InnoHEIs
Interreg Europe

European Union
European Regional
Development Fund

UAB
Universitat Autònoma
de Barcelona

Overview of instruments in support of HEIs infrastructure

Catalonia

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Contents

Introduction

This document summarises the key strategies and instruments currently available in Catalonia for activities related to research and innovation, with attention to those that involve HEIs infrastructure.

The document has the following objective:

- Review and update, where appropriate, of the public policy instrument through an analysis of public and private instruments to support RDTI infrastructures in Catalonia, looking at the Catalan, state, and European Union level.

The aim of this overview is to set the scene to identify potential instruments to address with the action plan of the project INNOHEIs. The task is not easy. The policy landscape has evolved significantly due to the pandemic, with new funds available across Spain and Catalonia. At the same time, however, the ERDF Operational Plan -which has typically been the objective of Interreg Europe Action Plans- has not been defined or approved, making the task difficult.

This overview is structured as follows:

Section **1** and **2** review the strategic landscape in Catalonia, looking at the EU and at the regional level. In this way, it gives us an indication of where the implementing instruments will be going in the future.

Section **3**, **4, 5 and 6** are more empirical in nature and look at recent and current calls.

Specifically:

Section 1 reviews the key strategic instruments at the EU level, namely:

- the EU Green Deal,
- the Agenda 2030,
- The EU Digital strategy
- the EU New Industrial Strategy.

Following that, it zooms into specific calls, within the above umbrellas that are focussed on university infrastructure, notably from the H2020 project.

Section 2 will review the following Catalan strategies to address global challenges:

- L'Agenda 2030: Transformar Catalunya, millorar el món.
- Pla estratègic de Recerca, Innovació i Transferència agroalimentària de Catalunya 2021-2030 (PRITAC2030).
- Pacte Nacional per la Indústria.
- Pacte Nacional per la societat del coneixement.

Section 3

Section 3 reviews the key characteristics of the Post-Covid recovery plans, namely the Next Generation EU, which is articulated in two streams React-Eu and the Resilience and Transformation Mechanism.

The session reviews the strategic instruments:

- El Plan de Recuperación Transformación y Resiliencia
- Next Generation Catalonia

Section 4 sums up the key instruments from the RIS3CAT 14-20. The section will analyse whether attention is put on the role of HEIs and the key learnings therein.

It will focus in particular on the calls:

- RDTI Infrastructure
- Knowledge industry (Indústria del coneixement)
- The RIS3CAT Communities
- PECTS (projects for territorial specialisation and competitiveness)
- Knowledge transfer (Transferència de coneixement)
- Industrial Doctorates

Section 5 reviews a set of instruments of key policy actors involved in RDTI activities, namely:

- Departament Universitat i Recerca, the regional ministry of university and research
- Acció, the Innovation Agency of Catalonia
- Departament d'Empresa i Treball, the regional ministry of business and employment
- Departament d'Acció Climàtica, Alimentació i Agenda Rural

Section 6 reviews the calls from state level actors, namely the Ministry of Science and Innovation.

Section 7 concludes with some reflections for the next steps of the INNOHEIS project.

Section 1: Strategic documents at the EU level

Section 1 reviews the key EU strategic documents and explores to what extent they are directly or indirectly linked to HEIs infrastructure.

The Agenda 2030

The 2030 Agenda for Sustainable Development was launched by a UN Summit in New York on 25-27 September 2015 and is aimed at ending poverty in all its forms. The UN 2030 Agenda envisages “a world of universal respect for human rights and human dignity, the rule of law, justice, equality and non-discrimination.

The SDGs are a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. They are articulated in 17 specific goals, each of them accompanied by a set of targets. The European Union, as well as the Spanish government and the Catalan government are fully committed to achieving the Sustainable Development Goals

The Agenda 2030 sets the background for key policy actions across EU countries and territories. As such it is not directly linked to any specific funding instruments and, within the INNOHEIS work, needs to be seen simply as an umbrella strategy.

All the strategies reviewed in this document are de facto aligned to SDGs and the Agenda 2030.

The EU Green Deal

The EU Green Deal is a set of policy initiatives with the overarching aim of becoming the world's first “climate-neutral bloc” by 2050. The aim of the Green deal is to address the effective implementation of the Paris Agreement and the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda.

As such the Green Deal embraces many different sectors, including construction, biodiversity, energy, transport and food. It also leans on the Horizon Europe Programme, to play a pivotal role in leveraging national public and private investments. Through partnerships with industry and member States, it aims to support RTDI (Research Technological Development and Innovation) on transport technologies, including batteries, clean hydrogen, low-carbon steel making, circular bio-based sectors and the built environment.

Relevance for INNOHEIS

The EU Green Deal is a strategic document, as such it sets the background against which many EU instruments will need to be developed.

The programme Horizon Europe needs to be aligned to the Green Deal. Therefore, for the purpose of INNOHEIS it is useful to reflect on the implications of the Green Deal on Horizon Europe, as we do in the next section.

Horizon Europe and university infrastructure

The Horizon Europe Infrastructure Pillar provides funds to strengthen European research infrastructure. More specifically, according to the Horizon Europe Website (verbatim):

The overall objective of the Research Infrastructures Programme under Horizon Europe is to empower Europe through world-class and accessible research infrastructures, as part of an integrated European research and technology infrastructures landscape.

The Research Infrastructures work programme under Horizon Europe will address the global environmental, social and economic challenges, based on the fact that, to cope with new challenges and ensure leadership of Europe in frontier research, research and innovation need to be maintained at the forefront of science and technological developments.

