

Research Centres of Catalonia

RAMON MORENO

Ten years ago a process of change in research was started in Catalonia that became instrumental in setting the foundations of the current Catalan research and innovation system. The implementation of the 3rd Research Plan 2000-2004 and assessment of the mission done so far by centres promoted by the Government of Catalonia and public universities made clear that unequal development of these research institutions was taking place. While a few centres clearly fulfilled their mission, others required redefinition of their goals and structure in order to comply with international scientific quality standards.



Ten years of research centre policy by the Government of Catalonia

At the initiative of the then minister Andreu Mas-Colell (2000-2003), the Government implemented a policy to seize talent and create research centres of excellence with a legal personality of their own and a flexible structure, similar to those existing in Europe: the **Institució Catalana de Recerca i Estudis Avançats** (ICREA). This policy was continued by ministers Carles Solà (2004-2006), Joan Manuel del Pozo (2006) and Josep Huguet (2007-2010), besides deploying a plan for big research infrastructures, the most outstanding of which are **the Alba synchrotron and the Mare Nostrum supercomputer**.

This policy to improve Catalonia's research and development (R&D) capacities is coincident in time with the framework created in the **European Union** after 2000 with the adoption of the so-called **Lisbon strategy**, the aim of which was «to become the most dynamic and competitive knowledge-based economy in the world by 2010 capable of sustainable economic growth with more and better jobs and greater social

cohesion». ¹ This ambitious –and in retrospective unfeasible– proposal was completed by the goal set in the **2002 Barcelona European Council** of reaching an R&D expenditure equivalent to 3% of GDP (gross domestic product). Both agreements created a framework of political consensus that allowed the Government of Catalonia to do a significant effort in giving support to relevant initiatives and create new research centres to provide the country with support structures needed for a sustainable knowledge-based economy.

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It has been based on these different realities, of more or less successful experiences and a favourable political and economic climate that a research policy was created by the Government of Catalonia. These last ten years have thus been a period we could call of systemic innovation of the R&D structure in Catalonia, with the appearance

of programmes implemented by Catalan authorities or having their support to develop new forms of research organisation like support to research groups (SRG), promotion of science and technology parks attached to universities and the **Research Centres of Catalonia Programme** (CERCA).

It has been a decade in which the Government of Catalonia progressively increased R&D expenditure. According to the latest available data, one can see that R&D public expenditure in Catalonia in 2008 amounted to almost 1.1 billion euros, roughly one third of total Catalan R&D expenditure (€3.286bn) that year. As to Catalan GDP, total R&D expenditure increased from 1.11% in 2000 to 1.61% in 2008, a determined progress towards convergence with Europe (1.86%, EU-27 average).

The CERCA research centre system

The result is that 24 new centres have been created in ten years, and further fifteen have been enhanced and transformed during the same period, either at universities or at the initiative of other institutions. Besides, full inclusion into

the system of further nine research institutes related to hospitals adapting now to the research centre model as defined by the CERCA programme is under way.

Centres within the CERCA system are independent organisations with a legal personality of their own under participation of the Government of Catalonia, the main purpose of which is scientific research of excellence.

The Research Centres of Catalonia Programme (CERCA) was created in 2005 by the Directorate General of Research to set up a relevant policy in this field. The mission of CERCA has so far been to do a follow-up of research centres under participation of the Government of Catalonia, provide them support, disseminate and implement best management practices and articulate the centre of excellence model to which existing and new centres have adapted.

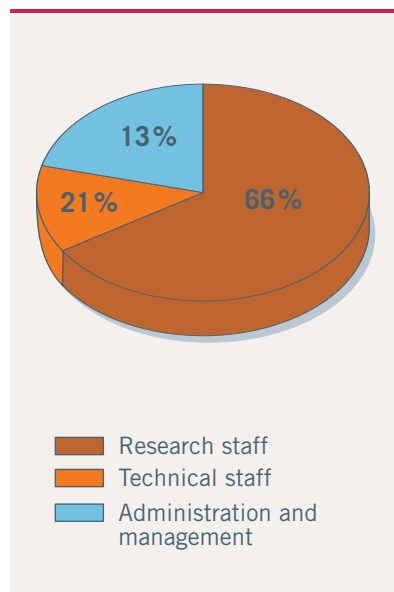
Of the current 39 research centres participating in the CERCA programme, ten work in biomedicine and health, ten in science and engineering, five in energy

and environment, four in agriculture and food, four in Earth and space sciences, three in economics and social sciences and three in humanities. The push given in recent years to the creation and restructuring of biomedical centres by the Ministry of Health is remarkable.

