

# CATALAN AGREEMENT ON THE KNOWLEDGE SOCIETY



**Generalitat de Catalunya**  
Government of Catalonia

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The PN@SC has its own permanent website, where you can access all the documentation used by the various working groups to prepare the objectives and the proposals submitted to the Permanent Board and the Plenary, organised by working group. This documentation is represented in annex F.





## Foreword by the Right Honourable Quim Torra, President of the Government of Catalonia



Catalonia has taken part in all the industrial, cultural and artistic revolutions that have shaped our world. And it continues to do so, thinking in terms of modernity, innovation and openness. Now we have a new world ahead of us,

where regions' prosperity will be measured by their ability to generate and attract talent and knowledge.

This new world needs, more than ever, comprehensive knowledge that mixes areas and disciplines with more powerful coordinated networking than ever. We have seen this throughout the pandemic caused by SARS-CoV-2: researchers coordinating worldwide, traditional production companies redirecting production towards innovative projects, traditional industry and start-ups working hand in hand.

Now it is time to strengthen the foundations of sustainable development in line with the 2030 goals. It must be redirected to create a just and prosperous society that protects the most vulnerable sectors. We need a territorially balanced country to advance in knowledge regions and ensure a living country throughout. And the knowledge society must play a decisive role in a crisis that may affect our rights and freedoms.

This is the opportunity afforded to us by the **Catalan Agreement for the Knowledge Society (PN@SC)** and all its reflections and actions, which you are about to discover. A unanimously approved agreement that can serve as a compass, directing us towards the knowledge society we must aspire to in order to guarantee the progress and well-being of our fellow citizens.

With this **PN@SC** we are making innovation the core of Catalonia's strategy to put the percentage of knowledge-based economic activity on a par

with those of the countries leading the social progress and economic development indexes.

Of course a challenge of this magnitude cannot be met overnight. It requires rigour and analysis, which is what it has taken over more than a year to finally draw up this approved document.

Our thanks, therefore, to the working groups, the Advisory Board and all the people, companies and organisations that made their contributions in the participatory process. They have all shown that when the goal is worthwhile, effort is as necessary as it is effective. Thanks also to the Ministry of Business and Knowledge for its commitment.

We thus present today this national agreement, by all citizens, for all citizens. An agreement with its sights on present and future well-being, on the creation of opportunities for those who are here now and for those to come. Now we must imagine and build this future in which knowledge guides our policies and activities. Let's make it possible.

**Quim Torra i Pla**

## Foreword by the Honourable Ramon Tremosa, minister of Business and Knowledge



These are times of new paradigms, of rapid changes in our productive and economic models. As a country we find ourselves at a crossroads regarding our immediate future, where we must choose between taking the demanding highway towards advanced

societies and the complaisant track that leads us away from progress. And we can't afford to leave it until later. We need to hurry because we're already late. Fortunately, Catalonia has two fundamental pillars that hold up any society that aims to progress and improve its well-being: knowledge and talent. Without these two ingredients we could not aspire to equate ourselves with the leading economies that, for some time now, have known how to make knowledge the driver of their competitiveness.

The global pandemic caused by COVID-19 we are currently facing underlines, if there were any doubt, the crucial role of knowledge in any strategy for progress one might pose. Such knowledge must be fostered by the Government, in a sustained manner over time, and shared by all the actors involved in the productive model. Only then can it become a factor for growth that helps position us amongst the countries that are distinguished by their social progress indexes and their innovation capacity.

We were always certain of this, but we can now state that we have the necessary tool to make it happen. The **Catalan Agreement on the Knowledge Society (PN@SC)** – presented here – is the result of a major national agreement, of a matured participatory process and of the unanimity of the Plenary, with representatives of the scientific, academic, economic, business, social, cultural and political spheres. Àngels Chacón, my predecessor as Minister for Business and Knowledge, did a fine job of promoting the Agreement and steering it towards approval last May.

This Agreement comes with ambitious goals, knowing our entrepreneurial capacity as a country and the human capital that comprises our higher

education and research system. Accordingly, one of the goals we intend to meet in the short term is to significantly increase overall spending on R&D&I to 2.12% of Catalonia's GDP, increasing public spending and boosting private spending to equal the EU average in these areas. This is a highly important agreement, a long and justly demanded aspiration that we must achieve within four years.

Because this is merely an example; the **PN@SC** goes much further in its proposals, which I invite you to read for yourself. The Agreement sets the stage for a shared strategy for higher education, research, innovation and business with the help of public policies at the service of a knowledge economy. And it does so by highlighting the land as the core of the country, generating quality employment as a factor of social cohesion and proposing policies for attracting and retaining the talent we can produce thanks to the excellent quality standards of our universities and research centres.

This Agreement will ultimately help us to foster such long-awaited knowledge transfer, which will enable the knowledge in our universities and research and technology centres to reach the productive fabric so that it can benefit the whole of society. The generation of our own knowledge must be our main source of wealth and bring about a change in the economic model that is fully in line with the 2030 Agenda and its Sustainable Development Goals.

Knowledge, growth and well-being, in this order, are the lanes on the highway we must travel if we wish to be part of a responsible advanced society that knows the best legacy it can leave to future generations. And the **PN@SC** is undoubtedly the best vehicle to take us to the highest heights of collective prosperity.

**Ramon Tremosa i Balcells**



## A point on the horizon and a tool to reach it

**Progress, prosperity and well-being can be achieved only by countries that decisively commit to the knowledge society.** There are no shortcuts to a fairer, more cultured, more civil, more open, more competitive and more democratic society. Catalonia needs to not only prioritise education and training, but also strengthen research, technological development and innovation and transform them into wealth, high-quality jobs and long-term employment to ensure the sustainable growth of the economy.

A coordinated and stable political approach and ongoing dialogue between the scientific community, the business fabric and society are necessary to improve the population's quality of life. Countries like Austria, the Netherlands, Sweden and Denmark committed to the knowledge society many years ago and, as we know, are making great progress, periodically renewing their resolve and making course corrections and improvements along the way.

**Catalonia aspires to follow in their footsteps and move out of the group of European countries with a moderate level of innovation to number among the continent's leaders. Through this it aims to raise and unify its society's standards of living** and also contribute to meeting the international challenges included in the UN 2030 Agenda and its Sustainable Development Goals. Denmark summarises its strategy as "Knowledge > Growth > Prosperity > Welfare", which it applies both locally and globally. This is a maxim that could also work for Catalonia.

Reaching this point on the horizon requires a tool, a stable, shared and agreed strategy that defines, orders and identifies the mechanisms, resources and policies necessary for success. This tool is the **Catalan Agreement on the Knowledge Society (PN@SC)**. It is a national agreement forged on all the economic, social and political levels of higher education, research,

innovation, the production economy and public policies which facilitates coordinated and efficient work. It is an agreement that encompasses the conditions and needs of all levels of higher education, public and private research, and knowledge transfer and dissemination.

This document analyses the current state of Catalonia's knowledge system and presents the actions to be taken to achieve the objectives and strategies defined in accordance with the contributions made by the Agreement's various working groups, its Advisory Body — formed by key figures in the academic, scientific, business, social and cultural spheres — and members of the public, who played their part in a participatory process. The contributions of all these parties are truly appreciated.

**The initial diagnosis is clear. In Catalonia there is a major imbalance between knowledge generation and innovation capacity.** Our scientific system is competitive at the international level thanks to the public policies we have implemented over the last 20 years, but to achieve our objective we need to enact not only a comprehensive R&D strategy, but also a sustained public strategy designed to foster and facilitate business innovation.

The PN@SC covers the entire knowledge generation, transmission and application system (higher education, research, and innovation) and proposes challenges, objectives, actions and commitments in all these spheres. Its novel approach is based on four key aspects:

1. The special attention of a production fabric involving 99% of SMEs and 60% of micro-enterprises.
2. The fact that our higher education system generates gaps (between university and non-university higher education) and a certain amount of friction in university education,



because, in contrast to the majority of Western countries, it does not differentiate between career-oriented and academic profiles.

3. A development policy based on the specialisation requirements of a large and, above all, diverse territory.
4. The need for a specific law governing science in Catalonia that would for the first time develop the power stipulated in article 158 of the Statute of Autonomy of Catalonia and lend solidity, efficiency and legal and budgetary stability to our knowledge system.

**The accords contained in the Agreement also directly correlate with the implementation of the 2030 Agenda in Catalonia.** Numerous actions correspond to the 17 Sustainable Development Goals (SDGs) and their associated 169 targets<sup>1</sup>.

Catalonia does not presently have sufficient powers to define, for example, new governance systems in an element as essential to the knowledge system as universities. Even if the Organic Law on Universities is reformed in the next few years, it will be necessary to implement the measures specifically proposed in this national agreement.

This is also the case when it comes to, for example, overcoming problems arising from the aforementioned higher education model or the difficulty of comprehensively implementing equity measures in access to higher education, given that every study clearly indicates that inequalities start in earlier educational stages.

Moreover, Catalonia is still dealing with the effects of the last economic and financial crisis in relation to public funds and the economy's potential for mid-term growth. This situation is exacerbated by fiscal deficits (an exaggeratedly negative fiscal balance with the Spanish State and excessive fraud and underground economy levels), which compromise the availability of public resources. However, **the proposals put forward in the PN@SC are considered to be feasible.**

The point on the horizon set by the Catalan Agreement is not near and the course is not easy, but there is a well-defined path and we have an ambitious tool to aid us on our journey. If Catalonia is to become a knowledge-based society, then it needs to create alliances between its public and private agents and make a strong political commitment to this objective. The accords defined in the PN@SC will have to be in place for a decade or longer.

As such, **the document's target is 2030, which is when public spending on R&D should account for 1% of GDP, and private, incentivised investment should account for 2% of GDP.** The Agreement also sets the objective of an initial stage, the five-year period from 2020 to 2024, which focuses on converging with the best European standards to reach a level of public investment equal to 0.75% of GDP, the same as the current average in the EU.

We invite you to discover the details of the preparation of the Catalan Agreement on the Knowledge Society, the actions to be taken, the conclusions of its studies, and the accords. But, above all, we urge you to contribute as much as you can to it within your own particular sphere.

1 . They are identified in the areas of quality education (SDG 4), gender equality (SDG 5), decent work and economic growth (SDG 8), industry, innovation and infrastructure (SDG 9), reduced inequalities (SDG 10), sustainable cities and communities (SDG 11), peace, justice and strong institutions (SDG 16) and partnerships for the goals (SDG 17)



## An agreement to converge with Europe's most advanced countries

In relation to the goal of achieving convergence with the standards of the most developed European countries (the former EU15), when the European average reference values are applied to Catalonia in accordance with its population and wealth, the Catalan Agreement on the Knowledge Society is not starting from scratch. It builds on previous initiatives such as the Catalan Agreement on Research and Innovation, which has been in force since 2008, and the 2017 Catalan Agreement on Universities, and it has strong links with the Catalan Agreement on Industry, which also dates from 2017.

It also refers to some forty agreements, plans, programmes and actions pertaining to various areas of government that identify specific needs and actions in higher education, research and innovation. Additionally, there are a number of international benchmarks that can be used to determine the starting point and the objectives, and to establish the framework for the strategies and actions to be implemented.

In this sense, and even though it has not been addressed in a specific section, **the international dimension is a cross-cutting pillar of the Agreement, which aims to place Catalonia firmly on the map of global higher education, research and innovation by 2030.**

Catalonia must strengthen its knowledge system and its higher education, research and innovation systems if it is to establish itself as a socially and territorially cohesive country that fully taps the potential of the people in its various geographical areas and achieves and distributes social well-being. The base of this knowledge society is formed by education, at every level, and the capacity to generate new knowledge in all areas, that is, the university system.

The main activities of universities are high-level academic education and scientific research.

These activities favour the creation of quality jobs and foster long-term employment. To remain efficient this university system must attract the best students and, above all, not lose any good ones along the way.

Accordingly, it is necessary for the ministries and departments of the various administrations responsible for formal and non-formal education to set common goals and form alliances in order to foster diversity, end gender bias, and remove inequalities in the stages prior to higher education.

Integrating the actions of all their agents is a priority for all advanced societies. Europe's decision to base its development strategy on regional development through the Research and Innovation Strategy for Smart Specialisation (RIS3) is a clear indication of the importance of this, and there is no lack of interest in successfully implementing it.

**The PN@SC has attracted the participation of a large number of parties, including the various stakeholders** (universities, research centres, business associations, territorial representatives, etc.), the various ministries of the Government of Catalonia involved, as well as the public, experts and individual knowledge agents. They have all participated in the various structures of the Agreement and in the participatory process established for this purpose.

The bodies involved in the preparation of the Agreement were as follows:

- The **Plenary**, with representation from the knowledge agents, the Government of Catalonia, the country's political parties and its social and business agents, as a participation instrument in the drafting and validation of these proposals. The Plenary met on two occasions during the process, kicking off and concluding the work of the Agreement.



- The **Permanent Board**, as a management and coordination instrument, which monitored, validated and homogenised the proposals of the working groups.
- The **Advisory Board** of 38 experts as the body advising the Plenary and the Permanent Board, which also reflected on the work done on the Agreement by way of conclusion.
- **Seven working groups**, which met separately to analyse the situation of their individual areas and propose the corresponding future actions.
  1. *Knowledge system*, to analyse the purview, make-up and quality of its main agents, provide them with the necessary support and reflect on the necessary transformations.
  2. *Human resources*, to analyse talent, as well as the model used for its management at both universities and research centres.
  3. *Financial resources*, to define the resources (and their timing) that are necessary to make progress in the development of the knowledge society to which Catalonia aspires.
  4. *Research system*, to identify the indicators for comparison and convergence with the economies the Agreement seeks to emulate. The results of its work were also used in the drafting of the Catalan Science Bill.
  5. *Transfer, innovation and enterprise system*, to identify and classify all the active agents, and to define specific actions to improve innovation and commit to a competitive economy.
  6. *Research support infrastructures*, to propose their classification, as well as the policy to make progress and the roadmap to be followed. It also reached a consensus on the Catalan open science strategy.
  7. *The territory, the regions and the cities*, to analyse the regional component and the need to foster knowledge regions involving the decentralisation and territorial specialisation of the R&D&I policy based on the connection between higher education, research and the industrial and business fabrics.
- A **participatory process** to allow the public to contribute their ideas both online and in person. Over the course of three months some twelve in-person sessions were held, of which five were sectoral and seven covered the various areas of Catalonia. The results can be consulted on the website [participa.gencat.cat](http://participa.gencat.cat).

The result is a document that defines the initial situation, the strategy, the objectives, the actions, and the resources necessary in the coming years to improve the Catalan knowledge system and, above all, its impact on the production model, well-being and social justice. This document shows that we know where we are starting from and that we have a clear idea of where we want to go.

The document also answers the question of how knowledge should impregnate the production economy to make it more innovative, integrating, sustainable and open to the world. **In short, the Catalan Agreement on the Knowledge Society allows us to move from abstract ideas to concrete actions.** And, above all, to start the most critical phase, which is the implementation and effective consolidation of its proposals.





1

The knowledge  
system

## 1. The knowledge system

**The knowledge system is essentially made up of three subsystems: higher education, research, and innovation.**

Given their long history and the breadth and depth of their activity in all three areas, universities occupy a special place amongst the actors involved. In addition to rigour and truth, they disseminate humanistic values to society based on combining knowledge with a critical, inclusive and people-centric spirit. In Catalonia, universities act as a coordinated system that is organised through structures like the Inter-university Council of Catalonia (CIC).

### Overhaul higher education

**The higher education system identifies the national objectives to which universities should contribute through each one of their missions<sup>2</sup>** (teaching, research, knowledge transfer, social responsibility, and impact on society). In the 1990s and early 2000s Catalonia designed the legal framework of its higher education system and established its current territorial map of twelve universities.

The process has evolved very satisfactorily during the almost thirty years that have elapsed since its start. More social groups have been able to access higher education, new skills have been developed, the European Higher Education Area (EHEA) has been adapted, and tertiary education has had a high socio-economic impact on Catalonia. **Catalonia is a success story thanks to its results and comparative quality. This, however, sets the stage for future challenges in terms of size and impact, in both the social sphere and in the production economy.** An example of this is lifelong learning, which is alarmingly underused by workers, the unemployed, and companies.

The effects of the serious financial crisis of 2010 on public revenue and the resulting cuts affected this development and introduced one of the main elements to be taken into account: the extent to which public responsibility and commitment should be involved in the provision of higher education. This also includes the policy on grants and fees, which should focus on removing economic obstacles in order to guarantee equal access to higher education and, at the same time, contribute to the economic sustainability of the knowledge society.

Legislation introduced in 1970 in the Spanish State divided tertiary

2. Universities' functions in relation to society and the main objectives are extensively described in article 3 of the Law on Universities of Catalonia and in article 1 of the LOU.

education into university education, governed by its own regulations, and higher education vocational training (advanced vocational training), which was associated with legislation on non-university education. Advanced artistic studies were also divided between university and non-university institutions.

**This Spanish legal organisational framework differs from the model in place in most of Europe**, which does not separate vocational training to such an extent or limit the development of university campuses to those that cover every educational level through to doctorates, but allows for the coexistence of two types of university: one with more career-oriented training, which does not offer doctoral studies, and another more research-focussed one that teaches courses at all levels, from undergraduate courses to doctorates, in which all activity is impregnated with research standards. The latter corresponds to the only type available in Catalonia and the Spanish State.

In the 1990s, responsibility for non-university higher education was transferred to the autonomous communities and organised into vocational training cycles. Since then it has undergone various regulatory developments, including the regulation of the participation of vocational training students in university access tests (2010).

Careers guidance, the fact that students need good job prospects without waiting to complete tertiary education and the market's appetite for them have timidly resulted in a vocational training model that makes training compatible with employment. These two trends, going on to degree courses after completing vocational training and combining education with work, make it necessary to consider a series of new demands regarding tertiary students in the two types of higher education in place in Spain.

**There is a broad consensus that it is necessary to comprehensively and systematically increase the level of continuity between advanced vocational training and undergraduate education.** It is also necessary to increase the number of career-oriented degrees in all areas of higher education. It is important, therefore, to review the regulations that facilitate mutual recognition between the career-oriented and academic systems.

This situation leads to the need to differentiate profiles and, where applicable, accreditation criteria for career-oriented education and academic education in order to define university, professional, vocational and lifelong higher education.



Needless to say, the student body plays a key role in the knowledge society. Firstly, because students form the base of the pyramid that renews and broadens the necessary job market and, second, because they represent the majority of the future generation of a society that aspires to have more than half of its population educated to degree level.

Equity needs to be guaranteed for these students in relation to higher education access and selection, which means that matters like financial aid and access conditions cannot be ignored and measures must be taken to remove access obstacles for the most vulnerable and disadvantaged families, providing grants at all stages of education up to and including university education.

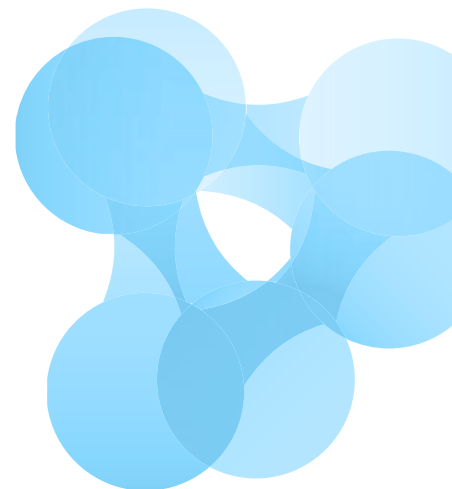
More than twenty years ago the Catalan University Quality Assurance Agency was created to ensure the quality of university higher education and since then it has made significant progress in terms of international prestige, as well as in services, focussing on qualification standards, faculty quality and student satisfaction, among other aspects.

In this sense, quality is assessed on two fronts: accreditation, that is, meeting pre-established standards and criteria; and the opinion of the users in terms of both satisfaction and results. This makes it possible to prepare reports and conduct comprehensive and far-reaching surveys and institutional assessments that guarantee complete, comparative and descriptive information about the quality standards of Catalan higher education.

This information is useful on the user level, but also for the governance of the institutions as well as government decision-making regarding the competencies of university education in terms of funding and course authorisation, for example.

### Invest in research

With regard to the research system, **Catalonia's growing evolution of high-impact scientific publications and scientific productivity places it above the global and European averages**, and even above the values that could be expected of it in line with its demographic and economic dimensions. Running almost parallel to this is an improvement in the number of competitive research funds (mainly European) that Catalonia wins, perhaps in part due to the reduction in the funds available in calls organised at state level as a result of the economic crisis.

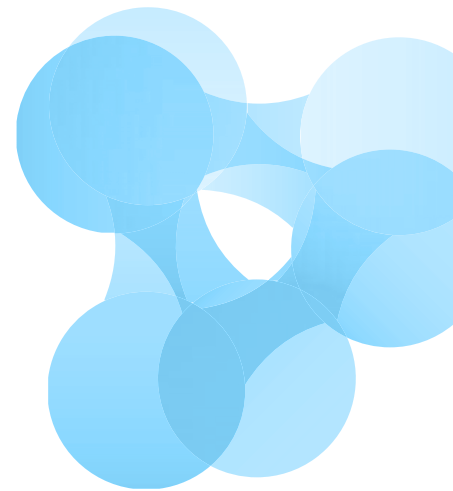




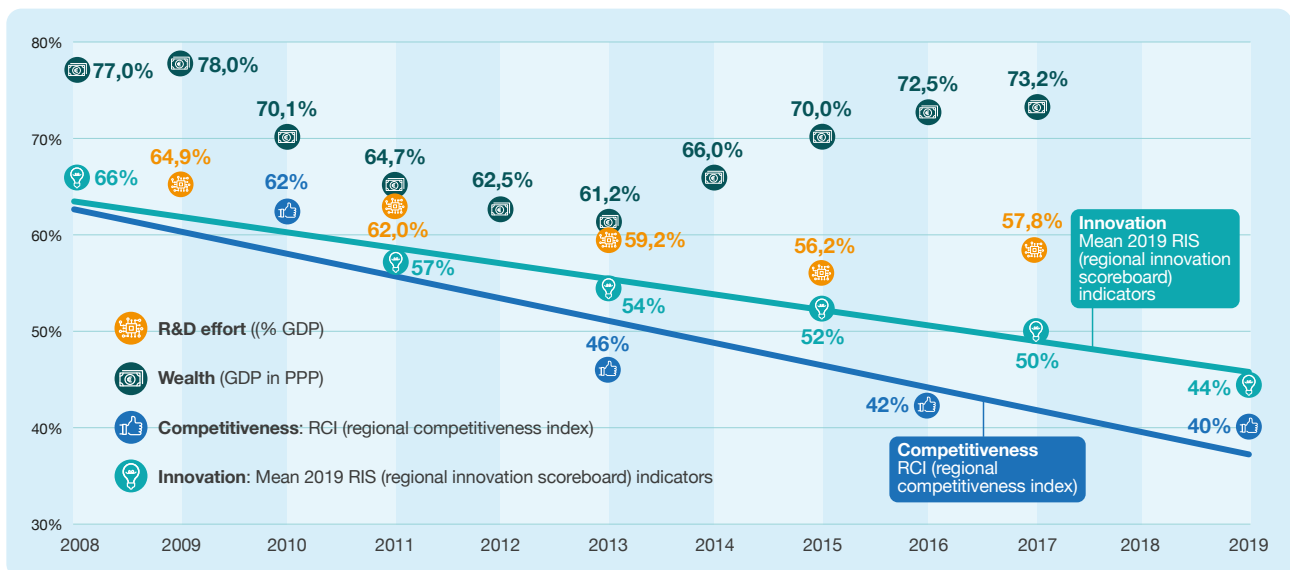
**In relation to Western European countries, however, Catalonia has a smaller percentage of research staff.** Overcoming this deficit is essential to achieving a research system in line with European values, and also to winning more resources from publicly funded research calls.