The Research Infrastructures work programme will support the development of innovative cutting-edge scientific instrumentation, software and methods. These developments, carried out in cooperation and co-creation with industry, will advance the industrial technological level in Europe and lead to breakthrough technological and societal innovation. Training for RI users, as well as strengthening the RI scientific, technical and managerial competencies of staff, will underpin all the activities implemented under the Research Infrastructures work programme, thus contributing to the education and employment opportunities of the next generation of researchers, technologists and high level science managers.

The Research Infrastructures work programme is structured around the following five destinations:

Box 1: The Research Infrastructure Programme in H2020

- INFRADEV - Developing, consolidating and optimising the European research infrastructures landscape, maintaining global leadership, to contribute to a strong, excellent and impactful European Research Area, by reinforcing RI capacities in Europe, their role at the global level and the policy-making in this field;
- INFRAEOSC: Enabling an operational, open and FAIR EOSC ecosystem, aiming at delivering a "Web of FAIR Data and Services" for Science: a trusted virtual environment supporting Open Science, based on key horizontal core functions, with their corresponding e-infrastructures, and service layers accessible to researchers across disciplines throughout Europe;
- INFRASERV: RI services to support health research, accelerate the green and digital transformation, and advance frontier knowledge, with a focus on the provision of integrated RI services to enable R&I addressing major societal challenges, notably in health, in support of the green and digital transformation and ensuring resilience to crises as well as to support curiosity-driven research and advancement of frontier knowledge in broad scientific domains;
- INFRATECH: Next generation of scientific instrumentation, tools and methods and advanced digital solutions, to enable new discoveries and keep Europe's RIs at the highest level of excellence, while paving the way to innovative solutions to societal challenges and new industrial applications, products and services;
- INFRANET - Network connectivity in Research and Education – Enabling collaboration without boundaries, providing high-bandwidth networks and network services to interconnect researchers, data and computing resources in a non-discriminatory way regardless of the location of the users and the resources to allow scientists to conduct excellent research.

Source: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-3-research-infrastructures_horizon-2021-2022_en.pdf

Reflections

The INNOHEIS Action Plan cannot influence Horizon Europe, nevertheless it is useful to be aware of what the latter funds, as significant attention is placed on

synergies between HE and regional funds. Moreover, it may be important to reflect on the skills and capacities of Catalan actors required to access those funds. The latter may be a point of leverage for the INNOHEIS Action Plan.

The EU New Industrial Strategy[1]

In March 2020 the Commission presented a new strategy to help Europe's industry lead the twin transitions towards climate neutrality and digital leadership. The strategy aims to drive Europe's competitiveness and its strategic autonomy at a time of moving geopolitical plates and increasing global competition.

Europe needs industry to become greener, more circular and more digital while remaining competitive on the global stage. These three drivers will transform our industry, support our SMEs and keep Europe sustainable and competitive

This strategy lays the foundations for an industrial policy that will support the twin transitions, make EU industry more competitive globally and enhance Europe's strategic autonomy.
Innovation, cooperation and dialogue with social partners and civil society are essential to the strategy which centres around the following points:

- Industrial alliances
- Cluster policy
- Energy-intensive industries
- Supporting clean hydrogen
- Skills for industry
- Advanced technologies
- Innovation
- Interregional partnerships
- Industrial policy dialogue and expert advice
- Intellectual property

The strategy was updated in 2021 with reflections and actions on the efficiency of the single market.

Reflections

The strategy, in itself, is strongly oriented to innovation in the private sector, in particular SMEs. As such is of limited direct relevance for INNOHEIS. However, the strategy highlights that, within the European context, university infrastructure needs to be interpreted as an element of a broader ecosystem.

[1] For more information consult this document.
https://ec.europa.eu/info/sites/default/files/communication-industrial-strategy-update-2020_en.pdf

The EU Digital strategy: EU Digital's decade and the Digital Europe Programme[2]

Digital technology is changing people's lives. The EU's digital strategy aims to make this transformation work for people and businesses, while helping to achieve its target of a climate-neutral Europe by 2050. The Commission is determined to make this Europe's "Digital Decade".

The Digital Europe Programme (DIGITAL) is a new EU funding programme focused on bringing digital technology to businesses, citizens and public administrations. The strategy is articulated in the following pillars.

- Digital citizenship: rights and principles for Europeans
- The Path to the Digital Decade
- Multi-country projects
- International partnerships for the Digital Decade

The Digital Europe Programme will provide strategic funding in five key capacity areas: in supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring a wide use of digital technologies across the economy and society, including through Digital Innovation Hubs. With a planned overall budget of €7.5 billion (in current prices), it aims to accelerate the economic recovery and shape the digital transformation of Europe's society and economy, bringing benefits to everyone, but in particular to small and medium-sized enterprises.

Relevance for INNOHEIS

The EU Digital Decade strategy does not specifically address universities infrastructure as such. However, the Multi-Country projects may be of relevance. Multi-country projects are large-scale projects that can contribute to achieving the digital decade targets. They will allow Member States to come together and pool resources to build digital capacities that they would not be able to develop on their own.

In the review we have identified one forthcoming call that is of relevance to INNOHEIS, namely:

2.3.2.2 Testing and Experimentation Facility for Health:

Activities supported by this scheme will cover the demonstration, testing and validation in real-life application environment, possibly with real patients, but also ethical and data protection reviews, certification, market analysis, IP protection, incubation and business development, as well as the contribution to the regulation and standardization effort, when relevant. The infrastructure established within this facility will include both the hardware (e.g. robots, high-performance computers, 3D printing, IoT) and the software, including trusted

[2]For more information see: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0118&from=en

and secured access to data, necessary to provide the different services. Links to the data space for health should be established, when necessary

Section 2 The strategic context in Catalonia

The 2030 Agenda: Transforming Catalonia, Improving the World.