All centres in the CERCA system are organised following a governance and management model that makes sure efficiency, flexible management, seizing and promoting talent, strategic planning and executive capacity. This CERCA model can be summarised in the following directives:

- ▶ Research centres within the CERCA system are independent organisations with a legal personality of their own (consortia or foundations) under majority participation of the Government of Catalonia, the main purpose of which is scientific research of excellence.
- ▶ They implement a private management model with maximum flexibility and self-discipline, based on a programme of several years materialised in a strategic plan and ex-post monitoring that keeps the autonomy of each centre.
- ▶ Their governance is efficient, hierarchical, based on

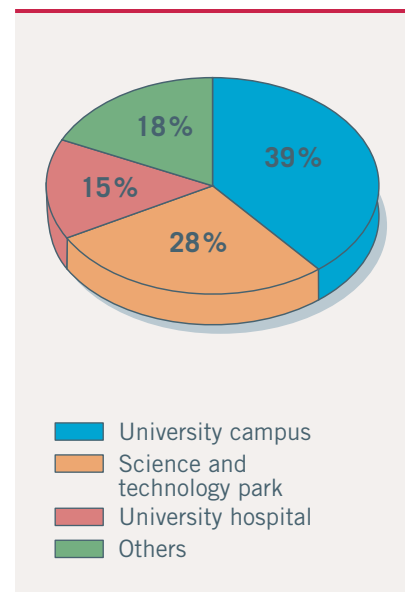
Graph 1. Staff type by function



Source: own.

▲ A good organisation of centres ensures their efficiency.

Graph 2. Settings of CERCA centres



Source: own.

▲ Many CERCA centres are related to universities.

management with ample powers according to the managing body of the centre to which they are accountable.

- These centres have been designed to have a quality research staff in order to have an international impact, a structure made of research groups headed by internationally renowned scientists and with a big turnover of post-doc researchers, aimed at developing frontier research intended to create a scientific and economic impact and improvement of social and individual welfare.

Their governance is efficient, hierarchical, based on management with ample powers according to the managing body of the centre to which they are accountable.

- They have significant and stable structural funding through programme contracts with the Government of Catalonia and implement a policy to seize talent on the basis of defining the scientific career of their research staff according to the specifics of each field and the hiring strategies chosen by each centre.
- Each centre is indispensably advised and assessed on

a regular basis by an international scientific committee of high standing ensuring implementation of practices and criteria according to international standards of excellence in research.

The Institution of Research Centres of Catalonia

Following the directives of the National Pact for Research and Innovation (2009-2010), the Government of Catalonia created the Institution of Research Centres of Catalonia (CERCA Institution) in 2010 as a tool to enhance and coordinate the CERCA centre system. Its goal is to address increased complexity of the research centre system and new internationalisation challenges as well as to reach higher efficiency in knowledge transfer.

The CERCA Institution is the own tool and the technical service of the Government of Catalonia to do follow-up of, provide support to and facilitate activity at research centres within the CERCA system. It is established as a public foundation under the supervision and directives of the Department of Innovation, Universities and Enterprise within the

Commission of Universities and Research. The mission of CERCA is to ensure adequate development of the Catalan research centre system, encourage and maximise synergies, coordination between centres and strategic cooperation, improve the position, exposure and impact of research done and facilitate exchange with the different public and private stakeholders.

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In a nutshell, action of the CERCA Institution focuses on the following goals:

- Corporate, institutional and scientific exposure of research centres allowing them to reach and consolidate international leading positions.
- Running the secretariat of joint bodies and doing budgetary monitoring over the functioning and investment of research centres.
- Disseminating and promoting best practices

regarding strategic planning, seizing talent, research management and raising funds.

- ▶ Identifying and taking advantage of synergies and economies of scale.
- ▶ Increasing technology and knowledge transfer to companies and the society for a larger economic and social impact.
- ▶ Fostering interdisciplinary R&D and network research aiming at the focus and challenges set by the NPRI (National Pact for Research and Innovation).
- ▶ Implementing an assessment system for centres and the impact of their R&D.