**However, the evolution of investment and of the results of the most competitive European standards places the country in a situation of stagnation and probable decline.** Sufficient basic funding needs to be provided and linked to the amount of competitive funds actually won. Only this way will it be possible to guarantee that resources will be properly managed and used and ensure that the system will regain its place among the most advanced European averages.

Public responsibility is essential in this aspect. Moreover, it is necessary to set dimension and positioning goals for the various elements of the research system that depend on the Government of Catalonia, universities, hospitals and companies. In short, a new model must be established to analyse the impact of scientific production that is more in line with what represents and improves society, which is also an objective of the EU's new framework programme, Horizon Europe.



**Change in percentage of European Union regions with a lower value than Catalonia in % of GDP spent on R&D, per capita GDP in purchasing power parity, RCI and RIS**



With the impact of the global economic and financial crisis that started in 2008, Catalonia fell back in wealth and R&D spending effort, which is now converging with previous values with the economic recovery, but it has continued to drop back in competitiveness and innovation in the last 10 years, showing that the Catalan economic growth model is not founded sufficiently on knowledge-based innovation and competitiveness.

## Improve innovation

**The knowledge economy is supported by its intellectual capital. This premise forces the innovation system to place human capital at the centre** and act on three basic pillars: general or compulsory education and lifelong training; the creation of new knowledge through research; and the application of this knowledge through innovation. A knowledge-based economy continuously creates knowledge and transforms it into innovation. It is, then, of paramount importance to align industrial and scientific policies with a view to ensuring that demand will drive and develop supply.

In general, although Europe achieves a high level of excellence in science it finds it difficult to convert this into innovation, that is, to bring it to market, generate wealth and create new job opportunities. In Catalonia, this shortcoming is even more striking. It is a leading region in scientific production, but it is clearly below the European average in indicators related to innovation, as systematically reflected in the European Union's Regional Innovation Scoreboard (RIS). **Catalonia's major challenge is to improve its capacity for innovation and make it one of the main drivers of its economy.**

If Catalonia is to become a leader in innovation, it must define a policy that promotes private investment based on ongoing incentives for public and private investment and securing external funds and integrates all the agents of the local ecosystem and internationally connects them. Accordingly, the objectives in this area focus on boosting and increasing business innovation as an instrument of economic transformation and growth in relation to the base of innovative companies and their global dimension.

To do so, it is necessary to improve the connection between knowledge creation and application, bringing resource objectives into alignment with — but not making them subject to — the objectives of innovation, and harmonising the scientific and industrial policies that are in place to meet national challenges, in addition to defining their management and coordination mechanisms. **It is essential to instil innovation and technological transformation in our companies, especially SMEs, stimulate the start-up ecosystem and define a legal framework that incentivises creation and growth.** It is of paramount importance, then, to link the future needs of business innovation to the provision of education and training throughout people's working lives.

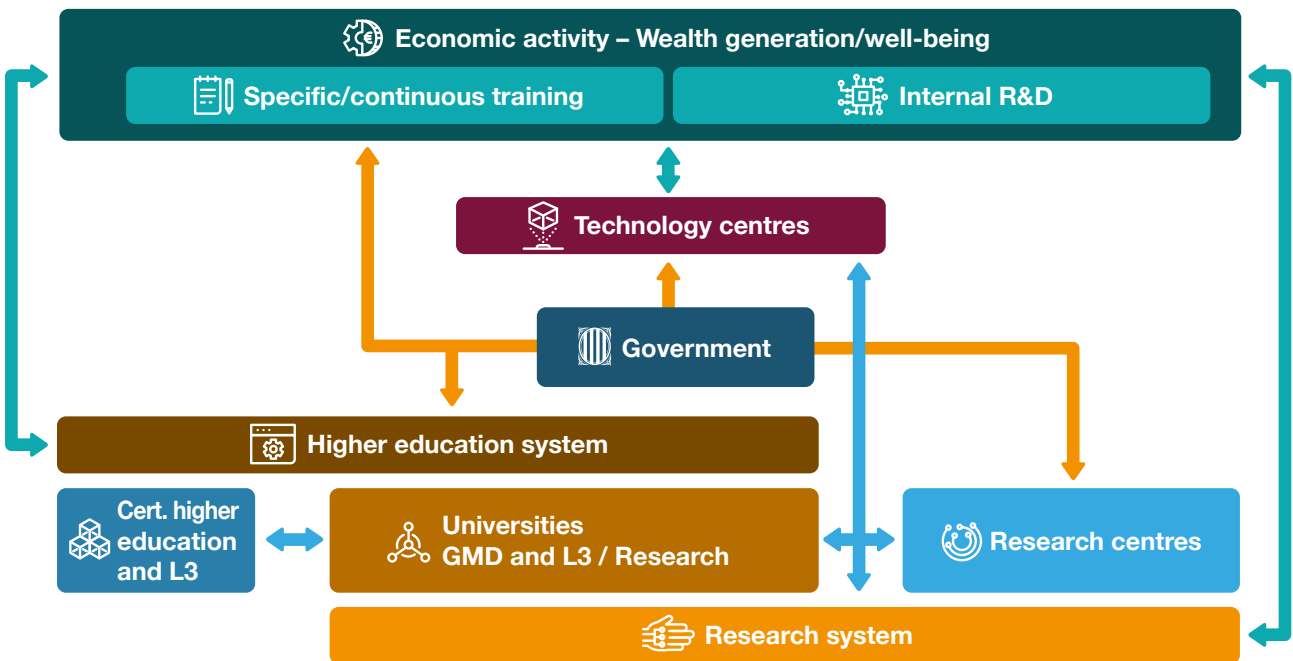
3. See the Catalan Agreement on Industry, 2017–2020.



Some of the agents in our three subsystems have achieved prominence thanks to their excellence and results. Now it is essential for these agents of excellence to work in a more coordinated and concerted manner to achieve common goals. The Agreement prioritises policies and instruments that foster systematic collaboration between the various agents of the system.

These scientific and innovation policies must be designed for the whole of Catalonia, taking regional development policies and making them compatible with the demands and wishes of Catalan territorial diversity through bodies created to decentralise and develop what is now the only policy on R&D and smart specialisation (RIS3) in place for the entire territory.

### Map of economic flows between agents in the knowledge system of Catalonia

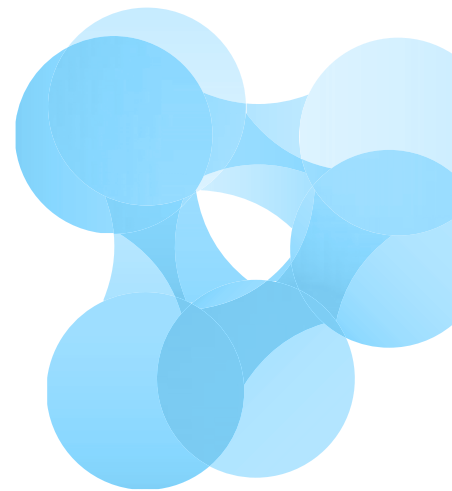


Reality shows that some of these flows are symbolic or need to be improved, such as the direct connection between the knowledge creation system (bottom) and the application system (top), aligning – but not subordinating – research objectives (universities and research centres) with those of innovation (technology centres), science and industrial policies (government) based on country-wide challenges, and defining management and coordination mechanisms.



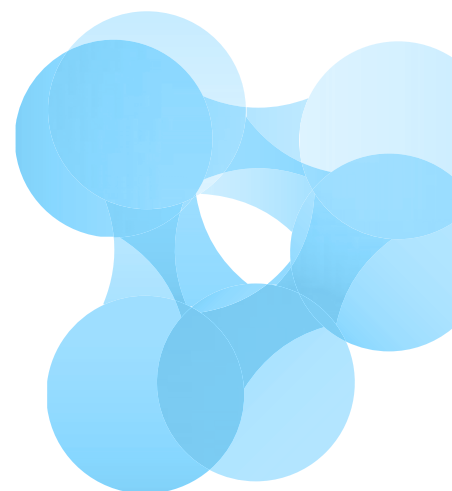
## Agreements. **A leap forward in the knowledge system**

1. Define the interrelationship and structure of the Catalan higher education area by means of collaboration between the ministries responsible for education and universities.
2. Define the interrelationship and structure of higher artistic studies by means of collaboration between the ministries responsible for education and universities.
3. Implement a comprehensive orientation system (personal, academic and professional). And thereby help people throughout their lives, and especially when choosing their studies, to effectively and efficiently make decisions about their educational and professional options. This orientation must be coordinated with that provided by the ministries responsible for education and employment and include the participation of the financial and business system.
4. Improve the equity of higher education in Catalonia through the system of public grants and the resources cited in the financial resources section.
5. Prepare reports and conduct comprehensive and far-reaching surveys and institutional assessments to obtain complete, comparative and descriptive information about the quality standards of Catalan higher education.
6. Identify the improvements and regulatory developments to be fostered to improve mobility between higher education levels (gateways) through collaboration between the ministries responsible for education and universities.
7. Foster maximum continuity between advanced vocational training qualifications and career-oriented degrees and, where applicable, merge advanced vocational training and undergraduate studies into a comprehensive career-oriented four-year degree.
8. Foster dual training (academic studies and internships) in career-oriented university degrees (in accordance with the profiles and criteria of career-oriented and academic education accreditation). Achieve this by fostering closer ties between universities and companies and other organisations with a view to improving university students' skills.



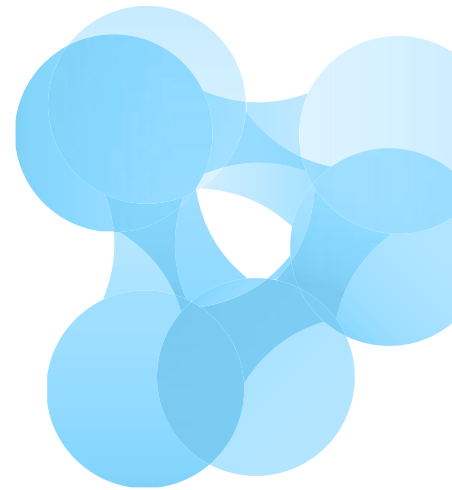


9. Prepare and apply policies for dual training in higher education based on the specific context (production sector – prioritisations). Achieve this with the application of regulations recommended by the EU such as the training of mentors, mobility of teaching and non-teaching staff, quality control measures, tax breaks for companies co-responsible for dual training, and quality assessment. Flexibility measures should be applied to meet the specific needs of the production sectors. It would be necessary to examine the relationship between the sectoral councils created by Law 10/2015 and universities, specifically those that provide career-oriented degrees.
10. Throughout Catalonia foster the identification of campuses attached to or integrated with career-oriented universities, following the model established by TecnoCampus (Pompeu Fabra University), Terres de l'Ebre Campus (Rovira i Virgili University), Igualada Campus (University of Lleida), and the CETT School of Tourism, Hospitality and Gastronomy (University of Barcelona).
11. Develop accreditation standards for courses that allow the introduction of career-oriented elements.
12. Design and implement a lifelong education system in conjunction with the ministries responsible for employment, business and universities in order to provide a response to social needs, apply business innovation, and reduce the digital divide.
13. Foster the description and assessment of skills-based learning and the recognition of professional skills acquired through work experience or non-formal training. Achieve this in coordination with the Public Training and Professional Qualifications Agency of Catalonia and the Catalan University Quality Assurance Agency (AQU Catalunya).
14. Foster the detection of the skills that higher education graduates need in the job market, using tools coordinated by the Public Training and Professional Qualifications Agency of Catalonia and AQU Catalunya.
15. Foster a joint regulation platform created by the Consortium for Lifelong Learning of Catalonia and AQU Catalunya to define profiles and verify vocational training and lifelong learning, covering all defined qualification levels.
16. Develop mechanisms to accredit training levels 5, 6, 7 and 8 of the European Qualifications Framework, with certification recognised in the European framework.





17. Establish assessment structures to determine and improve factors related to the social dimension of higher education, especially students' living conditions and employability.
18. Establish periodic assessments of the quality of research and transfer activity.
19. Foster an increase in the number of researchers to an average close to that of the leading European countries and the highest values of the Spanish autonomous communities. In five years (2024) achieve an increase of 900 researchers per million inhabitants to reach 4,750 researchers per million inhabitants.
20. Achieve a rate of employment in knowledge-intensive services with respect to total employment similar to that of European countries of the same size and competitiveness as Catalonia (EU5). In five years (2024) achieve a 10 point increase to reach 45% employment in knowledge-intensive services.
21. Reach or exceed the EU15 average to become one of the 10 best European economies in terms of the various indicators and positions of the Catalan research system.
22. Achieve a total R&D spending level of 2.12% of GDP in five years (with an increase in public spending from 0.58 to 0.75%, and with policies and measures to foster private R&D spending and significantly increase it from 0.94 to 1.37%).
23. Set the following public development standards of scientific production and technology transfer by type of agent:
  - **Universities:** all university research institutes and departments, in all areas of knowledge, must establish the international benchmarks against which they will be assessed and, in all cases, have a scientific impact above the EU28 average.
  - **Research centres:** the research centres of the CERCA network and those attached to a Catalan public university, defined in specific areas of knowledge, must establish their international benchmarks and number among the best in their field.
  - **Technology centres:** the level must be that of the most developed countries in terms of attracting foreign resources and the transfer of generated knowledge, and the frame of reference should be the centres of EU15 + Asia + USA.



- **Hospitals:** research hospitals must establish their benchmarks in accordance with European standards.
  - **Other research agents:** by default they must establish their European benchmark or exceed the EU28.
24. Establish a new model that assesses the social impact of scientific production in line with the requirements of the European Framework Programme for Research and Innovation, based on the previous experience of the RIACat community.
  25. Assume and set a timeframe for the objective of raising indicators to the EU average, in which the reference value is a normalised minimum value of 100 in each indicator of the Regional Innovation Scoreboard.
  26. Foster and consolidate the growth of EURECAT as a Catalan technology centre so its relative dimensions and impact are similar to those of the world's leading technology centres. By 2024, this dimension should be close to €100 m in revenue. In the long-term, this dimension should double. To achieve this it is essential to consolidate its funding model, with baseline public contributions accounting for a third of this revenue.
  27. Consolidate the TECNIO centres network, with the support of other structures, such as science and technology parks and other bodies, as transfer structures.
  28. Increase public business R&D investment (in accordance with the objective of increasing business innovation projects in collaboration with other agents of the system set by working group 5) for baseline support of EURECAT, transfer via the TECNIO network, the co-funding of R&D projects, systemic innovation programmes, technological entrepreneurship, open innovation, tax incentives and other ACCIÓ programmes, to 0.10% of GDP (when public spending on Catalan R&D is 1% of GDP, with a time frame ending in 2030). Achieving this would require the allocation of at least 10% of the R&D public spending increase for the next five years.



2

The talent  
of people,  
the energy  
of knowledge

## 2. The talent of people, the energy of knowledge

**All the capital of a knowledge society lies in its people and their talent.** The generation of new knowledge constitutes a unique professional activity and requires specific, stable definitions and employment frameworks. The human resources of Catalonia's universities and research centres are a fundamental element of the path we aim to follow as a society.

If the people who make it possible to improve training, research and knowledge transfer are not empowered and the international renown of the Catalan higher education and research system is not bolstered, the Catalan knowledge society will not be competitive nor will it improve its social well-being. It is essential, therefore, to better define professional careers and establish suitable measures to also improve the provision, stabilisation and promotion of the personnel who work in these institutions.

### Professional careers and productivity incentives

Comparisons with other European and international R&D systems reveal that Catalonia has fewer human resources than it should in accordance with its economic and demographic dimensions. They also show that the people occupying permanent positions are relatively old, especially within the university sphere, and there is an excessive level of temporary employment in age ranges in which professional stability should have been achieved.

This situation has been brought about by various causes and situations, including the freezing of public spending over the last decade, which has limited the ability to hire new permanent staff at a time when a significant number of academic staff members are reaching retirement age. It is also explained by a deficit of mobility and flexibility in the staff structure and the lack of a scientific career plan that would facilitate staff planning.

**A comparative analysis of European university systems reveals the existence of a double university model in practically all state models – with the exception of Spain (and Catalonia), Italy and France – composed of research universities and universities of applied sciences.** The latter offer qualifications that are more geared towards the careers of their graduates, while the former focus on the academic sphere and intensive research.



In Catalonia we have an extremely homogeneous and generalist public university model, defined as a research university system. In contrast, the private university system is more heterogeneous, although some of its universities also fall into the research category. The existence of two types of university allows for academic career differences that have been proven to be functionally necessary, but they are simply not an option for the staff in our single university system.

In Catalonia, professional careers at universities and research centres follow the same path, with a parallel external accreditation process for teaching staff implemented by the recognised agencies ANECA and AQU Catalunya. To provide the university and research spheres with more stability it would be beneficial for their professional careers to be established with equivalent levels for the two activities: academia and research.

These levels should also encompass similarities with the rest of Catalonia's knowledge agents (CERCA centres, mainly) in order to favour the mobility of teaching staff and research staff between the system's various institutions.

With regard to the productivity incentives system for teaching and research staff, the results, dimensions and classes of the current teaching, research and management incentives must be assessed and the need to foster incentives for transfer activity must be considered.

Finally, it is necessary to consider that in academic careers there may be mobility to other agents of the knowledge system such as research centres or the production fabric, which could and should increase the hiring of talent to make better use of the potential of generated knowledge and a knowledge-based economy.

### **Programmes to attract and retain talent**

The attraction and retention of talent in the knowledge system are strengthened through specific programmes, such as the Serra Hùnter Programme, the ICREA programmes and the Beatriu de Pinós predoctoral and doctoral grants, which help overcome limitations and improve the system in terms of attracting and promoting academic and research staff with qualifications in line with international standards.

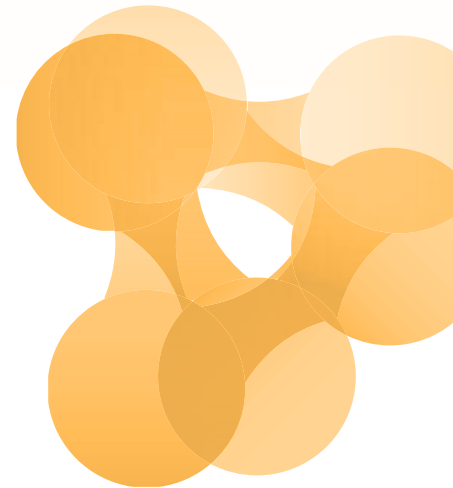
**It is necessary, then, to establish transparent objectives for the basic programmes that incentivise this talent reception and attraction, and there must be a system of indicators to monitor the results.** At the same time, we must consider whether



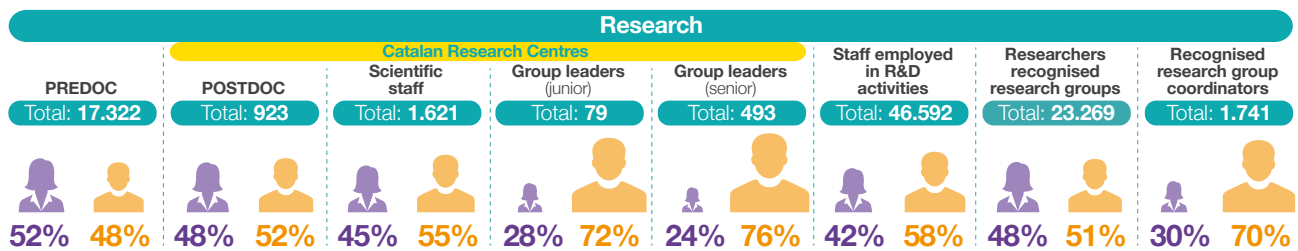
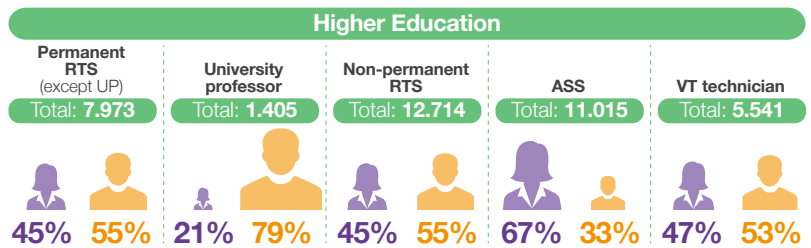
the need to train researchers and new teaching staff will redimension certain programmes and affect their compatibility with other state programmes like Beatriz Galindo and Ramón y Cajal.

There are, however, more questions to be resolved, such as the impact on the staff of institutions due to the public funding crisis. There should also be more emphasis placed on programmes to strengthen and compensate research/academic careers (extension of ICREA Academia), while strengthening the ICREA programme to attract senior researchers and maintaining the Serra Hùnter Programme, with the necessary improvements and corrections. The aim of these actions is to ensure that the teaching staff selection processes in all the systems are equivalent to each other.

Talent retention and attraction programmes cannot overlook the needs of STEM (science, technology, engineering and mathematics) education in an economy as industrialised as that of Catalonia, or ignore the amount of talent lost due to gender bias in selection processes and the glass ceiling of professional careers in the sciences.