This agenda translates the UN SDGs in the Catalan context, with the aim of supporting government departments in taking them into account in their own plans.

The document contains a chapter for each of the first 16 SDGs. Each chapter contains a short discussion of the Goal in an international and European context, followed by a brief diagnosis of each target, identifying the challenges it poses for Catalonia.

The report does not address specifically HEIs infrastructure, however, it highlights across different SDGs the crucial role of research for development in fields such as agrifood, fisheries, health, sustainability. The Agenda 2030 should therefore be considered as a crucial background element for the INNOHEIS action plan.

National Pact for Industry[3].

The Pact is a programmatic agreement for planning the industrial development of Catalonia with a focus on long-term drive to boost industry productivity, transform the productive model so that it is sustainable and create quality employment. The pact focusses on internationalization and innovation as drivers of sustainable growth.

The pact does not explicitly address research infrastructure, however innovation is central to the strategy and universities are considered key partners in the process of industrial development.

The pact proposes a wide set of initiatives. Below we report a selection in which the role of universities' infrastructure appears relevant.

In the Area "competitiveness and industrial employment" the following actions appear as relevant:

- Action 1.3, "Generate knowledge about opportunities for competitiveness", includes developing a mapping of universities capacities and infrastructure, as part of a broader regional mapping process.
- Action 3.1 , "Reinforcing the innovation ecosystem", suggest reinforcing the accreditation of universities ready for technology transfer (i.e. the Tecnio accreditation explained below).
- Action 3.2, "Support industrial R&D", suggests reinforcing the implementation of incubators and accelerators based on the protected intellectual property of universities and R&D centers and Tecnio centers.

Moreover:

[3] For more information see here: http://empresa.gencat.cat/web/.content/actualitat/documents/arxius/Pacte_Nacional_Industria.pdf

- In the area related to Digitization and Industry 4.0 universities are involved in actions related drones and robotics as well as industry 4.0 infrastructure.
- In the area Energy and Infrastructure universities are also seen as critical partners in several actions directed to industry.

National Pact for the knowledge society.

The Pact 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. The pact wants to address the imbalance between knowledge generation and innovation capacity. The local scientific system is competitive at the international level yet, such excellence, is not matched when it comes to knowledge-based business innovation.

The Pact pays significant attention to research infrastructure and commits to develop a new classification and mapping of current infrastructure, as well as optimising the use of the existing infrastructures and foster their cooperation.

The pact acknowledges that Catalonia is home to major scientific facilities that are recognised as unique infrastructures and require unique public agreements and efforts. These infrastructures must be improved, **but above all their use and collaborative development must be incentivised and become economically sustainable.**

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.

Therefore the pact formally agrees to:

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

Sectoral plans

Strategic Plan for Research, Innovation and Agri-Food Transfer of Catalonia 2021-2030 (PRITAC2030).[4]

PRITAC 2030 is the main plan of the Government of the Generalitat de Catalunya aimed at increasing the competitiveness and sustainability of the agricultural, agri-food and forestry sector through RDTI.

[4] For more information see: https://participa.gencat.cat/processes/PRITAC?locale=es

The plan has a specific action focussed on scientific infrastructure. Namely, Action 23 covers “Strengthening key infrastructures” and is run by the DACC (The department for Climate Action, Food and Rural Agenda).

The Strategic Plan for Food in Catalonia (PEAC)[5]

The PEAC is organised across four dimensions:
1) Sustainable transformative and based on circular bioeconomy
2) Local and rooted in the territory
3) Fair equitable and cohesive
4) Healthy and trustworthy

Each of them is articulated in strategic objectives, strategic lines and initiatives. Furthermore, the plan foresees. Besides, the plan foresees:

- Transformative actions, aimed at transforming the current system across multiple dimensions.
- Specific actions, to be implemented in each dimension and
- Instrumental actions in communications, training, R&D and innovation.

Research and innovation are, unsurprisingly, central to the plan. Although no specific reference is made to research infrastructure, it appears useful to keep in mind the following elements:

- The transformative action 5 - FoodCat Research and Innovation Partnership
- The instrumental action on RDI and exponential technologies, which will be based on the use and capitalisation of research, innovation and knowledge and its transfer.
- Monitor dimension 1 and specifically the promotion of seven transformative projects based on research and innovation.

The Maritime Strategy of Catalonia (EMC)[6]

The scope of the EMC covers all activities that are related to Catalonia's maritime space, including economic sectors, leisure, culture and research as well as their economic social and environmental sustainability (it excludes the transportation of goods and passengers and the port and logistics). Research and innovation are central to the strategy and indeed the research sector is part of its governance. Each of the scopes is organised in strategic goals.

Below we report the strategic goals that may be of relevance to INNOHEIS per each scope of action:

Table 1 Scopes and strategic goals of relevance to INNOHEIS is EMC

Scope	Strategic goals

[5] http://agricultura.gencat.cat/web/.content/04-alimentacio/consell-catala-alimentacio/enllacos-documents/fitxers-binaris/strategic-food-plan-catalonia-2021-2026_executive-summary.pdf
[6] http://agricultura.gencat.cat/web/.content/08-pesca/politica-maritima/enllacos-documents/fitxers-binaris/ESTRATEGIA-MARITIMA-2030-Pla-2018-2021_EN.pdf

Sustainable, integrated and harmonious development of the blue economy that respects the human uses of the sea	Promotion of the structuring of a scientific network of excellence
An innovative governance framework to drive the strategy and guarantee its operability	Creation of the laboratory of sustainable maritime initiatives of Catalonia Design and implementation of an environmental variables monitoring network in the maritime scope, maximising the use of the available fixed and mobile infrastructure, re-launching of projects to re-sestablish historical series of data (e.g. XIOM network)

The Bioeconomy of Catalonia strategy 2021-2030[7]