Success in attracting talent to the Catalan R&D system

As is known, the European Research Council (ERC) gives the Advanced Investigators Grants to consolidated researchers with a record of excellence and international leadership to fund – up to 3.5 million euros per project – frontier research in all fields of knowledge. In the last call (January 2010), six of ten grants awarded to researchers doing their task in Spain went for public

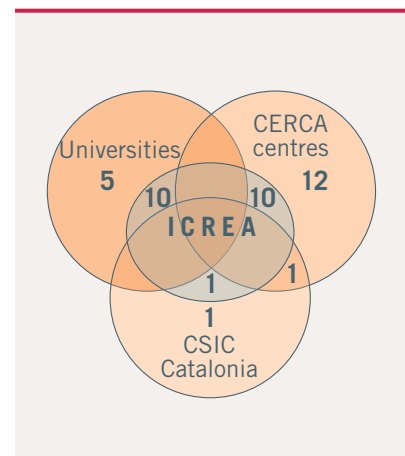


▲ The CERCA Institution promotes scientific exposure of research centres allowing them to consolidate international leading positions.

research centres in Catalonia. This difference made by Catalan centres has been the tone of the four calls published so far: two for consolidated research staff and two for junior researchers.

Taking the aggregated results of the four calls, forty ERC Grants to researchers from Catalonia compare to 26 from the rest of Spain. In Catalonia, 21 are ICREA researchers (ten of which are at a CERCA centre, another ten at universities and one at CSIC), twelve are researchers directly hired by

Graph 3. Researchers with ERC Grants



Source: own.

▲ Many ERC grants went to CERCA centres.

centres from the CERCA system, five are university teachers and two CSIC researchers (one of which at a CERCA centre cooperating with CSIC in a consortium). Without any doubt, these results are a good indicator of the success of the science policy carried out by the Government of Catalonia in the last ten years, especially as to seizing talent.

After ten years, the outcome of European excellence funding allows to have very good results of this policy that can be considered a success.

After ten years, the outcome of European excellence funding allows to have very good results of this policy that can be considered a success. Had ICREA and the CERCA centres not been created, 33 award winners would probably not be in Catalonia or Spain right now, that is, half the ERC Grants obtained so far by Spain would not be accounted, and what is worse, research of excellence done by them would not have contributed to scientific and economic development of our country.

From all this we can infer that the criteria and methodology followed by ICREA and the CERCA centres in selecting researchers

abide by the international standards of excellence in research the European Research Council uses for its calls.

24% of the scientific staff at CERCA centres are foreigners.

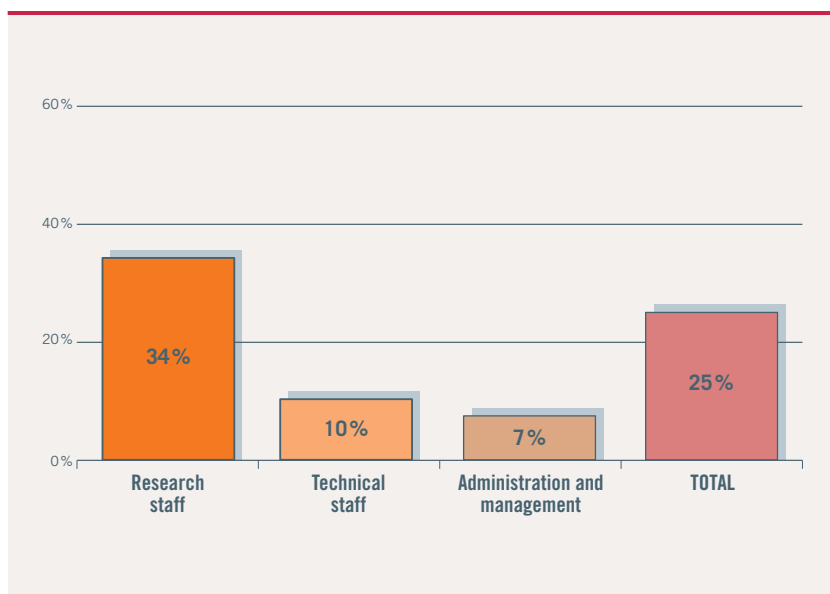
Also, considering that 24% of the scientific staff at CERCA centres are foreigners, which does not include visitors (14% of permanent researchers, 9% of support technicians and 40% of post-doc and pre-doc researchers), it can be stated that CERCA centres attract international talent in a comparable manner to European reference centres.