**Distribution of men and women in the Higher Education and Research system by category and work group**



In both higher education and research, the percentage of women is declining in the higher professional categories. The biggest differences are in the category of university professor, group leaders (junior and senior) in Catalan research centres and in the coordination of recognised research groups. RTS: research and teaching staff; ASS: administrative and service staff; UP: university professor; VT: vocational training

### **Academic careers in the field of health and other career-oriented qualifications**

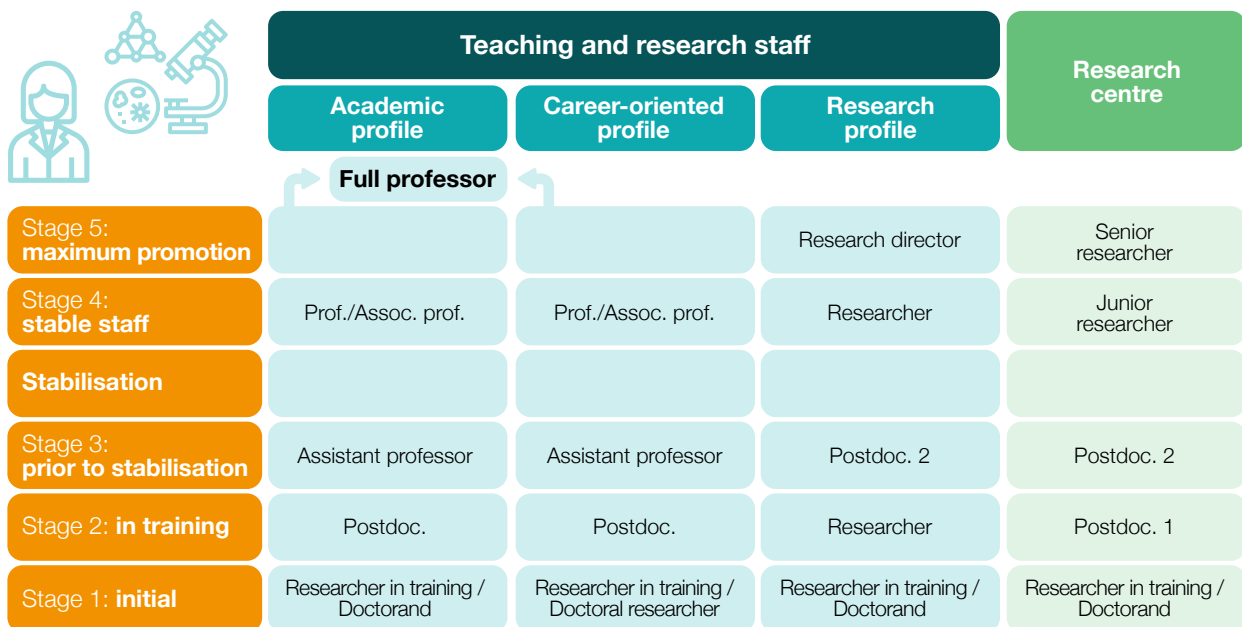
Since the 1980s the Spanish legal framework has established specific regulations for healthcare professions, placing special emphasis on professional careers in the medical academic field for medical professionals. A specific academic career should also be designed in other healthcare education programmes and career-oriented qualifications, with specific additional requirements in relation to gaining access and promotions that also take into account career-oriented achievements.

**It would be a matter of defining an academic and healthcare professional career that is comparable to a scientific career, enabling suitable recognition of both scientific and professional activity.** A similar model should also be determined for the academic career of other career-oriented qualifications both in healthcare and other fields, such as education. In these cases the possibility of associating university teaching posts with professional activity should be analysed.



## Agreements. Facilitate the appearance and attraction of talent

1. Consider two academic career profiles for teaching and research staff (TRS), the existence of which must be possible beyond singular areas of knowledge (high temporary employment and low research accreditation) and the core of academic careers. It will also be necessary to define the criteria to be specifically assessed for each profile, based on European human resources selection standards like HRS4R.



2. Develop the possibilities of associating positions for teachers of career-oriented qualifications with their own field in accordance with their professional career and the profiles established in the accord above.
3. Guarantee the continuity of the Serra Húnter Programme until the assessment results of TRS selection processes are comparable, within a university TRS rejuvenation programme. At the same time, the results obtained so far and the technical operation of the calls will be assessed with the aim of improving aspects that facilitate management and increase efficiency.
4. Strengthen the technology and knowledge transfer incentive within the framework of the productivity incentives of academic personnel and the associated management and support staff.

5. Introduce new incentives in academic and research careers with the aim of bringing research results to market more quickly, especially in relation to the regional development of influence.
6. Foster a programme that facilitates and promotes the collaboration of CERCA centre researchers in university teaching activities.
7. Increase the number of predoctoral researchers (FI) and post-doctoral researchers (Beatriu de Pinós) as one of the methods of increasing the number of researchers per million inhabitants. Most of this increase, however, should be achieved in the production fabric.
8. Strengthen the Industrial Doctorates Plan, introducing improvements to increase the impact on the transfer of university talent to companies and other organisations, especially SMEs.
9. Increase the number of ICREA Academia programme positions to reach 3% of permanent TRS (50 new positions per year).
10. Promote the policy of gender equality in teaching and research careers.
11. Expand the ICREA programme to 20 new positions per year in five years so that it covers all areas of knowledge, placing special emphasis on social sciences and humanities and promoting gender equality.
12. Define, in conjunction with the ministry responsible for health, the professional career in the medical academic area, as part of shared responsibility for training in the field of medicine and healthcare institutions, in addition to that of other healthcare professions.
13. Introduce changes to ensure the operability of the issuance of credentials that enable the development of an academic career in areas of knowledge in which there is both a low number of permanent TRS in relation to total TRS and a low proportion in accordance with research productivity. At the same time, foster the support of the Government of Catalonia and universities for research in these areas of knowledge.
14. Define and deploy the mechanisms necessary to provide associated positions in career-oriented qualifications.

# 3

## Investment, a safe bet





### 3. Investment, a safe bet

Catalonia invests, in terms of relative weight of GDP, fewer resources in the knowledge society than neighbouring countries and its investment level is far below that of the leaders. Without a higher level of financial investment it will not be possible to take the desired path. This effort, however, is a safe bet and results in more well-being, more progress and more prosperity. This is not just because it is true in a theoretical model, but also because it has proven to be case in the countries that have followed this path.

Comparisons with OECD countries, with the European Union and specific countries with characteristics similar to those of Catalonia make it possible to set values, objectives and terms in relation to the public and private resources to be allocated to the knowledge society and also to higher education and R&D so they can realise their potential in accordance with the country's capacities.

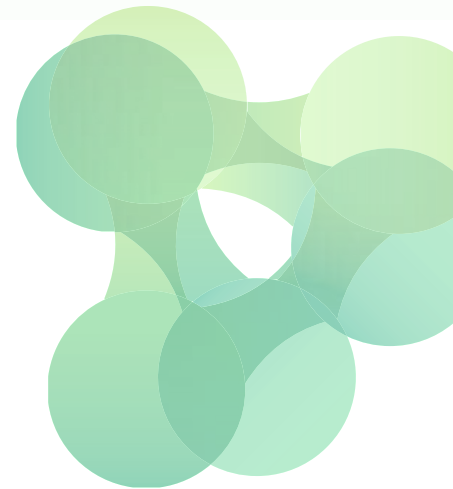
To ensure that the knowledge system becomes the basis of Catalonia's future growth it is essential to allocate the right resources. At the same time, however, it is necessary for the objectives to be realistic and achievable, taking into account the budgetary environment planned for the coming years and without losing sight of the fact that the country is still dealing with the effects of the last financial and economic crisis.

**To facilitate decision-making with respect to the distribution of public resources, the PN@SC also sets the definition of bases for a new funding model for public universities and R&D in Catalonia as one of its objectives.**

According to Eurostat data, in Europe R&D&I investment was 2.03% of GDP in 2016 (2.04% in 2015), well below the target of 3% set for 2020. These percentages are also far below the investment rates of the United States (2.79% in 2015) and Japan (3.29% in 2015). In recent years, Europe has also been outinvested by China (2.07% in 2015).

In Spain, R&D&I investment is much lower (1.185% in 2016, 1.21% in 2017, and 1.24% in 2018). Catalonia's investment level is significantly higher than the Spanish average (1.45% in 2016, 1.47% in 2017, and 1.52% in 2018), but still below the EU28 average and even further behind its leading countries (with values ranging from 2.5 to 3.3%).

In Spain public research was one of the areas most affected by the austerity measures implemented as a result of the financial crisis.



**R&D expenditure as percentage GDP in the EU and Catalonia (2018) by sector of execution**

	Public spending	Private spending
Denmark	1,07%	1,96%
Sweden	0,96%	2,35%
Austria	0,94%	2,24%
Finland	0,92%	1,82%
Belgium	0,80%	1,97%
EU average	0,69%	1,43%
Catalonia	0,58%	0,94%
Spain	0,54%	0,70%
UK	0,48%	1,22%
Ireland	0,29%	0,86%

According to the Cotec Report, the State's investment in R&D&I was €6.675 bn in 2009, while in 2017 it was €1.376 bn, representing a reduction of some 80%.

**In Catalonia, state public spending on R&D decreased from €541.52 m in 2009 to €348.34 m in 2016, a reduction of practically €200 m per year**, a much starker drop than that suffered by the Government of Catalonia's spending in the same period, which decreased from €673.94 m to €619.06 m (€54 m).

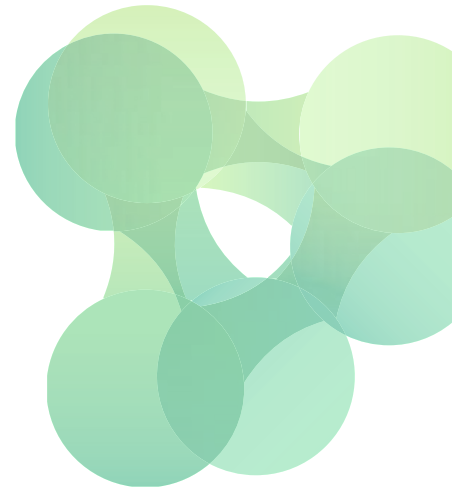
This has resulted in a significant reduction in the funds that universities and research centres have been able to obtain for their projects within the framework of national R&D plans, which has been only partially compensated by the significant increase in European funding awarded to the research groups of Catalan institutions.

In spite of this fall in public funding, the Catalan research model has been consistently consolidated and developed by the various governments, regardless of their political stripe. This model boils down to a firm commitment to talent (committing to people rather than projects) and key research infrastructures. Funding these baseline resources (staff and facilities) ensures that Catalonia can be competitive in the fight for research funds, especially those provided by the State and Europe.

Moreover, the Catalan economy is increasingly based on exports and since 2009 it has experienced continuous growth in its export volume (more than €73.8 bn in 2019) and in the number of companies that regularly export their goods (more than 17,300 in 2019). This situation is the result of an increasingly greater capacity to compete and, therefore, offer innovative goods and services.

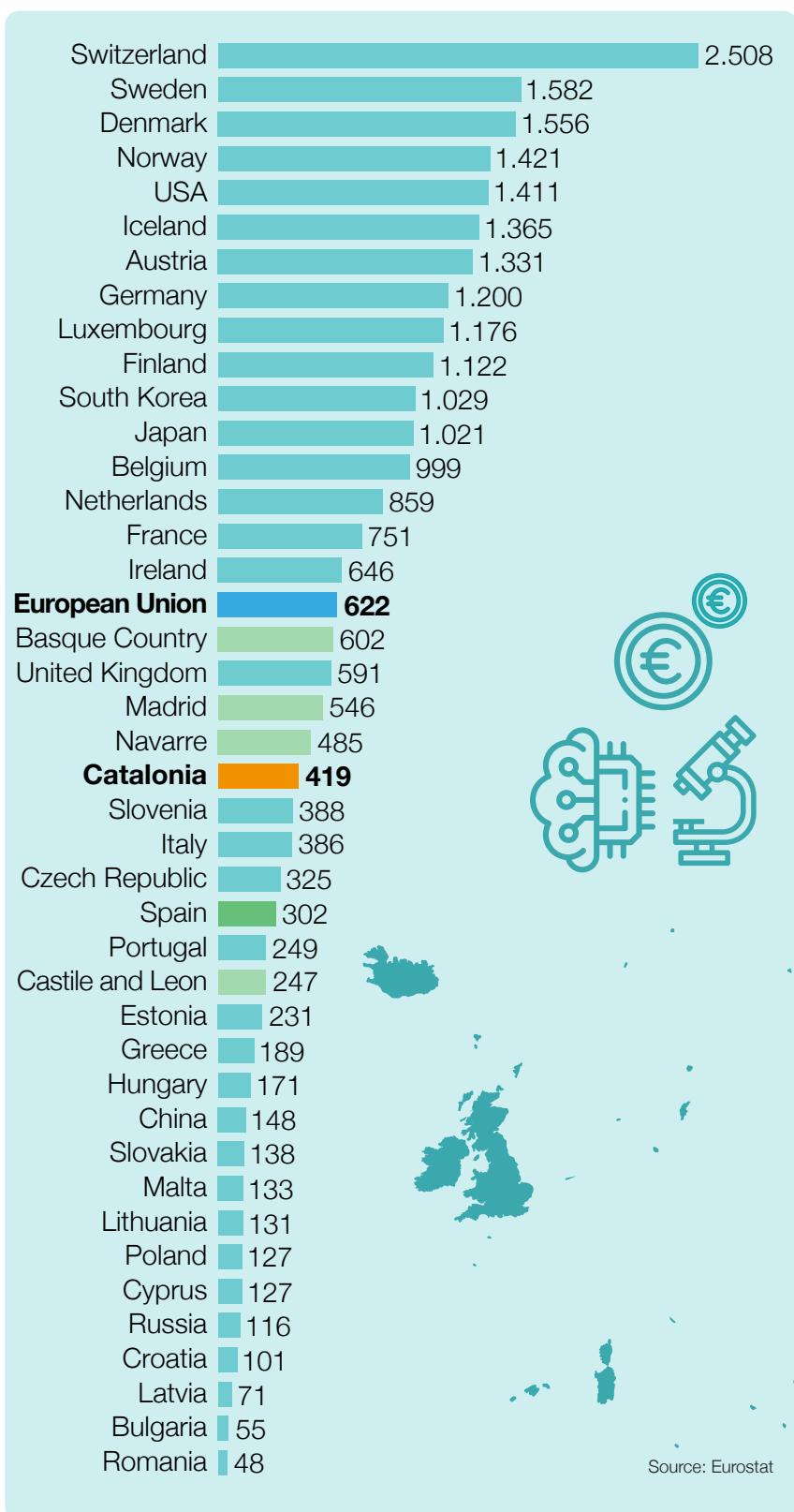
To continue attracting strategic business investments it is necessary to plan an expansion of the university and research systems, in a coordinated manner with the innovation system, so that companies can continue to find talent and the capacity for innovation in the knowledge system.

Increases in public investment in R&D must pursue growth and the consolidation of research and innovation in all areas of knowledge, both at universities and research centres and in business, with an impact greater than the Europe average and also fostering private investment.





### 2017 R&D expenditure per inhabitant in current euros



According to Eurostat data for 2017, R&D expenditure in Catalonia was 419 euros per capita, below the European Union average of 622 euros and far from 2,508. euros allocated by Switzerland. However, it was above the whole of Spain, which allocated 302 euros per capita.

**With regard to the funding of the Catalan public university system, progress should be made in a stable model that consolidates the effective financial autonomy of public universities**, above all because they are the main agents of higher education and R&D activity in Catalonia.

This stability and financial sufficiency will ensure that universities are autonomous enough to develop their academic, scientific and staff policies, assure quality in all their activities, and recover the capacity to maintain and invest in buildings and infrastructure.

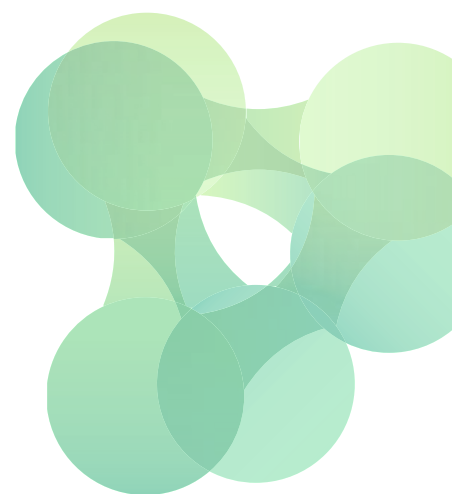
With regard to policies to promote studying, university fees need to be reduced and equity needs to be improved so that nobody is excluded from access to higher education for financial reasons. And both direct grants for studies and indirect aid for halls of residence, dining halls and transport must also be increased.

**It is necessary, moreover, to facilitate university access for the most disadvantaged students through the progressive implementation of grants that allow students to study on a full-time basis** and take advantage of the public resources they receive to further their studies. It is also necessary to make courses of study more flexible so they better suit the diversity of students accessing higher education.

The university funding model should be based on four basic components:

- 1) Structural funding, aimed at public universities, to fund the basic teaching activity and personnel costs (also the main component of the funding of research).
- 2) Funding based on the participation of the student body, complying with Motion 97/XII of the Parliament of Catalonia, in reference to a 30% reduction in enrolment fees and making the fees for master's and bachelor's degree courses the same in each scientific discipline.
- 3) The baseline funding of research, for the entire university system, with assessment standards set for the entire research system.
- 4) The funding of public university investments.

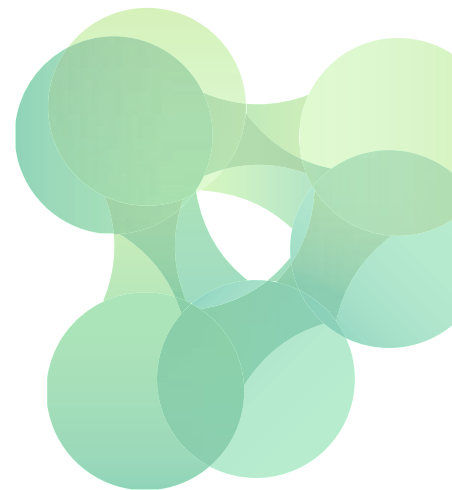
**The current distribution model for the funding of Catalonia's public university system entered into force in 2002** and made considerable improvements with respect to previous resource distribution mechanisms. It is a system based on general parameters common to all universities.



The model, however, **does present certain weaknesses**. It is highly complex, with a large number of variables, which, moreover, have been amended in successive adaptations over the years, making it somewhat difficult to understand and predict. These modifications and adaptations have distorted some of its initial characteristics. The new funding models and variables that have been introduced have even made it possible for the results of certain variables to cancel each other out.

These two aspects mean that the model does not incentivise the achievement of quality and efficiency objectives and, especially, inter-university collaboration, due to their exclusively competitive nature. Moreover, variable objective-based funding responds to system objectives, but does not specifically address each university in relation to its own problems and improvement strategy. And to make things worse, the model could generate unwanted results, such as cases in which universities improve their results but suffer a reduction in funding.

**The Government of Catalonia and the public universities agree that it is necessary to update and rethink the funding of this structural component**, both in terms of size and distribution criteria, in order to ensure financial sufficiency and incentivise improvement. This distribution may be modelled on global results indicators or global costs indicators, although it should incorporate a transitional period so that the change in model can be applied without endangering the economic sustainability of any of the institutions.





## Agreements. A workable solution

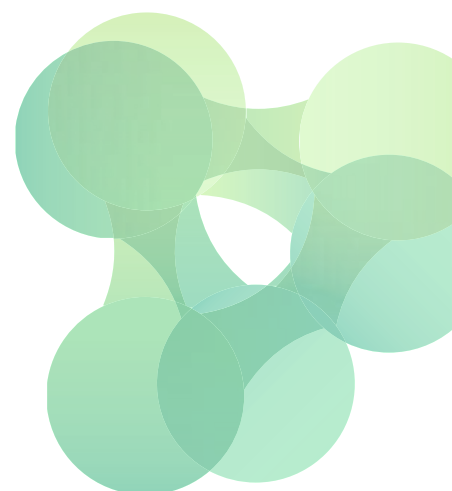
1. Progressively and continuously increase public spending on R&D&I in Catalonia to 1% of GDP, while incentivising private investment, which should reach 2% of GDP in the same period. The aim is to reach 75% of this objective in five years (a public investment level of 0.75% of GDP, 10% of which is allocated to supporting and fostering private investment), equalling the current EU average. This increase, interpolated based on the data from 2017 and 2018, is specified in the following table (data in €m).

	Current	%	% GDP	Increase (5 years)	%	Annual increase	Total 2024	% GDP
Basic univ. activity	508			160		32	668	
Univ. R&D	352	56,9%		180	49,3%	36	532	
Univ. investments	20			80		16	100	
<b>TOTAL Univ.</b>	880		<b>0,39%</b>	420		84	1.300	<b>0,58%</b>
R&D (SUR)	158	25,5%		90	24,7%	18	248	
R&D (other depts.)	58	9,4%		35	9,6%	7	93	
<b>TOTAL R&amp;D (non-univ.)</b>	216						341	
Innovation/companies	51	8,2%	<b>0,02%</b>	60	16,4%	12	111	<b>0,05%</b>
<b>TOTAL R&amp;D</b>	619	100%	<b>0,28%</b>	365	100%	73	984	<b>0,44%</b>

2. Increase public spending in R&D to pursue assessable objectives and impacts. At least half of the €365 m of R&D improvements proposed over the next five years (0.15% of GDP estimated for 2024) should be met by the State with public funds from abroad and the rest by the Government of Catalonia.
3. Progressively and continuously increase public investment in universities to 0.8% of GDP (80% of the level invested by EU countries similar to Catalonia) in 2030 (€1.6 bn). Seventy-five per cent of this objective, that is, a public investment level of 0.58% of GDP (€1.3 bn), should be achieved in five years.



4. Increase public spending in universities, pursuing assessable objectives and impacts, distributed into three funding areas:
  - Impart basic university activity with financial sufficiency and stability, including improvements in equity and fees.
  - Consolidate the baseline funding of research for all institutions. Public and private university R&D should be increased by €180 m and non-university R&D by €125 m in five years.
  - Recover the capacity to invest in public infrastructure through the University Investment Plan.
  
5. Improve the equity, in higher education in Catalonia, of fees and the grant system through the following actions:
  - Expand the fee reduction process to cover all income levels, keeping the reductions in the first quintile.
  - Review the grant and scholarship system, starting after compulsory education.
  - Study a set of measures that reorient young people's education and training options according to their skills and vocations rather than their family's ability to pay.
  - Transfer general grants. Expand free studies to all students included in the first bracket (remove academic requirements).
  - Double, in five years, the resources allocated by the Government of Catalonia to student grants.
  - Promote a grant system that goes beyond the grants included in the current general system, in line with those already in place at certain universities.
  - Establish a system to assess the impact of grants and scholarships, in such a way that mechanisms can be established to make corrections in their award, improving efficiency and effectiveness.





4

Cultivate  
the research  
system  
and its  
infrastructures

## 4. Cultivate the research system and its infrastructures<sup>4</sup>

**Suitable governance is essential for the proper development and success of the public policies applied to Catalonia's R&D&I system and its agents.** Good governance must identify all the agents of the system and differentiate their roles and, at the same time, define creation, recognition and renewal criteria, as well as establishing objectives with a scientific, economic and social impact.

Universities, their departments, units and research centres are the foundations of Catalonia's public research system, along with Catalonia's research centres (CERCA centres) and the Catalan Institute for Research and Advanced Studies (ICREA). Suitable governance must establish mechanisms to enable all these agents to efficiently work with each other and also with Catalan private research, mainly conducted by companies.

This should be done in accordance with the international scales against which we measure our performance so we can then establish objectives, the achievement of which must bring the Catalan system closer to the standards of the leading European countries, above all with regard to scientific productivity and production and investment in R&D&I as a percentage of GDP, in relation to the population of the territory and the number of researchers. This framework of decision-making and monitoring is an essential requirement for the competitiveness of the system, its internationalisation and the improvement of its impact on the consolidation and growth of an economy based on the knowledge society.

