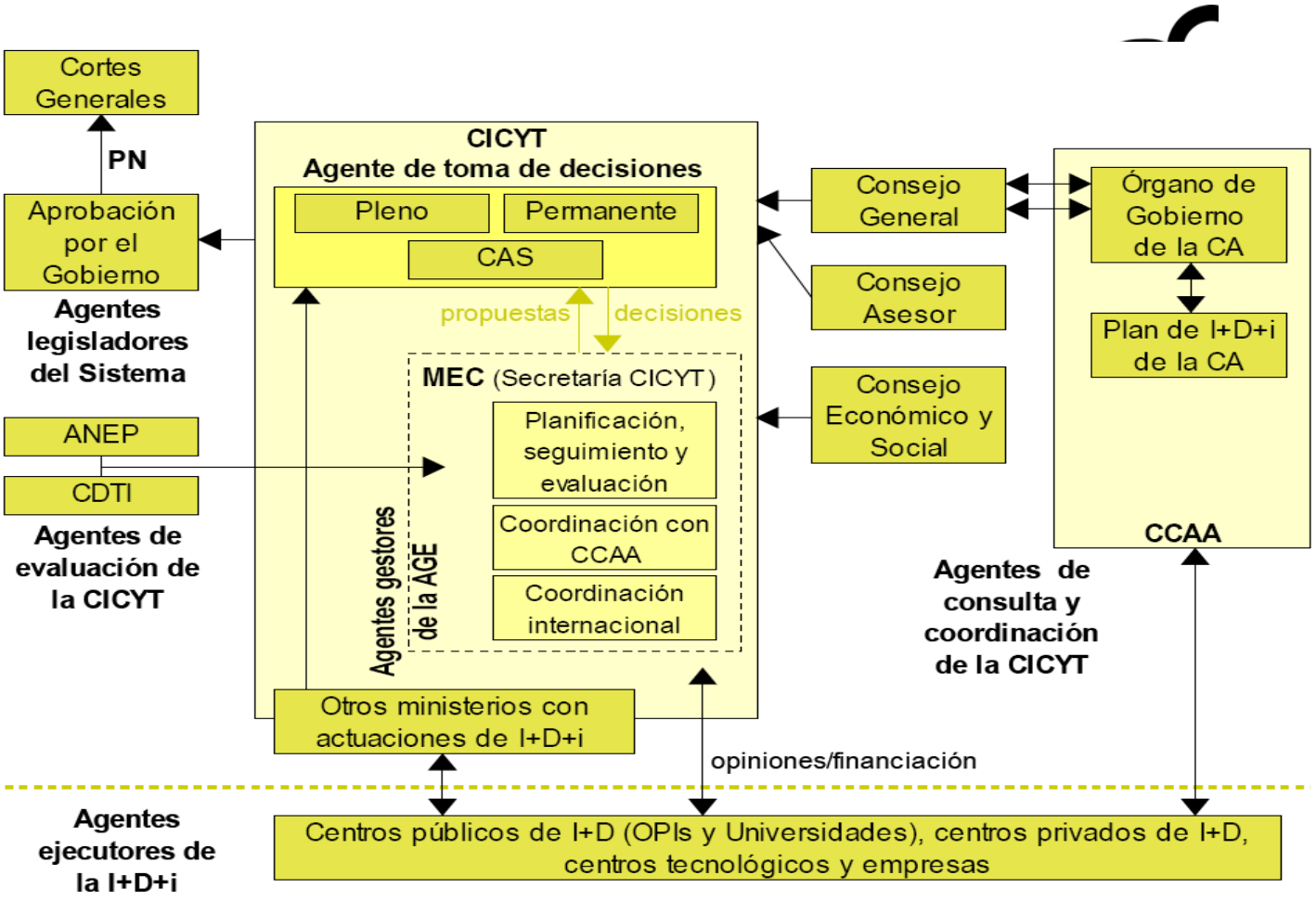
This Annex contains an analysis of the Spanish Science and Technology System (the SECYT), taking into account the main statistical indicators and official studies available. It takes the form of a SWOT analysis, a methodology used to study the competitive situation of an organisation or system in its market or environment, and its internal characteristics, in order to determine its **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats. According to the logic of this method, the strengths and weaknesses refer to internal aspects of the Spanish R&D and innovation system itself, while the opportunities and threats concern aspects relating to its context (national, EU and global).

To supplement this information, a diagram showing the organisation chart of the SECYT is included at the end of this Annex, which represents the reference framework for the definition of R&D and innovation policies in Spain.

