

JRC TECHNICAL REPORTS

Higher Education for Smart Specialisation The Case of Navarre, Spain

Igor Campillo, Eskarne Arregui-
Pabollet, Javier Gómez Prieto

June 2017



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Contact information

Name: Eskarne Arregui-Pabollet
Address: Edificio EXPO, C/ Inca Garcilaso, 3, E-41092 Seville/Spain
Email: Eskarne.ARREGUI-PABOLLET@ec.europa.eu
Tel.: +34 954488206

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JRC107532

EUR 28701 EN

PDF ISBN 978-92-79-71216-6 ISSN 1831-9424 doi:10.2760/84738

Luxembourg: Publications Office of the European Union, 2017
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How to cite this report: Campillo, I., Arregui-Pabollet, E., and Gómez-Prieto, J., Higher Education for Smart Specialisation: The Case of Navarre, EUR 28701 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-71216-6, doi:10.2760/84738, JRC107532.

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Acknowledgements

The authors would like to thank all the representatives of the universities, research centres and companies that accepted to participate in the different research phases of the Navarre case study. We are particularly grateful to SODENA team, in special to Luis Goñi, for accepting to be one of the regions participating in the first HESS case studies and for the continuous support received throughout the whole process. In addition, we would like to thank for their participation in the final workshop to Javier Alonso, Mikel Navarro, José Luis Fernández and Xabier Hualde.

The authors want to express their gratitude for their comments, views and suggestions to: Louise Kempton, John Goddard, John Edwards and Susana Elena-Pérez.

Executive summary

This report gathers the main findings extracted from the Navarre case study carried out in the framework of the Higher Education and Smart Specialisation (HESS) project managed by the Joint Research Centre of the European Commission. Navarre has been one of the two regions covered as case studies during the first phase of the project. The overall aim of HESS is to understand and provide support to national and regional authorities on how to integrate higher education into the policy mixes of their Smart Specialisation Strategies (S3). This technical report provides some interesting insights into how an advanced region with high involvement of universities in the early phase of S3 definition is facing the challenges of their role in the implementation phase. On the one hand, it shows that different universities in the same region are likely to vary in nature and function and as such may contribute differently to the S3. In Navarre, one of the two universities is more research oriented with a strong focus on the attraction of international talent, while the other is more regionally rooted with close ties to local companies and stakeholders. On the other hand, the report identifies tensions in engaging individual researchers in regional development activities, as well as potential mechanisms and tools to overcome them. The methodology used during the project has included qualitative research methods, participatory workshops and desk-research activities.

Research objectives

Two research objectives were defined for the Navarre case study:

- To understand how universities can contribute to developing talent for the region and align the educational offer and scientific capabilities of universities to Navarre's S3 priorities (Government of Navarre, 2016).
- To explore the type of incentives for universities and academics that can boost their cooperation and involvement with S3 and regional development activities

Additionally, a secondary objective was established:

- To assess whether interregional cooperation within the Euroregion Aquitaine-Navarre-Basque Country can boost the role of universities in S3

Policy context: EU, national and regional level

- The recent European Commission Communication on a "Renewed EU Agenda for Higher Education" (European Commission, 2017) emphasizes that HEIs are not contributing as much as they could to regional development. They are called upon to play a wider role in S3 by facilitating connections between academics, entrepreneurs and public authorities, while aligning more of their educational offer to S3 priorities.
- At national level, the Spanish Ministry of Education launched the Campus of Excellence programme in 2009 to promote the international excellence and specialisation of Spanish universities and increase their engagement in regional

development. Navarre has been part of this programme with the Campus Iberus initiative.

- At regional level, SODENA led the process of developing the 2014 Moderna Plan: An ambitious regional development strategy that can be seen as a step towards defining a S3; with thematic vertical priorities and a number of crosscutting factors for the competitiveness of industrial sectors, elaborated with key social and economic stakeholders of the region.
- The Spanish political system is characterised by a strong decentralised model with highly autonomous regions. Navarre is one of the Spanish autonomous communities with its own taxation system providing the region with significant political powers.

Key features of Navarre region

- Navarre is a moderate innovator in the EU28 (RIS, 2016) and among the top Spanish autonomous communities in terms of innovation performance, having the second highest level of private R&D in Spain (COTEC, 2015)
- Navarre has high levels of tertiary education attainment as well as knowledge intensive employment (RIS, 2016); including an above average number of 30-34 year olds with tertiary education (compared to national and EU figures).
- Public universities are funded by regional governments with an annual "framework agreement" signed between the regional government and the university that establishes the activities and financial regime.
- The region has two universities, one private university with a strong international orientation and specialised in bio-health and one more locally rooted public university specialised in engineering fields.

Methodology

The case study has been carried out in consecutive steps with the following methodology:

- An exploratory meeting to understand the role of universities in Navarre's S3 and the main challenges faced for a broader involvement.
- In-depth interviews with HEI managers and key research and innovation stakeholders to gain a deeper understanding of the issues raised in the exploratory meeting.
- Analysis of the interviews and desk-research to extract key findings
- A final participatory workshop to validate and discuss the main outcomes from the interviews together with peers from the Basque Country and Aquitaine-Basque Country Eurorregion.
- Analysis of overall findings from the interviews and final workshop, drawing final conclusions and extracting policy implications and recommendations in the form of a technical report.

Key findings

- Universities should balance the response to global challenges with local engagement, providing a fundamental educational base and strong disciplinary

competences that have both global and local value (but not overly dependent on local demands).

- Universities have already anticipated emerging trends in terms of education, innovative educational models and promotion of entrepreneurship.
- The engagement of the broader academic community in the S3 process is considered important. The research institutes and centres in both universities have considered S3 priorities in the definition of their strategic plans.
- Both universities have put in place mechanisms and tools to become more responsive to regional needs. They consider information from outside the university and feedback from stakeholders to be crucial in aligning the educational offer with Navarre's S3 priorities.
- The Navarre S3 priority areas map fairly well onto the research and educational strengths of Navarre's two universities, although these strengths were not considered as key factors for the selection of the priorities (save for Health).
- The regional S3 is always 'on the table' and 'present in the discussions' in the review of curricula at Navarre's public university, and its 2016-2019 Strategic Plan has considered the S3 priority areas and the Campus of Excellence dynamics in the re-definition of undergraduate degrees, masters and PhD programmes.
- Both regional governments and universities themselves have promoted different tools to integrate higher education into S3, and they have been very positively received by actors in the research and innovation system. The university research institutes and centres, thematic chairs, industrial PhDs and innovation ecosystems promoting cooperation in value chains among knowledge triangle actors are helping to boost the university's participation in S3.
- The main bottlenecks to increase the engagement of universities with the region are related to the complexity of shared national and regional higher education competencies and the regulatory system of universities.

Conclusions

- The complementarity of both universities, UPNA and UNAV, is an important strength of Navarre. Both universities are contributing differently to regional development based on their strengths.
- The importance of sharing information on the economic evolution of the region, the skills and competences needed by companies, institutional and university strategies, mapping of research and innovation capacities, etc. to understand the regional context and plan the potential role, actions, programmes and initiatives by the different stakeholders.
- The need for stronger participation of the academic community in the different working groups and entrepreneurial discovery dynamic, particularly in the continuous processes of narrowing the current priorities into innovation projects.
- The potential gains of a more flexible and tailored human resource regulations for universities that enable hiring different type of researchers' profiles, with differentiated career paths and incentives.

- Important role to be played by the recently created "Knowledge Communities (KC)" in strengthening the integration of higher education dimension and closer collaboration between technology centres, universities and clusters. The integration of the knowledge and information on EU policies, programmes and calls in the KC might facilitate the consideration of synergies of regional funding tools in the framework of S3 with other EU R&I funding programmes (H2020, Erasmus+, KICs, EIPs, etc).
- The fact that competencies on public university funding are allocated at the regional level gives the flexibility for the university and government shaping of the annual framework programme in a way that matches regional socio-economic needs.
- The opportunity of strengthening the synergies and complementarities of Vocational Education and Training (VET) with higher education, as Navarre has developed a strong plan within S3 for VET.
- The relevance of the UPNA new educational offer, which has considered the alignment with the selected Navarre S3 priority areas, as a key contribution to integrate universities' education mission in regional development. The importance of further identifying the competencies and skills demanded in Navarre, as well as putting in place strong skilled talent attraction and retention policies, has been identified as relevant aspect to be further considered in the contribution of the education mission of universities to the S3.
- Substantial scope for increasing cross-border cooperation in the framework of Aquitaine-Navarre-Basque Country along value chains through the newly created Navarre S3 clusters.

1. Introduction

Higher Education Institutions (HEIs)¹ can play a key role in the design and implementation of Smart Specialisation Strategies (S3). They are among the few institutions that act as 'boundary spanners', bridging all three elements of the 'Knowledge Triangle' (Research, Education and Innovation). HEIs can build innovation capabilities in regions and can play a much broader role than is usually considered.

Universities have been considered as important actors in regional innovation systems and smart specialisation reinforces and amplifies this role. In this regard, an increasing role is given to universities by regional governments beyond the teaching and research missions (Kempton et al. 2013). However, this potential contribution has not been harnessed by many S3, especially in less developed regions where HEIs can have a particularly important role to play. This has been a major observation by the JRC when reviewing and monitoring the S3 and was also highlighted in a report by an expert group convened by DG Research and Innovation (European Commission 2015).

Over recent years European and international policy agendas have reinforced the role of HEIs as important players with a key role in contributing to territorial development. The European Higher Education Modernisation Agenda (European Commission, 2011) and more recently the "Renewed EU Agenda for Higher Education" (European Commission, 2017) emphasize that HEIs are not contributing to innovation as much as they could in regions. The latter in particular emphasised that HEIs could play a potentially wide role in S3 by facilitating connections between academics, entrepreneurs and public authorities, and by aligning their educational offer to S3.

This technical report presents the results of the pilot case study of Navarre region, included in the first phase of the project on Higher Education for Smart Specialisation (HESS). The project was launched in 2016 by the European Commission's JRC in partnership with its Directorate General for Education and Culture. Its overall aim is to generate knowledge and support regions in reinforcing the role of Higher Education in S3 and promoting the integration of higher education with research, innovation and regional development in S3 policy mixes, particularly through the use of European Structural and Investment (ESI) Funds.

The Navarre case study has had two specific research objectives:

- To understand how universities can contribute to developing talent for the region and align the educational offer and scientific capabilities of universities to Navarre's S3 priorities (Government of Navarre, 2016).
- To explore the type of incentives for universities and academics that can boost their cooperation and involvement with S3 and regional development activities.

Methodologically the case study has been deployed in five phases:

1. An exploratory meeting where the JRC, SODENA and representatives of HEIs and other key research and innovation institutions of Navarre discussed the engagement of

¹ The term Higher Education Institution (HEI) is often used to include a broader range of institutions than just universities. In this report the terms university and HEI are used interchangeably to mean all institutions that provide tertiary education services.

universities in S3 and the main challenges faced in building a broader role for universities.

2. In-depth interviews with HEI managers, research centres and institutes, companies, departments of the regional government, research institutes and company associations.

3. Analysis of the outcomes of the interviews and desk-research to extract main key findings

4. A final participatory workshop with the participation of the JRC, SODENA, the interviewed stakeholders and selected invited experts from the Basque Country and Aquitaine-Basque Country Eurorregion. The aims of the workshop were to:

- Present the main findings from interviews
- Discuss and validate the most relevant results
- Identify potential measures to increase the engagement of universities in S3
- Learn from the experiences of other regions discussed with the invited experts

5. Analysis of overall findings from the interviews and final workshop, and the drawing of final conclusions, policy implications and recommendations in the form of a technical report.

The rest of the report is organised as follows:

Section 1 explains in detail the methodological approach followed in the Navarre case study

Section 2 gives an overview of the Spanish university system and summarises the higher education and research systems of Navarre

Section 3 focuses on Navarre regional context, describing its innovation and HEI system. A special focus is on the evolution of the research and innovation policies of the region and the more recent Navarre S3 and the integration of education and training dimension.

Section 4 describes the main results, namely the findings from the exploratory workshop, interviews and final validation workshop.

Section 5 concludes by highlighting the key lessons learnt and the policy implications of the research for the region and the broader EU level.

2. The HESS case study: Methodology

The methodological approach designed for the case of Navarre is largely based on the views and reflections of regional stakeholders and also integrates the perspective of international experts and academics. With the aim of identifying practical evidence derived from the involvement of HEIs in S3, the case study has comprised four broad steps.

2.1 Exploratory workshop and self-evaluation exercise

A more general assessment on the involvement of universities in S3 shows that the capacities of both the public (UPNA) and the private universities (UNAV) of Navarre have been taken into account in the definition of the S3 priority areas with a very high involvement of the most senior university managers in the key decision-making processes. The general perception of a variety of regional actors that have participated in the case study clearly perceive an increasing role for universities in the design of regional innovation strategies, starting from the early days of the Moderna Plan and later the S3 process.

Outside the universities, there is as well the perception of an increasing demand for the participation of universities in the regional innovation policy design, and, in particular, in the S3 development process. In general, regional stakeholders agree that both universities have responded well and that their involvement in the process has been very high. Some of the non-university interviewees claimed that if this question had been asked several years ago, their answer would have been negative. This clearly indicates an increasingly positive perception of universities in Navarre by the other stakeholders.

In addition to this, an exploratory workshop was organised on May 6th 2016 in Pamplona with the participation of the JRC, SODENA, the two universities of Navarre and a number of key research, innovation and education actors of the region. The aim of the meeting was to present the general objectives of the HESS case studies, bring together the relevant actors of the region and gain a first understanding of how universities have participated so far in S3 as well as the challenges they face in contributing to innovation and engaging with other institutions in the territory. The discussions and exchange between the different participants helped to frame the research questions for the study.

The discussions focused on the three main missions of the university: research, teaching and third mission.² The event brought the participation of representatives of public and private universities, research centres, Vocational Education Institutions and regional administrative bodies.

The main points raised by the participants during the workshop were the following:

- Public University of Navarre (UPNA) has launched several initiatives to generate collaboration spaces with companies, such as the Business and Social Forum that has created a space to discuss and enable the identification of emerging needs in the business environment to improve the employability of upcoming PhDs, training of PhDs and introduction of entrepreneurial skills.

² The term third mission is used while recognising that the current scholarly debate on the engagement of universities suggests that a more holistic understanding of research and teaching would allow engagement to be mainstreamed across the traditional activities of the universities, rather than separating it into a 'third' (and consequently less important) mission.

- The Business and Social Forum has worked with more than 20 regional business stakeholders to define and launch industrial PhDs. Nevertheless there is a need to explore other ways and actions that could be put in place to reinforce and deepen the alignment of curricula with regional priority areas and with the skills demanded by companies.
- The Advanced Innovation and Technology Corporation (ADITech) has created a new ecosystem that brings together existing research capacities of research centres and universities in different knowledge fields: agri-food, energy, biomedicine and industry. These ecosystems bring together new forms of establishing research centre-university-business-society collaborations in the value chain, especially focused on the implementation and application of new products and services. The way to integrate the higher education dimension of the "innovation ecosystems" and closer collaboration between ADITech technology centres and the universities to respond to the regional challenges would be welcome.
- The need to further explore the support, evolution, monitoring and evaluation of the S3 regional priorities by HEIs was underlined. Also, mapping the skills and competences that will be needed in the future by business and economic environment will be a very useful exercise, which will enable HEIs to adapt the future academic syllabus together with business and other stakeholders.
- There is a need to fully exploit the Vocational Education and Training offer of national accredited centres of reference in energy (CENIFER) and health (ESTNA), which are very close to the needs of the territory and especially devoted to the education and training of students to ensure their future employability.

2.2 Research objectives

Following the exploratory workshop, self-assessment exercise and discussions with the regional authorities and key stakeholders, two research objectives were defined:

- To understand how universities can contribute to developing talent for the region and align the educational offer and scientific capabilities of universities to Navarre's S3 priorities
- To explore the type of incentives for universities and academics that can boost their cooperation and involvement with S3 and regional development activities.

The research objectives are coherent with different issues and questions addressed during the discussions with the regional actors, namely:

- How can HEIs, in their teaching, research and third mission activities, contribute to the Entrepreneurial Discovery Process (EDP) within a region?
- How do curricula and academic specialisation within and between HEIs interact/align with priority setting at regional level?
- What are the main drivers and barriers for building quadruple helix partnerships within the HE and territorial governance systems?

- How to optimize the role of HEIs throughout the S3 cycle and make them self-sustainable over time?
- How can HEIs combine sources of funding at EU and national level in a more strategic manner to bring about transformational change within a region?
- What are the main instruments used to capitalise the potential of HEIs, business and other key stakeholders in the context of S3?
- How can an improved participation and higher integration of HEIs in the overall RDI ecosystem of the region contribute to higher impact of the region's S3?

2.3 Semi-structured interviews

An interview guide (see Annexe 2) was prepared and sent to the interviewees in advance. The interviews were conducted at the end of November and beginning of December 2016 in the premises of each interviewee, each with an average duration of two hours. The list of interviewees is shown in Annex 2.

The interviews were designed according to several policy research reflections such as the need to understand how the university's global perspective and local engagement can be balanced, or how to establish the participation and involvement of HEIs in the Navarre S3 design and governance, specifically through the role of universities. Also, by considering how the capacities of the HEIs (both educational/training offer and scientific and technological capabilities) have been considered for the final selection of the S3 priorities and objectives.

Key issues included in the interviews also addressed S3 design and governance, current contribution of HEIs to S3 development, future potential role of HEIs in the Navarre S3, main barriers and gaps for the HEIs and other types of organisations to work together in the development of the S3, incentives for HEIs and university researchers to be involved in S3 and regional development activities and inter-regional cooperation, in particular the activities of the Euroregion Aquitaine-Basque Country-Navarre.

2.4 Workshop and final validation

A workshop was held in Pamplona on December 19th 2016 with a twofold objective. First, to present and discuss with regional stakeholders the major findings derived from interviews and analysis carried out by the JRC and second, to validate results and identify potential actions that could be taken by the relevant stakeholders.

The event concluded the fieldwork and allowed the main players of the regional higher education system as well as public authorities to recognise several common challenges identified by stakeholders over the whole research process.