Research is an activity that, in and of itself, fosters innovation inasmuch as it provides new, more efficient or disruptive solutions to social or business problems and demands. Therefore, favouring correct communication and relations between the agents of the system is essential to subsequently help convert the knowledge they generate into productive activity through innovation. This is also why **to achieve these objectives it is essential to present and approve the Catalan Science Act.**

### Science legislation for a singular system

Catalonia's R&D&I system is made up of different public and private agents that conduct research activity mainly in Catalonia, but also in connection with the entire world. It is a system implemented over the

4. This section merges the conclusions of working groups 4 (research system) and 6 (research infrastructures).

course of the last twenty years that has become internationally competitive, a benchmark and a success story due to its flexibility. However, **this system does not have any R&D&I regulations that define, coordinate, protect or foster science and innovation as a whole, describe their unity of action, or assess or foment their importance.** This shortcoming means that Catalan research is subject to, and restricted by, state regulations, which do not take into account Catalonia's singular nature or the development of its own model.

**The drafting of a Catalan Science Act will identify the agents of the system and establish its mission, organisation and public responsibility.** Additionally, it will improve mobility, cooperation and scientific exchanges between the research and management staff of the various R&D&I agents and will foster the transfer, innovation, internationalisation and growth of the private funding or co-funding of research through sponsorship or collaboration. It is a law, then, whose overall aim is to foment and promote scientific activity and its relationship with the production fabric in order to facilitate opportunities.

The aim of the National Agreement is not to identify strategic areas of excellence, but a science law that for the first time develops article 158 of the Statute of Autonomy of Catalonia will prepare the foundations to consolidate a common and strategic public research policy based on coordination mechanisms and explicit support for major instruments of competitive research funding.

**The research sector involves intensive technology training and higher education and the people who carry out this work should be recognised,** especially research staff and technical support staff with R&D&I collaboration and assistance functions, in addition to administration and service staff. This is why it is necessary for strategic research policies to plan the promotion of all these persons through training, consolidation, attraction, retention and, where necessary, talent return processes. Allowing them to play their central role is a key part of achieving Catalonia's scientific, social, economic and cultural progress.

### Outlook of the agents of the Catalan research system

Catalonia has a dual public research agent model: its universities and a network of specialist research centres, in addition to the Spanish National Research Council (CSIC), with which it also intensely collaborates. This model explains its ability to attract talent, win funding (regardless of source) and achieve a high level of internationalisation. Over the years, this model has undergone changes, moving from dual or differentiated to mixed, thanks to the mobility of researchers

between agents, as borne out by the level of co-authored scientific production.

A significant percentage of this Catalan scientific production owes its existence to the organic, progressive transformation of the model. Improvements to the research system and increases in its flexibility and international competitiveness must be increasingly based on this mixed collaboration model in order to generate larger and more cross-cutting scientific collaboration and research management structures.

To quantify the impact of these proposals, it is necessary to set objectives and indicators and determine criteria to evaluate the system. These indicators, in addition to determining the current state of affairs and conducting an international comparative analysis, must also be used to analyse and assess the impact of research beyond the number of citations. It is necessary to take into account other indicators related to the dissemination of publications, especially the consideration of research results in accordance with criteria other than publication, such as social impact and quality. This is a factor of special importance because the Regional Innovation Scoreboard (RIS) indicates a certain level of stagnation in the Catalan R&D system.

With regard to benchmarks, and depending on the type of indicator, it is necessary to approach the indicators of the European Union prior to the last expansion (EU15) or, at least, exceed the EU28 average and the average of countries similar to Catalonia in terms of population and GDP (Ireland, Denmark, Finland, Austria and Sweden, or the EU5), or the average value of the regions ranked above Catalonia in the RIS.

Current analyses of the Catalan R&D system and international comparative analyses paint a picture of a Catalonia behaving slightly better than expected in terms of the impact and quality of its scientific production, but not in terms of public-private collaboration. It is necessary, then, to approach the standards of the most advanced European regions with regard to scientific productivity and, above all, take into account the great distance that separates Catalonia from these regions in terms of industrial property. It is essential, in this sense, to foster measures to increase public investment in R&D and foster private investment in R&D.

To fall in line with the best European standards, it is necessary to increase the number of researchers so it approaches the average of the leading European countries and the highest values of the Spanish autonomous communities. To achieve this it is essential to establish the dimension objectives of the various actors associated with the

Catalan R&D system: universities, research centres, hospitals, and agents that facilitate research and technology, such as technology centres.

### Infrastructures, making the impossible possible

Research infrastructures are facilities that provide resources and services for research staff on a scale that would be impossible for individual groups, departments and centres. They can, and must, be used for purposes other than research, such as specialist training, public services and specialist services for companies, and they may occupy a single site or be distributed over several sites.

**Catalonia is home to major scientific facilities that are recognised as unique infrastructures and require unique public agreements and efforts.** The university system has developed a network of libraries through the University Services Consortium of Catalonia (CSUC), which must be strengthened. It has also promoted science and technology parks as spaces to develop and channel the geographic dissemination of knowledge between the agents that generate it and those that apply it.

These infrastructures must be improved, but above all their use and collaborative development must be incentivised. At the same time this concept must be extended to other areas in order to maximise scientific and economic efficiency. And it should not be forgotten that these infrastructures need to be economically sustainable and their knowledge transfer should benefit the whole of Catalonia.

**All powerful and evolving research ecosystems need a variety of different scientific facilities, ranging from small local facilities that offer immediate access to major infrastructures with cutting-edge specifications.** The latter, due to their size or capacity, serve a larger territory or part of the scientific community than they were designed for. In some cases, they even require joint management to share synergies and costs. In this sense, then, it is essential to implement a strategic policy to define the type of research infrastructures necessary for the immediate future.

### Research support infrastructures

Since the late 1990s, one of the priorities of R&D in Catalonia has been the creation of major research infrastructures in collaboration with the Spanish State. Our country plays host to three major infrastructures: the Alba synchrotron, operated by the CELLS Consortium; the MareNostrum supercomputer, located at the Barcelona Supercomputing Center; and the National Genome Analysis Centre (CNAG). All these infrastructures have been created by the Govern-

ment of Catalonia in collaboration with the State, which recognises them as Unique Scientific and Technical Infrastructures (ICTS).

Today, Catalonia has eight more ICTS<sup>5</sup>. Moreover, there is another series of infrastructures that should be treated in a strategic and collaborative manner, such as Catalonia's almost 40 public animal facilities (which require a specific strategic plan) and its 13 biobanks.

**To plan the research infrastructure model it is first necessary to determine the condition and type of the infrastructures currently in place.** That means also determining which will require a new approach in order to grow, in some cases intensifying their collaboration and promoting networking. Additionally, based on the strengths detected in the Catalan research system, it will be necessary to identify, analyse and define infrastructures whose creation is essential for the future of our science.

The existing set of research infrastructures, those that are considered essential but do not yet exist, and the research and innovation priorities set by the European Commission through the European Strategy Forum on Research Infrastructures (ESFRI) must be used to define a model that takes into account all these types of research infrastructures. **The objective is for our research system, based on stable, ongoing and strong investment and cooperative management, to achieve an even higher level of competitiveness.**

### Open science in Catalonia

The concept of open science lies within the framework of the requirements of the European Commission's Horizon 2020 (framework programme for 2014–2020), which highlights the dissemination and communication of research results as two areas that should be strengthened to bring science closer to society. Moreover, open science is one of the three pillars of Horizon Europe – the next research and innovation framework programme (2021–2027).

In an action that can now be considered associated with this area, the CSUC has developed the Catalan Research Portal (PRC), which gathers all the information about research conducted in Catalonia, at both universities and research centres. Moreover, the CSUC manages cooperative thematic digital repositories (theses with TDX, research documents with Recercat, teaching material with MDX, etc.).

5. See: [Directory of Unique Scientific and Technical Infrastructures \(ICTS\) created by the Government of Catalonia](#)

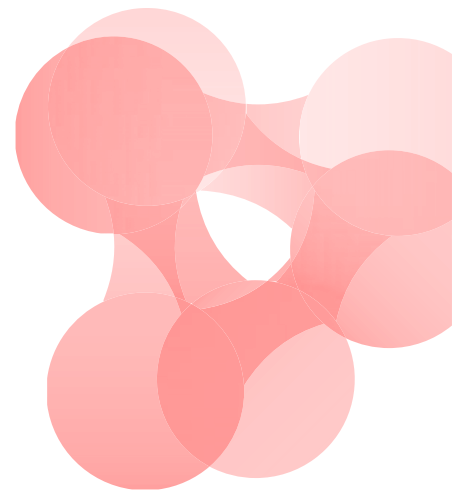


To better serve the country's scientific objectives and comply with the directives and road maps set by the European Commission, the objectives to be met in the field of open science in Catalonia are:

- Establish the main policy lines upon which to construct a Catalan open science strategy in the form of a national action plan, with specific objectives and indicators to assess its progress as a country in this area.
- Strengthen existing infrastructures, like the CSUC (and the PRC), and define the infrastructures necessary to implement the strategy, fundamentally to ensure open access to publications and research data.

This strategy must be based on existing success stories and its design must involve the main agents associated with the Catalan R&D system. In this sense, **the Catalan Science Bill is presented as the coordinating backbone of Catalonia's open science strategy**. It will achieve this by consolidating the knowledge system with the involvement of all the agents to ensure that Catalan research is of increasingly higher quality, more cooperative and more transparent and that its results and the data on which they are based are more accessible, verifiable and within the reach of more citizens. Given its stated aim of helping the next knowledge generation, the law is also intended to play a significant role in Catalonia's strategy to achieve the UN's Sustainable Development Goals.

In line with the European Commission's recommendations, the Catalan strategy on open science will be based on the following definition: a new approach to the scientific process based on cooperative work between academics and non-academics and new ways of diffusing knowledge by using digital technologies and new collaborative tools.



## Agreements. In pursuit of Europe's leaders

1. Promote the Catalan Science Bill.
2. Foster a programme that facilitates and promotes the collaboration of CERCA centre researchers in university teaching activities.
3. Set the following as the baseline indicators for the monitoring of the research system: RIS indicators, publications, co-publications, R&D spending, European funds, number of European Research Council grants per million inhabitants, PCT patents (normalised RIS value), number and percentage of population working as researchers and in R&D.
4. Increase the number of researchers per million inhabitants in five years from the current total of 3,850 to 4,750 (2024).
5. Meet the European scientific production quality, impact and productivity standards and aspire to achieving the average value of the regions above Catalonia in the RIS.
6. In accordance with the knowledge system working group's proposals:
  - Set the following public development standards of scientific production by type of agent: universities, research centres, technology centres, hospitals, and other research agents<sup>6</sup>.
  - Establish a new model that assesses the social impact of scientific production in line with the requirements of the European Framework Programme for Research and Innovation, based on the previous experience of the RIACat community.
  - Achieve a total R&D spending level of 2.12% of GDP in five years (with an increase in public spending from 0.58 to 0.75%, and with policies and measures to foster private R&D spending and significantly increase it from 0.94 to 1.37%).

6. As specified in the 'Accords' section of the chapter 'The Knowledge System'.

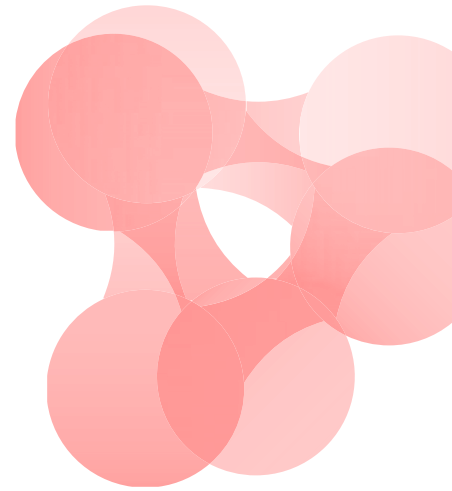
7. Classify the research infrastructures of the Catalan research system into four categories:

- Research infrastructures oriented to the ESFRI.
- Unique Scientific and Technical Infrastructures (ICTS).
- Cooperative research infrastructures.
- Unique research infrastructures.

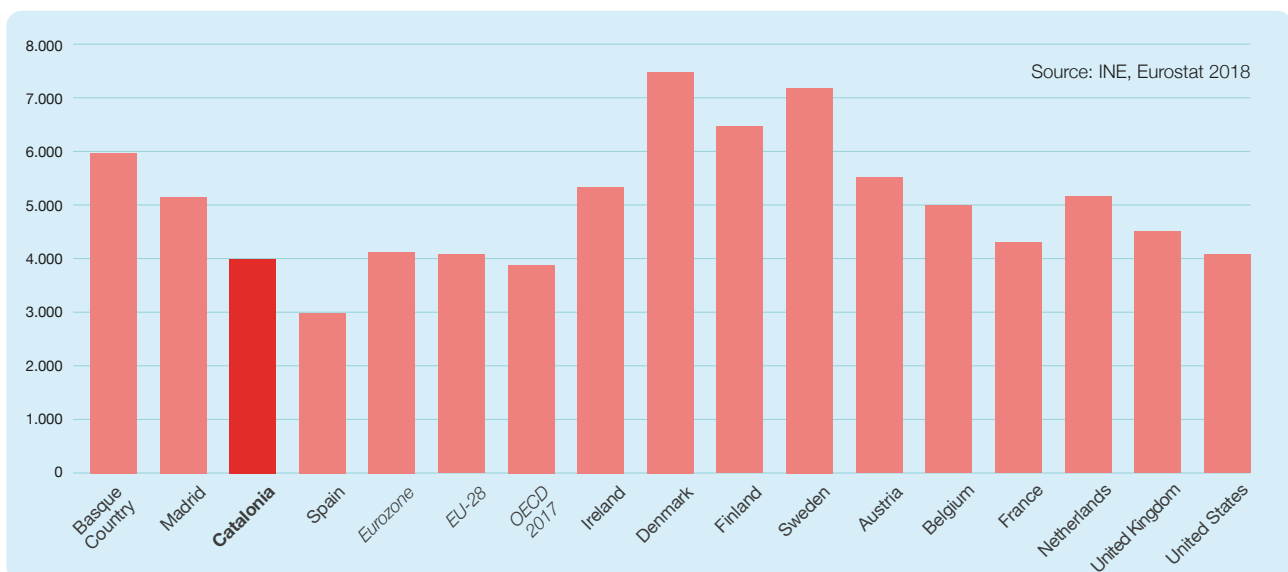
8. Ensure the efficient and effective use of the existing infrastructures and foster their cooperation.

9. Foment a Catalan open science strategy that covers:

- Open access to scientific publications.
- The publication of FAIR (findable, accessible, interoperable and reusable) scientific data.
- The creation of new infrastructures to integrate the resources of the Catalan research system into the European ecosystem of the European Open Science Cloud (EOSC).
- Responsible research and innovation policies. Increase the value of scientific culture as an essential tool to form a responsible and critical society and strengthen ad hoc training in this respect.



### FTE researchers per million inhabitants



The goal of the PN@SC is to increase the number of researchers per million inhabitants in five years from the current total of 3,850 to 4,750 (2024).

5

Transform  
knowledge  
into prosperity  
and well-being



## 5. Transform knowledge into prosperity and well-being

**Without added value, without innovation, there can be no prosperity, social progress or well-being. This is why in the leading economies private, business investment in R&D vastly exceeds public investment and acts as its driver.** Europe's top 1,000 companies in terms of innovation invest, on average, more than 3% of their turnover in research. The overall private investment rate in the EU28 is 1.41% of GDP. In Catalonia it is 0.94%.

It is evident, then, that although the competitiveness of Catalan companies is relatively high, with good levels of exportation and internationalisation, a more innovative business fabric needs to be developed to grow competitiveness based on new products and processes. Achieving this will require an increase in business innovation and entrepreneurship and a significant increase in knowledge and technology transfer between universities and research and technology centres and companies.

The sustainability of the innovation and research system depends on the growth of demand and meeting the added value and competitiveness needs of the production fabric, progressively improving the Catalan economy as a more innovative and more competitive knowledge-based economy.

The European Union's Regional Innovation Scoreboard ranks Catalonia under the European average and far below the leaders in terms of innovation. The innovation rate has slightly improved since 2011, but its relative position with respect to other European regions has worsened. Catalonia stands out (above the EU average) in trade mark applications, scientific publications, population with tertiary education and high- and medium-high-technology manufacturing sector employment, and knowledge-intensive services. Conversely, Catalonia presents worse indicators than the European average in parameters directly associated with business innovation, such as investment in private R&D, other spending on innovation, production and process innovations, marketing and organisational innovations, internal innovation in SMEs and collaboration for innovation between SMEs.

**SMEs comprise the majority of our production fabric and job market.** Given their size, and often due to the training of their staff and factors like inertia and tradition, their competitive spirit does not extend to the generation and application of knowledge through R&D&I like it does in big companies. **Therefore, special attention should be paid to the application of the measures and actions proposed in this part of the production fabric.**

Other agents with a great impact on the transmission of knowledge, including both those that generate it and those that apply it, are **science and technology parks**, which, distributed throughout Catalonia and generally located on or next to higher education campuses, are essential transfer tools that create value when their size and economic development are sustainable in accordance with the demands and priorities of their territory.

The objective is, then, to improve the innovation rate and become the leading region in the terms set by the RIS. Achieving it will require improvements to be made in the way knowledge is exchanged between the education and research system and the business system, as well as fostering business innovation. And this must be done by means of public investment that is ongoing, promotes the growth of private investment and aligns the innovation policies to integrate all the agents of the local ecosystem and connect them internationally.

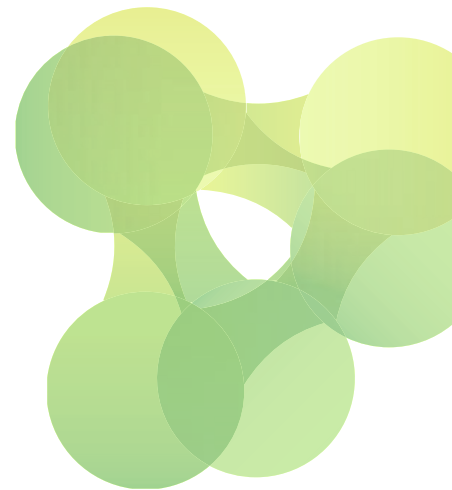
### Promotion of business innovation

The innovative big companies, small and medium-sized enterprises, clusters, associations and business consortia that form the innovation system are the drivers of the growth and competitiveness of the economic fabric. **The growth of new technologies in recent years has generated new business models that were previously unthinkable and impossible. The rules of the innovation game are changing and Catalonia must adapt to them.**

The accelerated incorporation into the production fabric of transformative technologies, especially those associated with the digitisation of the entire value chain of companies, is one of the challenges that companies must meet head on if they are to maintain their competitiveness.

The future success of companies will depend on how well they are able to systematise innovation, defining new business processes and incorporating these technologies into them. According to official data, Catalonia is the leader in terms of the number of innovative companies in the state, with 21.5% of the total. It is necessary to increase the number of innovative companies and, at the same time, help companies that are already innovative to become systematically innovative and collaborate with other companies or agents.

This will allow new technology-based start-ups to flourish as one of the key agents of the most advanced innovation ecosystems. Fostering programmes, support initiatives and stimulus packages to improve the generation and growth of these new technological companies is vitally important to their success.





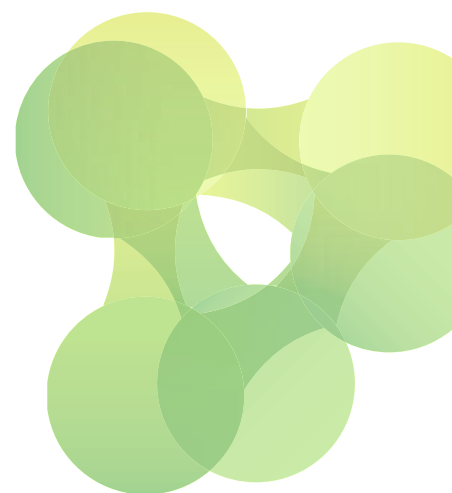
**It is no secret. To become a leading region in innovation it is essential to increase investment in R&D&I.** According to the Catalonia Innovation Barometer, there is a clear correlation between companies that systematically invest in R&D&I and increased turnover. Companies spend just 0.94% of GDP on R&D, which is well below the European average of 1.41% and the 2% average achieved by the leading innovation countries. The rate of public funding of this private investment in Catalonia is 0.04% of GDP, while in the leading innovation countries it is around 0.1% and is constant over time.

The public sector, then, must activate mechanisms to incentivise this investment, through the design of fiscal benefits and competitive grant programmes, or through public-private co-investment to promote major projects that meet the challenges of the country. Also in this area, public budgets should provide sustained funding for innovation actions on a level at least equalling that, as a whole and on average, allotted by EU countries: **10% of public spending in R&D must be dedicated to fostering private investment.**

Companies must overcome the limitations of their own internal resources and cooperate with multiple sources of external knowledge to increase the speed of innovation. The competitive advantage of companies will be determined by their capacity to establish and maintain successful collaborations that maximise the incorporation of knowledge.

For this reason, it is necessary to reinforce connection mechanisms, align the objectives of public and private research and incentivise business innovation projects connected to the scientific system to make progress towards a production fabric that is mainly based on knowledge. It is necessary to reinforce the action of the agents that directly participate in knowledge transfer, such as the transfer units of universities and research centres, technology centres and other strategic agents, especially science and technology parks.

In this environment where technological progress revolutionises the production fabric and its processes, a large proportion of jobs will be automated and there will be a demand for new professional profiles. Measures will then have to be applied to better connect the education system with companies and improve the lifelong training of their employees (dual training in career-oriented higher education, university-company innovation areas, etc.).



**To encourage its science and technology talent to generate knowledge, Catalonia must design measures to incentivise the hiring of people with these profiles in the business world.**

And, at the same time, it must adopt measures to attract knowledge from abroad. The Industrial Doctorates Plan, the recent recognition of the transfer of university teaching staff's six-year periods of activity as part of their assessment, and the non-competitive funding achieved by scientific institutions are actions that could serve as examples for the government.

**Promotion of social innovation**

It is necessary to foster fields of innovation for research with a social and educational impact and establish a mechanism for close communication between universities and society that, within the framework of the 2030 Agenda, guarantees coherence between the challenges that society aims to meet and the research that universities conduct or should conduct.

In this sense programmes must be promoted to incorporate professionals into areas of innovation and research through industrial doctorates of the social and educational type, in which public administrations can also participate, in addition to the creation of jobs with scientific and technical profiles associated with innovation.

**Alignment of innovation policies**

An innovation system is made up of a complex network of relations between a large and highly diverse number of agents that act on the sectoral or territorial scale. If the system is to be efficient, its governance mechanisms must be capable of aligning objectives, defining priorities and distributing competencies within the system.