WEAKNESSES	STRENGTHS
Technological gap and insufficient size of the system. Spain is still a long way behind the EU average and the objectives fixed for 2010, both with respect to the amount of resources dedicated to the system (input) and the results (output). On the basis of a wide range of statistical indicators of scientific-technological development, Spain reaches 54% of the EU-25 average. The Spanish R&D and innovation system is small in relation to the needs of the Spanish economy and companies. Insufficient business investment in R&D. The level of business expenditure on R&D and innovation is 0.61% of GDP (1.17% for the EU-27) and the percentage of researchers in companies as a proportion of the total number is 30% (49% in the EU-15). Of the 900 companies that invest most in R&D in the EU-15, only 9 are Spanish (given the size of the economy, there should be 50). Limited impact of knowledge generated by public research bodies and universities on business technological developments (technology-push). The creation of spin-offs from universities has remained at the same level as 2003, with 90 and 89 firms set up in 2004 and 2005 respectively. This is below the European average. In 2004, income for patent licences reached 1.9m euro, a much lower figure than that for more advanced countries. The activity of public research bodies and universities is fragmented and there is a limited critical mass compared to large European centres or groups. Investment per researcher of 51,000 euro is a long way behind the European average of 88,500 euro.	Greater awareness of the importance of R&D and innovation as a tool for future competitiveness and welfare, promoted by the Lisbon strategy and reflected in the Spanish NRP. This increased political commitment is reflected in new frameworks: Budgetary. More funds both from central and regional government, supplemented by European Structural Funds (2007-2013). Regulatory. Important reforms have been started within the framework of INGENIO 2010, with the new national plan recognising the need for such reforms to be taken further. Strategic. Adoption of the ENCYT strategy and the new NRP for 2008-2011. Fixing of objectives with a new emphasis on monitoring the impact of R&D and innovation support policies and programmes, based on the Global Monitoring and Assessment System (SISE), launched at the same time as INGENIO 2010. Scientific production. Spain has consolidated its position in Europe (5th) and in the world (10th) in terms of number of publications, of which about 60% come from universities. Furthermore, an increasing number of publications are published internationally. Efforts must be concentrated on increasing quality.

WEAKNESSES	STRENGTHS
Complexity of the public R&D and innovation support system: It is necessary to improve the management structures of policies and programmes, as well as to facilitate the procedures for participating in such programmes. In addition, cooperation between central and regional government requires strengthening to reduce the risk of the effect of state funds being neutralised by policies that clash or differ. The new principles of management and good governance in the new NRP which includes, inter alia, the one-stop shop project, must be put in place as soon as possible. Lack of standard policies to measure scientific excellence and competitiveness in relation to public research bodies, universities and other actors involved in R&D and innovation such as the science and technology parks and technology centres. There is a lack of homogeneous and comparable statistical indicators capable of allowing incentives to be introduced that promote the contribution of these agents to development activities. Delay in convergence with the information society with respect to the EU-15, both in business circles, and at a family or personal level. For example, the percentage of Spanish companies that buy and sell online is the lowest in Europe, even below Greece and Portugal, the only two countries in EU-15 with a greater technology gap than Spain. In general terms, the evolution of the Spanish system with respect to different indices is stable with a slight downward trend.	Good reaction capacity of the public research bodies, universities and other research bodies to the direct demand of businesses (demand-pull). The level of business financing of university R&D or of the public research bodies - around 7% - is similar to the EU-25 average. The development of science and technology parks is contributing to this and it is expected that this trend will be strengthened in the future (more than 50 parks are in the pipeline). Given the significant growth in business demand (partly due to the success of programmes like CÉNIT), measures that increase the flexibility of public research bodiess and universities should be implemented more quickly. Significant R&D and innovation investment in service sectors. Growing investment in these sectors may help Spain to strengthen its competitive position in key areas, such as tourism.