3. Overview to the Spanish University System

The aim of this section is to understand the specificities of the Spanish university system and how this impacts on the contribution of HEIs to S3. Particular attention has been given to the distribution of competences between the national and regional administrative levels, as here lies some of the most important challenges for an increased engagement of universities in regional development. In addition, the regulations in terms of curricula definition and employability measures of universities are described due to the importance of such activities for the research questions.

The Spanish University System (SUS) is regulated by the Organic Law 6/2001 of 21 December, (LOU 6/2001), revisited by the Organic Law 4/2007 of 12 April, (LOU 4/2007).³ The structure of official university education in Spain is established in the Royal Decree 1393/2007, of 29 October, in line with the general guidelines issued by the European Higher Education Area (EHEA).⁴ Doctorate studies are governed by the provisions of Royal Decree 99/2011, of 28 January.⁵ More than 90% of Spanish students are concentrated in public universities, with the remainder in private universities.⁶

Certain specificities of the Spanish university system, regarding university typologies, accreditation system and competencies, have been considered in this section. A special focus has been given to the higher education competences of the Spanish Ministry of Education and those attributed to the Spanish autonomous communities, as they are important to understand the opportunities that it generates and identify potential future actions.

3.1 Typologies of Universities in Spain

According to LOU 6/2001 there are two types of universities in Spain:

- Public universities are financed by the state which establishes the guidelines for its organisation.
- Private universities are mostly self-financed (with some public support in certain conditions) and self-organised, while respecting the above mentioned Organic Laws and Royal Decrees.

Both types of universities are founded pursuant to a specific act passed by the legislative assembly of the region where the institution is located, or an act approved by the Spanish Parliament, at the proposal of the central government and in accordance with the relevant autonomous community council. A report from the General Conference for University Policy is also mandatory.

Public universities can be composed of schools, faculties, departments, research institutes, doctoral colleges and other necessary structures for the execution of their

³ Spanish Official Bulletin Ref - BOE-A-2001-24515: «BOE» núm. 307, from December 24th 2001, pages 49400 to 49425 (26 pages); and Ref - BOE-A-2007-7786: «BOE» núm. 89, from April 13th 2007, pages 16241 to 16260 (20 pages).

⁴ Spanish Official Bulletin Ref - BOE-A-2007-18770: «BOE» núm. 260, from 30/10/2007.

⁵ Spanish Official Bulletin Ref - BOE-A-2011-2541: «BOE» núm. 35, from 10/02/2011.

⁶ Several references have used to write about the Spanish University System:

The official page of the Spanish Ministry of Education, Culture and Sports: <http://www.mecd.gob.es/portada-mecd/>

The Spanish University Portal: <http://www.universia.es/>

The Spanish service for the internationalization of education: <http://www.sepie.es/>

The European education dictionary: <http://www.euroeducation.net/>

functions. The requirements for the establishment and the maintenance of these institutions are established by the Government, once a report by the General Conference for University Policy and the Council of Universities has been issued.

University schools and faculties are the institutions responsible for the organisation of their studies and are in charge of academic, administrative and implementation of the regulations that lead to the conferment of the different university degrees. Their creation, modification and abolishment as well as the implementation and abolishment of studies leading to the obtainment of an official university degree with national validation must be agreed by the regional government to which the university belongs. Proposals can be made either by the university governing council or by the regional government following consultation with the university. In both cases a previous favourable report on behalf of the university's social council⁷ is required.

Departments are teaching and research units in charge of coordinating studies of one or more fields of knowledge. They support teaching and research activities and initiatives of the teaching staff as well as all other functions appearing in the university statutes. The establishment, modification and abolition of departments are the sole responsibility of the university.

Universities may also have university research institutes. Their activity focuses mainly on technical and scientific research and on artistic creation. These centres are also entitled to offer graduate programmes (Master's degrees or PhDs). University research institutes may belong to more than one university. They can also be established by public or private organisations by means of collaboration agreements or specific arrangements. Furthermore, universities can create joint research institutes, in cooperation with other public research bodies, with the National Health Service and with public or private non-profit research centres.

The official regulations which establish the structure of PhD programmes also authorise the creation of doctoral colleges, whose objective is to organise provision at this level into one or more interdisciplinary knowledge branches, which may also include official science-oriented master programmes, as well as many other types of research training activities. These colleges may be founded by one or more university, with the possible participation of other bodies, centres, institutions or national and international entities which carry out R&D activities.

Public universities may also have public or private associated centres offering official study programmes. The association is established by means of an agreement which should be endorsed by the relevant regional government, based on a proposal of the university's governing council, once the proposal has been positively informed by the university's social council. Associated centres must be established within the territorial scope of the relevant regional government, or receive approval from the regional government where they are located.

⁷ The University Social Council is the governance body that establishes the relations of the University with society. This body is in charge of supervising the economic activity of the university and the performance of its services, as well as the approval of its budget. It is constituted by personalities from the cultural, professional, economic and social life, that will not be from the academic community itself, except for the Rector, General Secretary and the Manager. It is regulated by the Autonomous Communities Law (<https://www.boe.es/buscar/doc.php?id=BOE-A-2001-24515>)

Private universities and other centres may be created by any individual or legal entity, regarding that they respect the constitutional principles and are subject to national and regional regulations. University private centres must be integrated into a private university as centres belonging to the university or they must be ascribed to a public or private university.

3.2 Curriculum

Universities enjoy the autonomy to design the curricula for their degree programmes. However, they must be verified by the Council of Universities⁸ and receive authorisation from the relevant regional government, once they have been approved by the National Agency for Quality Assessment and Accreditation (ANECA) and/or the analogous agency of the corresponding autonomous community. Once they have been verified and accredited, the degree programmes must be registered in the Registry of Universities, Centres and Degrees (RUCT) as a mandatory requisite to obtain official validity throughout Spain.

3.3 Employability

A main concern for both the education authorities and universities is improving the employability of their university graduates. In order to deal with this problem, university education must respond to the following principles:

- To include in their study programmes abilities and skills geared towards innovation, the fostering of creativity, business initiative and entrepreneurship, incorporating them into the different subjects, concepts and cross-curricular competences, in learning methods and in assessment.
- To make proposals for new degrees and educational provision which prepare students for the qualifications required by new employment needs so as to improve employability of citizens in the labour market.
- To promote adaptability to social and economic changes, providing citizens with opportunities for ongoing professional development and extension of university studies; and to increase the possibilities for mobility in education within Spain and in Europe, as well as the effective incorporation of university graduates into the labour market, strengthening the links between universities and the business world, paying special attention to the promotion of competences for entrepreneurship and self-employment.

Collaboration between universities and the productive sector may be articulated on the basis of the following initiatives:

- Creation of technology-based innovation companies.
- Establishment of innovation poles, by means of providing a common physical space for universities and companies in the production sector.
- Launching and promotion of programmes to enhance transfer and appreciation of knowledge.
- Creation of consortiums for research and knowledge transfer.

⁸ The Council of Universities is a body for universities academic coordination depending on the Ministry of Education. It is a channel for academic cooperation and coordination, inform about legal and regulatory aspects affecting the university system as a whole. It is in charge of formulating proposals to the Government in the field of the university system. <https://www.boe.es/buscar/doc.php?id=BOE-A-2009-19439>

- Creation of corporate-sponsored university chairs, based on collaboration in research projects, which allow university students to participate and combine their research activity with training opportunities.

Specific measures aimed at promoting employability of university students are established in both the national framework regulations for university education system and in the University Student Statute of 2010,⁹ namely:

- Universities offer student mobility programmes through university cooperation agreements. These programmes pay attention to academic training related to the degree in which the student is enrolled, and to other competence areas, such as training for employment.
- Universities should have student information and guidance services, whose aim is to provide information and orientation regarding learning itineraries and future professional opportunities, training in cross-curricular competences and design of professional projects, in order to facilitate student employability and insertion in the labour market.
- Universities also offer student guidance and monitoring until they graduate. The law also considers the possibility of degree advisors. These are coordinators or student advisors who provide guidance to students throughout the program, regarding their learning process as well as their professional prospects in the labour market.
- The statute also contemplates the possibility of creating alumni associations for former students. These associations must be registered at universities, and one of their goals is to collaborate actively in providing access to the labour market to university graduates.

3.4 National and regional competencies on higher education in Spain

In Spain, competencies on higher education are regulated by the Royal decree 284/2017 of organic structure Ministry of Education, Culture and Sport. The following table illustrates some of the main functions attributed to the General Secretariat of Universities (non-exhaustive list) which denote the high concentration and decision power on universities at central state level. At regional level, competencies are limited to specific fields of intervention mostly based on administrative and budgetary management as well as planning of the academic offer.

In Navarre region, the competencies on HE are established according to the regional law 136/2015 on the organic structure of the education department of Navarre. This legislative piece provides the general direction of universities in the region with competencies such as administrative and financial control of the UPNA, management of scholarships and planning of the educational offer. With regard to university policy, accreditation and incentives the national law does not attribute competencies to the region.

⁹ The aim of the University Student Statute is the development of the rights and responsibilities of all university students and the creation of the Council of University Students at national level in compliance with the provisions of Article 46 of Organic Law of Universities 6/2001, of 21 December. This Statute is applicable to all students of the Spanish public and private universities, both the own centres and the attached ones. <https://www.boe.es/buscar/doc.php?id=BOE-A-2010-20147>

Box 1: Comparison of national and regional competences for education in Spain

National competences	Regional competences
<ul style="list-style-type: none">• Structure and governance of universities is regulated by a law at national level applied to all universities in Spain: <i>Ley Orgánica de Universidades</i> (LOU)• The afore-mentioned law regulates university personnel recruitment modalities and contract types• The National Agency for Accreditation and Evaluation (ANECA) evaluates / accredits researchers and evaluates the content and modification of curricula (undergraduate degrees, masters and PhDs)• Launching calls for research personnel / groups, projects and programmes for HEI orientation (e.g. Campus of International Excellence)	<ul style="list-style-type: none">• Public universities are funded by regional governments• Negotiation and approval of the annual "framework agreement" that regulates the terms and funding received by the public universities from the regional government• Approve new education centres (faculties, schools, etc) and university research institutes• Evaluation and monitoring of public university performance• Specific calls for attracting talent, collaboration projects with regional actors, etc

3.5 International Campus of Excellence programme (CEI)

In 2009 the Spanish Ministry of Education launched the Campus of Excellence programme to foster the modernisation and internationalisation of Spanish universities. The programme has been managed by the Ministry of Education in collaboration with the Ministry of Science and Innovation and the governments of the Spanish autonomous communities participating in the programme.

The overall aim of the programme is to improve the position of Spanish university campuses in Europe, to promote the internationalisation dimension of universities and enhance the strengths of the Spanish university system. The aim of the CEIs of promoting the diversification and specialisation of Spanish universities, focusing on their areas of excellence, through the development of knowledge ecosystems around the specialisation areas to contribute to regional economic development is of particular interest for the aims of HESS case study.

The CEIs have promoted the grouping of regional actors, collaborations between different Spanish autonomous communities and trans-national cooperation. The CEI programme is particularly relevant in the context of understanding the role of HEIs in S3, as they have boosted a stronger engagement of universities within their territories and expanded their role in territorial development creating stronger links in the so called Knowledge Triangle.

The Campus of International Excellence programme was launched in 2009 by the government in office as an ambitious transformation of the university system in Spain. The programme has had three calls (2009, 2010, 2011) with an overall funding of 686,7 M€, partly in form of grants and the most important part in form of loans with low interest rates (De La Torre et al.2011).

With the change of government in 2011 the programme was frozen and no further calls were launched until 2015. This call had a limited budget of 7 M€ and the aim of consolidating the existing Campus of Excellence.

More information about Spanish university system can be found in Annex 1.

4. Regional context of innovation and universities in Navarre

4.1 Regional profile of Navarre

Navarre is a region located in the north of Spain, neighbouring with three other autonomous communities, namely Basque Country, La Rioja and Aragón, and with Nouvelle Aquitaine region in France. It is a relatively small region, with a population of 640.647 inhabitants in 2016,¹⁰ which constitutes 1.38% of the Spanish population, making it the third smallest autonomous regions in Spain after La Rioja and Cantabria.¹¹ During the period 1996 to 2012 the population grew by almost 20%, but since then the trend has reversed, mainly to lower migratory flows and the reduction in the birth rate.



In terms of area it has 10.391 Km², with only one province and an important part of its population concentrated around main urban areas, particularly the capital Pamplona and the surrounding villages.

The GDP in Navarre is above the EU average, with a Gross domestic product (GDP) per capita at current market prices evolving from 114 in 2016 to 101 in 2017 (EUROSTAT, 2017), the third highest in Spain well above the average (80). Expenditure in R&D is 1.6% of GDP, with 17% of the total active population employed as research personnel (FTE) with an increasing evolution since

2001 from 8%.¹² 56% of researchers are employed by the private sector and the 43% by higher education and public administration sectors.

Unemployment (10%) is slightly higher than the EU average (9.5%), but considerably lower than the Spanish average (18%) (EPA, 2017)

The higher education system in Navarre is quite advanced, with a public R&D expenditure above the EU average. The economic structure is characterised by a high specialisation in the automotive, agro-food, machinery and renewable energy sectors. The health industry is particularly significant from a knowledge perspective, with a whole ecosystem of education institutions, hospitals and research centres specialised on health and biotechnology.

4.2 Innovation profile and performance

Out of the 17 Spanish autonomous communities, only the Basque Country and Navarre display an R&D intensity above the EU average (Fernández-Zubieta and Zacharewicz, 2015). The region of Navarre is considered a moderate innovator according to the regional innovation index that compares the innovation performance of EU regions.

¹⁰ Instituto Navarro de Estadística. December 2016 data.

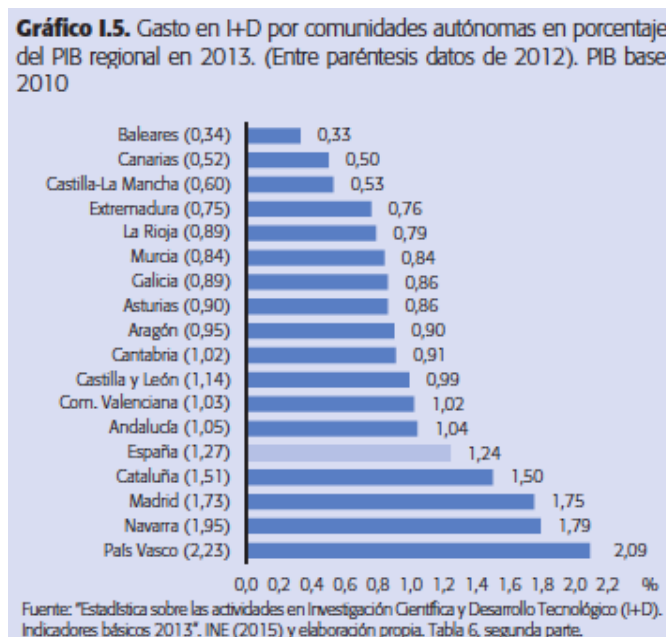
<https://www.navarra.es/AppsExt/GN.InstitutoEstadistica.Web/InformacionEstadistica.aspx?R=1&E=1>

¹¹ Instituto Nacional de Estadística 2016. <http://www.ine.es/jaxiT3/Datos.htm?t=2915>

¹² Instituto Nacional de Estadística 2016. R&I indicators Navarre.

<https://www.navarra.es/AppsExt/GN.InstitutoEstadistica.Web/InformacionEstadistica.aspx?R=1&E=1079>

Figure 1: R&I Expenditure by Spanish regions (Source: COTEC Annual Report 2015)



As shown in Figure 1, Navarre is among the leading Spanish regions in terms of innovation performance, with 1.79 total R&D expenditure in terms of GDP in 2015; it is second only to the Basque Country and well above the national average of 1.24. The proportion of private R&D is the second highest in Spain with 68.7% of total R&D expenditure (COTEC, 2015).

Figure 2: Key education and R&D innovation performance indicators (Source: Regional Innovation Scoreboard 2016)

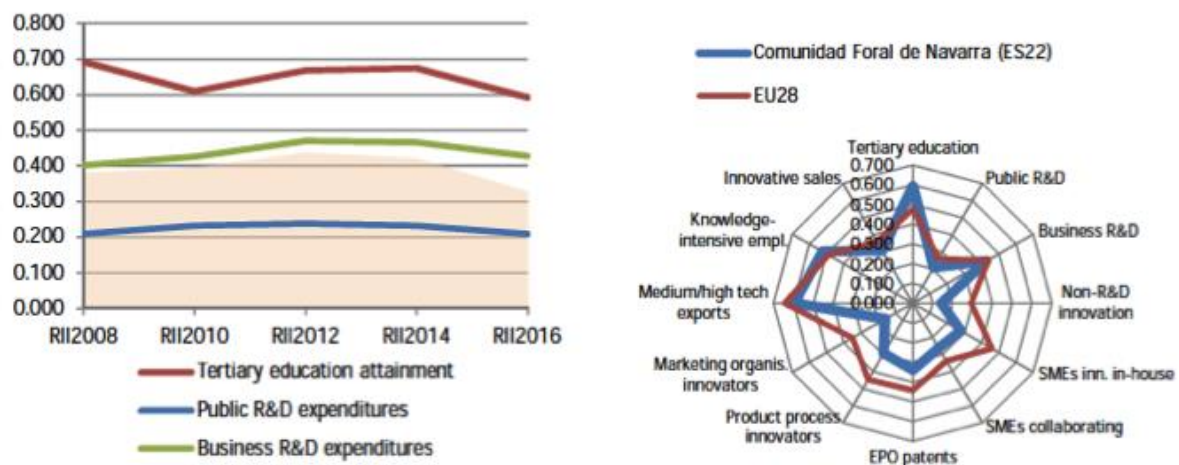
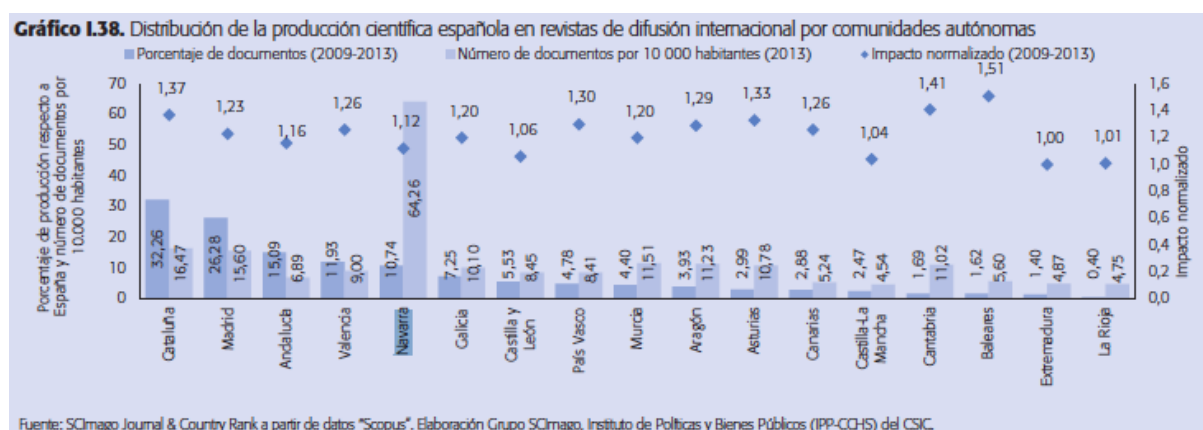


Figure 2 shows that one of the region's main strengths is the proportion of the population with higher education and the capacity of the region to generate knowledge intensive employment. The region shows a performance well above the average the EU in tertiary education attainment as well as knowledge intensive employment (Regional Innovation Scoreboard 2016). The percentage population of Navarre aged 30-34 having completed

tertiary education (69%), while below the Basque Country as the best performing region (91.9%), is above the Spanish average (60%).