The ministry responsible for knowledge must coordinate all the policies of its sphere. As the Science Bill proposes, the Inter-ministerial Commission for Research and Innovation (CIRI) would be the coordination body for competencies of the Government of Catalonia in terms of fostering scientific research and development, innovation and transfer, in addition to the systematic assessment of the results. And the Catalan Council for Research and Innovation (CORICAT) would be the Government of Catalonia's advisory body on these matters.

**Innovation policies must be defined to meet the major global challenges facing society and the business fabric.**

Catalonia is committed to making progress towards a knowledge society that has a competitive economy based on innovation and is efficient in



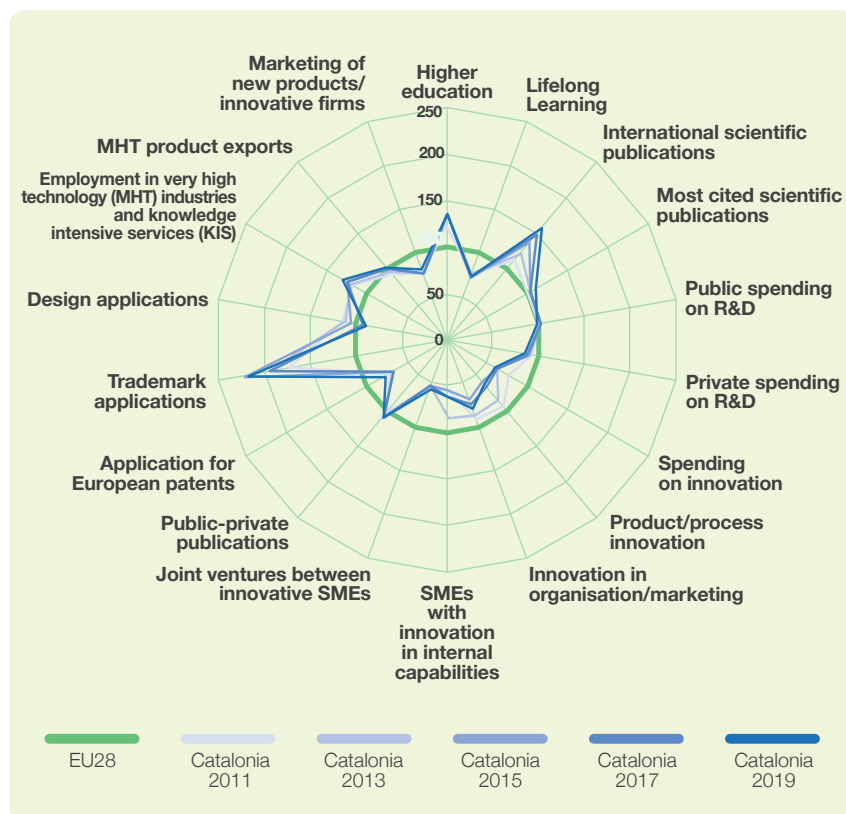




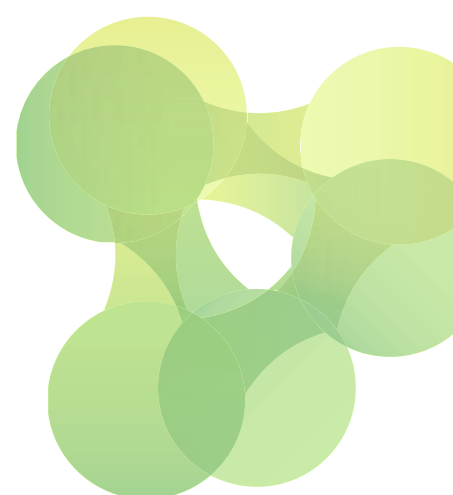
the use of resources. This commitment must also comply with the United Nations 2030 Agenda for Sustainable Development. Therefore, above all we must define our actions in accordance with Europe's strategy. It is important, then, to have a presence in the decision-making bodies of these strategies.

To be efficient, this public effort must be coordinated by the ministries of the Government of Catalonia and their dependent or associated bodies. Only this way will the public promotion of private innovation and R&D be effectively capable of impacting the Catalan economy's main indicators of innovation and competitiveness to such an extent as to exceed the European average.

**Change in RIS indicators for Catalonia compared to the European Union 2011 average (static)**

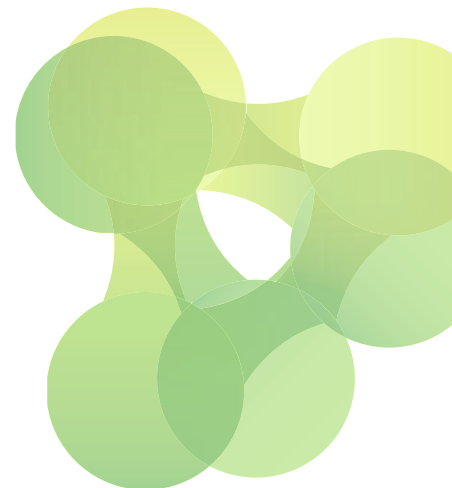


The graphic shows that the relative values for Catalonia have hardly changed this decade with respect to the European Union 2011 average, beyond lengthening the points where it exceeds the European average. In other words, in the last decade, marked by the global crisis that began in 2008, Catalonia has failed to improve in any of the indicators where most needed, thus it has lost relative competitiveness because most European regions have improved on the average.

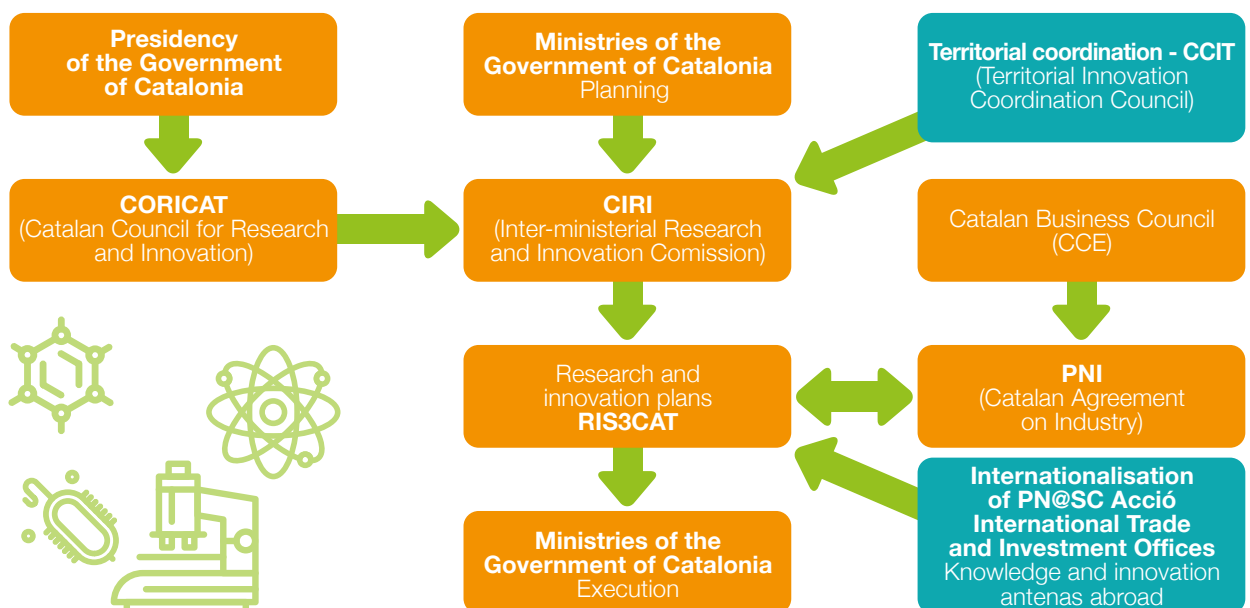


## Agreements. **A commitment to innovation to ensure a future for Catalonia**

1. Progressively and continuously increase public investment in R&D&I to 1% of GDP, while incentivising private investment, which should reach 2% of GDP in the same period.
2. Promote R&D and business innovation within the framework of RIS3CAT 2021–2027 with public support for the execution of projects carried out in the environment of Catalan innovation ecosystems. The projects must meet the challenges of innovation in terms of technology, territory and value chains and be the driving force in priority areas (mobility, sustainability, industry 4.0, well-being, culture and creativity, etc.). The instruments supporting the projects must be efficient enough to guarantee the provision of resources to companies with an intensity that mobilises private investment, while ensuring flexibility in the administrative management of grants.
3. Foster a programme to support the creation and growth of companies based on knowledge and deep tech in collaboration with local agents, parks, incubators, accelerators and other agents. This must be in connection with international ecosystems supporting the scalability of companies.
4. Create agile financial instruments based on new mixed formulas to accelerate the growth of innovative companies with a high potential for growth included in the Government of Catalonia's register of innovative companies and scale-ups.
5. Establish public-private collaboration agreements to foster the creation of innovation hubs that facilitate contact between the supply and demand sides of technology, including technological testing infrastructures.
6. Create a technological transformation programme for Catalan companies, with an emphasis on SMEs and micro-enterprises, to knit a technologically advanced and sustainable business fabric and facilitate the systematisation of innovation, disruption and the adoption of new technologies.
7. Create an industrial and intellectual property (IP) stimulation office to coordinate actions, provide a training programme, revitalise intangible assets, and provide incentives for their protection and a fund to defend Catalan IP.

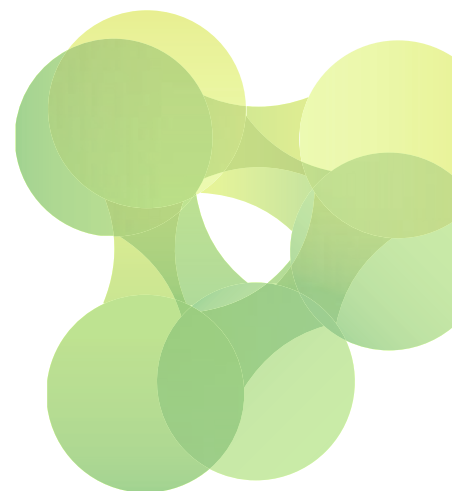


8. Support EURECAT as a Catalan technology centre to complement the rest of the country's innovation agents, seeking synergies between EURECAT and other elements of the system, such as science and technology parks, the TECNIO centres, university transfer offices and companies.
9. Consolidate EURECAT as a Catalan technology centre and foster its growth so it becomes big enough to meet the needs of the Catalan ecosystem, taking into account the characteristics of the micro-enterprise and SME system, and so it can be comparable to the leading technology centres.
10. Prepare a Catalan technology roadmap to ensure the provision of technology to companies with the participation of universities, research centres, technology centres and other organisations in the research and innovation ecosystem, and foster a Catalan alliance between all the agents.
11. Recognise the key agents in the Catalan transfer and innovation ecosystem (the most representative innovation companies, technology agents, ecosystems, professionals, and business organisations, among others) and systematically promote their cross-cutting and transdisciplinary collaboration by means of new collaboration mechanisms (consortia, partnerships, innovation corridors, hubs, etc.) on both the intraregional and interregional scales.
12. Foster inter-ministerial and territorial coordination based on the following governance system, which is proposed in the Catalan Science Bill:



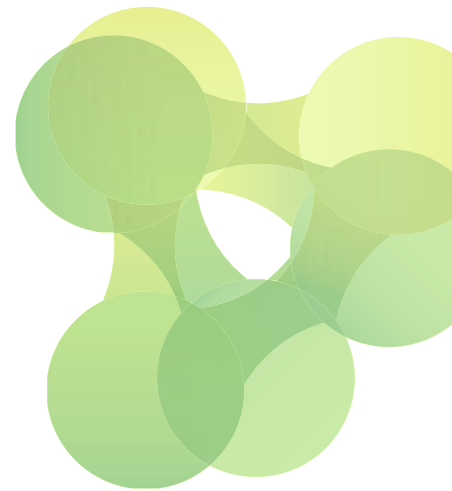


13. Consolidate programmes to highlight technology and knowledge and transfer them to public agents, with a special emphasis on SMEs:
  - Incentives for knowledge appreciation and transfer projects in various stages of maturity.
  - Support for the knowledge appreciation and transfer units of the various knowledge agents.
14. Establish a university-business communication mechanism to bring the professional profile needs of the industrial and production fabrics characteristic of each territory more in line with the study plans of the dual university system.
15. Reinforce programmes designed to promote the incorporation of talent into companies and the creation of jobs that take into account scientific and technical profiles and new basic and advanced digital skills. Also include new professional profiles associated with innovation and the development of new businesses brought about by new technologies.
16. Consolidate an innovation ecosystem in Catalonia that is internationally recognised and connected.
17. Invest 0.1% of GDP in business innovation with a public contribution (from all public administrations), to be made in the future (with the Government of Catalonia contributing a maximum of 50% by 2030), of a minimum of €220 m per annum as an incentive to mobilise private investment in R&D&I.
18. Develop instruments and mechanisms to attract public and private funds to increase and accelerate the transfer and use of basic research in companies.
19. Invest 3% of the Government of Catalonia's public procurement budget in innovative public procurement to develop a coordinated technology policy and create new solutions. And therefore, niche segments that adopt new technologies and are based on industrial and national challenges. To do so, Catalan innovation companies and technology agents must be prioritised to perfect globally applicable technologies, with special attention to SMEs and micro-enterprises.
20. Create and stimulate the Catalan Research and Innovation Portal, to integrate all the information of the public and private R&D&I ecosystem and share it with the business fabric.





21. Coordinate the policies and instruments of the various ministries of the Government of Catalonia that execute research and innovation policies and programmes in accordance with the PN@SC, the PNI, RIS3CAT, SmartCatalonia and any and all present and future government agreements and strategies in the business area related to innovation. Governance should be multilevel (local, regional, state and European) and foster the collaboration of the various agents, seeking synergies with the combination of different sources of public and private funding.
22. Foster an entrepreneurial model that incorporates training, curricular and professional career aspects in the area of research and innovation, while recognising and fostering the ability of companies to provide training.



# 6

The territory,  
the regions  
and the cities,  
an opportunity





## 6. The territory, the regions and the cities, an opportunity

In the globalised world, knowledge and innovation are essential to improve the competitiveness of companies and the personal and professional development of people. This is a challenge that, with the help of new technologies, and placing knowledge within everyone's reach, makes it possible for all territories to realise their economic development potential. Paradoxically, globalisation also fosters regionalisation: globality can be perceived from any point on the planet and all these points are accessed and impacted by it.

**Local singularities have value in the global world.**

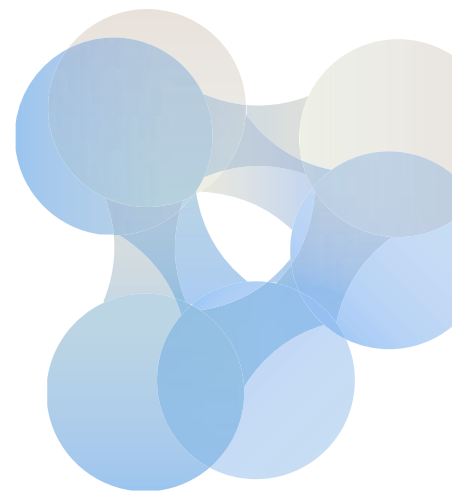
Since its establishment, the European Union has had two souls: that of a union of states, with their necessary confluence of interests, and that of a union of societies (of citizens) with common cultural roots that are better developed in harmony. This is the aspect of the EU considered to be the Europe of the Regions, and the European Regional Policy is its main instrument (more than 40% of European funds are allocated to regional development).

**Catalonia is one of more than 270 European regions, but it cannot be identified as a simple region. Its human, cultural, social and economic dimensions are those of a medium-sized European state** (the majority of EU28 states are smaller than Catalonia).

The European map of regions and, specifically, comparisons with the leading countries and those that are similar to Catalonia in terms of population and economy show that regions with their own territorial development powers are typically smaller than Catalonia (€15–25 bn annual GDP per million inhabitants).

In the eyes of the European Union, Catalonia behaves, therefore, and in spite of its human and economic dimensions, as a single region with competencies. It is, in its development, equivalent to a centralist vision. This is why the application of European regional development concepts and policies to Catalonia as a single region limits us.

The regional policy does not focus on redistribution, but on growing distributed internal capacities. The different capacities of each part of Catalonia must all be honed to benefit the country as a whole. **Innovation policies must be oriented to the economic situation of each region and, although the Barcelona metropolitan area is by far the most powerful, every single business fabric in Catalonia offers a diversity of singularities and opportunities that should be tapped.** A policy that allows us to





identify and strengthen local and regional relations between business fabrics and regional knowledge systems is, therefore, necessary, especially in medium-sized university cities.

Following the European regional policy of the Research and Innovation Smart Specialisation Strategy (RIS3), which identifies knowledge as one of the foundations of regional development strategies, the concepts and objectives developed in the Catalan Agreement on the Knowledge Society can be applied to the various regions of the country.

In fact, the Committee of the Regions (CoR) promotes measures on the regional scale to transform research results into innovation, as well as measures for the construction of a regional innovation capacity based on smart specialisation (RIS3) and inter-European cooperation.

Even though the European regional policy identifies the regions<sup>7</sup> as its interlocutors, there is nothing to stop us implementing an internal regional organisation, on the NUTS 3 level, to which part of the responsibility for developing RIS3 strategies could be transferred, which is how it is done in the majority of European countries.

Regional innovation ecosystems are based on a modern form of co-responsibility shared by society, business and the public authorities in the development of policies. This is the case to the extent that regional collaboration may be pioneering in the formation of groups on the European scale with different capacities and specialisations and in the promotion of social innovations for European use. This makes sense, given that these regions or subregions may be more efficient in the development of the smart specialisation strategies promoted by the European Union because they are better able to channel bottom-up transformations and foster the change in mindset that entrepreneurship requires.

Innovative communities and organisations operate in ecosystems made up of systemic relationships and networks, where the borders are often blurred. They are open ecosystems, where society's transformative processes interact more with cities and with the regions driven by these cities. Interaction between people and digitisation and between organisations and technology fosters and promotes the decentralisation of innovation in the form of collaboration, the network culture and entrepreneurial discovery.

7. European classification of statistical territorial units: NUTS 0 for states; NUTS 1 for small countries and certain areas of large states, etc. The NUTS 2 regional level is the basic level in the development of European cohesion and regional development policies. It is mainly used in the compilation of data and statistics and, therefore, in interregional comparisons.



**It is essential for each territory to be able to state its aims and propose its own sustainable development commitment.**

Universities, cities and industrial environments provide this interaction with the framework it needs to understand and implement the fundamental activities of innovation and change. It is necessary, then, to analyse and discuss the need for and emergence of regional development policies that cover R&D&I, so these policies can adapt to the various situations of the Catalan territory.

It is also very important for Catalan companies to be able to access real technological and economic development to fight off strong global competition, and this is not possible if we do not have instruments and people with the skills necessary to transform Catalonia into a leader in R&D&I. In this sense, an important role is played by facilitation elements such as science and technology parks and other similar or territorial structures, due to their functions and their territorial distribution.

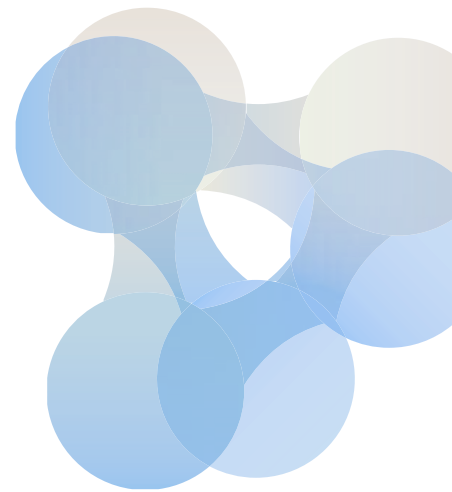
It is also of capital importance for each Catalan territory, according to its needs and potential, to be aware of and make the effort necessary to meet this challenge. For this reason it is necessary for knowledge and innovation to be universal for everyone, wherever they live, and to prevent the fracturing of territorial knowledge.

**Catalonia's business sphere already shows a development discrepancy between the most populated and metropolitan areas and the rest of the territory.** Accordingly, the Barcelona metropolitan area is home to 46% of Catalan companies and 52% of Catalonia's GDP. It also plays host to almost 350 R&D&I centres and entities and has an ecosystem of more than 1,500 start-ups, making Barcelona the fifth largest hub in Europe and the largest in Southern Europe.

The aim of securing a place for Catalonia among the leading innovative regions opens up a further two challenges: growing and funding R&D&I in all metropolitan areas and expanding R&D&I policies to cover the entire territory.

The Government of Catalonia's implementation of the framework of R&D&I policies in relation to both its own resources and those of Europe (Research and Innovation Strategy, ERDF) adheres to equality criteria and shows no territorial bias. RIS3 should be increasingly introduced and internalised as a paradigm of European policy on regional development.

Strategies to involve and seek the participation of the most peripheral areas must be sought in order to meet these challenges. These strategies must also take into account the internal balance of the



ecosystems. In summary, **it is necessary to identify interterritorial and intraterritorial balance strategies to prevent an accumulation in the centre to the detriment of the periphery.**

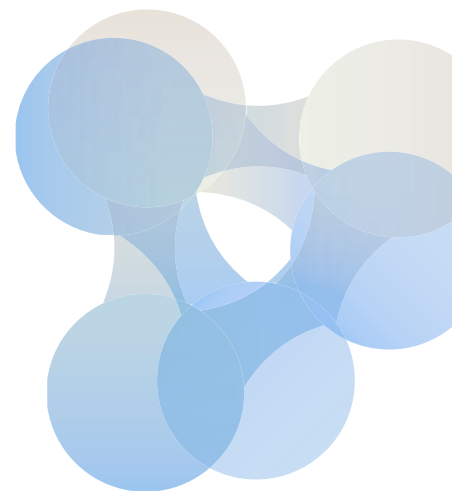
We must identify elements of Catalan planning and development policies that could fall under the responsibility of intermediate regional entities, ensuring that a fair territorial balance is struck. We must also identify the agents of each ecosystem and recognise their singularities. We need to adapt to European policies on the territorial definition of knowledge regions in order to operate on the same level and be competitive. This means developing components of Catalan innovation policies and RIS3CAT on the regional scale, respecting the definition process and rules of the ERDF Regional Operational Programme.

Therefore, we need human, economic and knowledge criteria to carry out a bottom-up identification of Catalonia's knowledge regions and to ensure equal participation in the definition of knowledge access needs and in the definition of R&D&I policies. That is, **knowledge regions that fully develop the concepts of citizen science and science at the service of people and their values as the base of the Catalan knowledge society**, in addition to science conducted with people, regardless of age, based on their skills and knowledge, their virtues and sensitivities, which are normally deeply rooted in a specific territory.

Having more contained knowledge regions, with very small populations, very few knowledge structures (universities, R&D centres, etc.) and small-scale economic dimensions should make it easier for Catalan R&D&I policies to adapt to the characteristics of the production fabric of each internal region and improve its results.