Scientific results

Regarding scientific production, data from all centres are currently being gathered to have an aggregated view of the CERCA system comparable to other scientific organisations like CSIC in Spain, CNRS in France or the Max Planck Institute in Germany. The study is in its initial stage, so only a few indirect indicators can be referred to as of now. Nevertheless, the results are excellent.

For instance, taking as a reference the research quality ranking provided by

Graph 4. Distribution of foreign staff



Source: own.

▲ CERCA centres attract international talent in a comparable manner to European reference centres.

SCImago² it can be observed that of the thirty first Spanish institutions appearing there, 21 come from Catalonia, of which nine are CERCA centres, five hospital research institutes, one is ICREA, three are universities and three other organisations. Of these thirty, the three first are CERCA centres and the only universities are the three mentioned from Catalonia.

Economic impact

It is commonly considered that the economic impact of research lies in knowledge transfer, especially of technology to productive industries. Hence research is necessary to create new knowledge and technologies eventually leading to new marketable products creating wealth. The outcome of research is expected to translate into patents, licenses or spin-offs and that know-how is transferred by taking into companies doctors educated at research centres or universities.

Competitiveness of companies requires constant innovation, and there is no innovation without research. It is therefore an increasing requirement that an important part of research is geared to the

needs of the industry. This is one of the goals of the 2010-2013 Research and Innovation Plan, to have 30% of research looking into social or economic challenges or serving the needs of the industry in Catalonia by 2013.

As there are no data on knowledge transfer in the overall system, if analysing from a revenue per activity perspective, CERCA centres already obtain an average 32% from agreements and contracts with the private industry, thus catering for the research needs of companies.

However, it needs to be born in mind that research is in itself a business as well. Taking the CERCA system, some indicators are shown in the following:

The goal: to have 30% of research looking into social or economic challenges or serving the needs of the industry in Catalonia by 2013.

► The CERCA system created 4173 new jobs (2008 data),

The screenshot shows the ICRPC website. At the top, there are language options: CATALÀ, ESPAÑOL, ENGLISH. Below this is a navigation bar with links: llibres, E, notícies, ICRPC, Institut Català de Recerca en Patrimoni Cultural, situació, blog. The main navigation bar includes: L'ICRPC, RECERCA, PUBLICACIONS, ESTUDIS I ANÀLISIS, DOCÈNCIA, ACTIVITATS, NOTÍCIES, BIBLIOTECA. The page title is 'Presentació'. Below the title is a large image of a modern building structure. The text below the image describes the institute's mission and goals. The footer contains contact information and a list of services.

▲ ICRPC is a CERCA centre that intends to be a reference and support to the different stakeholders involved in cultural heritage.

of which 2764 are researchers, 851 support technicians and 558 administrative staff. It further hosts 451 associated researchers (75 ICREA researchers and 376 university professors) selected for their high scientific level.

► For each million euros the Government of Catalonia spends in structural expenditure to run CERCA centres, the latter obtain an additional 1.5 million euros through competition calls, contracts and agreements. Most of this revenue is for the benefit of the Catalan system as it comes from

external sources, basically Spanish and European calls.

► Although the CERCA system encompasses only 15% of researchers in Catalonia, they obtain nearly 50% of competition funds seized by the Catalan system. Just as an example, statistics indicate that researchers in Catalonia are seizing roughly 2% of total funding from the 7th R&D Framework Programme of the European Union, a proportion largely above that of Catalan population within the EU (1.5%). With regards to Spain, it takes 33% of

overall European funds given there (double the population rate of Catalonia).