The Bioeconomy Strategy of Catalonia 2021-2030 aims at promoting the production of biological resources and local and renewable processes. It focuses on the fields and activities of bioeconomy that are less developed and, therefore, need more institutional support

The strategy establishes 37 measures structured in 7 strategic objectives

1. Improve the use of biomass in Catalonia through characterization, quantification, management optimization and distribution
2. Develop a business fabric based on circular bioeconomy throughout the territory, paying special attention to the first sector
3. Promote the use and consumption of bioproducts, bioenergy and biomaterials in the market
4. Promote resilient agroforestry landscapes and the sustainable provision of ecosystem services in the context of Catalan circular bioeconomy
5. Position knowledge as a driving force for circular bioeconomy
6. Strengthen the role of the administration and adapt the regulatory and legal framework in a way that favours circular bioeconomy in Catalonia
7. Preparing Catalan society for the change towards circular bioeconomy

The value chains prioritized in the Strategy are:

1. Improvement of forest management and the use of forest resources.
2. Creation of resilient agroforestry landscapes and the sustainable provision of ecosystem services.
3. Valorisation of livestock waste and other organic waste (sewage sludge, FORM, etc.).
4. Valorisation of co-products and by-products of the food chain.

[7] https://web.gencat.cat/es/actualitat/detall/Estrategia-de-la-bioeconomia-de-Catalunya-2021-2030

The strategy, as such, has not yet developed or identified specific instruments. An operation plan for the next three years is currently being developed and its progress will be monitored throughout the definition of the Action Plan for INNOHEIS. In particular, it will be interesting to follow-up on the following proposal:

- The evaluation of scientific infrastructure in terms of its ability to support the circular economy.

Section 3 Instruments for Post-Covid recovery

State-level instruments: the Spanish National Plan for Recovery and Transformation

The Post-Covid recovery plan "Next Generation EU" is articulated in two streams:

- REACT-EU has been designed with a shorter-term perspective (2021-2022) to help them in the initial phase of relaunching their economies.
- The Recovery and Resilience Fund has a duration of six years, from 2021 to 2026. Its total size is €672.5 billion, of which €312.5 billion is grants and €360 billion are loans at subsidised rates.

To access the RFF member states need to submit a National Plan for Recovery and Transformation. In this session we will therefore review the Spanish "Plan de Recuperación Transformación y Resiliencia".

The Recovery Plan for Spain is organised in 10 pillars, the sixth of which is "The pact for science and innovation and the strengthening of the health system" and it is of relevance to INNOHEIS.

Pillar six stresses the role of science and innovation for society and the need to increase public investment in these fields. Among the various action of the pillar, the most relevant for INNOHEIS is action 17 "Institutional reform and capacity-building of the national science, technology and innovation system", which comprises both legislative and investment measures. Among such measures, the ones most directly related to scientific infrastructure are:

1. *C17. I1* ***Complementary Plans with Autonomous Communities.*** *Collaborations between the Autonomous Communities and the General State Administration in R&D&I actions, aligning priorities and establishing synergies in strategic areas.*
2. *C17. I2* ***Strengthening the capacities, infrastructures and equipment of SECTI agents.*** *Calls for grants will be reinforced to enhance the internationalization capacities of the science system, a critical factor for its success. The scientific and technical research equipment will also be renewed.*

The few recent or current calls of relevance to INNOHEIS are presented below under the relevant national or regional administrative actor.[8]

The regional instruments: Next Generation Catalonia[9]

Catalonia has published a strategy to position itself in relation to the national recovery plan.

The Next Generation Catalonia document presents **27 emblematic projects** that the Government of the Generalitat has identified as crucial, together with the collaboration of experts and economic and social agents of the country. The emblematic projects are initiatives that have the institutional support of the Government of the Generalitat, and that will be promoted so that they receive European funding.

None of the 27 project is specifically concerned with universities infrastructure, however, all of them have an innovation dimension and several of them specifically identify universities as key partners. The list below includes those strategic projects in which universities are listed as strategic partners.

Currently there are no calls from this instrument relevant to INNOHEIS.

Table 2 Projects in NEXT Generation Catalonia

	Project	Category
1	New model of care for dependent people	Equality and social cohesion
3	Health 2030	Health and education
4	Alternative protein	Agri-food sector
5	Training and digital talent	Lifelong learning
10	Battery hub	Sustainable mobility
12	Connected, intelligent and autonomous mobility	Sustainable mobility
14	Promotion of the natural environment and rural areas	Natural environment
15	New space economy	Digital infrastructures
16	Artificial intelligence hub and language technologies	Digital infrastructures
17	Intelligent cloud infrastructure	Transformation of administrations
19	Urban tech hubs	Innovation and entrepreneurship
20	Quantum computing and telecommunications	Research and innovation
21	Knowledge regions	Research and innovation

[8] There are some calls address to universities that offer opportunities for international mobility, as well as calls that are relevant for regions other than Catalonia. Another call currently open is addressed to Singular Scientific and Technical Infrastructure.