THREATS	OPPORTUNITIES
Productive structure specialising in medium-low and low technology and a limited culture of innovation. Spanish businesses generally show insufficient capacity to adapt to change and take risks to make the most of global markets. Main related statistical indicators: - High technological dependence: the acquisition of foreign knowledge and technology (machinery, equipment and software) represents more than 85% of total R&D and innovation spending declared by Spanish companies (innovation survey by National Statistics Institute (INE) 2005). - Low number of requests for patents. In 2004, Spanish companies requested about 30 European patents per 1000 inhabitants, compared to the average for the EU-15 of more than 160. Uncertainty in relation to the sustainability of the rate of convergence with Europe. This is derived from the low rate of growth of productivity and uncertainty regarding the change of cycle in the Spanish economy. The scenario where a reduction in growth leads to less R&D and innovation spending needs to be avoided. For certain statistical indicators (eg use of ICT), the rate of progress is not enough to improve Spain's world ranking. Risk of future scarcity of researchers in Spain due to demographic trends (ageing population) but also to a lower number of university students and those doing doctorates. The education system should anticipate future needs and companies must take a more positive approach to R&D and innovation, increasing the demand for those with PhDs, thus making the private sector a more attractive option to young people.	Take advantage of the European impetus with respect to knowledge and innovation. The Lisbon Strategy is a stimulus to maintaining efforts in Spain as regards R&D and innovation and an opportunity to make use of synergies through concerted action in this area. The new focus of the structural funds, including the Technology Fund and the EU's Seventh Framework Plan, provide opportunities to strengthen available resources and may provide the tools needed to modernise the Spanish system. Maximum use must also be made of the new EU legal framework for State aid and R&D and innovation. Size and potential of the Spanish and European market. In GDP terms, Spain is among the world's ten largest economies. The European market is one of the biggest in the world, with a high level of internal demand that Spanish companies must exploit. In terms of human resources, Spain continues to be one of the EU-25 countries with the highest proportion of university students compared to the total student population (20.8% compared to 16.5%). Development of demand pull policies, to supplement the budget increase programmes: Take advantage of the potential of public sector purchases, which in Spain account for 3.5% of the GDP, to lead the demand for innovative solutions. Make the most of planned special scientific infrastructures and installations, as an indirect method of boosting cooperative R&D and innovation.



Current organisation chart of the SECYT

ANNEX II

MONITORING DATA

Table AII.1. Budget Data

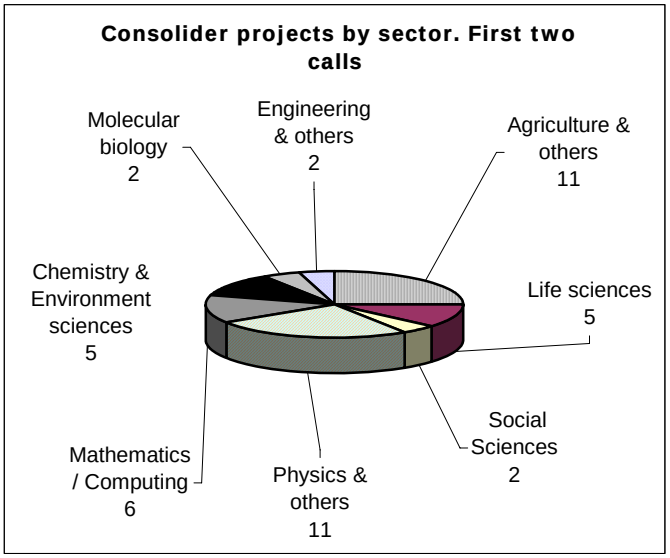
Ingenio 2010 in the national budget		2006		2007		2008*		2009*		2010*	
		Sub.	Cred.	Sub.	Cred.	Sub.	Cred.	Sub.	Cred.	Sub.	Cred.
Consolider	I3	27		52	--	--	--	--	--	--	--
	FEICT	22	200	33	180	40	352	--	--	--	--
	Consolider Projects	15	20	45	35	--	--	--	--	--	--
	Ciber	32	--	87	--	--	--	--	--	--	--
	Total Consolider	96	220	217	215	--	--	--	--	--	--
CÉNIT	Neotec Risk Capital	--	5		20	--	--	--	--		--
	Torres Quevedo Programme	17	--	54	--	--	--	--	--	--	--
	Cénit Projects	50	--	145	--	195	--	195	--	145	
	Total Cénit	67	5	199	20	195	--	195	--	145	--
AVANZA	Digital Citizenship	195.5		375		--	--	--	--	--	--
	Digital Economy	708		852		--	--	--	--	--	--
	Digital Public Services	52		67		--	--	--	--	--	--
	New Digital Context	37.5		145		--	--	--	--	--	--
	Total Avanza	252	742	442	997	553	1.122	641	1.262	744	1.405
Euroingenio	Eurociencia	--	--	2.7	--	2.2	--	3.5	--	4	--
	Tecnoeuropa	--	--	8.8	--	--	--	--	--	--	--
	Eurosalud	--	--	1.6	--	--	--	--	--	--	--
	Innoeuropa	--	--	2.5	--	1.2	--	--	--	--	--
	Total Euroingenio	--	--	15.6	--	--	--	--	--	--	--
Totals	Total Ingenio 2010	**1,382**		**2,106**		--		--		--	
	Total R&D and innovation National Budget (Function 46)**	**4,867**		**6,541**		**7,679**		**8,907**		**10,333**	