Looking in more detail at the research and innovation indicators, Navarre shows very good performance in published scientific and technological publications for the period 2009-2013, being the leading Spanish region (64.3 publications per ten thousand inhabitants). In terms of the distribution of the patent demand and award, Aragon (152) and Navarre (123) regions are the top two regions by number of inhabitants, much higher than the lowest performing regions Baleares (20) and Canarias (23).

Figure 3: Distribution of scientific publications among Spanish regions (Source: COTEC Annual report 2015)



The percentage of company researchers also has significant differences among Spanish regions. In this regard from 2008 to 2014 Navarre has declined, from 5.29 to 4.79 in the number of full time company researchers per thousand employed, while the average for Spain in the same period increased from 2.33 to 2.54 (COTEC, 2016). Navarre was still above the average for Spain (2.54) for the year 2014, although significantly lower than the best performing region in Spain (the Basque Country on 8.67), the EU average (7.9), France (9.9) or United Kingdom (8.9).

4.3 The research and innovation ecosystem of Navarre

The region of Navarre has three universities: the Public University of Navarre (UPNA), the University of Navarre (UNAV) and the National Distance Education University (UNED) (Described in detail in section 4.6).

In addition, Navarre has a large number of research and technology centres, specialised in different fields, the most important being CENER, CEMITEC, CNTA, CIMA, CSIC, Lurederra and Navarra Biomed. In the public sector, there are two companies that also carry out R&D&I activities in their respective areas, such as Tracasa and Intia.

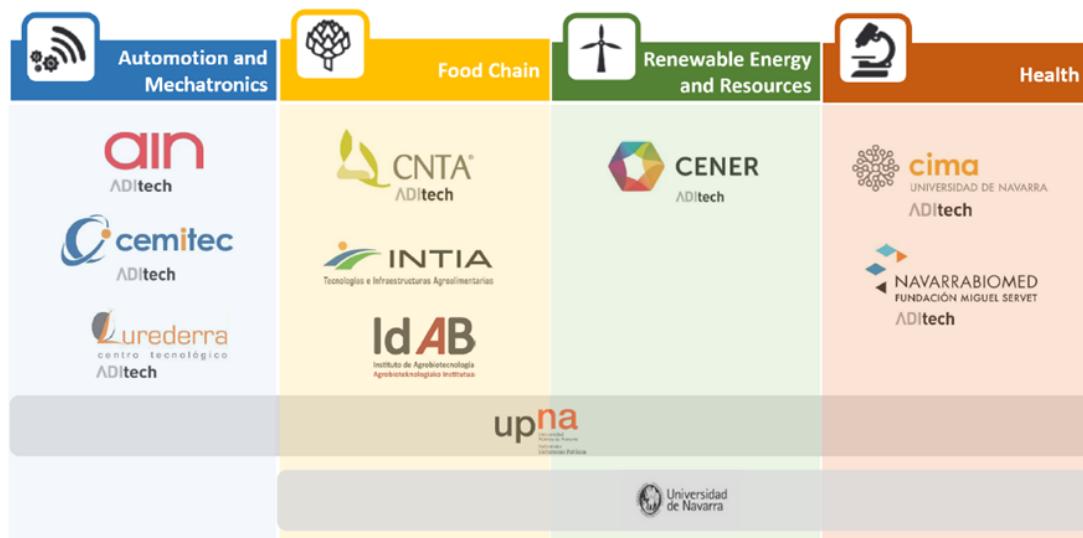
Over recent years the Navarre research and innovation ecosystem has experienced a reorganisation of actors, the most important being the launching of AdiTech Corporation gathering together six technological centres, three research centres and two universities under the same organisation, namely:

- CNTA (Centro Nacional de Tecnología y Seguridad Alimentaria/National Centre for Technology and Food Safety)
- CIMA (Centro de Investigación Médica Aplicada/Centre of Applied Medical

Research-University of Navarre)

- Navarra Biomed-Fundación Miguel Servet
- CENER (Centro Nacional de Energías Renovables/National Renewable Energy Centre)
- CEMITEC (Centro Multidisciplinar de Tecnologías para la Industria)
- AIN (Asociación de la Industria Navarra)
- Lurederra
- Public University of Navarre
- University of Navarre

Created in 2013, Aditech Board is formed by companies, the two universities and technological centres and the regional government. Initially created to group together the six mentioned research and technology centres, its mission has been redefined to form a knowledge and innovation community in Navarre that integrates actors from the Knowledge Triangle of education, science and business. Its aim is to generate value for society by developing new products that incorporate the latest knowledge, technology and R&D&I, and are subsequently to generate jobs and economic development for the region. The activity of ADitech is focused on four areas: energy, industry, agro-food and biomedicine, and has an important role in the development of Navarre S3.



The Navarre Industrial Association (AIN) is a non-profit private entity owned by different industrial associations. Its objective is to foster collaboration and competitiveness of the Navarre industry and its environment. AIN has a cross-cutting coverage of technologies and its activities are multi-sectorial in nature, being composed of companies from different industries, including automotive, mechatronics, food chain, energy and health. AIN participates as an "Industrial Modernisation Cluster" in the recently launched cluster policy of Navarre, promoting sectorial clusters that will have an important role to play in Navarre's S3 implementation.

Other research and technology centres decided to remain outside of the umbrella of ADitech Corporation, such as Lurederra or IDAB. Lurederra is a technological centre that carries out research and applied technological development activities in the fields of nanotechnology, new materials and advanced environment at the service of companies

and economic agents at both national and international level, including the subsequent implementation of the innovations developed by the industrial production centres. IDAB (Instituto de Agrobiotecnología) is one of the joint research institutes of the Spanish National Research Council (CSIC)¹³, managed by the UPNA and the regional government. The centre focuses on the study of different aspects of biotechnology and agronomy, with a research formed by UPNA professors, CSIC researchers, pre- and post-PhD researchers under contract, and technical and administrative staff from the two institutions.

Another important step in the reorganisation of the research and innovation ecosystem of Navarre has been the creation of IdiSNA. The Institute of Medical Research of Navarre, IdiSNA includes the health public service of Navarre, the University of Navarre Clinic, the two universities and two research centres, Cima and Navarra Biomed, bringing together basic research and patient-oriented research, leading to a faster and more effective transfer of results of research to patients.

Even though small and medium sized companies are the most numerous in Navarre's economy, several large sized firms need to be highlighted; MTorres and Loxin working in the robotic and advanced manufacturing fields; Jofemar Corporation in the manufacturing of technological solutions for the vending, sustainable mobility and energy storage industries; Viscofan which is the world leader in manufacturing and distribution of casings for the meat industry; Cinfa is a leading pharmaceutical laboratory for generic drugs that exports to 55 countries around the world; Volkswagen car manufacturing plant; Gamesa and Acciona technological leaders in the wind industry, renewable energy and infrastructures; and AN Group that is a leader in the agro-food industry.

Finally, the European Business and Innovation Centre of Navarre (CEIN) is a public non-profit organization of the Government of Navarre whose objective is to contribute to the economic development of the region by encouraging entrepreneurship in all areas of society and supporting entrepreneurs and companies to be more competitive.

The above mentioned key actors of the research and innovation ecosystem have actively participated throughout the process of defining Navarre's S3 priorities, orchestrated by SODENA, the government agency that coordinates the design and implementation of the regional S3. In addition SODENA offers a comprehensive financial toolbox for companies, from seed capital initiatives to private equity funds, together with loans and guarantees.

4.4 Evolution of Navarre innovation policy

The capacity of Navarre to design innovation policies and its S3 is thanks, to a large extent, to the long standing experience of the regional government in supporting technological innovation. Since 2000, R&D and innovation support policies have been periodically regulated by successive regional technological plans. Furthermore, there has been a hugely beneficial level of stability and continuity in the staff designing and implementing these plans.

¹³ The Spanish National Research Council (CSIC) is the largest public institution dedicated to research in Spain, the third in Europe and the seventh in the world. Attached to the Ministry of Economy and Competitiveness, its mission is to develop and promote research for the benefit of scientific and technological progress, in collaboration with Spanish and foreign entities. CSIC plays a central role in science and technology policy, from basic research to the transfer of knowledge to the productive sector in the main areas of knowledge.

Innovation support has been moving from firm-oriented to system-oriented measures. The main objective of the First Technological Plan (2000-2003) was to boost the R&D activity of enterprises. The Second Technological Plan (2004-2007) stimulated cooperation between the regional agents. The Third Plan (2008-2011) adds an internationalization dimension to such R&D and innovation cooperation support policy. The Fourth Plan (2012-2015), in addition to "vouchers", the main change was that, instead of directly financing the technological centres, funds were provided to firms so that these can contract R&D services freely with technological centres¹⁴.

The current Science and Technology Plan (2016-2020) has placed particular attention on boosting R&D&I through economic activity, fiscal policies, funding for companies, promotion of talent, cooperation and internationalisation. The plan puts special attention on the integration of actors in the innovation system, the orientation of R&D&I towards solving societal challenges and the region's S3 (Government of Navarre, 2016)¹⁵.

By and large, Navarre's innovation policy has given preference to R&D based innovation and overlooked non-technological innovation and modes of innovation and learning based on practice. This is something that appeared in the S3 updating process, and the government is committed to addressing this gap through specific measures in its industrial plan, setting up calls for management innovation projects. Likewise, until now the strategy has not fostered social innovation, and innovative public procurement has not been used. Furthermore, despite enjoying great autonomy to design and develop its own tax policy, there has not been a tailored and strategically managed fiscal regime to support innovation (beyond having a very generous incentive system to support R&D). The exception is the recent fiscal incentive scheme of 35% for film and audiovisual production as well as other deductions for activities contributing to cultural heritage.

¹⁴ https://www.navarra.es/home_es/Temas/Empleo+y+Economia/Innovacion/PlanesTecnologicos.htm
IV Plan Tecnológico de Navarre 2015. Gobierno de Navarra <https://www.Navarre.es/NR/rdonlyres/1F28291D-DDF1-4304-BE7E-2349CE1B4CB7/273143/PlanTec5.pdf>

¹⁵ <https://gobiernoabierto.navarra.es/sites/default/files/131216de80plan.pdf>

Table 1: Fiscal incentives for the audio-visual industry in Spain

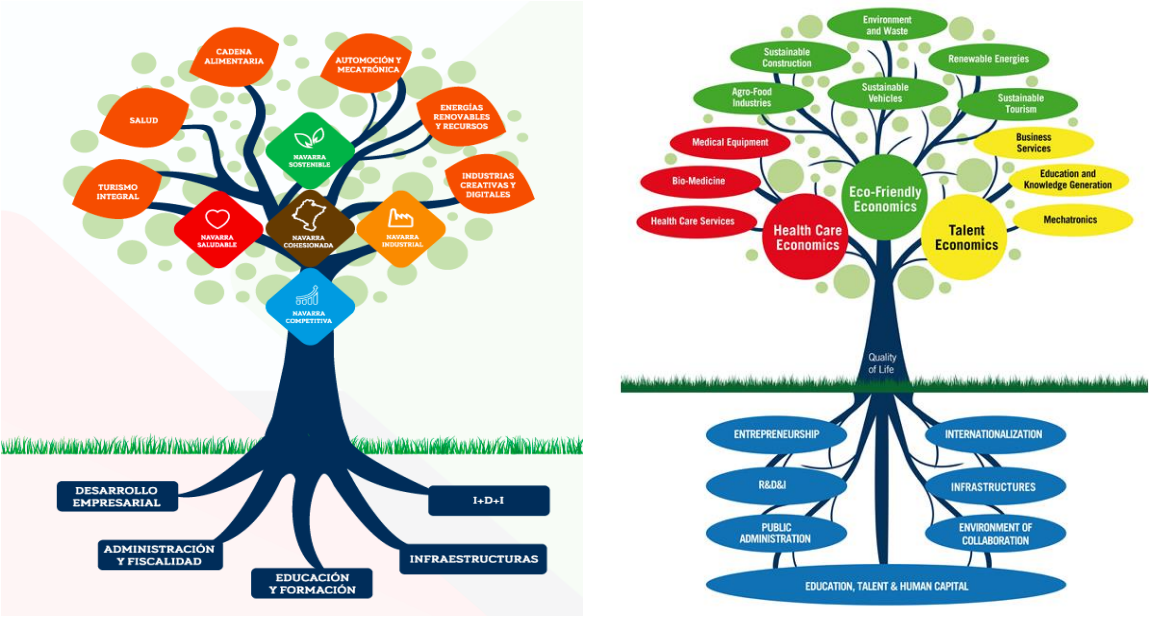
FISCAL INCENTIVES FOR AUDIOVISUAL INDUSTRY INVESTMENTS
<p>Navarre is one of the 17 regions of Spain and has got its own fiscal system, whereby all taxes are collected locally, a system supported by the Spanish Constitution. This fiscal autonomy allows for the definition of fiscal policies at a regional level, with no dependence of national policies for most of the taxes. At the end of 2.014, the reform of the fiscal system has been approved, leading to significant changes and improvements for the fiscal incentives applicable to film and audiovisual production.</p>
<p>This fiscal incentive is one of the most favorable and "ready-to-use" in Spain and has two main areas of coverage and it affects Corporate Income Tax, always in a 35% tax credit of eligible expenses in Corporate Tax:</p>
<ul style="list-style-type: none">-The case of a producer or co-producer, with fiscal residence in the region of Navarre-The case of a service company with fiscal residence in the region of Navarre, delivering services to national or international producers
<p>The fiscal incentive is applicable in both cases for productions where a certain percentage of the overall qualifying budget is spent in the region of Navarre</p>
<p>More info: http://Navarrefilm.com/</p>

The Moderna Plan¹⁶ represented a turning point for innovation policy in Navarre. On the one hand, unlike previous strategies it contained clear vertical choices, even before the introduction of smart specialisation. The previous technological plans and economic promotion programmes were composed basically of horizontal policies and measures. In the Moderna Plan, whose priorities were expressed in the image of the "Moderna tree" (see Figure 4), some key horizontal fields were identified, as well as an array of actions to be developed. More precisely, the Moderna Plan targeted those factors which had a decisive, core effect on all business sectors of Navarre: education, talent and human capital, R&D&I, entrepreneurship, globalisation, public administration, infrastructures and an environment of collaboration. Significantly however, there was also an explicit attempt to identify the thematic or vertical fields on which the regional economy should be based.

The MODERNA Plan was a medium and long-term strategic plan that promoted change in the economic development model of Navarre, moving towards a knowledge-based economy that focuses on people. Navarre was the first Spanish autonomous community to launch a strategic plan of these characteristics, whose key aspects, during its preparation and drafting, were the participation of the citizens and institutional consensus. The plan was promoted by the main political, education, business and social institutions, grouped together in the Steering Committee of the Plan, and it included the contribution of more than 1500 citizens. MODERNA was in line with the Europe 2020 strategy, promoting inclusive, sustainable and smart economic growth, and it was considered by the European Commission as a good practice in regional smart growth strategies. In fact, Moderna Plan constituted Navarre's first S3.

¹⁶ MODERNA Nuevo Plan de Desarrollo Económico de Navarra, 2011. Plan de Acción. (Please note that MODERNA is not currently in place)
http://www.redidi.es/sites/default/files/biblioteca-documentos/plandeaccionmoderna_1.pdf

Figure 4: Navarre’s innovation strategy tree. Left: Moderna’s Plan summary. Right: Navarre’s RIS3 summary.



4.5 Update of Navarre’s S3

In 2016 a collaborative participative process was set up to update the Navarre S3. Over ten months a series of forums, encounters and meetings were held gathering different actors from the quadruple helix (government, business, research and civil society). The updated S3 was publicly presented on 22nd November 2016 by the President of Navarre's Government¹⁷.

If we have a look at the evolution from Moderna Plan to the Navarre S3, we see that the Moderna Plan included a set of transversal factors in which Education, Talent and Human Capital were included as one of them and Education and Knowledge Generation as one of the Strategic pillars. In fact, the MODERNA Action Plan included a quite detailed description of the activities with a long term vision of "working to transform Navarre in a pole of identification, development, attraction and connexion of talent, recognisable by its excellence and quality of life". The plan included a set of strategic lines to be developed, each of them with a set of actions, projects and clear indicators.

In the case of Navarre S3 the section 3.7 describes in detail the participation of universities in S3 and the way in which education and training has been defined as part of the strategy.

The Navarre S3 aims to provide a shared vision of the future that will lead to economic transformation based on knowledge, business development and sustainability. It is committed to a socially and territorially cohesive, open and interconnected Navarre, integrated by creative and entrepreneurial people who are involved in a modern and competitive economy, standing out for its industrial strength, its commitment to the environment, health and quality of life.