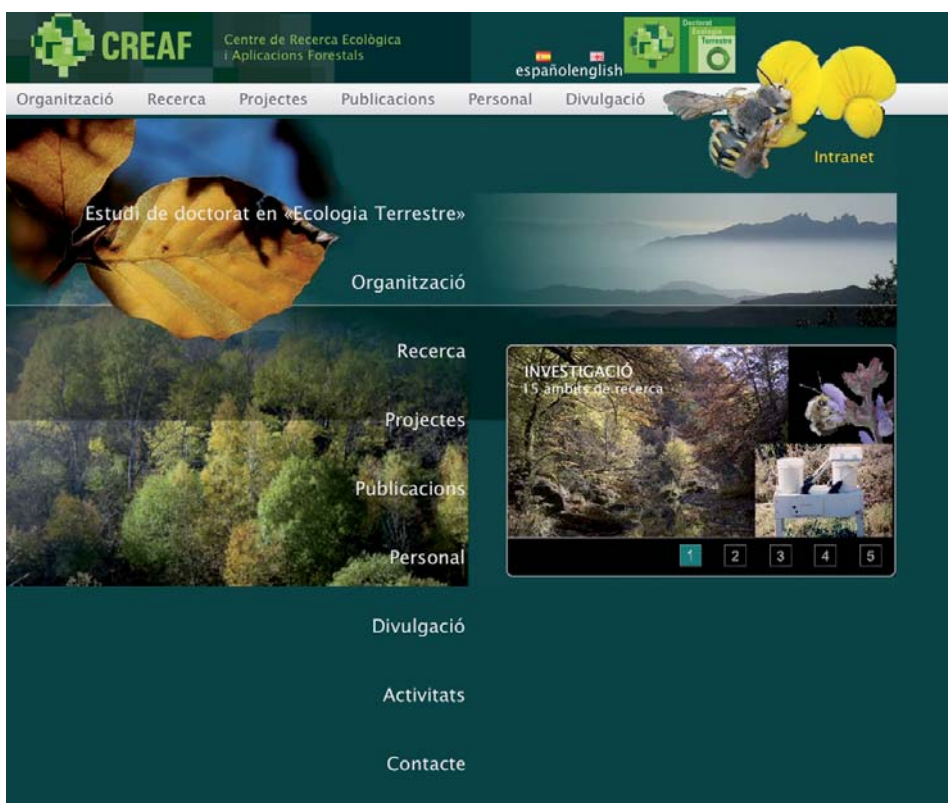
To conclude with

The creation of these centres provided some important milestones in strengthening Catalonia's scientific foundations in line with the **Lisbon strategy**, which is kept in the new **2020 strategy** proposed by the **Euro-pean Commission**.³

The new context of the global economy, being in a deep crisis of self-trust with high unemployment and unprecedented job and business destruction, means however that needs to reform the economy are as urgent as ever.

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Within this new context, the CERCA Institution needs to facilitate improved efficiency of the system and its impact with two clear development patterns: international



▲ The creation of centres like CREAM has helped reach important milestones in strengthening science in Catalonia.

exposure of Catalonia as a first-class R&D pole in Southern Europe, with a system of centres of excellence attracting foreign investment finding in

Catalonia not only a high living standard but also highly skilled people able to generate knowledge and technology, great scientific facilities and an environ-

ment ready for creativity; and the capacity of transferring technology to Catalan companies wishing to change to become more competitive.

RAMON MORENO

Doctor in Ecology from the UAB.

Director of the CERCA Programme and full profesor of Ecology at the University of Girona. He is currently at the Department of Environmental Sciences and a researcher at the Institute of Aquatic Ecology of the University of Girona.

He has been director general of Research at the Commission of Universities and Research, first vice-rector and research vice-rector of the University of Girona and director of the master programme in Environmental Management and the post-graduate diplomas in Environmental Management in Urban Settings, in Control Systems and Environmental Certification, in Forest Management and Planning and in Environmental Communication and Sustainability.

He is a member of the Protection Board of the Aiguamolls de l'Empordà Natural Park and of the Advisory Council of the Illes Medes Protected Area.



Notes

1. European Council in Lisbon, 23 and 24 March 2000, *Conclusions of the Presidency*. For recent assessment of this strategy, cf. http://ec.europa.eu/archives/growthandjobs_2009/pdf/lisbon_strategy_evaluation_en.pdf
2. SCImago group - www.scimagoir.com
3. «EUROPE 2020 - A Strategy for Smart, Sustainable and Inclusive Growth», COM(2010) 2020. Available at http://ec.europa.eu/commission_2010-2014/president/news/documents/pdf/20100303_1_en.pdf