[9] http://economia.gencat.cat/web/.content/20_departament_gabinet_tecnic/arxius/pla-recuperacio-europa/next-generation-catalonia.pdf

22	Strengthening of the science, technology and innovation system	Research and innovation
23	European chip	Industrialisation
25	Digital and technological transformation of the industry	Industrialisation

Besides the 27 emblematic projects, the plan identifies **57 high level projects**. Below we report the ones that may of relevance to INNOHEIS

1. **Innovation Centre Naus Bosser – CS Parc Taulí – Sabadell**
   Remodelling of a facility (5000m2) for the development of innovation projects of the Parc Tauli Research and Innovation Institute (I3PT) in diagnostic imaging, artificial intelligence, connectivity, 3D printing, organoid production, as well as a facilitating environment for co-creation projects with companies, patients and citizens that reinforces the multidisciplinary approach to projects and enables progress in implementation of the health model 4.0. • Scope of action: Health and Education.
2. **Clinical Advanced Technologies Institute (CATI) – Hospital Clínic - Barcelona**
   Creation and consolidation of a centre dedicated to innovation in healthcare technology (robotics, sensory, (bio)3D printing, diagnostic imaging, AI. The activities of the project are aimed at generating technological and transferable knowledge, the link with the industrial sector of high health technology and the construction of stable relationships and collaborations to generate value and ensure the sustainability of the center. • Scope of action: Health and Education.
3. **NeuroHub: Translational Research Centre in Cognitive Neuroscience**
   Creation of a Translational Research Centre in Cognitive Neuroscience through the integration of advanced research technology units and a multidisciplinary, translational and socially focused projection. It wants to emphasize the training of new entrepreneurs and the attraction of both talent and companies and investors in the generation of knowledge and technologies that improve mental health and global well-being.
   Scope of action: Cross-disciplinary research and research.
5. **Creation of a new research and innovation complex, focused on biomedicine biodiversity and planetary well-being in the space of the old Fish Market**
   Development of the Campus of the Citadel of Knowledge from seven initiatives (BIST, CSIC, UPF, IBEC-IBMT, investment funds and two new research centers) complementary in order to attract new national and international institutions recognized internationally in the fields of health, biomedicine, biodiversity and planetary well-being, which will add to the existing critical mass to increase interinstitutional synergies and promote interdisciplinary initiatives. Scope of action: Infrastructures for a competitive territory

It needs to be stressed that currently it is unclear whether or how the Next Generation Catalonia will be implemented. The NGEU funds are being managed largely at the

national level. Hence the implementation of the strategy Next Generation Catalonia depends upon the extent to which the aforementioned projects can be embedded in national initiatives.

Section 4. Key instruments in the RIS3CAT [10]

In this section we review the key instruments of the RIS3CAT 2014-2020 of relevance to INNOHEIS.

RDTI Infrastructure

The most important instrument, for that purpose, is that of "RTDI Infrastructure", which was deployed in 4 calls.

Calls for large scientific and technological infrastructure:

The call had the following objectives:

- Increase the participation of agents of the RDTI system of Catalonia in horizon 2020 and ESFRI projects and international European networks.
- Increase the impact of RDTI infrastructures on the production fabric. The actions envisaged in this instrument are: - Actions to promote unique scientific and technological infrastructures, shared between the General State Administration and the Generalitat de Catalunya, which are currently three: the Alba Synchrotron - CELLS Consortium, the Barcelona Supercomputing Centre - National Supercomputing Centre (BSC - CNS) and the National Genome Analysis Centre (CNAG).

Call for unique RTDI infrastructure projects (2015):

This call offered grants for unique projects of construction, acquisition, habitation or substantial expansion of buildings for RDI infrastructures, which increase the capacity of researchers to participate in Horizon 2020 projects, ESFRI projects and European and international networks. Universities were the beneficiaries of 3 out of 14 funded projects.

Call for cooperative projects for the acquisition of scientific equipment (2015 and 2019):

The call offered grants for cooperative projects of RDTI institutions to create, build, acquire and improve scientific and technological platforms and equipment, with the aim of making shared use of them. Universities were the beneficiaries of 2 out of 8 for cooperative projects.

[10] This section builds heavily on the document "Informe de seguiment del Pla d'acció de la RIS3CAT 2015-2020 (2020) Col·lecció "Monitoratge de la RIS3CAT", número 11, juliol de 2020", available at: http://catalunya2020.gencat.cat/web/.content/00_catalunya2020/Documents/estrategies/fitxers/informe-seguiment-ris3cat-2020.pdf

Knowledge industry (Indústria del coneixement)

The Knowledge Industry Programme funds projects that favour the valorisation and transfer of research results developed by universities, research centres and technology centres.

The "seed" (Llavor) line of action focuses on the first phase of valorization (technological levels TRL 1-2). With these projects the first feasibility tests are carried out, the knowledge generated is protected and the proofs of concept and design of pre-prototype are planned. In this line of action 135 projects have been approved, with a total investment of 3.02 MEUR. These projects receive a funding of 1.68 MEUR from the ERDF. Universities account for 62% of the total investment, and research centres account for 33%.

The "product" (Producte) line of action focuses on the concept and prototype testing phase (technological levels TRL 3-4-5-6-7). These projects test the reliability and technological feasibility of the product or process through the design and construction of prototypes that allow the necessary tests to be carried out.

The projects of the "product" line of action add up to a total investment of more than 11 MEUR. The ERDF finances 44% of the investment, with 4.94 MEUR. Investment is mainly concentrated in research centres (57%), 41% corresponds to universities, and the remaining 2% to technology centres.

The RIS3CAT Communities

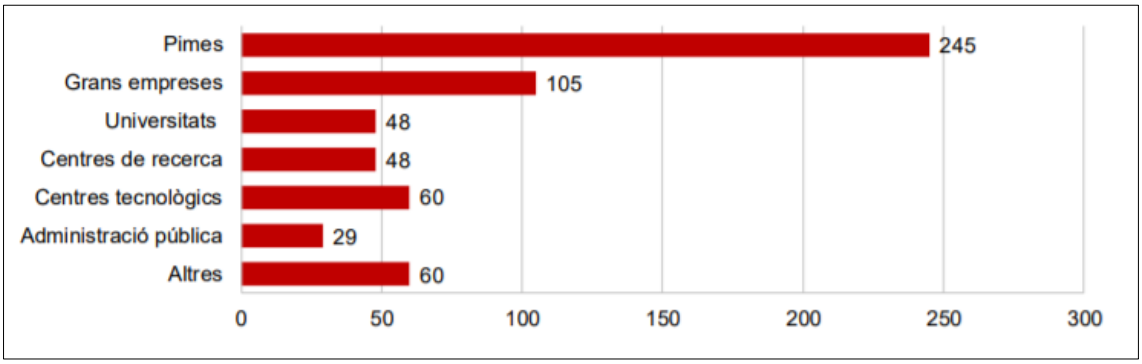
The RIS3CAT Communities are voluntary groups of companies and agents of the Catalan research and innovation system that promote RDTI projects in the leading sectoral areas of RIS3CAT.