We should take into account that Catalonia's local administrations have worked on the economic transformation and innovation capacity of the territory through **Territorial Specialisation and Competitiveness Projects** (PECTs), which have made a significant contribution to smart specialisation, improving competitiveness, job creation and, to the extent possible, the creation of links to the international value chain.

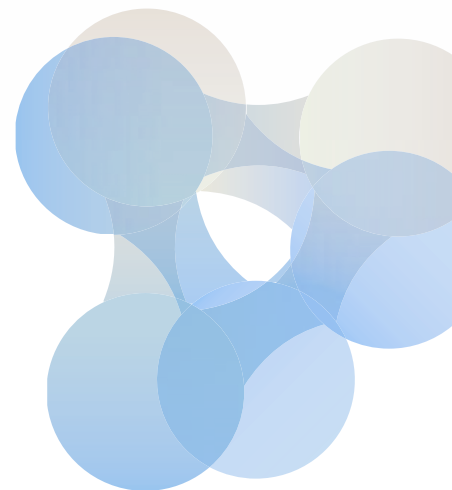
Additionally, we should not overlook the involvement of the social and cultural agents of the various cities in the identification of challenges in the territory and in the proposal and design of social and community research and innovation projects, to which universities may lend their services. This allows part of the resources society places at the disposal of higher education, research and innovation to be given back to it.



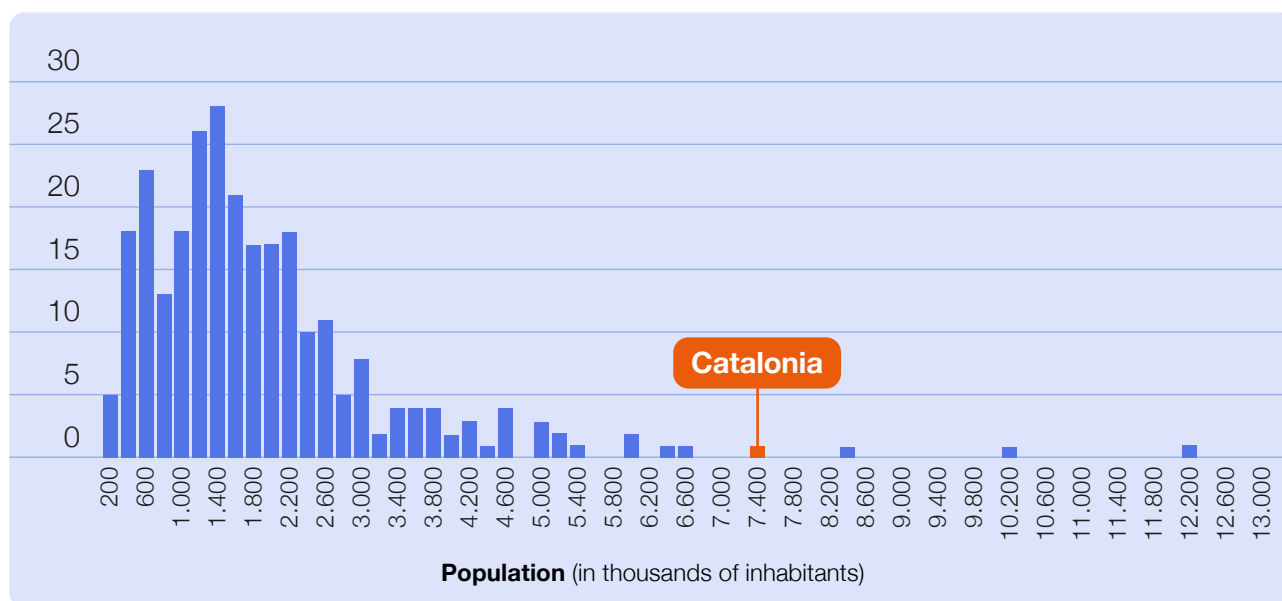


An analysis of the almost 280 regions included in the RIS shows that among the leaders and the strongest innovators there are more than 30 with a population of fewer than 1.5 million inhabitants (and six with a population under 600,000). All of these are characterised by having a developed university system, with research universities and applied sciences universities, in addition to some innovation infrastructures.

This process will require, then, two very specific actions: identify the minimum requirements for Catalan regions to become a Territorial Innovation System (TIS) and determine the common elements to be incorporated by the governance models of each one of these knowledge regions.



#### Population distribution of European Territorial Units for Statistics NUTS2

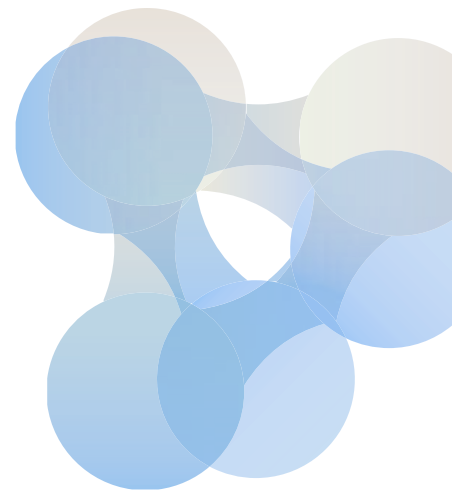


Catalonia appears as the fourth largest (only 3 higher: Paris, London and Andalusia), of the 276 NUTS2 regions in the European Union. This means Catalonia is among the top 2% largest regions in the NUTS2 statistical classification, surpassed only by another Spanish region and the large metropolitan areas of Paris and London, which is indicative of the anomaly. By size Catalonia should be NUTS1 and be divided into several NUTS2, which have an average size between 1/4 and 1/4 of Catalonia, depending on the indicator.



## Agreements. **Strengthen the Catalan regions**

1. Continue supporting territorial strategies with a broad consensus, driven by the agents of the territory that organise projects with operations and actions for the economic transformation of the territory, which associate the work of Territorial Specialisation and Competitiveness Projects (PECTs) with territorial network perspectives to improve economies of scale and foster comprehensive development.
2. Foster regional innovation, testing out broader territorial areas and approaching the limits of the European concept of knowledge region:
  - The approximate dimensions of Catalan knowledge regions would be:
    - 400,000 to 600,000 inhabitants.
    - A GDP of €10–15 bn.
    - A university with R&D activity.
3. Create an innovation and development body in each knowledge region to manage its governance, strategy and relations between public and private agents, with specific areas of action in innovation and development.
4. Promote regional information systems (indicators of the Regional Innovation Scoreboard) in the area of the knowledge regions.
5. Provide them with part of the resources that Catalonia already allocates to development policies based on R&D&I (15%).
6. Work on the negotiation of competencies between administrative levels to make decision-making more subsidiary (closer to the user) and coordinated (territorial balance).



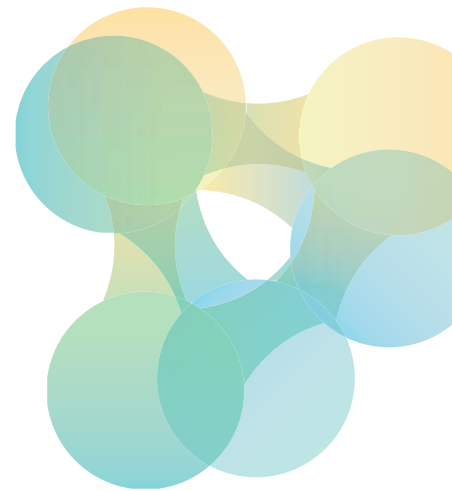


## Becoming a knowledge society is within our grasp

**The central theme of the Catalan Agreement on the Knowledge Society is the objective of securing a place for Catalonia among the countries that are today considered to be knowledge societies.** This will be achieved by becoming one of the leading regions in innovation and scoring above the European average in all related indicators. The period to achieve it is defined on two levels: a long-term consolidation horizon, given the great distance to be travelled in some of the main indicators, which could be some time this decade, with the deadline of 2030, and an initial operational level within the five-year period from 2020 to 2024, in which it will be necessary to cover 75% of the ground described in the final objectives.

Apart from the ultimate long-term goal and the intermediate mid-term goal, the various proposals of the PN@SC to improve Catalonia's innovation, competitiveness, growth and well-being can be summarised in four singular characteristics:

1. SMEs and micro-enterprises form the majority of our **production fabric**. Proposals about the innovation system, people, talent and economic resources adopt a special approach to the needs and set-up of these types of companies in order to make knowledge transfer, the hiring of talent and the public promotion resources of private R&D more effective.
2. Discontinued and uniform organisation of **higher education**. Proposals concerning the knowledge system, people, talent and economic resources develop a solid response to this problem, within the limitations of the legal powers currently assigned to Catalonia. These are proposals that focus on coordination, duality and recognition to make progress towards more European and more effective standards regarding higher education organisation and professional careers.
3. **Single development policy** despite the large territorial dimension. Debates and agreements regarding the territory, regions and cities indicate a clear response to the demands and proposals of the entire Catalan territory in terms of its R&D&I development and specialisation, which are complemented with measures in research infrastructures, taking into consideration the territorial dimension in their cooperation and their network in Catalonia.





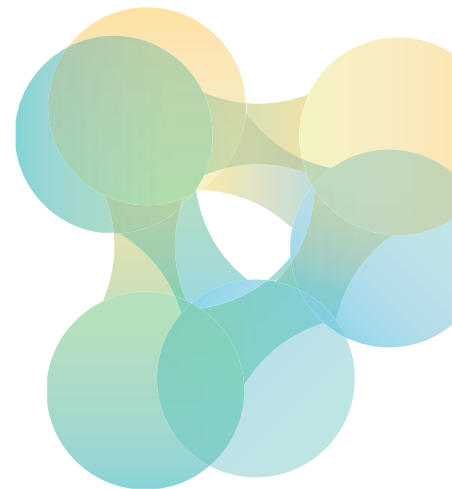
4. There is a need for a **Catalan Science Act**. The working group on the research system is the one that has contributed the most to drafting the Catalan Science Bill, and, in conjunction with the innovation system and research infrastructures working groups, it has produced a series of reflections and accords that are based on and apply the vision, policies and stability of this future law.

To accomplish the objectives it is essential to have an annual monitoring mechanism, both for the application of the Government of Catalonia's policies and smart specialisation strategies and for the indicators proposed to assess each one of the areas or pillars of the PN@SC.

This monitoring must include studies and reports on the assessment of the proposed indicators, in addition to the creation of the instruments necessary for their promotion and achievement.

This monitoring should include and serve the future work of any bodies of the CIRI and the CORICAT that may be constituted based on the approval and application of the Catalan Science Act. It will also be especially necessary to consider monitoring the European R&D policy programmes with which we are aligned or whose standards we share, such as Horizon Europe and RIS3.

We will end how we started. **Progress, prosperity and well-being can be achieved only by countries that decisively commit to the knowledge society.** Reaching the horizon we have set in this document is not only desirable, but necessary. **It is not a pipe dream, it is within our grasp. The Catalan Agreement on the Knowledge Society is the tool that will make it possible.** Only this way can we make progress towards a fairer, more cultured, more civil, more open, more competitive and more democratic society. **Let's get to work!**





As annexes, this document includes the set of main indicators that have been used in the diagnosis of the situation and in the definition of the objectives (annex A), in addition to two additional documents that contain operational proposals, which are more specific than those generally included in the PN@SC and based on the contributions of the participatory process (annex B) and the reflections and agreements of the Advisory Board (annex C). There is also a financial report that covers all the proposals of the PN@SC with financial implications and estimates its economic impact (annex D) and finally there is the framework of rights and obligations of the Catalan university system (annex E).

The PN@SC has its own permanent website, where you can access all the documentation used by the various working groups to prepare the objectives and the proposals submitted to the Permanent Board and the Plenary, organised by working group. This documentation is represented in annex F.



# Annex A

## Monitoring indicators





PN@SC monitoring indicators

**Basic**  
Indicator level 1

Indicator	Year	Value	Objective 2024	Objective 2030
Percentage of the population aged 30–34 with tertiary education	2019	50,6%		70%
Percentage of the population aged 25–64 in lifelong learning	2019	9,3%		15%
Population aged 20–24 with secondary or higher education (upper secondary diploma, vocational training or university degree)	2018	75,1%		83,4%
Population with higher education over the EU28 average	2019	129,1%		
Lifelong education over the EU28 average	2019	67,4%		100%
Number of R&D researchers	2017	28.922	35.625	
Percentage of employment in the knowledge-intensive sector with respect to total employment	2015	10%		
Percentage of people employed in knowledge-intensive industries	2016	4,54%		
Public spending on education as a percentage of GDP	2017	3,56%		
Total spending on R&D as a percentage of GDP	2018	1,52%	2,12%	3%
Public spending on R&D as a percentage of GDP	2018	0,58%	0,75%	1%
Total percentage of private spending on R&D	2018	61,56%	64,6%	66%
RIS index value (percentage over EU28 average)	2019	77,6%	100%	
RCI value (EU28: 0)	2019	-0,17		0
GDP at purchasing power parity per person currently employed (percentage over EU28 average)	2018	104,5%		
Gini coefficient (0 equality; 1 inequality)	2014	0,34		
Catalonia's rank in the EU Regional Social Progress Index	2016	65,51%		

### PN@SC monitoring indicators

General Indicator level 2		Indicator	Year	Value	Objective 2024	Objective 2030	
Higher education indicators		Number of official tertiary education students	2017-18	337.650			
		Percentage of tertiary education students over the total number of students	2017-18	21,0%			
		First-time graduation rate (for all the population of graduation age) at university bachelor's degree level	2016	37,86%			
		Number of Catalan universities in the Times Higher Education (THE) ranking of Europe's top 100 universities	2019	3			
		Percentage of foreign master's degree students enrolled in tertiary education	2017	35,0%			
		Gender pay gap percentage	2016	14,9%			
		Employment rate of recent graduates	2017	77,7%			
		Percentage of the active population working in jobs that typically require tertiary education	2017	25,9%			
		Percentage of students enrolled in STEM courses	2018	24,1%			
		Number of doctoral graduates per 1,000 inhabitants	2018	2,32			
		Average age of permanent university teaching staff	2017	49			
	Research indicators		Annual spending on R&D at current rates and as a percentage of GDP	2018	1,52%		
			Internal R&D spending of the public sector (percentage of GDP)	2018	0,58%		
		R&D spending of companies (percentage of GDP)	2018	0,94%			
		Percentage of the Government of Catalonia's budget allocated to R&D&I (programme 57)					
		Publications/1,000 inhabitants					
		Percentage of open-access publications with respect to the total number of publications					
		Percentage of European funds from the current framework programme received in Catalonia with respect to the EU	2014-18	2,7%			
		R&D staff in FTE	2018	51.830			
		Number of researchers in FTE per 1,000 workers					
		International co-publications (over EU28 average)	2019	132,5%			
		Most cited publications (over EU28 average)	2019	121,4%			
		Public spending on R&D (over EU28 average)	2019	108,6%			
		Private spending on R&D (over EU28 average)	2019	103,3%			
		Spending on innovation (excluding R&D) (over EU28 average)	2019	54,2%		100%	



### PN@SC monitoring indicators

General Indicator level 2	Indicator	Year	Value	Objective 2024	Objective 2030
<b>Innovation indicators</b>	Number of start-ups	2019	1.504		
	Number of research spin-offs (universities and centres and ICTS)				
	Patents/GDP				
	Weight of the high- and medium-technology sectors	2019	8,30%		
	Product/process innovation (over EU28 average)	2019	60,5%		100%
	Marketing/organisational innovation (over EU28 average)	2019	88,7%		100%
	SMEs with innovation in in-house capabilities (over EU28 average)	2019	56,1%		100%
	Collaboration between innovative SMEs (over EU28 average)	2019	55,0%		100%
	Public-private co-publications (over EU28 average)	2019	123,3%		
	PCT patent applications (over EU28 average)	2019	108,4%		
	Trade mark applications (over EU28 average)	2019	222,5%		
	Design applications (over EU28 average)	2019	113,6%		
	Employment in high- and medium-high-technology and knowledge-intensive services (KIS) (over EU28 average)	2019	124,6%		
	New sales by market/company (over EU28 average)	2019	115,7%		
<b>Execution indicators</b>	GDP at purchasing power parity per inhabitant (percentage over EU28 average)	2018	113%		
	Glass-ceiling index (1 indicates equality)	2018	2,033		
<b>Impact indicators</b>	Human Development Index (HDI; the closer it is to 1, the higher the degree of well-being)	2017	0,904		
	Catalonia's rank in the EU Regional Social Progress Index	2016	65,51		
	Productivity per hour worked (in euros)	2017	37,9%		
	Average salaries of workers with higher education (percentage in excess of €2,000/month)	2019	52%		
	Unemployment rate of people under 25	2019	26,2%		



PN@SC monitoring indicators

Higher Education Indicator level 3	Indicator	Year	Value	Objective 2024	Objective 2030
<b>Execution indicators</b>	Number of students in university higher education				
	Number of students in non-university higher education				
	Percentage of students in higher education over the population aged 18–24				
<b>Efficiency indicators</b>	Ratio of students per teacher in tertiary education	2018	17		
	First-time graduation rate (for all the population of graduation age) at university bachelor's degree level	2016	37,86%		
	First-time graduation rate (for all the population of graduation age) at university master's degree level	2016	20,62%		
	Number of Catalan universities in the Times Higher Education (THE) ranking of the world's top 500 universities	2019	3		
	Number of Catalan universities in the Times Higher Education (THE) ranking of the world's top 1,000 universities	2019	8		
	Number of Catalan universities in the Times Higher Education (THE) ranking of Europe's top 100 universities	2019	3		
<b>International indicators</b>	Percentage of foreign bachelor's degree students enrolled in tertiary education	2017	7,2%		
	Percentage of foreign master's degree students enrolled in tertiary education	2017	35,0%		
<b>Equity indicators</b>	Percentage of new students aged 18–24 with parents with no tertiary education	2015	35,5%		
	Matriculation fee (average)	2018	1.760		
	Percentage of students who pay matriculation fees	2019	73,3%		
	Percentage of university students with a grant based on socio-economic needs	2018	20,44%		
	Average grant amount	2019	2.017		
<b>Equality indicators</b>	Percentage of women aged 25–64 in lifelong learning	2019	10,8%		
	Percentage of men aged 25–64 in lifelong learning	2019	7,8%		
	Percentage of women aged 30–34 with tertiary education	2019	57,1%		
	Percentage of men aged 30–34 with tertiary education	2019	43,9%		
	Gender pay gap percentage	2016	14,9%		

### PN@SC monitoring indicators

Higher Education Indicator level 3	Indicator	Year	Value	Objective 2024	Objective 2030
<b>Employability indicators</b>	Employment rate of recent graduates	2017	77,7%		
	Percentage of the active population working in jobs that typically require tertiary education	2017	25,9%		
	Percentage of the active population with higher education working in jobs that typically require higher education	2017	21,5%		
	Percentage of the active population with higher education level but not working in jobs that require higher education	2017	20,6%		
<b>Quality indicators</b>	Number of qualifications with AQU Excellence Accreditation	2018	16%		
	Number of institutional surveys on student's situations and opinions	2019	2		
<b>STEM indicators</b>	Percentage of students enrolled in STEM (science, technology, engineering and mathematics) courses	2018	24,1%		
<b>Continuing Higher Education indicators</b>	Number of bachelor's degrees that can be accessed from advanced vocational training				
	Number of double degrees	2019	1		
	Number of career-oriented campuses attached to universities	2019	4		
	Number of career-oriented qualifications at EQF levels 5–8 with AQU accreditation				
	Continuing higher education at university foundations (number of students)				
<b>Research indicators</b>	Continuing higher education in a non-university area (number of students)				
	Number of doctoral graduates per 1,000 inhabitants	2018	2,32		
	Number of predoctoral and postdoctoral employees per 100 members of the teaching and research staff with stabilised positions				



PN@SC monitoring indicators

**Higher Education**  
Indicator level 3

**Indicator**

**Year**

**Value**

**Objective  
2024**

**Objective  
2030**

**Human resources  
indicators**

Average age of permanent university teaching staff

2017

49

Average age at which permanent teaching and research staff achieve stabilisation

2017

41,5

Percentage of doctors over the total teaching and research staff at universities (full-time equivalent)

Number of Serra Húnter positions offered

Average productivity bonus for permanent teaching staff (teaching, research, transfer, management)

Number of ICREA Academia researchers

2019

120

170

Number of unique fields defined

Percentage improvement in research and teaching staff and percentage of ongoing six-year periods of activity in "unique" fields

Percentage of permanent medical doctors with a doctorate at university hospitals

Percentage of positions associated with permanent medical doctors at university hospitals

**Economic  
indicators**

Annual spending per student at higher education institutions (non-financial operation expenses)

Spending on higher education with respect to GDP

2016

1,14%

1,37%

Spending on university education with respect to the total ministerial budget of the Government of Catalonia

2020

4,08%

4,4%

Amount allocated to university grants (AGAUR): €m

2020

105,7

PN@SC monitoring indicators

Research	Indicator	Year	Value	Objective 2024	Objective 2030
Execution indicators	Annual spending on R&D at current rates and as a percentage of GDP	2018	1,52%	2,12%	3%
	Internal R&D spending of the public sector (percentage of GDP)	2018	0,58%	0,75%	1%
	R&D spending of companies (percentage of GDP)	2018	0,94%	1,37%	2%
	Total spending on R&D (€m)	2018	3.512,7	4.770	7.500
	Total spending on R&D per capita	2018	466		1.000
	Public spending on R&D (€m)	2018	1.350,3		2.500
	Private spending on R&D (€m)	2018	2.162,4		5.000
	Foreign R&D funding in Catalonia (€m)	2016	246,87		
	Percentage of European funds from the current framework programme received in Catalonia with respect to the EU	2018	2,26%		
	Number of European Research Council (ERC) grants awarded in Catalonia per million inhabitants	2018	41		
	Total competitive funds won				
	Total international competitive funds won				
	Total national competitive funds won				
	Total budget allocated to supporting/fostering transfer and innovation (programme 574) in €m	2018	21,09	86	110
	Government of Catalonia funding of R&D&I (€m)	2018	747,8	1.100	1.600
	Percentage of the Government of Catalonia's budget allocated to R&D&I (programme 57)				
	Percentage of open-access publications with respect to the total number of publications				
	Number of departments with SDUR1 research grants: research departments				
	Number of departments with SDUR2 research grants: departments of excellence				
	Number of CERCA centres rated "A"	2016-19	22		
	Number of university hospitals with research structure	2019	9		
	Number of scientific publications				
	Number of scientific co-publications				
	Publications per 1,000 inhabitants	2017	15,76		
	Number of research infrastructures of each defined type				
	Directorate-General for Research spending allocated to major infrastructures				
	Percentage of Directorate-General for Research spending allocated to major infrastructures with respect to spending allocated to R&D by the Government of Catalonia				
	Number of open access publications produced by Catalan public universities				