The vision of the future is organised around the following five axes:

¹⁷https://www.navarra.es/home_es/Actualidad/Sala+de+prensa/Noticias/2016/11/22/Presentacion+Barkos+Es+trategia+Especializacion+Navarra+S3+24+retos.htm

- **Cohesive Navarre**, socially and territorially, as the ultimate goal of the strategy.
- **Healthy Navarre**, with healthy products and services, caring for people.
- **Sustainable Navarre**, environmentally responsible and efficient in the use of resources.
- **Industrial Navarre**, increasing our productivity with technologies 4.0.
- **Competitive Navarre**, improving the overall position of Navarre companies.

These axes serve as criteria or transversal axes for future development applicable to different business sectors and public policies. With the following long-term objectives:

- More Quality of life
- More Prosperity
- More Sustainability

The **six S3 priority economic areas** selected are the following:

- Automobile and mechatronics
- Food chain
- Health
- Renewable energies and resources
- Integrated tourism
- Creative and digital industries

It is important to clarify that the priorities are defined not only in sectoral terms, but also as business development themes addressed to long term societal needs, and that also include scientific-technological areas or transversal production systems, applicable to different needs or markets.

The most important **cross-cutting factors of competitiveness** are also identified:

- Business development
- Innovation
- Infrastructure
- Public administration
- Education and training

The fact that Education and Training has been considered as a key cross-cutting factor for the achievement of the S3 objectives is a very positive sign. Nevertheless, as discussed in more detail in section 3.7, the activities and instruments that will be implemented are still not sufficiently clear and would need to be further defined.

The instruments for the implementation of the S3 strategy are mainly the following:

- Work with clusters in the area of priority economic areas
- The strategic plans for the deployment of competitiveness transversal factors and in some cases also some of the priority strategic areas

Finally, in a very specific way, 24 projects have been selected for the period 2017-2020 related to both the strategic areas and the transversal competitiveness factors. The strategic challenges include aspects that the S3 Steering Committee has considered most relevant to address before 2020, according to the results of the diagnosis and the priorities of the region. Each challenge will group together different public services and departments under the leadership of one director general of the government, and will work with a project management perspective, instead of an organic or departmental focus, setting up a common view together with output objectives and indicators that will help review and coordinate public policies.

A new 'tree' summarises Navarre's S3 (Figure 4) and shows the evolution and narrowing down of priorities from the Moderna Plan to its S3.

4.6 Universities in Navarre and participation in the S3

Navarre is quite unique in Spain. Apart from a National Distance Education University (UNED, with 2 centres, in Pamplona and Tudela, with 4,869 and 2,401 students, respectively), there are two official universities: the University of Navarre (UNAV), founded in 1952 and linked to Opus Dei (a personal prelature of the Catholic Church); and the Public University of Navarre (UPNA), a relatively new university created by the regional government in 1987. Both universities have a similar number of students: According to the Education Ministry, the number of official students in the UNAV was 9,891 in the year 2014/15 (but some of them in the schools located outside Navarre San Sebastian, Barcelona, Madrid, New York and Munich) and 7,802 in the UPNA (all of them in Navarre). According to the U-Ranking 2017 (Pérez García, Francisco, et al), UNAV ranks first among Spanish private universities, and UPNA is fairly well positioned, given its size and young age (its position declined in the 2016 ranking from the 2015 one).

UNAV is particularly outstanding in teaching (first in Spain). Its main focus in Navarre is on undergraduate education. In life-long learning UNAV does not have a significant activity in Navarre unlike in its other centres. Compared to most private Spanish universities, UNAV also ranks quite well in research. Since 1990, UNAV committed itself firmly to research and currently "UNAV seeks to consolidate itself as a Research University". UNAV is by vocation universal. This is partly reflected in the origin of the students in the Navarre campus. While most students in Spain study at university in their home region in UNAV only 38% of students come from Navarre. Many students (47%) are from other Spanish regions (Andalusia, Basque Country, Galicia...) while 9% of undergraduate students come from abroad (48% in masters and 36% in doctorate courses). UNAV considers itself an international university, and it constantly seeks to have a high percentage of international students and staff. Each faculty has an advisory committee comprising world-class researchers. Besides, UNAV promotes a lively international alumni community.

As a private university, UNAV is not dependent upon Navarre Government's funding, but it is nevertheless very much linked to the region. UNAV has historically maintained a clear commitment to the region, and is in fact one of the hallmarks of Navarre itself, having promoted Navarre's visibility both in Spain and abroad. UNAV is also contributing to the economic tissue of the region, both by the creation of new spin off companies from the university and by collaborating with leading large companies based in Navarre.

UPNA is a fairly balanced university, which ranks quite well in teaching and researching, and is particularly good at knowledge transfer. It offers many postgraduate degree programmes, but few life-long learning courses. UPNA is acknowledged as one of the leading knowledge transfer universities in Spain. It shows less rigidity and more flexibility than the average Spanish university, due to its young age and not very large size; and in comparison with other Spanish public universities, is fairly well equipped and funded. UPNA could be defined as a regional university. At UPNA 85% of students are from Navarre (77% in masters and 63% in doctorate courses). Following the funding scheme of public universities in Spain, UPNA must be aligned with the region's innovation and development strategies. Although open to international collaboration, UPNA is more linked to the territory. Proximity is a crucial factor, and UPNA's immediate target for external engagement is local industry. We could define UPNA as 'a regional university with international projection'.

UPNA is partner of Campus Iberus constituted in 2012 as one of the Campus of Excellence funded by the Spanish Ministry of Education. Campus Iberus is a strategic alliance of four Spanish universities; the University of Zaragoza, the Public University of Navarre (UPNA), the University of La Rioja and the University of Lleida. It has also developed a strategic alliance with the Universities of Toulouse and Pau with which they have developed a new large-scale project called EBRoS- European Bioregion of Science Western Pyrenees. The specific objectives of Campus Iberus have been to:

- Contribute to the comprehensive training of students, complementing their theoretical and practical learning.
- Provide the knowledge of a working methodology appropriate to the professional environment in which the students will be operating, contrasting and applying the knowledge acquired.
- Encourage the development of technical, methodological, personal and participative skills.
- Obtain a practical experience which facilitates labour integration and enhances your future employability.
- Foster values of innovation, creativity and entrepreneurship.

The UPNA has promoted a new ambitious strategy to broaden its current academic offer of 18 degrees with seven more, starting from the 2018-2019 term. This new academic offer has very carefully considered the alignment with the Navarre S3 priority areas. Among the new degrees, the UPNA will offer seven new ones: Biomedical Engineering, Biotechnology, Data Science, Sciences (focused on Physics and Chemistry), Psychology, History and Heritage and International Relations and Cooperation. In addition, the possibility of offering the degree of medicine is under discussion with different actors, particularly with the Navarre Health Service (Servicio Navarro de Salud-Osasunbidea), as the new degree will require the participation of human resources from this public service.

Four degrees have already been opened to public consultation (Biomedical Engineering, Data Science, Sciences and Biotechnology), and two of them are very advanced in the discussions (Humanities and Cultural Industries). The selection of the new academic offer has considered not only employability aspects and market needs but specially the degrees that have higher demand and the societal needs.

Both UPNA and UNAV have actively participated in the 'Entrepreneurial Discovery Process' to define the priorities of Navarre's S3, being active in the working groups and decision-making bodies. The involvement of the universities at a senior level, with the rectors and vice-rectors leading the process, has enabled an unprecedented leadership of universities in the definition of the regional innovation strategy. The Navarre Government as well as the research and innovation stakeholders of the region have all acknowledged the critical importance of involving universities in S3.

4.7 The role of universities and higher education in Navarre's S3

In addition to the six thematic priority areas selected under the S3, five competitive factors have been selected. They constitute transversal priorities identified as key factors to develop the needs of the region to create an environment for the companies to be competitive. Education and training has been selected as one of these competitive factors, with the main objective to support innovative education oriented towards values and professional skills for the future. More specifically, the strategy aims to boost quality higher education and vocational education and training, that better responds to the needs of companies and is focused on strategic sectors, enhancing the skills and competencies for employability and life-long learning. The main tools defined in the Navarre S3 for the achievement of the education and training objectives are:

- Innovation projects
- Vocational education and training strategy
- Specialisation of universities
- Actions for professional development.

The importance given to education and training in the Navarre S3 is very positive and shows that Navarre has given the education mission of universities a key role to play in the achievement of the ambitious objectives set out by the strategy.

The S3 includes strategic aims for Education and Training as well as a dashboard of long-term monitoring indicators. The more detailed activities regarding the strategic lines and actions that will be put in place to achieve this S3 objective have been defined on the Science, Technology and Innovation Plan 2016-2020¹⁸ described in more detail later in this section.

In addition to this, the way in which the S3 will initially operationalise its implementation will be through a set of 24 challenges selected for the period 2017-2019. Among these challenges, there will be one on education focused on "Vocational education close to the companies", as shown in Figure 5.

In addition, a specific Vocational Education and Training Plan has been defined among the key social and labour actors, with a broad consensus that has led to an ambitious plan that constitutes the cornerstone of the education pillar. This VET Plan defines how the challenge will be tackled and a set of detailed activities, projects and indicators have been set up as part of the S3 education strategy.

If we take a look to the monitoring and evaluation tools of the Navarre S3 for the education and training challenge, we see that it constitutes a general dashboard with

¹⁸ <https://gobiernoabierto.navarra.es/sites/default/files/131216de80plan.pdf>

mid-term and long-term expected impact indicators, but no results indicators have been associated to the objectives defined, as shown in figure 6.

As an example, for the objective “Specialisation of universities” a mid-term objective of “Higher education graduates” has been included and described as the “% of population aged between 25 and 64 abandoning studies”. The departing point is 42.3%, with the objective of achieving 45% by 2020, 50% by 2015 and 55% by 2030. In this regard, the intermediate objectives defined to achieve the specialisation of universities could be more accurate and include short and medium-term proxies to measure progress towards the long term objectives. Nevertheless, the difficulties of collecting such data with the required quality and consistency have possibly determined the final selection of the more long-term indicators.

Figure 5: Navarre S3 Challenges 12 to 24 (in Spanish) with Education and Training highlighted and translated

	RETO	DESCRIPCIÓN - LÍNEAS DE DESARROLLO
DESARROLLO EMPRESARIAL	12	Clústeres para la innovación y la competitividad Trabajar en las seis áreas económicas priorizadas posibilitando la colaboración, el crecimiento y la innovación empresarial, alineando agentes, conectando a emprendedores y pymes con las grandes empresas y centros de conocimiento, y abriendo a Navarra al exterior.
	13	Incremento del tamaño medio empresarial Favorecer el incremento de tamaño empresarial medio en las áreas industriales de especialización inteligente, eliminando barreras legales para el crecimiento y potenciando la colaboración.
	14	Nueva cultura de gestión empresarial Impulsar los siguientes retos de gestión empresarial: nueva cultura y liderazgos que fomenten la participación laboral sobre la base de la confianza mutua, y que trabajen sobre la innovación sistemática y el marketing transformativo.
	15	Mejora de la financiación a proyectos empresariales S3 Reforzar la capacidad financiera de Sodena para la financiación de proyectos empresariales alineados con la S3, especialmente de capital semilla, fases iniciales y proyectos de expansión estratégicos.
	16	Acompañamiento a proyectos estratégicos de Navarra Completar con éxito el proceso de ampliación de la planta de VW Navarra y otros proyectos de importancia estratégica, implementando las medidas de apoyo necesarias para la mejora del entorno requerido y factores de competitividad (infraestructuras, talento, energía...).
I+D+i	17	Compromiso con la I+D+i Elaborar un Plan de Ciencia y Tecnología, y nueva Ley de Ciencia y Tecnología, con un compromiso de incremento presupuestario de la financiación pública, y la mejora del entorno de agentes clave.
	18	Transferencia tecnológica a las empresas Estimular la innovación colaborativa entre empresas, centros tecnológicos y universidades, integrando a emprendedores y pequeñas empresas en los retos de los líderes sectoriales junto con la participación de ADItech.
INFRAESTRUCTURA	19	Mejorar la comunicación y competitividad regional Mejorar la competitividad, apertura y conectividad regional a través de las infraestructuras y comunicaciones claves para el desarrollo económico regional: energía, banda ancha, transporte y agua.
	20	Desarrollo económico comarcal Potenciar la cohesión territorial mediante el desarrollo empresarial en zonas periféricas de Navarra, apoyando las estrategias de desarrollo local y la implantación de proyectos.
ADMÓN. PÚBLICA Y FISCALIDAD	21	Cercanía y agilidad administrativa Incrementar la agilidad de los trámites administrativos, especialmente en la implantación o crecimiento de los proyectos empresariales estratégicos para la región.
	22	Cambio de la imagen exterior de Navarra Cambio del modelo de presencia exterior de Navarra para el acompañamiento a las empresas y la creación de oportunidades para el desarrollo económico y la atracción de talento e inversiones.
	23	Proyecto Navarra Smart Region para la innovación pública Proyecto de innovación pública aplicando las tecnologías de la información y Comunicaciones a la mejora de servicios públicos regionales.
EDUCACIÓN Y FORMACIÓN	24	Formación Profesional cercana a las empresas Conectar la formación profesional a las demandas y necesidades de la empresa mediante una oferta de FP flexible (especializaciones, dual, online...). Elevar el porcentaje de jóvenes que estudian FP, visibilizando y haciendo atractiva la oferta.

EDUCATION AND TRAINING

24

Vocational training close to companies

Connecting vocational training to demands and needs of companies through a flexible PT offer (specializations, dual, online...). Increasing the percentage of young people on PT, making the offer more visible and attractive.

As previously introduced, in parallel to the Navarre S3, the Government of Navarre has worked on the Science, Technology and Innovation Plan (PCTI) 2016-2020 (Government of Navarre 2016). Both constitute the main pillars for science and innovation policy for Navarre in the coming years, the S3 being the broader policy strategy and the PCTI the operational tool through which some of the activities of the S3 are going to be implemented.

Figure 6: Navarre S3 Monitoring dashboard: Education and training challenge

	INTERMEDIATE OBJECTIVES	DESCRIPTION	STARTING POINT	OBJECTIVE 2020	OBJECTIVE 2025	OBJECTIVE 2030
EDUCATION AND TRAINING	Educational system	PISA Score	513	520	525	530
	Higher degrees	% population between 25 - 64 with higher education	42,3%	45%	50%	55%
	School dropout rate	% population between ages 18 - 24 who dropped out	10,8%	10%	9%	8%
	VT graduates and labor insertion	No. of VT graduates (and % of labor insertion)	2.577 (79%)	3.000 (80%)	3.600 (85%)	4.200 (90%)

The PCTI is based on seven axes, one of them being the regional S3. Furthermore, the other axes have considered the S3 priority areas and the transversal competitive factors, with prosperity and quality of life at the core of the strategy. The plan envisages specific support measures to improve access to European programmes, such as H2020, and to develop the talent to boost growth, prosperity and progress of Navarre. The pillar to develop regional talent includes the following objectives and actions:

1. Reinforce Vocational Education and Training (VET) in cooperation with industry and trade unions: The government aims to build a VET framework that provides flexibility for life-long learning and promotes the recognition of professional qualifications.
2. Attraction of international talent: Through the participation in Marie Curie calls, putting in place information platforms about working and living in Navarre and promoting industrial doctorates that increase the number of PhDs in local companies.
3. Adapt and tailor the educational offer of Navarre's universities: The government is working closely with the universities to design a new range of degrees that supplies the professionals that society demands.
4. Promote access to STEM (Science, Technology, Engineering, Mathematics) education: The government will promote the education offer related to STEM fields, since this is an indicator of faster growing economies. It will make an effort to promote STEM among young students and to attract women, including publications and multimedia material to be used in secondary education institutes.
5. The Government of Navarre will promote activities to improve the scientific and technological culture of society through education, training and outreach

activities, and will acknowledge those activities carried out by innovation actors in the region.

As a conclusion, the S3 and the Science, Technology and Innovation Plan 2016-2020 clearly include objectives and initiatives to strengthen the contribution of HEIs to respond to the future needs of the region. Nevertheless, a more specific identification of mid-term objectives, actions, programmes and actors that will be implemented to achieve the objectives would be beneficial, as well as clearer progress and output indicators to allow more effective evaluation and monitoring.

4.8 Instruments and tools under S3

An analysis of the calls for proposals launched by the Government of Navarre under Thematic Objective 1 of the European Structural and Investment Funds (ESIF) during the programming period 2014-2020 show that the four calls already launched have been focused on funding R&I projects or institutions and that the S3 priority areas of Navarre have been included as eligibility criteria.

Beyond the call for proposals co-financed by ESIF, additional instruments have been launched by the regional government to strengthen links between universities, industry and other innovation actors. As an example a "Call for Industrial PhD" was launched to support the development of doctoral studies by universities in partnership with local companies. Another interesting example of the policy measures is the recent "Call for technology centres and research institutions and dissemination of knowledge to develop R&D projects" with a budget of €8 Million. The call supports collaborative and leverage projects implemented by partnerships of research institutions and business in order to align research with high industrial and market potential. Both calls include alignment to the S3 priority areas as eligibility criteria. Finally, the PCTI has set up new "strategic" calls to support pluri-annual R&D project consortia devoted to specific S3 priority lines (for example in 2017 the chosen lines were electric vehicles and personalised medicine).

These calls show that the Government of Navarre is making efforts to promote specific instruments to boost the engagement of universities with its S3 priority areas not only in ESIF funded calls but also those funded by the regional administration budget.

4.9 Navarre S3 and cross-border collaborations

Navarre region has recently joined the Euroregion Aquitaine-Euskadi, a European Grouping for Territorial Cooperation (EGCT) funded by the three regional administrations that has the following primary objectives:

- To foster a comprehensive, multi-faceted approach to cooperation
- To develop territorial cooperation in a European context
- To enhance the visibility of all regions at a European level

Navarre is also one of the regions of the Working Community of the Pyrenees (CTP), created in 1983 with the support of the European Council, with the main aim of boosting cross-border cooperation and development of their territories.

Historically the collaborations between Aquitaine and the Basque Country have been very important for Navarre, due to the high levels of labour mobility in the cross-border region and the common economic and societal challenges linked to the Atlantic area. In this regard, Navarre is integrated in three Interregional Collaborations Programmes. The

cross-border cooperation programmes Spain-France POCTEFA, the Interreg Atlantic area and Interreg Sudoe.