The communities, made up of at least eight members, including companies and agents in the research and innovation system, present an R&D&I action plan for one of the leading sectoral areas of RIS3CAT's intelligent specialisation.

Incidentally, the role of Universities in RIS3CAT Communities has been analised by Marinelli et al. (2016) which identify a high degree of complexity in aligning the different incentives of different partners and pointed out to the relevance of the instruments in stimulating a culture of collaboration.

Universities received 8% of the RIS3CAT Communities funds, accounting for 48 out of 595 projects.

Graph 1 RIS3CAT instruments by beneficiaries.



Source: http://catalunya2020.gencat.cat/web/.content/00_catalunya2020/Documents/estrategies/fitxers/informe-seguiment-ris3cat-2020.pdf

Examples of RIS3CAT communities with universities' involvement follow in the box below.

Box 2 Examples of RIS3CAT Communities

Comunitat de tecnologies de la producció alimentària (COTPA)
The main objective of the community of agri-food production technologies coordinated by the University of Lleida is to contribute to the innovation of the agri-food sector to achieve a sustainable agri-food intensification that responds to the most important sectoral challenges. The community groups its projects into the three following basic axes:
- Advancing in technology, automation and technological integration
- Incorporating the circular economy into the sector's agenda
- Incorporating biotechnology as a resource for innovation

Within this community, the Universitat Autònoma de Barcelona will develop the project SMARTFARM Intelligent and profitable technification of Catalan farms.

Comunitat de solucions multidisciplinàries per als propers reptes de salut NextHealth

The community of multidisciplinary solutions for the next health challenges, coordinated by Biocat, wants to become a dynamic agent of an action plan with leading projects in Catalonia that promote a competitive and sustainable health system, promoting excellence in research, development and innovation, through the multidisciplinary participation of different actors in the sector, with the ultimate aim of responding to the current challenges that arise in the field of health. The main objective of this community is to develop innovation projects with a high economic and social impact (more economic activity and improvement of the quality of life and health of the citizen). This first level objective is specified in more specific objectives; the most outstanding are the following: - Solve the health challenges of citizens and improve the Catalan health system. - Improve the collaboration and competitiveness of the

participating entities. - Identify and promote new business opportunities or emerging activities. Within this community the University of Barcelona will implement the project ADVANCE.CAT an accelerator for the development of advanced therapies in Catalonia.

PECTS (projects for territorial specialisation and competitiveness)

The projects of specialization and territorial competitiveness (PECT) are initiatives that allow agents of a given territory and lead local public entities to promote actions for local transformation, responding to a strategy that has broad consensus among stakeholders.

Local entities, universities, technology and research centers, companies and other agents of the territory participate.

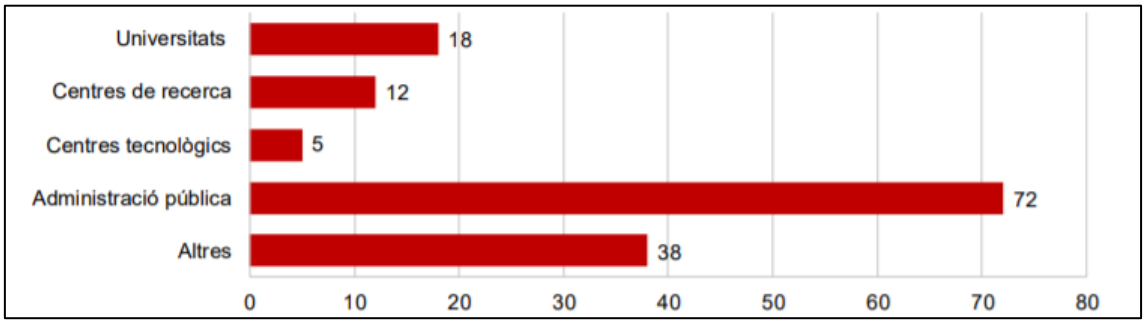
These actions can be activities of the following types:

- Support to research and innovation promoted by companies.
- Support for the creation and consolidation of innovative companies.
- Transfer and dissemination of knowledge.
- Development of entrepreneurship ecosystems.
- Development of ICT products and services.
- Promotion of energy efficiency and the use of renewable energies (both in SMEs and public infrastructures).

Promotion and dissemination of sectorial and intersectoral innovation structures in the territory, or protection, promotion and development of cultural and natural heritage, and improvement of the environment of training and knowledge.

The graph below indicates the number of projects received by type of stakeholders.

Graph 2 PECTS by beneficiaries



Below we identify some projects led by universities within PECTs, that are of relevance to the project INNOHEIS.