Source: prepared by author based on MEH, MSE, MITT and FECYT data
Figures in millions of euro
*Estimates
**Figures referred to civil R&D and innovation

Table AII.2. Consolider monitoring data

Consolider Projects		Calls 2006	Calls 2007	Total
Projects presented		79	71	150
Projects approved		17	28	45
% success rate		21.5	39.4	36.3
No. researchers participating		1.444	n/d	--
No. Research groups		200	302	502
Amount of aid (national budget) *(Million €)*	Chap VII (Sub.)	75	150	225
	Chap VIII (Cred)	100	20	120

Source: prepared by author (MSE data)



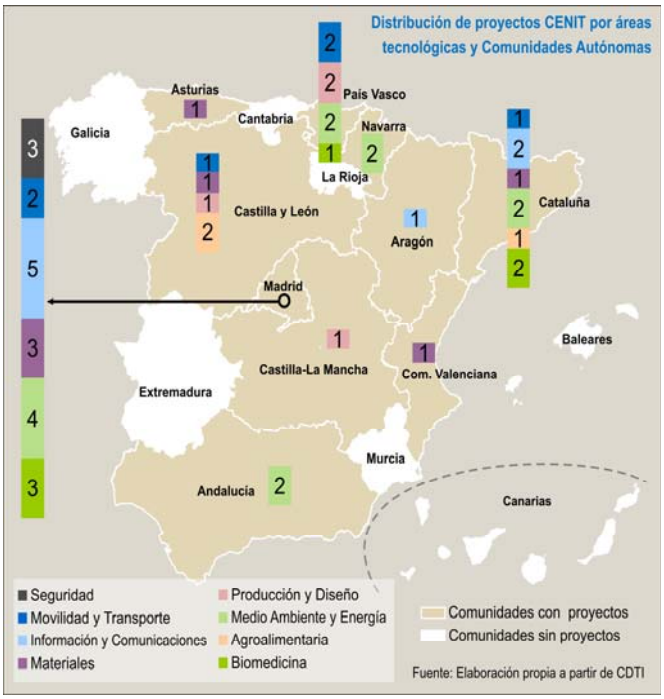
Source: prepared by author (MSE data)

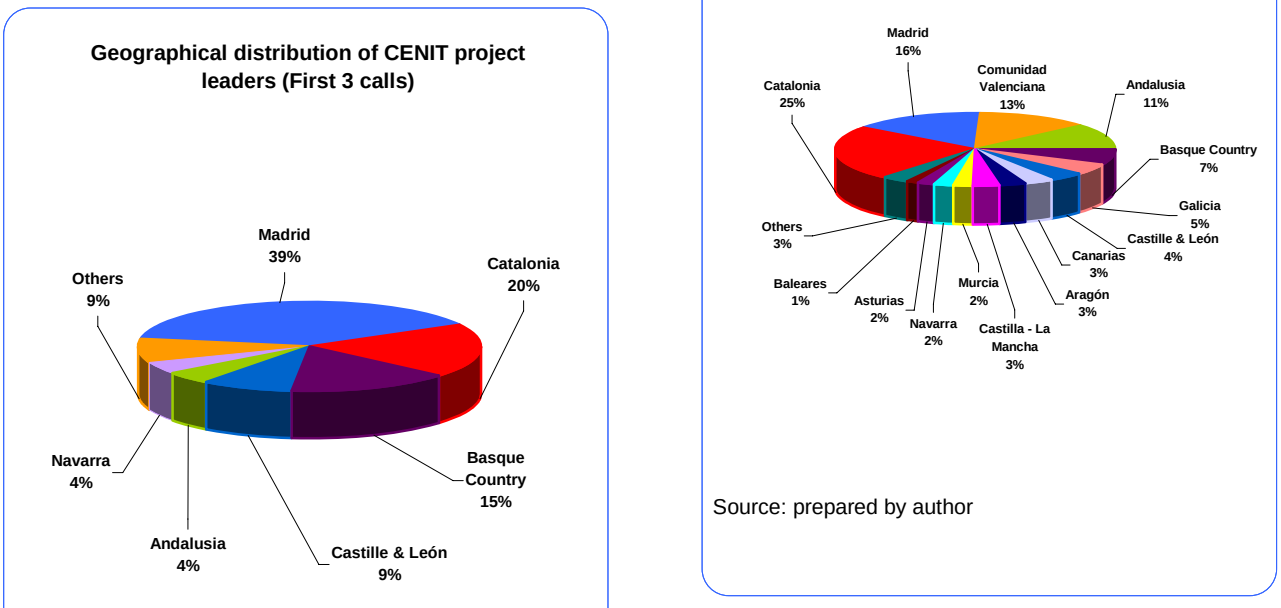
Programa I3	**Convenios 2005**		**Convenios 2006**		**Totales**	
I3 Incorporación	Incorporaciones	Coste M€	Incorporaciones	Coste M€	Incorporaciones	Coste M€
CC.AA	254	34,2	308	43	562	**77,2**
CSIC	40	5,2	50	0,6	90	**11,8**
UNED	3	0,4	3	0,4	6	**0,8**
IAC	2	0,3	5	0,6	7	**0,9**
ISCIII	7	0,9	2	0,3	9	**1,2**
I3 Intensificación (Coste en M€)	1,1		2,7		3,8	