Navarre is one of the partnering regions of the Vanguard Initiative and S3 Thematic Platforms, with the leading role of the Government of Navara, ADitech and other R&D&I actors. The Vanguard Initiative is driven by a strong political commitment of the partner regions to use their S3 to boost new growth through bottom-up entrepreneurial innovation and industrial renewal in European priority areas. There is a political engagement by the regions to position the smart specialisation agenda at the centre of the EU's drive for new growth and with a firm belief that common policy goals will provide the stimulus for revitalising European industrial growth.

The participation of universities in cross-border collaborations has evolved from university-university collaborations, particularly focused in collaboration among research groups, towards the collaboration with the larger research and innovation ecosystem.

5. Results

This section presents the aggregated results derived from the whole research process. The results integrate the reflections of regional stakeholders of Navarre, views and opinions of international experts and outcomes of the semi-structured interviews. The results are structured according to the main conclusions of the validation workshop with regional stakeholders.

5.1 Balance between global perspective and local engagement

Both universities as institutions and academics as individuals need to maintain a clear and determined orientation to knowledge production, which is a global endeavour. Universities are ranked internationally, and we cannot forget that academics are assessed by their contributions within their respective international communities of peers. However, universities are clearly one of the most decisive assets of a region since they directly contribute to provide and enhance the human capital of the territory, and can be a research and knowledge reference for companies in the region.

Universities should combine and reconcile the global perspective of the university activity and their engagement with the region. They must keep an eye on the regional demands, and look after future generations of highly qualified workforce, while another eye is focused on the production of knowledge that is relevant to tackle global challenges and the education of future researchers for the 'international enterprise' of knowledge. The educational offer of universities must be compatible with Navarre's needs and demands. However, universities must provide a fundamental educational base and strong disciplinary competences for each academic level, that are of global value and not dependent on local demands. Universities must provide an educational background in such a way that its graduates can be employable globally, in Navarre and other places around the world.

Furthermore, in an increasingly global scenario, and with widespread communication and mobility, the perimeter of influence of a university transcends the geographical borders of the region in which it is based. Graduates can now look for jobs and educational and training opportunities elsewhere that can be just 'two-hours flight from home'. Universities should not focus exclusively in attracting local students and become self-referential. Universities must be open to international students, and stimulate international mobility of its community. In fact, this is also an important contribution to the region, to be a 'pump' for the flow of talent in the region.

5.2 Skills and capacities of graduates highly recognised by employers in Navarre

Employers in Navarre mostly get their qualified employees from both universities. Therefore the demand of graduates is usually covered by both universities.

Employers in Navarre demand graduates with comprehensive transversal skills, i.e., team work aptitudes, communication and negotiation skills, multilingualism, etc. In general, employers are satisfied with the disciplinary and technical competences of graduates, but they usually consider that graduates are not 'ready-for-the-job', and that have not received enough training in their sectorial domains.

Some employers consider that graduates have a comprehensive knowledge, but they have not been focusing on the reality of Navarre. For example, the animal model of study

in livestock breeding or the plants studies in the agro-engineering degree are not very much focused on the typical Navarre agriculture and farming production. Apart from this, Navarre employers demand that graduates are not so specialized: they demand graduates with complementary competences (for example, engineers that know more about the economy, or economists competent in data analysis or in technology use).

According to one of the comments from the government, the existing social and humanities educational offer in the universities should be more strongly embedded in the regional S3 and its selected priorities. In this line, there is a view that the crisis has enhanced 'an economic-driven reductionism' in higher education. It also considers that students' expectations are very low and that many of them just want 'recipes to do the profession' and are not able to assess the added value and deep understanding that higher education provides.

On the other hand, universities consider that employers, and specifically companies, have a generally short-term vision and demand professionals in order to solve the immediate problems of the company. This mind-set has even permeated into the university and some subjects and themes have been reduced or even eliminated from the curricula because 'they were considered very abstract and not very practical'.

Universities consider that they are educating the new generation of professionals, those that can solve the problems of today (with the proper and necessary 'in-the-field' training inside companies) but that, above all, will be prepared to tackle the future, and always changing, challenges and demands that 'the companies will face tomorrow'.

Universities are aware of their key role in providing a highly qualified workforce for Navarre, and they are making a big effort to generate an offspring of professionals with added values and skills such as critical thinking, environmental awareness, culture of effort and hard work, or ethical values (honesty, integrity, loyalty, etc.). UNAV specifically considers that they provide a solid education on these skills and values.

5.3 Participation and involvement of HEIs in Navarre RIS3 design and governance

Universities have been playing an increasing role in the design of the regional innovation strategy since the early days of Plan MODERNA, and in its subsequent executive entity, MODERNA Foundation. In the most recent process of updating the Navarre S3, both universities have been actively involved. Both feel that the development process has been open and participative. They also feel that they have had 'their voices heard', as have those of other stakeholders in the region.

From outside the universities, there is a perception of the increasing demand of the participation of universities in regional innovation policy design, and, in particular, in the S3 development process. In general, stakeholders think that the response of both universities and their involvement in the process has been very high. Some of the non-university interviewees claimed that if this question had been asked several years ago, their answer would have been negative. This clearly indicates an increasing positive perception of the universities by other stakeholders.

Most of the interviewees think that the capacities of Navarre HEIs have been taken into account for the final selection of the S3 priorities. This is the case at least with the health priority that matches very well with the strongest capacity of UNAV. It is widely

recognised that UNAV has historically been a determining factor for Navarre to have excellent medical services and bio-health industry. It is also clear that there is a good match between Automotive and Mechatronics, Food Chain, and Renewable Energy and Resources Priorities and UPNA's strong capacities in engineering in those areas. However, this is 'a posteriori' analysis, and it seems clear that the selection of the S3 priorities and objectives has been done from an industrial perspective and according to the industrial demand side. For example, in the selection of the 24 strategic challenges there is not a clear matching with the strongest areas of UPNA. As a conclusion, the S3 priorities have been selected without taking into account the strongest capacities of HEIs (save for health), although the final selection does closely match with the strengths of the universities.

Both universities declare that they are always available and eager to contribute and take part in the S3 process. UPNA's rector and vice-rector for research have been involved, together with other agents, in the setting up of the regional strategy for innovation at different stages and in several teams. UNAV's rector, vice-rector for research and managing director have also been involved in the S3 development process. UPNA's rectoral team often delegates its representation to individual academics in order to bring about greater efficiency in specific working groups.

The rectors themselves are involved at the highest level, i.e. in the steering committee of the S3, where the final decisions are made. The vice-rectors for research take part in the strategic platform, a large consulting body that generates most of the ideas. Individual academics can participate in the S3 dynamics and they are appointed directly, without formally consulting rector teams.

Box 2: Awareness of S3 in the Navarre universities

Awareness of S3

University communities at large (academics, researchers, administrative staff) are not aware of the existence of a smart specialisation strategy. Most of them are not even aware of the regional policies for research and innovation. It is something out of the usual scope for academics that the university itself is a key player in regional development. Academics are very much self-centred, dealing with their own academic progression and career, and typically not engaged with the demands and needs of their territory.

Both UPNA and UNAV have not carried out broad information campaigns about S3 among the university community at large. The information has been selectively targeted on the areas where universities contribute. Nevertheless, universities think that academics will become progressively more aware of S3 priority areas during the implementation phase. For example, when applying to calls for proposals that include S3 priorities academics will reflect on how to respond to these priorities based on their own knowledge fields.

UPNA's rector is always invited to participate in the different public events to disseminate and support the S3 process, and it is visualised as one of the leading actors in Navarre, and in particular regarding the S3.

5.4 Current contribution of HEIs to RIS3

Entrepreneurial spirit and innovation among students and the academic community is expected to be a key contribution to S3 in Navarre. Both UPNA and UNAV foster “entrepreneurship and initiative culture” in their respective student communities. They do not only have specific programmes, but they also have the “innovation competence” included in the curricula of the different under- and post-graduate courses. Starting new companies is presented as a way of creating job opportunities for the students themselves.

What still remains pending in universities is fostering entrepreneurship and innovation in the academic community. There are few incentives to create new businesses, or to interact with companies, or even to move away from what your research group always does. Furthermore, academics claim that risk-taking and being innovative is punished. Entrepreneurship and innovation depends only on personal motivation. It is very difficult to launch new research lines or to start a company, because of the evaluation and accreditation system for academics. This does not only happens in Navarre but throughout Spain, and in recent years there is a prospective movement inside the Spanish Conference of Rectors (CRUE) to set up criteria, rules and incentives for entrepreneurship, innovation and connection to companies.

As previously said, UPNA’s current curricular offer is well aligned with the S3 priorities, at least for automotive industry and mechatronics, food chain, and renewable energy and resources. In fact, UPNA has a highly polytechnic profile that serves the demands of these priorities very well. This is not still the case with the other three priorities. UNAV, however, is closely aligned to the health priority. In any case, the contents taught in universities are not always aligned with the immediate needs of companies, and, therefore, an in-house training is needed for the graduates after leaving universities. There is not a great number of teaching staff in universities that are also professionally active in companies, and this can be one the causes for the mismatch in contents and companies needs and demands.

In UPNA's opinion, there are certain priorities, such as health and creative and digital industries for which UPNA has no strong teaching capacities. UPNA is analysing if the university has potential to diversify its teaching potential to match these priorities. Furthermore, UPNA is designing a new map of degrees (both under and post-graduate) and has invited different stakeholders to participate in the design of the new degrees, who they believe can make a crucial contribution.

At the same time, UNAV declares that there is a strong interaction with companies and other stakeholders in order to fine-tune their teaching/training offer to stakeholder demands.

In summary, according to the interviewees the concrete aspects of contributions of universities to S3 should consider the following drivers:

- Universities need to remain vigilant to excellence examples in order that Navarre does not lose competitiveness.
- Universities have an important role to monitor the state and advancement of Navarre, and identify the critical factor for success in the S3 development.

- It is clear that universities and businesses have different timings and social accountability. However, and because of this, universities must be in permanent touch with companies and other stakeholders in Navarre.
- The labour market and needs of companies evolve very quickly. Therefore universities are encouraged to analyse future needs of companies in terms of skills and competencies of graduates.
- In particular, universities can improve the innovation system by connecting to VET centres, which are traditionally closer to companies.
- Universities, particularly UPNA, understand the need to cultivate its alumni network, since alumni can act as important link between universities and companies where they become employed and thereby contribute to S3 implementation.

5.5 Alignment of university educational offer with S3 priorities

It is difficult to say what came first. It is not casual that four of the Navarre S3 priorities are very well aligned with the strongest offer of both universities in Navarre (Engineering and bio-health studies). In fact, there is a good alignment of the education offer of Navarre with the selected S3 priorities, even if it is underlined that this has not been specifically considered in the selection of the priorities.

In general, there is a strong focus on technology and technological innovation when analysing Navarre S3. Humanities and social sciences, that are key assets of university education and capacity, are not sufficiently acknowledged and included in the strategy. In fact, humanities and social sciences are not even mentioned. Some of the participants pointed out that there is a lot of interplay between technology and humanities nowadays that could also be exploited commercially.

The UPNA is promoting a new offer of degrees aligned with Navarre S3 with new seven degrees. The characteristics and rationale behind the new educational offer is a clear response to contribute to the Smart Specialisation Strategy of Navarre as well as the societal demands of the navarrian society. The new degrees will include:

- Biomedical Engineering: linked to Telecommunications Engineering offered in the UPNA and currently with a master degree in place
- Biotechnology: which is in the existing offer as a master and doctoral studies but linked to green and food biotechnology, and with the new offer will be broadened to technological applications
- Sciences: focused on physics and chemistry that the current sciences degrees do not cover, as are targeting the health sciences
- Data sciences: a field for the future in which UPNA has strong researchers
- Psychology: a degree with high demand among Navarre prospect students
- Humanities and Heritage: currently in the educational offer as a master's degree
- International relations and cooperation: a field with future prospects and that could be potentially linked to the degree in Law.

It should be noted that, the UNAV education offer is particularly well aligned with the health priority area of Navarre S3, with an existing offer of degrees in Biomedical

Engineering, Chemistry, Biochemistry, Medicine, Psychology. The UNAV has as well an offer of an International Relations and Law, Humanities and History degree offer, among others.

The interviewees underlined that it is necessary to consider analytical studies of market needs and occupation trends and perspectives. There is a need to start from evidence-based studies with quantitative data. In this sense, the representative of the Navarre Confederation of Companies (CEN) brought their "Empleo 2030" study to the table, in which they have analysed the market needs in upcoming years and the competencies and skills that are going to be under more demand.

VET systems also should play a key role as their contributions could be considered complementary with higher education. It was claimed that dual education offer should be given priority by the government, with a strong promotion of the government for training at the university and in companies, going a step further from the current in-company traineeship concept. The dual education of the Basque Country constitutes a very good example of how transversal competencies can be integrated in higher education.

It has to be considered which tools universities currently have or might put in place to face the upcoming needs and demands from companies. In this sense, dual education has proven to be very positive in other regions and the experience could be transferred and implemented in Navarre.

An example of the "sandwich year" applied in England was mentioned. Even if the context is very different it is an interesting example. Students can decide to dedicate one year of their studies to be in a company and then return back to their studies at the university. This programme enables the students an early introduction in the labour market environment.

The trends in the kind of skills and competencies that will be demanded in the future should be explored by the universities in order to define their current/future curricula.

Universities could learn from the VET best practices. The Confederation of Enterprises of Navarre (CEN) has been involved in the Dual Education programme that has started to be implemented, in which curricula are focused on the resolution of challenges rather than on distinct and traditional subjects.

5.6 Barriers, gaps and capabilities

The three main barriers identified during the research process were:

Firstly, there is an underlying conflict between HEIs and technological centres in Navarre. Sometimes they consider each other as competitors for both regional and international funds, as well as for collaboration with companies. There are many technology centres in Navarre, and they are also very different from each other; some are service oriented, others are more research intensive, several centres only have a regional scope, while others are nationally orientated. Some of the technology centres were created without taking into account the presence of universities, which has made the interaction and understanding between them more difficult. In principle, technology centres and universities work in different levels of the TRL (Technological Readiness Level) spectrum: universities typically in the lower TRLs and technology centres in intermediate to higher

TRLs. However, this distinction is not always clear and, in fact, reflects a wrongly perceived linear approach to the innovation process. Nowadays universities world-wide move all along the TRL spectrum and it is not possible to limit their mission and scope of activity. In Navarre this conflict stems from the increasing density of innovation actors. The creation of ADITech, which gathers and merges the interests of technology centres can facilitate (and in fact it is recognised that it is already delivering) the interaction with universities, since now there is a single entity that can channel the interaction with technology centres. At the same time, ADITech integrates both UPNA and UNAV in its governance structure (both universities are members of the Patronage Board).

Secondly, in general there is a lack of understanding of the university's mission and dynamics. Universities do not like to be perceived as 'factories of professionals' and 'service providers' of solutions for the demands of companies. Universities think there should be a balance among the responsiveness of universities to the immediate needs of companies (often with short-term views) and the more long-term and higher mission of universities of educating the society of the future. Universities understand the pressing force of the annual profit and loss accounts, but they consider that companies do not understand their role as long-term, solid knowledge foundations that can be the key for competitiveness and future business diversification. They feel that companies are more concerned about their urgent issues than the important ones that contribute to the common good. Companies in Navarre (as in Spain overall) do not properly value PhDs. On the other hand, companies cannot understand and even accept the inertia and low agility of universities. Besides, companies often think that academics live 'out of the real world' and that are only focused on problems and issues within academia.

In fact, there appears to be a 'clash of cultures' that prevents mutual understanding and from getting closer to each other. It has been pointed out by several interviewees that there is a need to foster dialogue, mobility and exchange of university and company people; universities could have more teachers coming from companies (taking advantage of the 'associated professor' profile), while companies could hire more PhDs with a highly developed and more complex 'intellectual architecture'. Industrial doctorate programs can facilitate this mobility, by providing a better understanding and commitment through co-responsibility in a project carried out by one person working on both sides.

Finally, there are several system barriers that limit interaction and prevents universities from working together with other agents and responding to the demands of society. Several problems were identified by the interviewees:

- University governance systems (at least in public universities) limit the development of a coherent institutional strategy. Therefore it is difficult to align the university with the regional strategy. Some even claim that governance systems in universities 'waste' resources.
- University autonomy that allows individual academics can do whatever they want, not taking into account whether it is socially relevant. Outside the university, stakeholders perceive that nobody can 'force' anybody within the university to do anything or to collaborate or to participate in a particular project.
- Internal bureaucracy in universities and how the resources are managed: sometimes 'the money and resources does not reach where they should reach',

with duplication of equipment, lack of ownership of the resources by groups or individual researchers, and other similar problems.

- Finally, accreditation processes for the degrees is very demanding, time consuming and slow. Moreover it does not take into account what society demands and reduces the response capacity to changing demands for training.

Concerning capabilities, one of the main assets that a university 'produces' is the PhDs programmes and therefore a type of human capital. Most of the interviewees highlighted that companies could hire more PhDs, because it would be one of the best ways to 'absorb' the full potential that universities can provide: rigorous people with complex mental architecture, analytical capacity, that know how to deal with failure and long-term methods for problem solving. This should be a starting point to better take advantage of what universities can give, and also to increase the connection between universities and other institutions and to decrease the 'cultural distance'.

Universities as research centres have high-level equipment for scientific and technological research that could also be useful for external users under rigorous protocols. This would provide a good opportunity to start conversations that can lead to collaborations.

In order to capitalise on the university's resources and capabilities for Navarre's S3, more mobility of personnel needs to be established between universities and other stakeholders (technology centres, companies, other institutions). At least, forums for exchange could be organised more often in such a way that 'friction' between stakeholders happens, and on-going conversations are established. In this way, academics can better visualise the demands and needs of both companies and society, and other stakeholders can better visualize the capabilities of universities and make use of them.

Finally, some interviewees commented that Navarre S3 is very much technology oriented and does not mention or include the social and humanities competences that universities can provide, as well as the role universities may play offering an integral education that goes beyond a set of technical contents and competences.

5.7 Incentives to HEIs and university in the context of S3

The importance of HEI actors' participation in the S3 design process was acknowledged. However, they pointed out that it is more rewarding to see the implementation of the strategy and seeing the contribution of the different actors to the objectives. They also emphasized the importance of tactics: one participant claimed that "it is usual that we have very nice strategies that remain as such and nothing relevant follows afterwards. It is very disappointing that strategies do not pass from paper to action". And as another participant concluded "you acquire a social compromise if as a researcher/professor you see that you are being able to transform things".