Box 3 Examples of University projects within PECTs

PECT: Vallès industrial: innovació i disseny de la indústria europea
Competitive intelligence observatory: Development and implementation of a platform and technological surveillance service.
Project Coordinator: Universitat Autonoma de Barcelona.
Companies will have a customizable tool that will allow them to automatically and regularly receive information on social and global trends in the field of industrial design and advanced manufacturing. The actions include the development of a technological surveillance platform, the creation of a database of companies and technological capabilities (knowledge map), the preparation of reports on technological surveillance and the awareness and provision of advice and training to companies. Autonomous University of Barcelona.
PECT: Health Care Innovation LAB Orbital 40
Project: CAREF, High performance center in photonic entrepreneurship
Project Coordinator: Universidad Politecnica de Catalunya
Creation of an incubator specialized in companies in the field of photonic science. The objective is to develop an innovative methodology to identify projects based on photonic technology and accompany them throughout the maturation process until they reach the market.
PECT: Litoral Besòs, territori sostenible
Project: Recerca per la sostenibilitat
Project Coordinator: Universidad Politecnica de Catalunya
The project focuses on the challenge of sustainability related to the use of water in the territory. The actions included are: the creation of a network focused on environmental quality on the Besòs coast, the design of a prototype for a system for measuring the quality of the water of the Besòs River and the development of solutions for the sustainable management of water resources (test intervention to improve the water ecosystem, that includes the sewerage system, surface waters, groundwater and beaches).
PECT: El bosc, el primer recurs de l'economia verda
Project Coordinator Universitat de Lleida
IMBIOFUST Creation of a lignocellulous biorefinery testing plant to separate the different fractions of chemical products present in forest biomass, currently a low value product with a local market. The objective is to transform the components of forest biomass into inputs for biorefineries and manufacture products of high added value for the advanced chemical industry, with a global market.

Knowledge transfer (Transferència de coneixement)

Through the knowledge transfer instrument, the Generalitat de Catalunya has provided financial support to actions that increase and optimize the processes of knowledge recovery, technology transfer and protection of the knowledge generated, as well as support and advice actions for the creation of companies and public-private collaboration.

The knowledge transfer instrument includes the following lines of action:

- grants for the recovery and knowledge transfer units of universities, which implement plans for the improvement and optimization of the instruments and

internal processes of valorisation and knowledge transfer of the universities of Catalonia. Universities received approximately 50% of the funds in this action.

- grants for R&D&I networks, that co-fund the creation of R&D&I networks made up of Catalan research centres that develop joint action programmes aimed at the valorisation and transfer of research results to the production sector. Universities received approximately 40% of the funds in this action.

Industrial Doctorates[11]

The Industrial Doctorates Plan aims to contribute to the competitiveness and internationalization of the Catalan industrial fabric, attract talent, and train doctors for companies within RDI projects.

The essential element of the industrial doctorate process is the strategic research project of the company where the doctoral student develops his research training in collaboration with a university, and which is the object of a doctoral thesis.

Through industrial doctorates, universities infrastructure can be used to support firms competitiveness. The call for industrial doctorates is issued in February, June and October of every year.

Technological Nuclei (Nuclis tecnològics)

The instrument "Technological Nuclei" allows companies to collaborate with agents of the RDTI system (including universities) in technological innovation projects. The instrument funds research and development projects, of high technological risk and with a strong capacity to generate externalities. Because of their risk profile, these projects could hardly be carried out exclusively with private capital. The instrument is coordinated and managed by ACCIÓ.

There are two types of Technological Nuclei: the local ones, in which Catalan companies partner with RDTI centres from Catalonia, and the international ones, in which Catalan companies collaborate with international partners.

Section 5. Instruments by Key policy actors in Catalonia[12]

Departament d'Universitats i Recerca: the regional ministry of university and research[13]

The department manages several instruments, which fall under the following category:

- Grants, scholarships and subsidies
- Prizes and contests

[11] https://doctoratsindustrials.gencat.cat/els-doctorats-industrials

[12] No instruments related to university were identified in the Departament d'Empresa i Treball (i.e. the regional ministry of business and employment).

[13] https://universitatsirecerca.gencat.cat/en/01_departament_recerca_i_universitats/recerca_i_universitats_de_catalunya/recerca/

- Selection and training processes
- Admission tests, pre-registration and registration processes

Several grants and prizes focus on innovation and tech-transfer, however, there is no specific attention to the valorisation of HEIs infrastructure in Catalonia. The department has recently also started, together with the Economic Department the **FITA funds**.

The Advanced Technology Investment Fund (FITA), with an estimated endowment of 60 million euros between 2022 and 2026, will invest in startup research projects in the early stage Its objective is to mobilize private capital in investment in technological development and contribute to improving the innovation index of Catalonia, one of the priority objectives of the National Pact for the Knowledge Society.

The recipients will be startups in initial stages of development, that is, in pre-seed, seed and commissioning stages of the different projects. The projects will be able to resort to the fund during the period 2022 and 2026, and it is estimated that the projects can be developed in a minimum of 10-12 years.

Acció, the Innovation Agency of Catalonia

ACCIÓ is the public agency for the competitiveness of Catalan enterprise, attached to the Ministry of Business and Employment of the Generalitat (Government) of Catalonia. It aims to promote the competitiveness and growth of the Catalan business fabric by promoting innovation, internationalization and by attracting investment.

ACCIÓ assists enterprise in the process of competitive differentiation and in the continuous search for new business opportunities. The agency guides Catalan companies so they can discover their environment and take advantage of the changes that take place in it, so they can strengthen those aspects that allow them to set themselves apart and position themselves in an advantageous position in the face of future global challenges.

All of its instruments are addressed to universities, however, some of them are of relevance to INNOHEIS in that they valorise universities infrastructure with the aim of supporting technology transfer. Examples of that are the **Tecnio Accreditation, the RIS3CAT Communities and the INNOTEC grants.**

TECNIO Accreditaton

In November 2021, All Catalan universities, the I-CERCA Foundation and the CSIC have formed a new association on Monday to promote technology transfer and connection with the business world through their TECNIO-sealed research groups and centres. The 'TECNIO Association' is formed by the 59 research groups that currently have the TECNIO accreditation granted by ACCIÓ, a seal that identifies technology developers in Catalonia to facilitate their connection with companies. The new association will have a grant of 300,000 euros from ACCIÓ in the next 3 years to strengthen the market vision of these agents and bring them closer to companies. The aim of this new entity is to group and make visible the activity of the research groups with the TECNIO seal, to promote their collaboration and to promote them as an instrument of connection with the business fabric and the administration.