Source: prepared by author (MSE data)

Table AII.3. Cénit Data

CENIT Calls				
	1st.	2nd.	3rd.	Tot.
Projects presented	53	42	25	120
Projects approved	16	15	16	47
% success rate	25	36	64	42
No. companies participating	175	208	252	635
% of SMEs	51	65	59	58
No. research bodies/groups	240	246	261	747
Resources* used	429	406	425	1260
Average budget per project	26.8	27.1	25.4	26.4





Source: prepared by author

Source: prepared by author

Note: the "Others" category includes Castille-La Mancha, Comunidad Valenciana, Asturias and Aragón

Table AII. 4. AVANZA plan monitoring data

AREÁS ESTRATÉGICAS	SUBÁREAS	PROGRAMAS OPERATIVOS	PGE 2006	PGE 2007	TOTAL ÁREAS 2006	TOTAL ÁREAS 2007
Ciudadanía Digital	AVANZA Ciudadanía	Dinamización	1,5	9	195,5	375
		Préstamos Ciudadanìa y jóvenes e universitarios	175	265		
		Convocatorias de ayudas para: igualdad de género, mayores y discapacitados	3	6		
		Impulso TDT	10	10,5		
Economía Digital	AVANZA PYME	Préstamo TIC	425	440	708	852
		Dinamización PYME-Micro PYME	25	20		
		Soluciones sectoriales	15,5	16		
	Política Industrial	PROFIT (Apoyo a la I+D+i en el sector industrial	202			
	Formación	ForIntel	27			
		Programa ArtePyme	15,5			
Servicios Públicos Digitales	AVANZA Local	Ciudades Digitales	24	30	52	67
		Ciudades Singulares	13	17		
		Aplicaciones PISTA	5,8	12		
	Otras AA.PP	E-Sanidad	252			
		E-Justicia	128			
		Convenio con el MAP	10			
Nuevo Contexto Digital	Seguridad	DNI electrónico	9,4	77	37,5	145
		Seguridad	2	11		
		EBA	13,5	24,5		
	Contenidos	Contenidos Digitales	1	20		
Total					**993**	**1439**

Source: prepared by author based on data provided by the MTTC

Evolución de los Indicadores principales de Avanza	2002	2003	2004	2005	2006
Penetración de la banda ancha en hogares. %	3,3	8,94	14,7	24,5	32,6
Porcentaje de ciudadanos con acceso a Internet. %	17,4	25,3	33,6	37,0	41,1
Porcentaje de hogares con banda ancha sobre el Total de hogares conectados Internet. %	N/D	35,5	44,7	66,2	79,5
Penetración de la banda ancha en empresas. %	62,4	81,2	82,1	83,7	94,0
Porcentaje de empresas que realizan compras por Internet. %	6,8	9,3	9,9	16,1	N/D
Grado de avance de España en el desarrollo de la Sociedad de la Información respecto a la UE-15	N/D	82,6	78,9	77,2	84,1

Source: prepared by author based on data provided by the MTTC
Summary indicator based on data regarding: broadband penetration in homes, percentage of citizens with Internet access, percentage of broadband as a total of connections and broadband penetration in companies.