In the Spanish evaluation and accreditation system, all the incentives and recognition for university professors and researchers are focused on teaching performance and "canonical" research indicators (i.e. scientific production in peer reviewed journals, and submitted patents at most). Furthermore, the interaction with companies at different levels (transfer projects, coordination of traineeships in companies, etc.) is not sufficiently acknowledged inside the universities. It was claimed that the university researchers' involvement in activities with an impact on innovation should be publicly

recognised. It is not always a matter of economic incentives, or compensation packages, but also of acknowledgement and public recognition.

There is a lack of calls for proposals that encourage technology transfer and closer interaction with other actors in the region, particularly with companies. The examples of university-business programmes or industrial doctorates were recalled as highly motivating factors to undertake research and academic work more engaged with the region, and particularly with its S3.

One of the key issues raised when discussing incentives for engagement with S3 was talent management in two different perspectives:

- The need to foster and stimulate the absorption of university graduates, above all PhDs, by companies. This is a key element to change the 'cultural distance' and mistrust between universities and businesses.
- The need to have a national programme in Navarre to attract international talent that can have a tractor effect not only in the universities but also in Navarre as a whole, fostering international connection and return in international funding. There is consensus that HEI capacity for international talent attraction and HEI contribution to territorial development can be met and reinforced mutually.

Box 2: Learning from other regions

Examples of tools/mechanisms/good practices that have been implemented in other regions/countries and that could be interesting for Navarre

Industrial doctorates: There was unanimous consensus about this tool as one of the most effective instruments to foster cooperation, establish responsible partnerships, and catalyse a change in the "clash of cultures" between universities and other agents (especially university-business interaction). The government of Navarre has recently opened the first call for proposals for industrial doctorates. However, most interviewees claim that it has been done late and with very short notice and time to apply. Furthermore, they think that the call must be improved to foster companies and university involvement and commitment (provide some funding for both of them). All of them recalled the Catalanian model for industrial doctorates as an example to follow.

Intensive and long-term internship programmes in companies: Dual education, such as French and German models for undergraduates and postgraduates were also recalled. However, in this case, a change in the Spanish labour market laws is required that could allow such programmes. Nevertheless, there was unanimous consensus about the importance of internships in companies and the need to reinforce these practices. More recognition for university teachers that make effort and devote time to students internship was requested.

More university-business collaboration programs: A challenge-based approach as in H2020 (with almost 40% of its budget oriented to the 'societal challenge pillar') would bring together resources and knowledge across different fields, actors, technologies and disciplines, including social sciences and the humanities. Several interviewees suggested that this H2020 challenge-oriented model could be replicated at regional level in Navarre, as a way to foster complex local interactions and responses, covering activities from research to market with a new focus on innovation-related activities, such as piloting, demonstration, test-beds, and support for public procurement and market uptake. Many interviewees think that industrial research with long-term objectives and not linked to immediate problems of companies must be promoted by the regional government. In Navarre there have been calls for proposals for industrial projects that require the

participation of universities. Technology centres and universities request that these programmes have greater scope and ambition, as well as more resources that enhance university-business cooperation. Apart from H2020, the Basque model of cooperative research programmes (former Eortek and Etorgai programs, and current Elkartek and Hazitek programmes), and the Spanish National Programme for Research Aimed at the Challenges of Society, were recalled.

Talent attraction and retention programmes: Universities think Navarre could design and implement programmes/instruments to attract international researchers in a similar way to Ikerbasque in the Basque Country¹⁹ and Icrea²⁰ in Catalonia. These agencies work with universities and research centres in their regions to integrate researchers in the research and innovation system, as well as attract international talent. These kind of programmes increase the knowledge base of the region, foster international connections, increase European funding returns, and help to create a climate of excellence that can easily permeate to the other regional actors, having a strong impact in the Navarre S3 priorities development and challenges fulfilment.

5.8 Potential role of Navarre HEIs in forthcoming smart specialisation process

Educational programmes

As already mentioned, UPNA is designing a new map of degrees (both under- and post-graduate), and has invited different stakeholders (companies, sectoral clusters, technology centres) to participate in the design of the new degrees.

All UNAV faculties have an external advisory committee, comprising both local and international professionals and researchers, which help them to update their educational offer. At the same time, UNAV academics and managers are constantly in contact with and listen to external professionals and their alumni community. This allows UNAV to update their curriculum, as well as to enrich their offer with ad-hoc seminars and courses facilitated by people of this external network.

These open dynamics make universities understand, and to some extent introduce, the demands of employers in the degrees (both under- and post-graduate). It also allows universities to introduce new degree models, such as double degrees that fit better to the 'complementary education and training' demands by employers, or to the changing professional profiles. The interviewed non-university stakeholders consider that their participation is important to shape the new degree offer according to the S3 priorities. It helps them to get closer to the university and understand the new higher education degree system, as well as the main constraints and time periods in the accreditation process.

¹⁹ Ikerbasque was created by the Basque government in 2007 with the mission to develop and consolidate scientific research in the Basque Country, attracting international talent to the Basque Country and helping researchers to work in research and innovation organisations of the Basque Country. .
<http://www.ikerbasque.net/en/>

²⁰ ICREA works with Catalan universities and research centres to integrate ICREA research professors in the Catalan research system. It attracts researchers from all over the world to Catalonia offering permanent positions. <https://www.icrea.cat/en/>

Research strategies/initiatives

UPNA is reorganising its research activity. In particular, it is creating different institutes for interdisciplinary, world-class research, that assemble fragmented research capacities (small research groups) in the University and that can interact more strongly with other agents in Navarre (Technology centres and companies) (<https://www.unavarre.es/research-institutes>), as detailed in the box below.

Not all the UPNA research is carried out within the institutes, but this is the strategic model that UPNA is promoting in order to integrate its research capacity and activity. The institutes are not created top-down, i.e. by decree of the rector team, but it is a bottom-up process led by senior professors. The institutes go through an external evaluation process before being launched in order to ensure excellence and a strategic approach.

The research at UNAV is characterized by its range of disciplines. Many areas of science and the humanities are the subject of research at the university itself and its associated centres, with the aim to serve society. UNAV has been performing its own 'smart specialisation process' since the nineties, when they selected several research fields and introduced internal instruments (such as PIUNA, Plan for Research at University of Navarre) to support and co-fund research projects. Some of the UNAV world-class centres and institutes (such as Centre for Applied Medical Research (CIMA), or the Nutrition Research Centre) are the result of that 'own smart specialisation' carried out over recent years. And, as already mentioned, these capacities, that historically have had a strong impact in the development and external image of Navarre have also carried a lot of weight in selecting health as one the Navarre's S3 priorities. These UNAV capacities are also called to play a major role in S3 development, since they constitute poles of attraction for international researchers, are very well connected with private companies in Navarre and its surroundings (some of them (CIMA) are initiatives with strong private investments), and they are also a source for new technology based-companies that will help fulfilling the Navarre S3 objectives.

Box 3: Research Institutes at UPNA

Research Institutes at UPNA

In the last two years UPNA has created four Institutes:

- Institute of smart cities (ISC).
- Institute for advanced materials (InaMat).
- Institute for advanced research in business and economics (INARBE).
- Institute for innovation & sustainable development in food chain (IS-FOOD).

The first three were created before the update of the S3, and are not inspired by the new strategy. However, these institutes are being oriented towards the priorities and to better respond to the identified challenges within each priority. The fourth and most recent institute, IS-FOOD, is very well aligned with the Food Chain priority since its very inception. The four institutes share a building and facilities in the UPNA Campus (Jerónimo de Ayaz building) to promote exchange and create an interdisciplinary environment that enhances scientific excellence and closeness to companies and other institutions. UPNA also appointed a single head of business development for all the research institutes who supports the scientific directors for management, knowledge transfer, regional engagement and international projection (above all increasing participation in European programs). This is a key coordinating position that will facilitate UPNA's involvement in

Navarre's S3 deployment.

INARBE is called to play a major role in the Navarre S3 deployment. In collaboration with Orkestra Institute in the Basque Country (which has also played a major role in the S3 update by carrying out a diagnosis of the Navarre system of innovation), and together with SODENA, INARBE will participate in the monitoring and evaluation of the Navarre S3 development. This task is well aligned with INARBE capacities, although the institute wants to add value from its very core mission as a research entity.

Knowledge Communities

SODENA has been working recently on the development of the Knowledge Communities (KC)²¹, a new instrument to better integrate the knowledge triangle actors of the region. The definition of the instrument is still in an incipient phase and has not been completed; therefore the information here should be treated as preliminary rather than conclusive.

The aim of the KC will be the creation of knowledge sharing and collaboration spaces integrated by company clusters, ADITech knowledge organisations (research centres and universities) and the Permanent European Fora²² to disseminate technology and the promotion of collaborative research and technology development projects. The objective is to approach the competitive priority of companies in the priority value chains to the different actors of the innovation system of Navarre, integrating the specialised knowledge at European level and reinforcing the clusters. The final goal is to foster complex challenge-oriented projects that need the concurrence of all the actors in Navarre, in a genuine quadruple-helix approach.

With this purpose, the KC will promote permanent working groups in the existing clusters, related on the one hand to the Navarre S3 priorities and on the other to the key enabling technologies transversal to these priorities. This KC will generate a community of projects that will be complementary, some will be S3 priority specific and others transversal to any area.

From the perspective of this case study, it is a very interesting and promising initiative to increase the integration and connection of universities to the economic fabric of the region, particularly to the companies and the technology centres. Even if the instrument is still under design, there are some very promising elements and certain aspects that could be further considered at this initial stage for a better integration of the education dimension:

- Consideration of the governance system of the KC. The co-lead nature of the instrument is a very interesting element in the context of the S3. The operationalisation of the instrument through the creation of permanent working groups within the clusters could strengthen the knowledge transfer from universities and research centres. Nevertheless it will be important to define a clear coordination mechanism and governance system with assigned roles to ensure a smooth connection of the knowledge triangle actors. The fact that the

²¹ Knowledge Communities (KC) are mentioned in the Science, Technology and Innovation Plan of Navarre (PCTI 2016). The JRC has had access to a more detailed six page short description (not publicly available) describing the aims and characteristics of the instrument, from which the following information and analysis has been derived.

²² Permanent European Fora are the main working lines and information provided by the Brussels Delegation of Navarre Government

clusters in Navarre are quite incipient with some being created in 2016 might introduce teething difficulties in the deployment of the KC as they would need an initial maturation and joint strategy within the cluster.

- The constitution of the communities will be a joint decision between the clusters, ADITech and SODENA. Even if the universities are part of the ADITech ecosystem and are integrated in the board it would be instructive to directly involve the private and the public university managers in the KC design process. The integration of the universities to the ADITech ecosystems is relatively recent and the direct involvement of universities could reinforce the knowledge triangle dynamics.
- Definition of the decision making process for the prioritisation of the projects to be integrated in the "technological roadmap" to be defined by each KC. It will be interesting to learn from the dynamics generated in other experiences carried out at European or regional level, such as the Knowledge and Innovation Communities (KICs) or the RIS3CAT Communities in Catalonia.
- The main role of management and leadership of the working session will be assumed by ADITech. The universities being part of ADITech, this could boost their role in detecting and proposing innovation challenges during the working sessions. This co-leadership approach could reinforce the cooperation dynamics of the new instrument and the co-creation of common solutions.
- The research institutes of UPNA and UNAV that are very well aligned with an important number of the S3 priority areas could be considered for the direct involvement of universities in the working groups. This would help to invigorate the objectives of the research institutes by connecting them to the regional innovation system and could channel the contribution of individual university researchers to the KC working groups.
- The integration of the European Fora in the knowledge communities can play a differential role. The Brussels Delegation of the regional government as main component of these Fora can boost the connection of the KC roadmaps to the European challenges and strengthen the integration in international value chains. The integration of the multi-level governance aspect of R&I policies and programmes in the KC could facilitate improving the definition and use of the S3 funding tools in synergy with existing EU R&I funding programmes. It could be considered the potential interest of including the knowledge and information generated by universities' EU offices, particularly the one related to higher education research and innovation programmes, such as Erasmus+, ERC, EIT or Marie-Curie.
- Finally, the public-private partnership business model proposed is very interesting. Nevertheless, a more precise definition of how the business model will work and its sustainability would be of interest. It will be interesting to explore the complementarity and balance between ERDF and/or regional funds and private funds or in-kind contributions, as well the leverage effect that these initiatives can

have to position Navarre in strategic European initiatives or programmes (including inter alia the EIT-Knowledge and Innovation Communities²³, H2020²⁴).

Other strategies/initiatives

There are also other instruments and activities such as thematic chairs. These chairs are relevant institutional instruments to strengthen the capacity of the universities in the S3 priorities. The chairs are focused on promoting and generating advanced research and practical training to enable integration and convergence between the academic disciplines and the technological and business sectors. The chairs support the development of joint research lines, doctoral theses and final projects or master's degrees, granting special awards as well as scholarships related to entrepreneurship. Chairs also play a major role in staff exchange, and in dissemination and public awareness.

In particular, the UPNA has different institutional chairs in place, such as the Chair on Renewable Energies (with Acciona, Gamesa, Ingeteam and CENER), the Chair ADITech and Chair Grupo AN. The UNAV has an important number of chairs in different fields, among which the Chairs with Volkswagen, Abertis, CaixaBank, SEAT, PricewaterhouseCoopers or Alcatel-Lucent could be highlighted.

In addition, the active participation of both universities in the clusters created by the regional government, together with key public and private stakeholders, and the participation in Innovative Business Groups (AEI) of the region is as well part of the commitment of the universities with the regional socio-economic development.

5.9 Future actions to optimize collaboration between HEIs and other regional actors

In order to foster collaboration between universities and other regional actors, it is necessary to understand the dynamics of academics research (mainly long-term and oriented to global knowledge challenges), the way an academic career is built over time (how an academic career is commonly evaluated) and how to motivate researchers in universities (keeping in mind academic freedom and allowing individuals to progress in his/her academic career). Of course, all these three factors are intimately related and are somehow redundant showing different facets of a single whole. In addition, understanding the dynamics of a university, its governance and internal management and bureaucracy is also required. Otherwise non-university actors in the region will easily become frustrated. This does not mean that the university is something untouchable. Of course universities can (and must) change and evolve to better serve the societies in which they are based, but this is not going to happen overnight. We can even claim that a constant and increasing interaction and cooperation with the non-academic world will boost that change within universities and the regulatory bodies that generate some of the university inertias.

For this to happen, a permanent conversation between regional actors must go on. Therefore, both universities and other actors must open channels (forums, encounters,

²³ EIT-Knowledge and Innovation Communities are partnerships in the triangle of knowledge that bring together businesses, research centres and universities <https://eit.europa.eu/activities/innovation-communities>

²⁴ Horizon 2020 Research and Innovation Programme <https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

workshops, mobility and exchange of personnel, shared facility use, etc.) that enable this permanent dialogue. This 'permanent touch' is a necessary condition, but it is not enough. In the interviews several comments/actions were suggested to collaboration between academics and other regional actors and contribute to the full development of Navarre's S3.

First and foremost, a societal recognition of the university activity for its own sake as a clear and distinct contribution to the region: Universities are universities, i.e. their primary responsibility is to fulfil their missions as universities and do not need to do anything more or anything different than being themselves. Although this is an obvious statement, sometimes universities perceive that it is forgotten and feel that they are asked to do something extra. Some academics now claim that they are under great pressure since they are supposed to be world-class researchers, excellent teachers, ingenious inventors, solvent managers, good negotiators, service providers, and even entrepreneurs... Relaxing this pressure on academics is required to bring about effectiveness and efficiency in the professional growth of academics and in the relations that they can establish with other agents. This must be a premise well assumed by all actors in Navarre.

Second, the way academics are evaluated does not encourage them to interact with other actors. In particular, the so-called 'sexenios'²⁵ usually do not include knowledge transfer merits, nor participation in projects with companies (unless they lead to publications and/or patents). Therefore, these metrics need to include other types of indicators that foster interaction with other regional agents (participation in industrial projects, contracts with companies, industrial doctorates, promotion of internship programs, seminars and encounters with companies, etc.).

Third, it is recognised that the second action is a systemic boundary condition that needs a national commitment to be changed. However, the merits of knowledge transfer activities and interactions with other regional actors could be acknowledged by the regional authorities, since the development of Navarre S3 is a regional endeavour. Recognition by the Navarre government could be introduced to those academics with 'sexenios' and regional engagement activity.

Fourth, private companies could invest more in research by sponsoring programmes with universities. This is not very common in Navarre (even in Spain), and often companies only invest in research with public entities, or with universities, if there are public subsidies (incentives such as fiscal exemptions are not considered as sufficient).

Fifth, individual remuneration to academics when they participate in projects with other regional actors could be a motivating factor. However, this is not always easy to implement (at least in public universities). Besides, there is the common perception that academics are already paid by society (many of them are civil servants) and therefore sometimes it is perceived as strange if they ask for extra money. This is somehow

²⁵ Sexenio – sexenios are the productivity complements recognised by the Spanish Accreditation Agency (ANECA) after an evaluation over six year periods. Sexenios are claimed to acknowledge merits and become incentives for further academic excellence and greater productivity. The usual metrics to be recognised with 'a sexenio' includes mainly JCR publications and patents, and to a lesser extent chapters in books, communications, and some clearly identified innovation management for engineers. See the 2016 Criteria Call for Sexenios for the different disciplines (http://www.boe.es/diario_boe/txt.php?id=BOE-A-2016-11189, in Spanish).

related to the first point in this list of actions: interaction with regional actors is not seen as an extra from university outsiders, but it is perceived as such by academics. Here again we meet the 'clash of cultures'. This individual remuneration should be studied in light of points 1 and 2, since focusing on relation with other regional agents consumes time and effort that cannot be devoted to the 'real academic tasks'.

Box 4: Euroregional Aquitaine-Euskadi-Navarre cooperation

Euroregional Aquitaine-Euskadi-Navarre cooperation

UPNA is the leading Navarre actor in the cross-border cooperation. They are one of the promoters of the Campus Iberus Alliance²⁶, which fosters strong connections with the Universities of Pau and Toulouse (to a lesser extent in Toulouse since the university landscape is very complex). UPNA promotes mobility of students and staff with the University of Pau. UPNA has some joint postgraduate degrees with universities in Aquitaine (Pau and Bordeaux). They can take advantage of the inter-regional Programmes (POCTEFA and Interreg SUDOE mainly) to set up common projects.