The INNOTEC grants

The INNOTEC grant finances from 25 to 70% of R&D projects, between 50,000 and 200,000 euros, developed by companies established in Catalonia. These projects must be carried out in collaboration with university groups (or CSIC or CERCA centers) accredited by TECNIO.

Departament d'Acció Climàtica, Alimentació i Agenda Rural: regional ministry of climate action food and rural agenda[14]

The DACC includes several activities that are of relevance to INNOHEIS they fall under the PATT (Annual Technology Transfer Plan) and the PDR (Plan for Rural Development) and the Strategic Plan for Research, Innovation and Agri-Food Transfer of Catalonia 2013-2020.

PATT: the Annual Technology Transfer Plan[15]

The PATT includes actions in the field of research and research -so-called demonstration activities- and in the field of dissemination and transfer of technical and management knowledge -called specific activities.

The demonstration activities, more relevant to INNOHEIS, provide grants to support the technology transfer and knowledge management in the agri-food and forestry sector through:

- demonstration projects, testing fields, experimental plot networks, pilot exploitations and demonstration itineraries
- application of differential technologies
- validation and prototyping of technologies
- sectoral analysis projects.

Universities, as well as other actors accredited with the TECNIO seal, can benefit from these instruments.

PDR: Plan for Rural Development[16]

The PDR of Catalonia for the 2014-2020 has provided grants to carry out innovative projects by Operational Groups (grouping of entities, including producers, companies or industries in the agri-food or forestry sector, cooperatives, advisors, universities and research centers and other agents in the agri-food and rural sector), to solve a specific sectoral and/or territorial problem or to take advantage of an opportunity. These groups promote the dissemination of the results of these projects.

Plan for Research, Innovation and Agri-Food Transfer of Catalonia

The PRIAT had the following strategic instruments:

[14] http://agricultura.gencat.cat/en/inici
[15] http://agricultura.gencat.cat/ca/ambits/formacio-innovacio/dar_transferencia_tecnologica/dar_patt/
[16] http://agricultura.gencat.cat/ca/ambits/desenvolupament-rural/programa-desenvolupament-rural/

1. Promote the training and professionalization of R&D&I by promoting a culture of innovation
2. Facilitate knowledge and collaboration between agents of the agri-food R&D&I system
3. Increase the valorization of research results, technology transfer and knowledge dissemination in the agri-food sector of Catalonia
4. Increase the recruitment of resources for the R&D&I system of the agri-food sector in Catalonia
5. Increase investment in R&D&I in the agri-food production and business fabric
6. Increase the recognition and international relevance of the Agri-food R&D&I system in Catalonia

There is no evaluation document that enables to asses how the different instruments performed over the years.

Section 6. Instruments by key policy actors in Spain

Ministry of Science and Innovation – Plan Estatal de Investigación Científica y Técnica y de Innovación (PEICTI) 2021-2023[17]

The Plan is the main instrument of the Spanish State for the development and achievement of the objectives of the Spanish Strategy for Science and Technology and Innovation. It is articulated in four state programs that correspond to the general objectives established in the EECTI 2021-2027.

The programs are:

1. State program to face the priorities of our environment
2. State program to promote scientific and technical research and transference
3. State program to develop, attract and retain talent
4. State program to catalyze innovation and business leadership

Current or recent calls, in which universities are beneficiaries, of direct or indirect relevance to INNOHEIS include:

Singular technical and scientific infrastructure (part of NGEU)

These are investment lines associated with the construction, development, instrumentation, equipment and improvement of the Scientific-Technical capabilities of the ICTS.

Projects in public-private collaboration 2021

The call offers grants for public-private collaboration to support experimental development projects in cooperation between companies and research organizations (including universities), in order to promote the development of new

[17] https://www.ciencia.gob.es/site-web/Estrategias-y-Planes/Planes-y-programas/Plan-Estatal-de-Investigacion-Cientifica-y-Tecnica-y-de-Innovacion-PEICTI-2021-2023.html

technologies, the business application of new ideas and techniques, and contribute to the creation of new products and services.

Centers of Excellence "Severo Ochoa" and Units "María de Maeztu" 2021

The purpose of the call is twofold.

- The recognition of outstanding centers and units of excellence, which stand out for the impact and international relevance during the reference period.
- The financing of the strategic plans of the “Severo Ochoa” centers and of the strategic research programs of accredited “Maria de Maextu” units.

Strategic projects oriented to digital or ecologic transition

The purpose of this call is to promote RDTI activities to increase Spanish competitiveness and international leadership through the generation of scientific knowledge aimed at the ecological transition and the digital transition.

Section 7. Conclusions

This document has reviewed a wide array of past and forthcoming instruments that, directly or indirectly, can foster a better use of university infrastructure. The review constitutes a basis upon which to develop the INNOHEIS action plan.

A clear conclusion emerges from the review. The issue of university infrastructure, per se, does not often appear as central to policy instruments. On the other hand, innovation and eco-systemic relationship do appear as critical in the development plans of the Catalonia, across strategic plans, sectoral plans and governmental departments.

Whilst there is ample descriptive information on the instruments reviewed on this plan, there is limited information on the challenges encountered through the implementation. It is therefore difficult to assess whether INNOHEIS is well positioned to address any specific element of a given instrument.