PN@SC monitoring indicators

Research	Indicator	Year	Value	Objective 2024	Objective 2030
Execution indicators	Percentage of open access publications produced by Catalan public universities with respect to the total number of publications				
	Number of open access publications that can be consulted on the Catalan Research Portal				
	Percentage of ERDF funds executed in R&D&I with respect to the total ERDF funds allocated to R&D&I in each operational programme				
	RIS normalised value (2011 base value of 100) of most cited publications	2019	107,45	134,96	
	RIS normalised value (2011 base value of 100) of international co-publications	2019	159,14	235,42	
	H2020 European funds won per million inhabitants	2018	145		
	% of ERC Starting Grants over the total	2007-18	23,68%		
	% of ERC Proof of Concept Grants over the total	2007-18	34,19%		
	RIS normalised value (2011 base value of 100) of public-private co-publications	2019	102	159,25	
	RIS normalised value (2011 base value of 100) of PCT patents	2019	76,83	123,86	
Equality indicators	Full-time equivalent staff in R&D over the total working population	2019	1,63%	1,94%	
	Full-time equivalent researchers over the total working population	2019	0,95%	1,23%	
	Percentage of women researchers in R&D	2017	39,4%		
	Percentage of women who work as R&D staff with respect to the total	2017	41,99%		
	Proportion (%) of women academic staff by rank and total				
	Total bibliometric impact	2014-18	187.986,82		
	Total bibliometric impact percentage of universities	2014-18	41,75%		





PN@SC monitoring indicators

Research	Indicator	Year	Value	Objective 2024	Objective 2030
Impact indicators	Total bibliometric impact percentage of research centres	2014-18	20,65%		
	Total bibliometric impact percentage of hospitals and health	2014-18	34,84%		
	Total bibliometric impact percentage of companies	2014-18	2,76%		
	Publications with international collaboration (per million inhabitants)	2016	1.370		
	Scientific publications among the 10 most cited in the world over the total publications of the country	2014	11,5%		
	Foreign doctoral students over the total number of doctoral students	2017	23,18%		
	Global Talent Competitiveness Index	2018	57,7		
	Percentage of H2020 European projects directed at subjects included in the SDGs (by keyword)			45%	
	Percentage of funds won in H2020 projects directed at subjects included in the SDGs (by keyword)			42%	
	R&D staff in FTE	2017	48.552,4		
Percentage of R&D staff hired by companies	2017	48,48%			
Human resources indicators	Total number of researchers	2017	28.921,7	35.625	
	Number of researchers in public administration and higher education	2017	16.977,9		
	Number of researchers in companies	2017	11.943,8		
	Scientists and engineers with respect to the active population	2017	7		
	Number of researchers in FTE per 1,000 workers	2017	8,72		
	Number of ICREA researchers	2018	264	300	
	Number of FI and BP grants offered				

PN@SC monitoring indicators

Innovation	Indicator	Year	Value	Objective 2024	Objective 2030
Execution indicators	Number of industrial doctorates				
	Venture capital spending (percentage of GDP)				
	PCT patents (RIS normalised value)				
	Patent applications over GDP (in billions)	2011	2,31		
	Trade mark applications over GDP (in billions)	2014	10,94		
	EU design applications over GDP (in billions)	2014	1,17		
	Number of technology centres that attract more external resources than the public resources they receive				
	Catalonia's rank in innovation: RIS	2019	140	100	80
	Catalonia's rank in competitiveness: RCI	2019	161		80
	Catalonia's rank in wealth: GDP per capita in PPS over EU28 average	2018	113		
	Catalonia's rank in well-being: Social Progress Index (SPI)				
	Percentage of SMEs with product or production process innovations	2019	11,30%		
	Percentage of SMEs with marketing or organisational process innovations	2019	32,20%		
	Percentage of SMEs that innovate in-house	2019	6,00%		
	Percentage of innovative SMEs that collaborate with other SMEs	2019	3,70%		
	Proportion of SME turnover over total business turnover	2019	n.d.		
	Public-private co-publications, Catalonia	2019	112,3		
	Private co-funding of public spending on R&D	2019	n.d.		
	Percentage of employment in the knowledge-intensive sector with respect to total employment				
	Productivity per hour worked (in euros)				
	Percentage of high- and medium-high-technology sector exports over total exports	2018	59,8%		
	Percentage of knowledge-intensive service exports over total service exports		n.d.		
	Innovation sales (new to the market and new to the company) over total turnover		n.d.		
	Weight of high-technology exports (pharmaceutical, electronic and ICT, aeronautical)	2018	10,9%		
	Employment in the industrial sector (percentage of the total)	2019	18,10%		
	Weight of the high- and medium-high-technology sectors (over total employment)	2019	8,30%		
	Employment rate (over the working age population)	2019	55,10%		
Opportunity entrepreneurs, motivational index (percentage of total entrepreneurs)	2019	56,50%			



PN@SC monitoring indicators

Innovation	Indicator	Year	Value	Objective 2024	Objective 2030
Execution indicators	Percentage of fast-growing companies (>10% per annum for at least 3 years), measured in terms of employment				
	Percentage of companies with broadband (Internet connection speed of at least 100Mb/s)				
	Days necessary to start a business				
	Turnover of EURECAT and attached centres (€m)	2018	73,6	180	
	Turnover of technology centres and TECNIO	2018	139,5		
	Number of start-ups	2019	1.504		
	Number of university spin-off companies				
	Number of research centre spin-off companies				
	Evolution of revenue from licences				
Regional development policy indicators	Number of knowledge region proposals				
	Percentage of ERDF funds executed in a decentralised manner				



# Annex B

## Contributions of the participatory process

## Contributions of the participatory process of the PN@SC

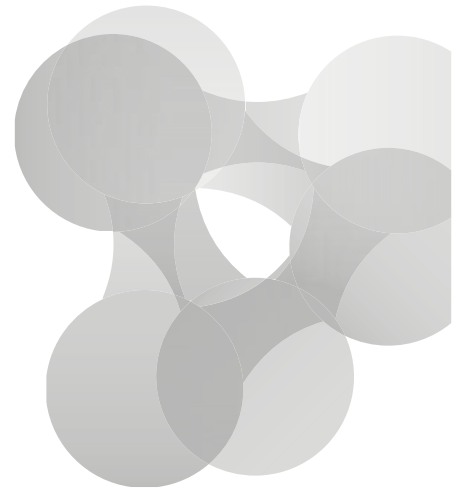
The **PN@SC** was opened up to the public through a **participatory process** designed to include everyone in the **construction of a shared strategy to make progress towards a knowledge-based society and economy**.

This participatory process, jointly organised by the Ministry of Business and Knowledge (through the Secretariat for Universities and Research) and the Government of Catalonia's Directorate-General for Citizen Participation and Electoral Processes in October and November 2019, collected the main ideas, opinions and proposals of the key actors of the knowledge ecosystem and the public, who participated through an open website.

### Global figures of the participatory process

The main figures regarding the participatory process in relation to attendees, bodies represented, contributions collected and other data are presented below.

- 12 debate sessions: 10 towns, 7 territories, 5 sectors
  - **“Knowledge system innovation and transfer”** session, held in **Sant Cugat del Vallès**
  - **“The global dimension of the research system. Infrastructures”** session, held in **Barcelona**
  - **“Talent”** session, held in **Barcelona**
  - **“The global dimension of higher education”** session, held in **Mataró**
  - **“The economic dimension of the knowledge system”** session, held in **Lleida**
  - **“The economic dimension of the knowledge system”** session, held in **Tortosa**
  - **“The economic dimension of the knowledge system”** session, held in **La Seu d’Urgell**
  - **“The economic dimension of the knowledge system”** session, held in **Vilafranca del Penedès**



- **“The economic dimension of the knowledge system”** session, held in **Girona**
- **“The economic dimension of the knowledge system”** session, held in **Manresa**
- **“The economic dimension of the knowledge system”** session, held in **Tarragona**

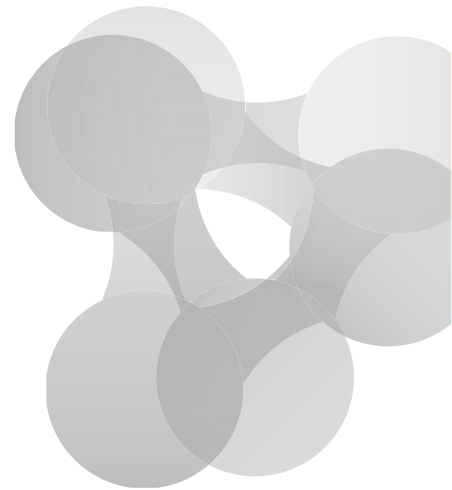
### A total of 250 participants

- **226 participants in the various in-person sessions:**

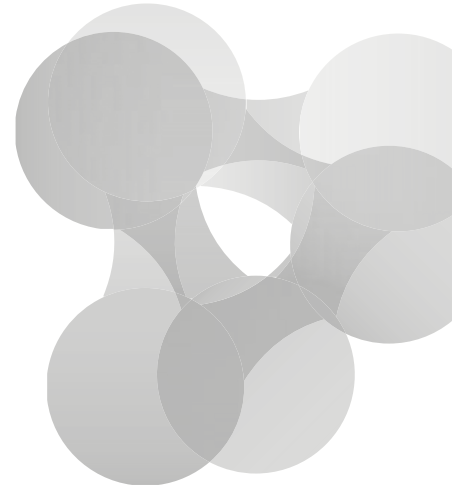
- Virtually equal participation in terms of gender, with **50.53% men and 47.87% women**.
- The **average age** of the participants was almost **49** (48.81), with an age range of 20 to 70.
- **90% of the 226 participants were born in Catalonia** and the majority lived in Barcelona. 7% were born elsewhere in Spain, and 2% were born in a different part of the world. 1% of the participants did not answer this question.

- **21 followers on the on-line platform, of which:**

- **4** submitted contributions regarding the social impact of knowledge transfer.
- **1** was interested in **talent attraction and retention, funding and resources in research careers**.
- **3** made contributions about the dissemination of professional activity.



- **A total of 132 strategies discussed** in the in-person and online sessions:
  - **129** corresponded to the work done **in the sessions**.
  - 3 contributions were presented **on line by the public on an individual basis**.
  - **13 messages of support** were given in various proposals.
  - **8 comments** on the proposals.
  - The majority of the comments and messages of support were received during the **first few days of the participatory process**.
- **169 different entities** participated in the in-person sessions held throughout Catalonia:
  - A total of 63 people stated they belonged to one or more entities.
  - The specified associations are: tourism, European, medical, and university associations, chambers of commerce, entrepreneur groups, feminist collectives, green consumption cooperatives, care bodies, religious groups, foundations and research centres, NGOs and development cooperation organisations, political parties and political associations, senior professionals, and scientific societies.

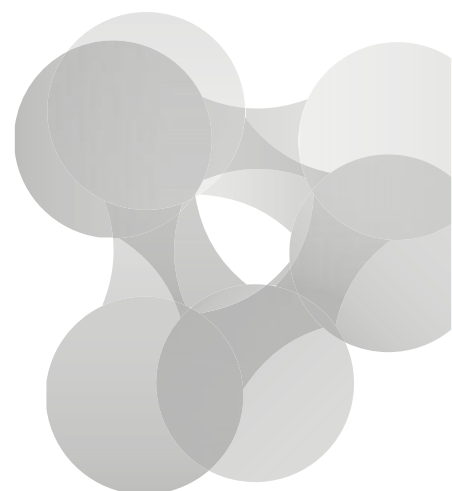




## Assessment of the contributions

The analysis of the more than 130 contributions submitted in the process identified that:

- **30%** (40 proposals) correspond to policies and actions that are **already being implemented by** the Government of Catalonia through the Ministry of Business and Knowledge or other competent ministries (mainly Education, Territory and Sustainability, Health, and Digital Policies).
- **Almost 60%** (76 actions) in some way are already **included as proposals** agreed by the working groups of the PN@SC. Some of the proposals submitted in the participatory process led to the reformulation, adaptation or improvement of a working group proposal.
- Just over **5%** (8 actions) **were not taken into account because they explicitly refer to competencies that are beyond the purview** of the Government of Catalonia.
- **8 actions (slightly more than 5%)** were submitted in such great detail that they are reproduced below so **they can be taken into account as proposals in future** developments of the PN@SC.





## **Contributions of the participatory process not explicitly incorporated into PN@SC**

### **1. Modernise and rejuvenate universities so that innovation forms part of their DNA.**

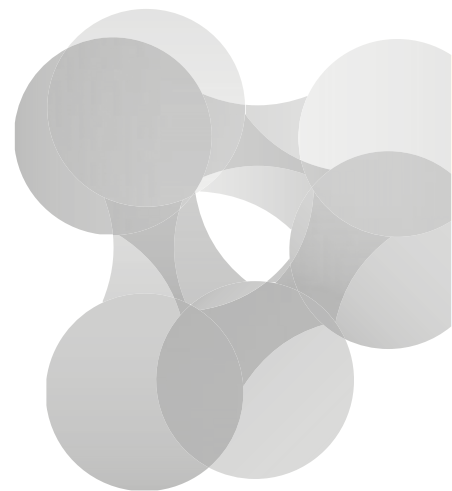
- The university structure is not prepared for innovation. Its organisation must change to make innovation a real priority, and this means, among other things, that innovation must be valued in professional careers, teamwork, usefulness for society...
- It is necessary to work on innovation in a collaborative manner, favouring the joint design of innovation projects by research professionals and teaching staff, the government, companies and society through participatory processes like the one being carried out to prepare the Catalan Agreement on the Knowledge Society.
- Young research staff must be attracted to ensure the very survival of universities and also to recognise and train talent and build loyalty. A model similar to La Masia (FC Barcelona's youth academy) should be considered: train talent from the territory so they can become professionals that are already familiar with the country's idiosyncrasies ("home-grown talent").

### **2. Promote the use of technology by young people for academic purposes.**

- Young people are very comfortable with technology, although they generally use it for fun.
- This knowledge needs to be tapped for more educational purposes.
- Achieving this will require teaching staff to reinvent themselves, which could be done through training and the organisation of congresses and meetings.

### **3. Foster multidisciplinary research projects.**

- Policies to promote multidisciplinary fields have been mooted for some time, but the assessments carried out so far seem to have lambasted the concept rather than favour it.



#### **4. Create cross-cutting research areas.**

- It is necessary to create mechanisms that facilitate encounters and interactions between different disciplines, which may generate new value chains.

#### **5. Create an instrument to externally absorb additional labour costs associated with the stabilisation of research teams.**

- Competitive funding (which is temporary) and labour legislation seem to be at odds with each other. Research talent is generally hired through competitive projects, which are characterised by their temporary nature, but labour legislation forces us to make them permanent.
- This produces a contradictory situation in which open-ended hiring generates additional costs that research institutions find difficult to cover. These additional expenses are prone to completely decapitalising a research group.
- This could be resolved by creating an external instrument (like in the case of ICREA) to absorb the additional costs generated by permanent research staff (compensation, etc.).

#### **6. Include the financial contributions made by biomedical healthcare in research.**

- It is necessary to identify and quantify the economic value of the contributions to research made by biomedical healthcare.
- Legislation is necessary to ensure reinvestment in the healthcare area and increase investment in accordance with needs. Legislation favours investment in the field of the pharmaceutical industry and makes it very difficult (practically non-viable) to conduct academic clinical trials at hospitals. Legislation should protect academic clinical trials because they contribute basic knowledge. The example to follow in this sense is the Swiss model.
- One of the fields in which the loss of public investment has been most keenly felt is healthcare. Notwithstanding, it seems that there has not been a corresponding decrease in the development of knowledge. But it would be necessary to guarantee public investment if it were concluded that the contribution of knowledge made by this field is significant and has economic value.



## **7. Foster mechanisms to attract private funding for research.**

- All the measures to be implemented require sufficient funding, not just public but also private.
- It is necessary to facilitate mechanisms to attract private funding, from both companies and society.
- To do so, standardised, easy-access platforms could be provided to enable microsponsorship.
- One option is to organise special events to garner support for projects as a public dissemination strategy.
- It is necessary to establish agile processes and mechanisms to obtain long-term funding, such as royalties, and to establish or adapt regulations that facilitate them.

## **8. Prepare and approve the sponsorship law.**

- We depend to a great extent on traditional bank funding, which is reluctant to take risks. To foster venture capital investment it is essential to favour alternative means of funding.
- This could be achieved with a good sponsorship law. It has been mooted for many years but never developed.
- At the same time, a cultural change that favours microsponsorship is necessary. In Catalonia we have La Marató (telethon), which works and is essential. This culture needs to be fostered.

# Annex C

## The Advisory Board's reflections and proposals

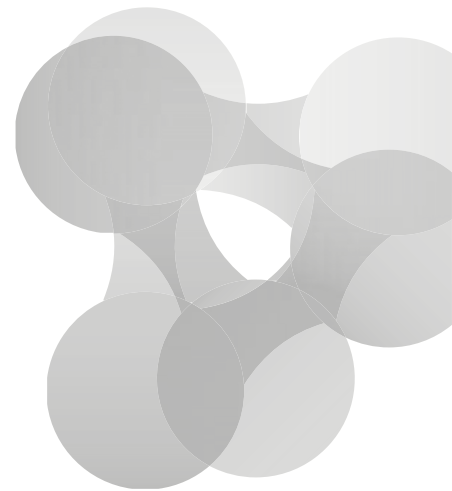


## The Advisory Board's reflections and proposals

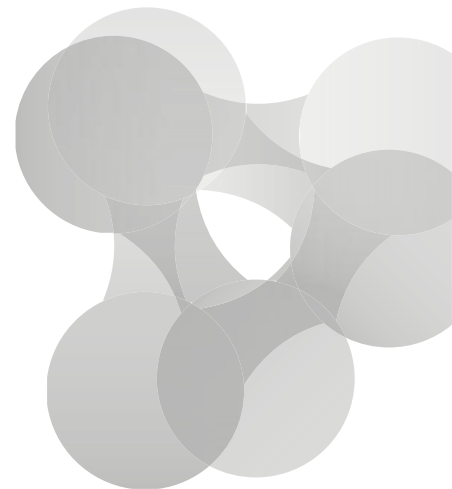
**A total of 138 reflections, contributions and suggestions have been made by the Advisory Board**, the majority of which have been identified as suitable for integration into the text of the final document of the PN@SC as an addition or, in some cases, as amendments or improvements to the drafting of the final proposals.

Of these 138, **after the third meeting of the Permanent Board, 15 contributions are not directly identifiable in the text or in the accords of the PN@SC** basically due to competencies and financial viability. Notwithstanding, the Permanent Board has approved the 15 proposals and they have been **incorporated as additional proposals to be developed in possible future policies implemented by the PN@SC**. They are to be added to the accords made by the seven Working Groups:

1. Make progress in the **creation of modern and international structures on the scale of the public university system** that focus on relating knowledge creation with innovation, such as ISIS Innovation (Oxford University).
2. Generate, beyond establishing new “bases of the funding model of Catalonia’s public universities”, **funding with a more predictable distribution model that incentivises technology transfer and the generation of employment**, given that they are clear multipliers of the value contributed to society by universities that need to be strengthened.
3. Foster a more decisive policy in areas such as **support for technology platforms, clinical trials and location in innovation environments** (public research – companies – technology facilities), **such as science parks**.
4. Make better use of the **RIS3CAT strategy**, which was introduced as a key element to align Catalonia’s strategy on innovation and competitiveness with the EU’s Smart Specialisation Strategy.

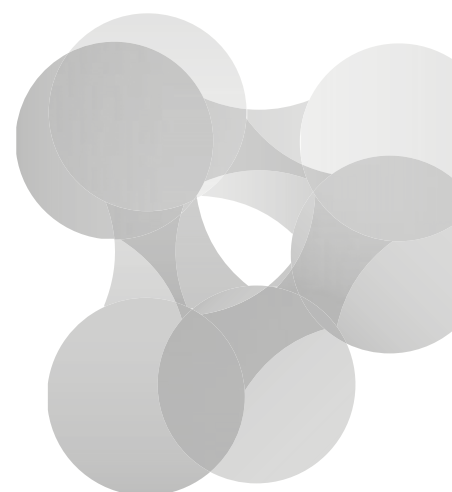


5. **Foster strategic planning actions that combine research and innovation in new cross-cutting technological areas** that will in the very near future change the industrial and social panorama of Catalonia, such as digitisation, big data, automation and robotics, and artificial intelligence. These plans should be coordinated with higher education and urgent action should be taken to update skills and courses of study.
6. **Foster the economic development of the territory through research and transfer**, in addition to the promotion of innovation instruments. Universities and research centres should prioritise the application of their knowledge and technology to the improvement of the production fabric, making a special commitment to SMEs and the early stages of spin-off companies and start-ups.
7. Insist on the **need to train specialists in the field of knowledge transfer and innovation**, with a component of international mobility and experience in the economic world.
8. Include more **innovation criteria in official training activity and promote an entrepreneurial culture**. To achieve this it is necessary to balance the acquisition of knowledge with new skills that encourage innovation and entrepreneurship. The objective of training institutions should be to identify talent and the objective of governments should be to create opportunities for young talent.
9. Transform knowledge regions into **modern industry 4.0 areas** around Catalonia's industrial and innovation estates associated with the activities of campuses (university or non-university), research centres and environments, major knowledge infrastructures, and technology centres.
10. Take advantage of the **business world's commitment to climate change** through the media and official information campaigns with actions that reward companies with social recognition if they increase business R&D and public-private coordination.





11. Promote, in the priority sectoral areas, **actions to attract innovative and entrepreneurial talent**. Foster the presence of international start-ups in regional ecosystems and science and technology parks, among others. Establish a foreign action programme that promotes these sectorally powerful innovative environments in Catalonia with a view to attracting companies and initiatives.
12. Ensure that the Government of Catalonia, through the PN@SC, **takes action on internationalisation, based on a network of European sectoral innovation ecosystems**. This network would be a sectoral collaboration area on the European scale and would facilitate the mobility and interaction of persons, projects and companies (including spin-offs and start-ups) and backers within this area.
13. Place more emphasis on innovation in **intangible actions like investments in organisational change**, new business models, and new work skills for the digital world (processes, organisational structures, legal frameworks, risk management and business models).
14. Identify and define the various **innovation models and make special reference to disruptions that promote innovations that are key to the economic future** of Catalonia, especially those based on the Internet of things, big data, robotics and automation, and artificial intelligence.
15. **Make red tape and bureaucracy more flexible and remove the compensation limits in place for** scientists and academics who participate in technology or innovation companies (spin-offs and start-ups). Contribute communication actions to the social and institutional recognition of activities designed to bring knowledge to the market, addressing social and economic challenges.



# Annex D

## Financial report of the PN@SC





## Impact

The deployment of the accords and measures included in the Catalan Agreement on the Knowledge Society (PN@SC) will have a powerful impact on knowledge transfer and innovation in the production fabric, transforming the Catalan economy and improving its competitiveness indicators due to an increase in knowledge-based activity.