In the collaboration agreement with Aquitaine and the Basque Country, to which Navarre has recently re-joined, both UPNA and the Navarre government envision a new framework of potential Euroregional collaborations that will have a great impact on the Navarre S3 itself.

More awareness of these Euroregional, cross-border opportunities could be raised by the Navarre government to foster this still untapped potential. From the results of the interviews, and save for UPNA and the Navarre government, enthusiasm for this potential inter-regional cooperation is not detected; at least, no more than for other international cooperation. In fact, stakeholder focus on international cooperation comes from the necessary pursuit of excellence or market opportunities and does not have a political driver.

Sixth, in line with the previous statement, and understanding the way the academic career is built and recognised by academic peers, there is a need to recognise what academics consider is 'time' to be able to focus on other 'non-academic' activities. This time, usually in the form of exemptions of teaching or management duties, can be given to individual academics provided that their department or institutes or centres receive money that can support those exemptions to hire additional personnel or re-arrange the teaching programmes or department activity. This money could come from either public or private sources (public incentives, public programs, private sponsoring, etc.). In the same way, academics value extra money for mobility, talent attraction and retention, and have a multi-annual, stable support for the group/institute/centre/department. At the same time, academics request that this money/resources really reaches their group/institute/centre/departments, being used for the purpose decided by researchers themselves without being dispersed in the university structure.

For the fifth and sixth points, it must be recognised that these type of measures cannot work for all academics in the same way, since the age of the academics and stage in the

²⁶ Campus Iberus. Along with the universities of Zaragoza, Lleida and La Rioja, the Public University of Navarre forms the Campus Iberus, distinguished by the Spanish Ministry of Education as a Campus of International Excellence (CEI). This project is based on three areas of expertise: materials and technology to improve quality of life (with two aspects: health technology and energy and environment); agri-food and nutrition; and memory, heritage and identities.

Thanks to the Iberus Campus, International Postgraduate and Doctorate Centre, an Innovation and Entrepreneurship Centre and Joint Research Centres with enterprises programmes have been put in place. The universities within Campus Iberus have also created a Cross-border Campus with the French universities of Toulouse and Pau in what will be a new big project: EBRoS (European Bioregion of Science) Western Pyrenees.

academic career matter substantially. It is commonly accepted that senior academics can have less constraints in establishing connections with other regional agents or devote more time and effort to other 'less' academic tasks. They can be more motivated to have an extra remuneration, either directly for themselves or funding for their group/institute/centre/departments, since they have already consolidated their academic position.

Seventh, companies should encourage their staff to participate in university teaching, either as associate professors or in dedicated seminars and workshops. Companies should consider that this is not 'a waste of time', but as a matter of prestige with clear incentives (in time exemption mode) for their most qualified staff. At the same time, universities should revitalise this 'external associate professor figure'. These external associate professors should participate in the curricular design and university departments should not 'leave the worst subjects' to these professors. They must be considered a key figure by the universities themselves.

Complementary reflections about the way to optimise collaborations at different scales would include cross-border dynamics, for instance developed in the framework of the Euroregion Aquitaine-Navarre-Basque Country. To this regard, these elements appear as relevant:

- It is important to note that the stakeholders from Navarre could greatly benefit and learn from each other through increasing collaborations among actors and strengthening collaborations within regional actors.
- The very scarce or inexistent collaboration between the public and private universities of Navarre is remarkable.
- The way to establish collaborations is not straightforward and has to be started by small personal contacts between researchers that are open and willing to collaborate and that have small amounts of seed funding to kick-off their collaborations.
- General and global strategies for collaboration face a lot of difficulties. Generally speaking it is more fruitful to build collaborations from smaller and more specific collaborations between two departments that fulfill their own interests easily and can achieve results in the short term.
- At the Euroregion scale, Xabier Hualde, from the Aquitaine- Basque Country (and from 2017 Navarre) Economic Grouping for Territorial Cooperation (EGCT), introduced how the new Euroregion Aquitaine-Navarre-Basque Country could contribute to the development of the territory. Among other issues, he highlighted the following:
 - The POCTEFA project "Competitiveko" (in which Sodena is a partner) can foster this cooperation through an already established framework. This project may integrate the Navarre case in actions related to synchronise the Aquitaine and Basque Country S3 from the industrial cluster perspective.
 - Mobility at the Euroregion level can be boosted by high-added value actions such as double degrees, trans-border cooperation laboratories, PhD co-supervision, university networks partnering with other stakeholders, etc. The EGCT promotes these kind of actions through different instruments: calls for proposals, mobility programs for students and internships, direct agreements with key actors to foster university networking and Euroregional communities.

- The incorporation of Navarre to the Euroregion enlarges the geographical perimeter and the possible opportunities, having more universities and stakeholders.

6. Conclusions and policy implications

In this report we have analysed how universities in Navarre have participated in the region's S3 development, from the early stage of design and updating, to the potential role that they can play in the implementation. Two main objectives were addressed:

a) Developing the future talent for the region and alignment of the educational offer and scientific capabilities of universities to the S3 priorities of Navarre:

b) Establishment of incentives to universities and academics to foster cooperation and involvement with S3 and regional development activities.

Several specific objectives were identified and for each one a number of conclusions are now made:

6.1 Universities: balancing the response to global challenges and local engagement

The results of the study have shown that the primary task of universities is to provide a fundamental educational base and strong disciplinary competences for each level of academic enquiry, that are of global value and not solely dependent on local demands. Nevertheless, universities must also be able to provide an educational background in such a way that its graduates can be employable anywhere, both in Navarre and in other parts of the world.

Universities are reservoirs of knowledge, are knowledge producers, and are hubs for knowledge exchange. Universities work with a long-term perspective, can envision the future and face global knowledge and societal challenges. Navarre needs to value its universities as such, and facilitate its universities to fulfil their missions.

Universities 'produce' and concentrate talent. This talent should not stagnate in universities but must spill over into the region. In Navarre, employers demand graduates with comprehensive transversal skills, i.e., teamwork aptitudes, communication and negotiation skills, multilingualism, etc. In general, employers are satisfied with the disciplinary and technical competences of graduates, even if sometimes more competencies for the work itself are missed and higher transversal skills would be greatly appreciated.

Both employers and professors were wary of overspecialisation in university degrees. Navarre employers would greatly value students with complementary competencies, for example, engineers that know more about the economy, or economists competent in data analysis or technology use. Some professors were worried about the recent trend of removing theoretical subjects from curricula, as this can provide a series of skills and competencies to develop a type of thinking that prepare students for future and unknown challenges.

There was a broad agreement on the fact that universities do not only 'train' professionals, but they must 'educate' people for the future and provide solid knowledge foundations that allow them to deal with complexity and changing demands.

Some employers in Navarre are not aware of how the new degree system (four year degrees and master) is arranged and what they can expect from graduates with or without a master. They do not even know what 'a new engineer graduate can do', or which competences are acquired in a master degree from a professional perspective.

Therefore the engagement of universities locally should probably come from the anticipation of emerging needs in terms of education, innovative educational models and promotion of entrepreneurship, instead of an overly specialised educational offer that perfectly matches with the demands of companies.

Companies are also aware that the challenge of the region is to be able to retain talent in the region, through strong talent attraction policies and programmes that Navarre needs to further develop. The examples of Ikerbasque, a specific agency created to attract and retain high level talent in the Basque Country, and ICREA, the Catalan Institute for Research and Advanced Studies, can be inspiring examples from which Navarre could learn.

6.2 High level university hierarchy involvement in S3

Both universities have been actively involved in the Navarre RIS3 process and are part of the governance boards of the strategy. The highest hierarchy at the universities are aware of the important role that they are called on to play, but they raised concerns regarding how the process will continue after the definition of the priority areas and how exactly the decisions will be taken. In the case of the UPNA the Rector has been involved in the steering committee for the Navarre S3, where the final decisions are made.

Nevertheless, the broader academic community engagement and awareness on the S3 process has not been considered a key aspect in the first stages of the S3 definition, which was more at the strategic level and in need of higher hierarchical involvement. The senior management of the universities think there is no need of specific communication channels or engagement of the broad academic community. There is a belief that they will become progressively aware of the S3 priority areas as the university research and innovation calls start introducing the S3 concept and priorities, and researchers accordingly align the submitted projects.

In any case, the personnel from research institutes and centres both in UPNA and UNAV, are more aware of S3, because these structures are closer to the S3 priorities, and are the main instruments of universities to contribute to S3. Strategic plans of the institutes have in fact considered the Navarre S3 priority areas.

6.3 Matching of Navarre universities' capacities and RIS3 priority areas

Most of the selected S3 priority areas map fairly well onto the research and educational strengths of UPNA and UNAV, although those strengths were not considered as key factors for the selection of the priorities (save for health). There was not a very detailed exercise of mapping the capacities that universities could bring to the S3 and how they can contribute from their three missions.

The fact that UPNA has promoted a new offer of degrees aligned with Navarre S3 shows a very high commitment with the regional development strategy. The consideration of social needs and not only market demand or employability in the selection of the new degrees is as well a very good indicator of the commitment of the university with the navarrian society.

Universities of Navarre consider that having regular information from outside the university and the feedback from different stakeholders is a crucial exercise to have an educational offer well aligned with Navarre priorities. Both universities independently

agree on this point and have their own dynamics to address this objective. Among others, the UPNA has the Foro Social that establishes a regular dialogue between research professors and companies and UNAV engages alumni to capture emerging market needs and trends for the definition of new curricula or adapt existing ones.

Navarre S3 is always 'on the table' and 'present in the discussions' in the participatory teams that have been put in place in the process of renewing the education offer of the UPNA. In fact, the UPNA has explicitly included in its Strategy Plan 2016-2019²⁷ the re-design of the degrees, double degrees, master and PhD curricula to become more harmonised with the Campus Iberus and aligned with the S3 of Navarre. This is a very good sign of the importance that the education mission of the UPNA is going to play in S3 implementation, and an important role given to the education dimension of the strategy.

6.4 Universities governance system and regulatory framework as main bottlenecks

The way in which universities connect and collaborate with other stakeholders of the region, and new ways in which this can be shaped, is an important aspect that can boost their contribution to the S3.

The region is trying to introduce new mechanisms and ecosystems that support stronger collaborations of universities with regional stakeholders. This might be a positive path to overcome the underlying conflict between HEIs and technological centres, which has hampered collaborations in certain areas. Most probably, one of the key factors for the success of Navarre S3 is a change in the relational model between universities, technology centres and companies. ADItech Corporation can play a central role to deal with this systemic challenge, as it gathers both technological centres and universities, together with companies, in its board.

The 'clash of cultures' between HEIs and companies prevents mutual understanding and cooperation. There is a need to foster dialogue and, above all, mobility and exchange of university and company people.

Several system barriers are identified as limiting factors in forging interactions and are preventing universities from working together with other agents and responding to the demands of society, especially the university governance system, internal bureaucracy and the accreditation process for degrees.

6.5 Potential incentives for university researchers contribution to S3

Regarding the incentives for HEIs and university researchers to be involved in S3 and regional development activities, several potential actions that could be taken to better align activities fostering the necessary collaboration between HEIs and other regional actors were identified.

- A societal recognition of the university activity for its own sake as a clear and distinct contribution to the region, and especially to individual teachers and researchers collaborating in projects of public interest.

²⁷ UPNA Plan Estratégico 2016-2019.

http://www.uNavarre.es/digitalAssets/221/221226_100000IVPlanEstrategico.pdf

- Include metrics that foster interaction with other regional agents (participation in industrial projects, contracts with companies, industrial doctorates, promotion of internship programs, seminars and encounters with companies, etc.).
- Merits of knowledge transfer activities and interactions with other regional actors could be acknowledged by the regional authorities, since the development of Navarre RIS3 is a regional endeavour.
- Private companies invest more in research by sponsoring programmes with universities for high-added value, high risk research projects.
- Individual remuneration of different kinds (extra salary, compensation packages for teaching and management, etc.) to academics when they participate in projects with other regional actors could be a motivating factor.
- Companies should promote and value that their staff participate in university teaching, either as associate professors or in dedicated seminars and workshops.

On a general basis, from all the information collected during the fieldwork for the Navarre case, we can conclude:

- Increasing the collaborations between Navarre universities is a key aspect, so that they do not overlap in the fields they cover. For example, collaborations between engineering and medical worlds, which are the main areas of expertise of the public and private universities respectively, could turn into very interesting research outcomes and innovative solutions for the region.
- The proactive involvement of universities in the regional innovation dynamics is necessary and welcome, and universities can play a decisive role in the future S3 deployment, i.e., the objectives of the Navarre S3 will not be achieved without the strong involvement of universities.
- Navarre government is a key and decisive actor to foster university-business collaborations and any kind of collaboration between all the actors participating and contributing to the Navarre S3. Industrial doctorates program, university-business industrial programs and challenge-oriented cooperative programs must be in the regional toolkit to deploy S3.

7. Policy recommendations

As a result of the previous analysis and conclusions, together with the working dynamics carried out during the workshop, several recommendations can be outlined as action lines to enhance and improve the contribution of universities to the Navarre S3.

7.1 Different contributions to S3 depending on the type of university

Research studies have extensively proved that universities can contribute differently to the development of the region, depending on their strategic orientation, geographic location, size or historical background.

In the case of Navarre, the two main universities of the region, UPNA and UNAV, are contributing differently to regional development based on their main strengths. UPNA is more regionally oriented university with strong connections to the territory as well as interregional collaborations. UNAV is well rooted in Navarre but displays a clear international talent attraction and research university vocation.

The complementarity of both universities is an important strength of Navarre. In terms of education, UPNA excels in a wide range of engineering fields, whereas UNAV outstands in health and humanistic fields.

There are existing collaborations between the two universities, mainly promoted by individual researchers that spontaneously collaborate on research and innovation projects. More recently, probably influenced by the S3 dynamics, a more intense institutional collaboration has been boosted. A good example is the recent agreement reached with by UNAV with the Government of Navarre and UPNA to join the IdisNA Medical Research Institute of Navarre. It was created by the UNAV gathering the capacities existing at the university, the University of Navarre Clinic and CIMA- Centre for Applied Medical Research. The agreement constitutes an important achievement merging the most relevant capacities of the region in the medical field, with the recent inclusion of the public health service and the UPNA capacities, bringing together basic and patient-oriented research, leading to a faster and more effective transfer of results of research to patients.

The HESS case study has pointed out that a more sustained and systematic institutional collaboration between both universities could have additional gains in the way Navarre universities can contribute to the S3. The own specialisation strategy of Navarre universities, among them and inside the institutions, should be carefully considered in the implementation of the S3 and in the reflection of the different type of contributions they can make to the strategy.

It would be interesting to reach agreements between the public university and the private university for a common, or at least coordinated, education offer in some fields relevant to Navarre.

In addition, UPNA and UNAV are highly committed with the regional development strategy of Navarre contributing from the education mission of the university to the Navarre S3. Among the most relevant ones, the new educational offer of the UPNA which has considered the Navarre S3 priority areas, or the highly attractive offer of the UNAV for the attraction of international students and researchers.

It would be interesting that certain aspects in the core of the contributions of universities to the Smart Specialisation Strategies could be considered in the selection of the new educational offer:

- Even not being the only consideration, the analysis of the demand side with the absorptive capacity of companies/organisations working in the field or related ones that could potentially employ future graduates. Considering the existing and potential absorptive capacity could be of particular importance in the case of the selected emerging Navarre S3 priority areas.
- Further to the sectorial/technological considerations in the selection of the new degrees, a prospective analysis of the future skills and competencies that could be potentially needed in the future in the region. The needs in terms of entrepreneurial skills, innovation mind-set, complex problem solving, analytical skills or multi-disciplinary knowledge and the way to integrate them in the current academic offer could be of interest. The literature on the importance of technological relatedness as an advantage for regional economic growth and diversification (Boschma and Frenken 2011; Neffke et al. 2011), could be indicating that the availability of highly skilled students with transferable and transversal skills, able to adapt to different related sectors/fields, could be relevant for future regional innovation.
- Exploring the complementarities and potential collaborations between currently existing UPNA and UNAV educational offer, considering the existing regional capacities in the different S3 priority areas and future emerging needs.
- Consideration of how the education and third mission dimension could be better integrated in a continuous Entrepreneurial Discovery Process, and potential mechanisms to detect the evolving regional education needs and incorporate them to the Education and Training S3 transversal priority.

7.2 Generation of knowledge on the process of Navarre S3

The different S3 in Europe are showing that the transformation processes being triggered within regions are in fact some of the most important results of the exercise, and not only the selection of the priority areas and mobilisation of actors.

The interviews, discussions and analysis carried out during the case study have shown that a lot of knowledge is generated on the economic evolution of the region, the skills and competences needed by companies, institutional and university strategies, mapping of research and innovation capacities, etc. This information is hugely appreciated and valuable to understand the regional context and plan the potential role, actions, programmes and initiatives by the different stakeholders.

The actors emphasized the need of an information flow, the public accessibility and permanent information sharing such as report studies, analysis and strategies that would greatly facilitate the decision-making process. As an example, the study "Empleo 2030" carried out by CEN should be accessible to all the stakeholders.

In addition, a complete study on economic sectors (both more demanded and demanding), higher-education offer mapping, students origin, student employability after graduation, VET, traineeships, etc. should be carried out in Navarre, incorporating the

perspective of different stakeholders. A coordination committee should be constituted in order to move from analysis to action.

In this regard, universities are very well positioned actors in Navarre to generate relevant knowledge on the S3 itself and in monitoring the impact of the strategy in the region. The INARBE research institute of the UPNA has potentially a key role to play in this regard, and this is recognised by multiple actors of the region and the manager of the institute itself. At the same time, important constraints and bottlenecks are hampering this potential contribution to the S3 of the INARBE institute. The most important constraints being associated to the limited time of the university professors to devote to third mission activities in addition to their teaching and research activities or bureaucracy associated to the funds allocated to the research groups and the need to allocate it only to certain type of expenditures.