This impact is divided into a direct component and an indirect component. The direct component can be annually quantified, during the first five years of the PN@SC's validity, as more than 2% of Catalan GDP in the form of R&D&I spending and an annual public funding level of 0.6% of GDP for higher education, of which only 40% (Frascati Manual) is counted as R&D. This means that in 2024, with a projected annual growth in GDP of 2% (Catalan GDP estimated for 2024: €250 bn), the measures and actions contained in this Agreement will have a direct impact on 2.12% of Catalan GDP (more than €5 bn) and on the almost €1 bn of university funding that is not counted as R&D. Of this direct impact of more than €6 bn, almost €1 bn would correspond to the R&D investment made by the Government of Catalonia, which would increase to €1.8 bn with the inclusion of university funding (due to the part not counted as R&D). That is, a return of more than €3.5 per euro invested.

In terms of employment, this investment is expected to increase the number of R&D researchers and staff per million inhabitants by 25% (almost 7,000 more researchers in the direct employment system), the proportion of which has an indirect and knock-on effect on employment of between 2 (ACUP impact estimation) and 7 (ICREA impact estimation) researchers. The resultant additional hiring of 7,000 to 40,000 people working in R&D, representing more than 1% of total employment in Catalonia, must also be taken into account.

And, moreover, there is a component that indirectly impacts the economic system, which will substantially increase the knowledge-based employment and production rates to the values of Europe's most advanced economies. It is calculated that knowledge intensity as gross added value could account for 70 to 80% of the total. This means a variation of almost 15% of GDP towards activities based on or incorporating knowledge as the base of their added value. That is, more than €37 bn of annual production that would incorporate knowledge as the basis of its economic competitiveness.



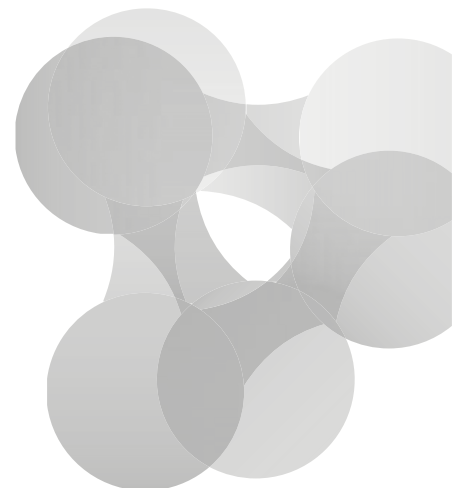
## Additional budgetary increase

In 2024 the PN@SC's commitments to increased spending or higher budgetary allocations would approach 1% of Catalan GDP, taking into account all the public administrations and the private sector.

Accordingly, the public sector's additional contribution is expected to amount to €600 m, distributed as follows:

- A €545 m increase in public spending on R&D, of which a maximum of 50% would be met by the Government of Catalonia. The Spanish State will have to increase its spending on R&D in Catalonia or transfer competencies and resources amounting to at least €220 m (ideally €300 m, to reach the percentage of public spending on R&D in Catalonia that the State funded before the crisis). This increase will be distributed as follows:
  - €240 m for baseline activity and investment in higher education
  - €180 m for university research
  - €125 m for non-university research
- €60 m for private innovation and R&D, which will have to be distributed among the various public administrations and will strengthen EURECAT and other institutions that actively work to transfer knowledge in Catalonia and Catalan public investment in companies to foster innovation. Here it is necessary to add any additional resources that may be allocated from other national agreements, such as the National Agreement on Industry, which impact policies that foster an increase in the application of knowledge to the production fabric and society in general.

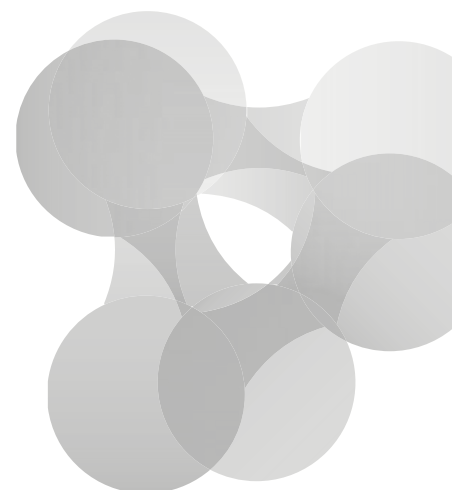
These figures are expected to be increases of at least €1 bn and €170 m, respectively, in 2030, and the State would have to contribute or transfer an amount of resources similar to the efforts made by the Government of Catalonia.



Specifically, these spending commitments are contained in the following accords of the PN@SC:

### Working Group 1

- Foster an increase in the number of researchers to an average close to that of the leading European countries and the highest values of the Spanish autonomous communities. In five years (2024) **achieve an increase of 900 researchers per million inhabitants to reach 4,750 researchers per million inhabitants** (2024 IMPACT OF ALMOST €300 m).
- Achieve a total R&D spending level of 2.12% of GDP in five years (with an increase in public spending of 0.58 to 0.75%, and with policies and measures to foster private R&D spending and significantly increase it from 0.94 to 1.37%) (2030 IMPACT OF MORE THAN €2.5 bn).
- Foster and consolidate the growth of EURECAT as a Catalan technology centre so its relative dimensions and impact are similar to those of the world's leading technology centres. **By 2024, this dimension should be close to €100 m in revenue.** In the long-term, this dimension should double. To achieve this it is essential to consolidate its funding model, with baseline public contributions accounting for a third of this revenue (2030 IMPACT OF €180 m).
- Increase public business R&D investment (in accordance with the objective of increasing business innovation projects in collaboration with other agents of the system set by working group 5) for baseline support of EURECAT, transfer via the TECNIO network, the co-funding of R&D projects, systemic innovation programmes, technological entrepreneurship, open innovation, tax incentives and other ACCIÓ programmes, **to 0.10% of GDP** (when public spending on Catalan R&D is 1% of GDP, with a time frame ending in 2030). Achieving this would require the allocation of at least 10% of the R&D public spending increase for the next five years (2030 IMPACT OF €220 m).





## Working Group 2

- **Increase the number of researchers** predoctoral (FI) and post-doctoral (Beatriu de Pinós) as one of the bases for the increase in the number of researchers per million inhabitants. Most of this increase, however, should be achieved in the production fabric.
- **Strengthen the Industrial Doctorates Plan**, introducing improvements to increase the impact on the transfer of university talent to companies and other organisations, especially SMEs.
- Increase the number of ICREA Academia programme positions to reach 3% of permanent TRS (**50 new positions per year**) (2024 IMPACT OF €2 m).
- Expand the ICREA programme to **20 new positions per year** in five years so that it covers all areas of knowledge, placing special emphasis on social sciences and humanities and promoting gender equality (2024 IMPACT OF €2 m).

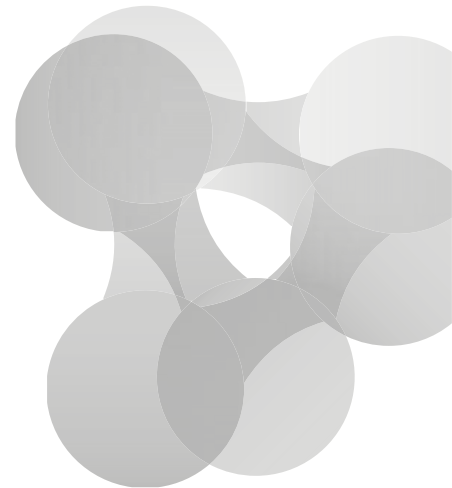
### Working Group 3

- Progressively and continuously increase public spending on R&D&I in Catalonia to 1% of GDP, while incentivising private investment, which should reach 2% of GDP in the same period. The aim is to reach 75% of this objective in five years (**a public investment level of 0.75% of GDP, 10% of which is allocated to supporting and fostering private investment**), equalling the current EU average. This increase, interpolated based on the data from 2017 and 2018, is specified in the following table (data in €m).

	Current	%	% GDP	Increase (5 years)	%	Annual increase	Total 2024	% GDP
Basic univ. activity	508			160		32	668	
Univ. R+D	352	56,9%		180	49,3%	36	532	
Univ. investments	20			80		16	100	
<b>TOTAL univ.</b>	880		<b>0,39%</b>	420		84	1.300	<b>0,58%</b>
R+D (SUR)	158	25,5%		90	24,7%	18	248	
R+D (other depts.)	58	9,4%		35	9,6%	7	93	
<b>TOTAL R+D (non-univ.)</b>	216						341	
Innovation/companies	51	8,2%	<b>0,02%</b>	60	16,4%	12	111	<b>0,05%</b>
<b>TOTAL R+D</b>	619	100%	<b>0,28%</b>	365	100%	73	984	<b>0,44%</b>

- Increase public spending in R&D to pursue assessable objectives and impacts. At least half of the **€365 m of R&D improvements** proposed over the next five years (0.15% of GDP estimated for 2024) should be met by the State with public funds from abroad and the rest by the Government of Catalonia.
- Progressively and continuously increase public investment in universities to 0.8% of GDP (80% of the level invested by EU countries similar to Catalonia) in 2030 (€1.6 bn). Seventy-five per cent of this objective, that is, a public investment level of **0.58% of GDP (€1.3 bn)**, should be achieved in five years.

- Increase public spending in universities, pursuing assessable objectives and impacts, distributed into three funding areas:
  - Imbue **basic university activity with financial sufficiency and stability**, including improvements in equity and fees (2024 IMPACT OF MORE THAN €1 bn).
  - Consolidate the baseline funding of research for all institutions. Public and private **university R&D should be increased by €180 m and non-university R&D by €125 m in five years.**
  - **Recover the capacity to invest in public infrastructure** through the University Investment Plan (2024 IMPACT OF €100 m).
- Improve the equity, in higher education in Catalonia, of fees and the grant system through the following actions:
  - Expand the fee reduction process to cover all income levels, keeping the reductions in the first quintile.
  - Review the grant and scholarship system, starting after compulsory education.
  - Study a set of measures that reorient young people's education and training options according to their skills and vocations rather their family's ability to pay.
  - **Transfer general grants.** Expand free studies to all students included in the first bracket (remove academic requirements) (2024 IMPACT OF ALMOST €150 m ACCORDING TO THE VALUATION OF THE TRANSFER).
  - **Double, in five years, the resources** allocated by Government of Catalonia dedicated to student grants (2024 IMPACT MAY BE AS MUCH AS €10 m).
  - Promote a **grant system** that goes beyond the grants included in the current general system, in line with those already in place at certain universities (2030 IMPACT MAY BE AS MUCH AS €40 m).
  - Establish a system to assess the impact of grants and scholarships, in such a way that mechanisms can be established to make corrections in their award, improving efficiency and effectiveness.



#### Working Group 4

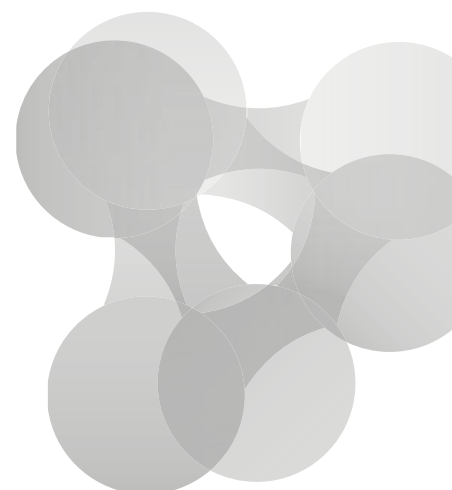
- Increase the number of researchers per million inhabitants in five years from the current total of **3,850 to 4,750** (2024).
- Achieve a total **R&D spending level of 2.12% of GDP** in five years (with an increase in public spending from 0.58 to 0.75%, and with policies and measures to foster private R&D spending and significantly increase it from 0.94 to 1.37%).

#### Working Group 5

- Invest in **innovative public procurement 3% of the Government of Catalonia's public procurement budget**, to develop a technological policy in a coordinated way, to create new solutions. Therefore, niche segments that adopt new technologies and are based on industrial and national challenges. To do so, Catalan innovation companies and technology agents must be prioritised to perfect globally applicable technologies, with special attention to SMEs and micro-enterprises (2030 IMPACT OF MORE THAN €10 m).
- Invest 0.1% of GDP in business innovation with a public contribution (from all public administrations), to be made in the future (with the Government of Catalonia contributing a maximum of 50% by 2030), of a **minimum of €220 m per annum as an incentive to mobilise private investment in R&D&I**.

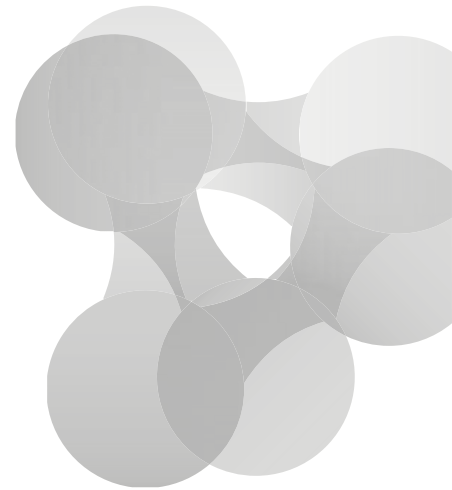
#### **This amount of €220 m in 2030 will be distributed as follows:**

- Promote R&D and business innovation within the framework of RIS3CAT 2021–2027 with public support for the execution of projects carried out in the environment of Catalan innovation ecosystems. The projects must meet the challenges of innovation in terms of technology, territory and value chains and be the driving force in priority areas (mobility, sustainability, industry 4.0, well-being, culture and creativity, etc.). The instruments supporting the projects must be efficient enough to guarantee the provision of resources to companies with an intensity that mobilises private investment, while ensuring flexibility in the administrative management of grants (2030 IMPACT OF €30 m).





- Foster a programme to support the creation and growth of companies based on knowledge and deep tech in collaboration with local agents, parks, incubators, accelerators and other agents. This must be in connection with international ecosystems supporting the scalability of companies (2030 IMPACT OF €25 m).
- Create agile financial instruments based on new mixed formulas to accelerate the growth of innovative companies with a high potential for growth included in the Government of Catalonia's register of innovative companies and scale-ups (2030 IMPACT OF €40 m).
- Establish public-private collaboration agreements to foster the creation of innovation hubs that facilitate contact between the supply and demand sides of technology, including technological testing infrastructures (2030 IMPACT OF €15 m).
- Create a technological transformation programme for Catalan companies, with an emphasis on SMEs and micro-enterprises, to knit a technologically advanced and sustainable business fabric and facilitate the systematisation of innovation, disruption and the adoption of new technologies (2030 IMPACT OF €15 m).
- Create an industrial and intellectual property (IP) stimulation office to coordinate actions, provide a training programme, revitalise intangible assets, and provide incentives for their protection and a fund to defend Catalan IP (2030 IMPACT OF €5 m).
- Consolidate EURECAT as a Catalan technology centre and foster its growth so it becomes big enough to meet the needs of the Catalan ecosystem, taking into account the characteristics of the micro-enterprise and SME system, and so it can be comparable to the leading technology centres (2024 IMPACT OF €60 m).
- Consolidate programmes to highlight technology and knowledge and transfer them to public agents, with a special emphasis on SMEs (2030 IMPACT €20 m):
  - Incentives for knowledge appreciation and transfer projects in various stages of maturity.
  - Support for the knowledge appreciation and transfer units of the various knowledge agents.







- Reinforce programmes designed to promote the incorporation of talent into companies and the creation of jobs that take into account scientific and technical profiles and new basic and advanced digital skills. Also include new professional profiles associated with innovation and the development of new businesses brought about by new technologies (2030 IMPACT OF €10 m).

### Working Group 6

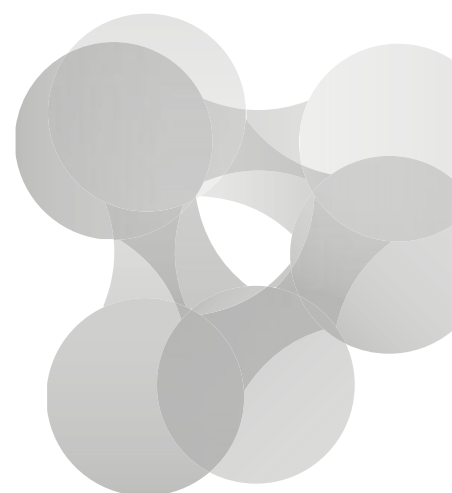
- Foster a Catalan open science strategy that covers (2030 IMPACT OF ALMOST €50 m: 3% OF THE €1.6 bn ESTIMATED TO BE ALLOCATED BY THE EU TO SINGLE DATA AREA POLICIES IN PROPORTION TO THE WEIGHT OF CATALONIA IN EU COMPETITIVE RESEARCH FUNDS):

- Open access to scientific publications.
- The publication of FAIR (findable, accessible, interoperable and reusable) scientific data.
- **The creation of new infrastructures** to integrate the resources of the Catalan research system into the European ecosystem of the European Open Science Cloud (EOSC).
- Responsible research and innovation policies. Increase the value of scientific culture as an essential tool to form a responsible and critical society and strengthen ad hoc training in this respect.

### Working Group 7

- Provide them with **part of the resources that Catalonia already allocates to development policies based on R&D&I (15%)** (NO 2024 IMPACT IN TERMS OF ADDITIONAL RESOURCES. 2030 IMPACT: €30 m FROM THE ERDF FUNDS ALLOCATED TO RIS3. 15% OF THE ANNUAL ERDF AVERAGE ALLOCATED DIRECTLY TO CATALONIA AND FOR THE SPANISH ERDF PLURI-REGIONAL OPERATIVE PROGRAMME).

All these and other measures and actions proposed by the PN@SC to increase the effectiveness and efficiency of innovation and knowledge policies are expected to result, in the period from 2020 to 2024, in growth in private spending on R&D to the amount of 0.5% of GDP: €1.2 bn. In 2030 this increase should reach as much as €2.5 bn.



## Monitoring spending

The monitoring of the actions and indicators defined in the PN@SC requires annual verification and validation of their status of compliance. This work, in addition to compiling and preparing the corresponding data, represents the verification of the actions carried out for each proposal of the Catalan Agreement on the Knowledge Society, as well as additional reports. It is therefore necessary to create mechanisms and implement instruments to monitor the accords, which will inevitably require additional resources within the Secretariat of Universities and Research, which is the body responsible for monitoring the accords of the PN@SC. This additional support should include a promotion and monitoring unit to conduct technical studies that compile data on the resulting impacts (research and innovation), as well as international comparisons with knowledge policies for which the Government of Catalonia does not compile data, among other efforts.

**Estimated budget to be allocated: €100,000/year.**

Additionally, an observatory is planned to be created for the Catalan Agreement on the Knowledge Society. Its structure will attract researchers and research into knowledge activity and its impact, moreover, will promote and defend the competitiveness indicators and values of a knowledge-based society. Its actions should include annual competitive grants for knowledge agents to foster and reward knowledge transfer, the open dissemination of knowledge and innovation, knowledge-based activity and the incorporation of talent into the production fabric.

**Estimated budget to be allocated: €400,000/year.**



# Annex E

Framework of rights  
and obligations  
of the Catalan  
university system

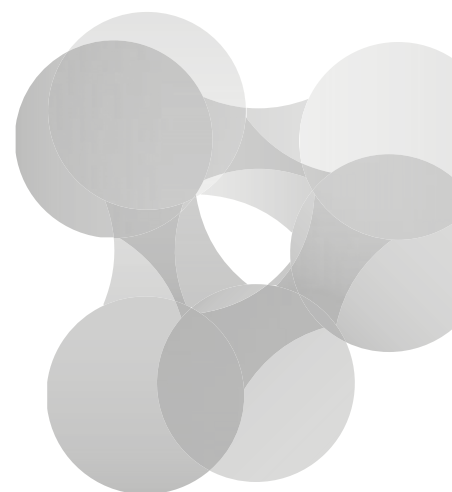
## Framework of rights and obligations of the Catalan university system

The PN@SC proposes explicit improvements to the Catalan university system in the accords proposed by working groups 1, 2, 3, 4 and 5. Some of these accords also affect or involve governance elements, but the document explicitly avoids possible reforms of the governance system and, eventually, reforming the current law governing Catalan universities (LUC, 1/2003), given that it considers that this question should be mooted only after the Spanish State's approval of a new law on universities, upon which any amendments to the LUC would to a great degree ultimately depend.

The PN@SC advocates the development of the Catalan Science Act (LCC), which deploys article 158 of the Statute of Autonomy of Catalonia and will establish the bases for consolidating a common public research strategy policy. The drafting of a Catalan Science Act will identify the agents of the system and establish its mission, organisation and public responsibility. It will also improve mobility, cooperation and scientific exchanges between the research and management staff of the various R&D&I agents and will foster the transfer, innovation, internationalisation and growth of the private funding or co-funding of research through sponsorship or collaboration. Accordingly, it is a law whose overall aim is to foment and promote scientific activity and its relationship with the production fabric in order to facilitate opportunities. The LCC will decisively strengthen universities, to the extent that it will foster their scientific specialisation, identify their departments as one of the foundations of the country's research and allow universities to be endowed with funds to establish long-term strategies.

Therefore, in accordance with the proposals of the PN@SC, the framework of rights and obligations of the Catalan university system is currently made up of the following legislation:

- Organic Law on Universities and its 2007 amendment:
  - Organic Law on Universities (LOU). Law 6/2001, of 21 December, on universities (BOE of 24 December 2001), amended by Organic Law 4/2007, of 12 April (BOE of 13 April 2007). Organic law amending the Organic Law on Universities (LOMLOU) of 2007.



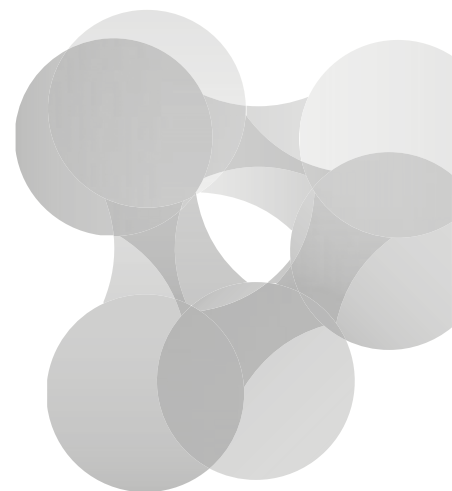


- Law on Universities of Catalonia (LEC). Law 1/2003, of 19 February, on universities of Catalonia.
- Law 14/2011, of 1 June, on science, technology and innovation.

A number of decrees that frame the work of universities also have an effect, including:

- Royal Decree 898/1985, of 30 April, on the university teaching staff system.
- Royal Decree 1393/2007, of 29 October, establishing the organisation of official university teaching, and Royal Decree 43/2015, of 2 February (BOE), amending Royal Decree 1393/2007, of 29 October, which establishes the organisation of official university teaching.
- Royal decree 99/2011, of 28 January, which regulates official doctorate teaching.
- Royal Decree 103/2019, of 1 March, approving the statute of predoctoral trainee research staff.
- Decree of 8 September 1954, approving the regulation of academic discipline of official higher and technical teaching centres that depend on the national Ministry of Education.
- Law 12/2009, of 10 July, on education of Catalonia (LEC).

The Catalan Science Act (LCC) will soon be added to these laws.





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