7.3 Activating top-down and bottom-up processes in university engagement

The highest university hierarchy has been engaged in the Navarre RIS3 process, with the rectors and vice-chancellors participating in the main decision bodies. There is a clear willingness of both universities to be an active actor in the S3 process at strategic level. Therefore, the decisions from the university side during the discussions have taken a top-down approach which seems to a certain extent logical at least in the first stage of the S3. The role of individual researchers or research institutes has been scarce.

The university governance, regulations and multiplicity of structures makes it difficult to turn the university strategy into individual researchers' priorities and activities. Even if Navarre universities have not yet communicated and engaged the academic community in the S3, it should acquire more relevance in the implementation phase. The fact that the UPNA has included the consideration of the S3 in its 2016-2019 Strategic Plan priority areas and the Campus of Excellence dynamics into the re-definition of degrees, master and PhDs, is considered a very positive sign of the contribution of the university education mission to smart specialisation.

However, as the Navarre S3 enters into its implementation phase, a stronger involvement of the academic community in the different working groups and entrepreneurial discovery dynamic should gain importance, particularly in the continuous processes of narrowing the current priorities into R&D projects, and the EDP, to raise awareness on new emerging fields. The communication and awareness raising on the aims of the S3, the key role of the university and the strategic level that the education dimension will have in the S3 implementation is considered relevant. Furthermore, a bottom-up participatory process to engage individual researchers, activating multiple research capacities and groups, could have significant benefits as it will give voice to the academic community.

The accreditation of researchers does not incentivise the participation in activities that contribute to territorial development, but the clear communication of the university strategy and how the researchers work can contribute to the S3 can introduce motivation as they will see more clearly the impact of their work.

7.4 Identification and definition of capacities and roles of university researchers

Not all researchers have to play the same role in the institution and be measured by the same parameters. It is important to define a career path for the different type of

researchers that can contribute to different activities in the institution. Some might focus their work on basic research, others to collaborate with companies or to policy oriented studies and engagement. It is necessary to bring specialisation to the existing researchers at universities, with clearer career paths and profiles defined by universities taking into account the interaction with other stakeholders in Navarre.

The university has room for introducing flexible structures that enable hiring other type of researchers' profiles. The newly created research institutes and centres in both universities are crucial instruments to design more flexible career paths that can be recognised and incentivised in ways to stimulate interaction with other actors in Navarre.

In the case of the UPNA research institutes INARBE there is a clear opportunity for the institute to play a key role in the S3, contributing to generate knowledge of the process, the impact in the regional economy, analysis and policy recommendations. In the case of UNAV the IdisNA - Institute of Medical Research of Navarre has been created as a space for multidisciplinary and translational research in the field of biomedicine. IdisNA together with the CIMA research institute, University of Navarre and Clínica Universidad de Navarra has generated a biosanitary ecosystem in Navarre. Both the research institutes of UPNA and UNAV can play an important role in Navarre S3.

In any case, the existing tensions between the interest of the regional government and the aims of INARBE will need to be addressed. On the one hand, INARBE would like to keep its research mission in the core of its activities not only responding to the specific demands of one institution. On the other hand, there is a need to have a clear and value-adding proposal, both in the research offer and in the collaboration framework, for the government to consider funding activities of regional interest.

The fact that INARBE is a research institute within the structure of the university might be hampering the flexibility needed to have different profiles of researchers and answer to the policy oriented research that contributes to the Navarre S3. The region could explore the possibility of putting in place a hybrid public-private organisation, such as a foundation, in partnership among different organisations. This would enable the creation of a sustainable commitment of key organisations interested in contributing to generated knowledge in the S3 process, while introducing the flexibility and agility to have different profiles of researchers. A partnership of multi-disciplinary research institutes of both universities could be potentially created, with the Navarre Statistics Institute, to generate knowledge and collaborations with the regional clusters and companies.

Enhancing the multi-disciplinary nature of INARBE could be further explored, as an opportunity to connecting capacities from UPNA departments and knowledge fields. According to the information provided on the website, the main departments involved come from the business and economic fields, and only few professors from law and social work have been involved. The possibility of integrating existing research capacities for example in the field of sociology, social work and law could be further explored, enabling the combination of social and economic analysis approaches. As an example, relevant capacities on inequalities, alternative index construction, citizenship and cooperation, etc could be relevant for contributing from INARBE to the RIS3 implementation and knowledge generation.

The inspiring example of Orkestra Basque Institute of Competitiveness and the existing collaborations with INARBE and the Navarre Government could be further explored, to think of a more sustainable partnership.

7.5 Enhance the role of instruments and programmes to increase university collaborations with the R&D&I ecosystem

The different instruments and programmes put in place, such as industrial doctorates, the Aditech innovation ecosystem, the university research institutes or the institutional chairs, are important steps towards enhancing the role of universities in the S3 from its three missions.

However, such instruments still need to be further defined and become operational. It will be of interest that the definition of such instruments takes into consideration how they can contribute to the Navarre S3 and better connect it to the planned actions and outcomes. A better orchestration and connection of the existing initiatives would be desirable in order to increase the impact in the region.

As an example, the recently launched 'Industrial Doctorate' call would need to be intensified and additional funding introduced. It would be of interest to consider how this call can contribute to the S3 and introduce certain criteria to ensure that they are in line with the priority areas of the strategy. Additional points could be granted to those PhD projects which have impact on the S3 priority areas.

7.6 University tools to incentivise researchers contributions to regional development

Although the Spanish accreditation system does not include career recognition/incentives to motivate involvement in S3, the Navarre Government and the universities can introduce metrics to acknowledge and stimulate regional engagement. The decentralised Spanish political system, and the unique fiscal autonomy of Navarre, provides an opportunity for the region to shape the budgetary framework agreement with the university to contribute to regional development.

The regional government of Navarre negotiates an annual "contract-programme" with the public university, agreeing the different chapters and activities in which the university will spend its budget. There is a long-standing demand of a multi annual funding scheme for UPNA which might help to better articulate long-term incentives to meet regional development demands. This could be a way for the government and UPNA to agree on the introduction of specific activities and indicators to contribute to the S3 and the economic incentives needed to implement the policy recommendations of this report. This multi annual 'Contract-Programme' between the government and the public university could be a possible and easy-to-implement pathway.

In addition, providing resources to academics in the form of additional salaries or free time to devote to different activities (compensation packages in order to devote time to tech transfer, projects with companies and new company formation) would be very much welcomed.

The UPNA being a public university depends financially and organically on the Department of Education of the Government of Navarre. However, as we have seen throughout the report, the involvement of the universities in S3 and the stronger engagement in regional development go beyond education competencies. An increased

coordination of different departments of the Government of Navarre in the negotiation and definition of activities under the annual "contract programme" could provide a more holistic and strategic vision to the activities of the university and its contribution to the S3.

7.7 Strengthen universities- companies' collaborations and joint curricula definition

Interesting initiatives have been introduced both by the universities and regional government to increase collaborations with companies.

The Social and Business Forum is "an environment to promote the participation and the advice to the UPNA Council, as an instrument for society and companies to participate in the University. It meets six monthly to establish a debate around the way to adapt the UPNA educational model to the needs of society, introducing innovative educational models that improve the skills of students and to strengthen the employability of PhDs in the business world."

This forum is a clear willingness of the UPNA to contribute to regional development from the education dimension of the university generating collaborations with companies.

There is a unanimous agreement on the value of the forum from the universities, companies and government side. However it would be interesting to explore sustainable forms of companies' engagement in the definition of university degrees and master curricula. In addition, having more concrete outcomes and actions from the forum discussions would be welcomed.

The re-valorisation of the 'associate professor' figure in universities would be needed, since this would facilitate closer university-business cooperation and more connected curricula to companies demand by having company professionals teaching in universities. In any case, this was a controversial point and there was no unanimous consensus. Above all, universities are reluctant to boost this associate professor figure, because it imposes a lot of coordination problems. This measure will need a lot of flexibility in both universities and companies.

The promotion of an internal acknowledgement system to academic entrepreneurs inside universities, introducing incentives in the form of teaching compensation packages, temporary exemptions or teaching credit reduction could be an interesting measure to promote entrepreneurial universities, and something that the long-term funding scheme could incentivise.

Among some of the additional actions that could be taken to promote university-business collaborations the following ones are identified to have most value:

- Strengthen the units and services that foster entrepreneurship and innovation culture in universities, both for students and academics.
- Foster a strong participation of university researchers and professors in innovation ecosystems and clusters.
- Launch a call for proposals of collaborative projects for university-VET-business consortia.
- The mobility of professors to companies would be very positive to promote university - business interactions.

7.8 Strengthen the collaborations and complementarities of vocational education and training with higher education

The region of Navarre has given strategic importance to the adaptation of the existing vocational education and training offer. The government has been working during the last year in collaboration with different education, social and economic actors of the region towards the elaboration of an ambitious plan based on the analysis of the demand from students and the needs of the socio-economic environment of the region.

The case study has raised the need to establish more links and collaborations between the higher education and the vocational education offer, as they can both complement each other in their contributions to the S3.

The Basque Country policy of vocational education promoted through Tknika²⁸ and training can be an inspiring example for Navarre. In fact dual education, that combines the offer directly provided in Tknika and the remunerated in company training has raised a lot of attention in Navarre, as it is a win-win for companies and for students. In fact the experience has shown that this type of education has much higher rates of employment and the students gain skills which closely match the interest of companies.

7.9 Attraction of talent to the region

It is important to consider not only the educational offer of the universities in Navarre and how they can better contribute to the S3, but also to consider the absorption and talent retention in the Navarre business environment.

The design and creation of a programme to attract international talent would be highly beneficial. The very good examples of ICREA in Cataluña and IKERBASQUE in the Basque Country could be instructive for Navarre to create a place for researchers that is internationally competitive, flexible and attractive, keeping in mind that Navarre (and Pamplona) is not a well-established destination.

In addition, it will be of interest to introduce indicators of the absorption of graduates by the socioeconomic entities. As a reference, the Basque 'dashboard for technology centres' could be used in this action line.

7.10 Interregional collaborations at higher education level

Finally three recommendations can be made regarding the additional theme on inter-regional cooperation in the perimeter of the Aquitaine - Basque Country - Navarre Euroregion.

The regional actors consider important to boost the Euroregional collaborations in the value chain through the newly created Navarre clusters within the S3. However, first and foremost there is a need to strengthen collaborations between different actors within the region before moving forward with Aquitaine and the Basque Country.

²⁸ Tknika is a centre promoted by the Deputy Ministry of Vocational Education and Training of the Education Department of the Basque Government. Innovation and applied research are at the core of Tknika in its ongoing efforts to place Basque Vocational Training at the European forefront. Tknika is modelled after some of the world's most advanced vocational training centres. Through networking and direct involvement by the Basque Vocational Training teaching staff, the Centre develops innovative projects in the areas of technology, education and management (www.tknika.eus).

The recent decision of Navarre to join the Euroregion Aquitaine – Basque Country is considered as a clear opportunity, especially the chance for institutions in Navarre to access the tools created by the European Grouping of Territorial Cooperation Aquitaine – Basque Country, and in particular for universities to join mobility programmes, clustering, and networking at all levels and scales.

There will be a need to design awareness campaigns about the opportunities that the new Euroregion Aquitaine-Navarre-Basque Country can have for innovation actors in Navarre and how joining this collaborative framework can strengthn the impact of the the universities' activities and the implementation of S3.

References

Ana Fernández-Zubieta, Thomas Zacharewicz; RIO Country Report 2015: Spain;

EUR 27849 EN; doi:10.2791/465255

COTEC Foundation (2015). Informe COTEC 2015: Innovación en España. Fundación COTEC :

COTEC Foundation (2016). Informe COTEC 2016: Innovación en España. Fundación COTEC : Available at: <http://cotec.es/pdfs/COTEC-informe-2016.pdf>

De La Torre, Eva, Perez-Esparrells, C., and Casani, F.(2011). "El programa campus de excelencia internacional en España y algunas estrategias de universidades de la Comunidad de Madrid para mejorar su posición en los rankings globales." Investigaciones de Economía de la Educación" volume 9 9 (2014): 351-369. Available at: <http://repec.economicsofeducation.com/2014valencia/09-18.pdf>

European Commission (2011) Supporting growth and jobs – an agenda for modernisation of Europe’s higher education system (COM (2011) (567), CEC, Brussels.

European Commission (2015). Perspectives for Research and Innovation Strategies for Smart Specialisation (RIS3) in the wider context of the Europe 2020 Growth Strategy. DG Research. Luxembourg, Publications Office of the European Union.

European Commission (2016) European Regional Innovation Scoreboard 2016. CEC, Brussels. Available at: <https://ec.europa.eu/docsroom/documents/23881/attachments/1/translations/en/renditions/native>

European Commission (2017) Renewed EU agenda for higher education (COM (2017) (247 Final). CEC. Brussels

Government of Navarre (2016). Navarre S3 Smart Specialisation Strategy Available at: http://www.sodena.com/images/estrategia-regional/Navarre_S3.pdf

Government of Navarre (2016). Science, Technology and Innovation Plan 2016-2020 (PCTI 2016). Available at: <https://gobiernoabierto.navarra.es/sites/default/files/131216de80plan.pdf>

Kempton L, Goddard J, Edwards J, Hegyi FB and Elena-Pérez S (2013) Universities and Smart Specialisation, S3 Policy Brief Series No. 03/2013, European Commission Joint Research Centre, Institute for Prospective Technological Studies

Neffke F, Henning M, Boschma R (2011) How do regions diversify over time? Industry relatedness and the development of new growth paths in regions. Economic Geography 87: 237–265. Wiley Online Library

Neffke FMH, Svensson-Henning M (2008) Revealed relatedness: Mapping industry space. Department of Economic Geography, Utrecht

Pérez García F., Aldás J., Aragón R, Zaera I.(2017). U-Ranking 2017: Indicadores sintéticos de las universidades españolas. Fundación BBVA

List of abbreviations

HESS	Higher Education for Smart Specialisation
SUS	Spanish University System
EHEA	European Higher Education Area
RUCT	Registry of Universities, Centres and Degrees
ECTS	European Credit Transfer System
MECD	Ministry of Education, Culture and Sports
ANECA	National Agency for Quality Assessment and Accreditation
GDP	Gross Domestic Product
EU	European Union
R&D	Research and Development
R&I	Research and Innovation
RIS3	Regional Innovation Strategy for Smart Specialisation
S3	Strategy for Smart Specialisation
S2	Smart Specialisation
UPNA	Public University of Navarre
UNAV	University of Navarre
EDP	Entrepreneurial Discovery Process
HE	Higher Education
HEI	Higher Education Institution
ADITECH	Advanced Innovation and Technology Corporation
VET	Vocational Education Training
EGTC	European Grouping for Territorial Cooperation
CEN	Enterprise Confederation of Navarre
PCTI	Science, Technology and Innovation Plan
INARBE	Institute for Advanced Research in Business and Economics
POCTEFA	Territorial Cooperation Programme Spain-France-Andorre
INTERREG	European Territorial Cooperation Programme
ESIF	European Structural and Investment Funds

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Total Headquarters (S): 113 (108 public)

SPANISH UNIVERSITY SYSTEM AT A GLANCE (II)

Number of students	2014 – 15					2015 – 16				
	Total	Public		Private		Total	Public		Private	
		Students	%	Students	%		Students	%	Students	%
Bachelor's degree	1.361.340	1.196.564	88	164.776	12	1.321.907	1.161.588	88	160.319	12
Master's degree	139.844	97.627	70	42.217	30	152.087	101.971	67	50.116	33

Table I – Number of undergraduate and master students

Number of doctoral students	Public Universities		Private Universities	
	Students	%	Students	%
28.546	27.390	96	1.156	4

Table II – Number of doctoral students in 2014 – 15 academic year

Doctoral theses	2009	2010	2011	2012	2013	2014
Total	8.235	8.747	9.483	10.504	10.889	11.316
Men	4.246	4.598	4.879	5.267	5.528	5.649
Women	3.989	4.149	4.604	5.237	5.361	5.667

Table III – Number of doctoral theses per year and sex

	Students	Graduates

	Total	International			Total	International		
		Total	%	UE-27		Total	%	UE-27
Total	1.529.730	85.973	5,6	30.992	301.137	17.055	5,7	5.292
Bachelor	1.361.340	54.530	6,7	24.245	233.626	5.622	4,8	1.776
Master	139.844	24.937	17,8	5.241	67.511	11.433	16,9	2.516
Doctorate	28.546	6.506	22,8	1.506	-	-	-	-

Table IV – International students in the Spanish University System. 2014 – 15 academic year

SPANISH UNIVERSITY SYSTEM AT A GLANCE (III)

Staff at Spanish universities	Total		Public universities		Private universities	
	Total	%	Total	%	Total	%
Total	195.492	100	170.481	100	25.011	100
Academic staff	115.366	59	99.453	58,3	15.908	63,6
Research staff	21.327	10,9	20.081	11,8	1.246	5
Administration and services staff	58.799	30,1	49.188	29,9	7.857	31,4

Table V – Staff at Spanish universities. 2015 – 16 academic year. Research staff means staff hired with public or private research projects funding.

The student/academic staff ratio is 14,1 in public universities and 16,6 in private universities.

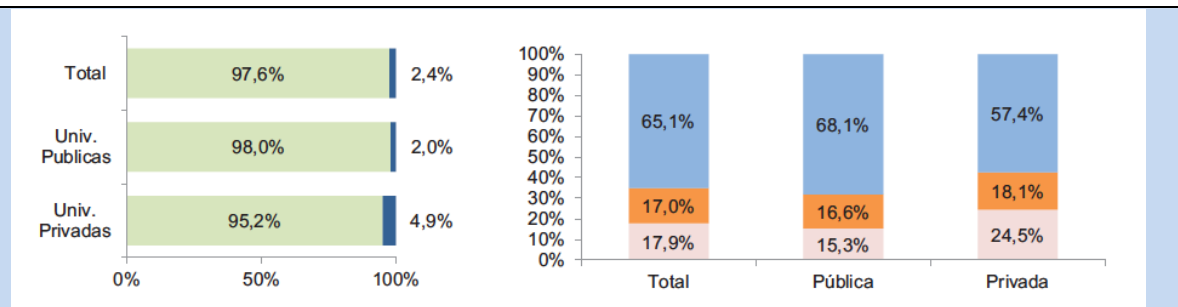


Figure II – Spanish and international academic staff. Left: Spanish in green and international in blue. Right: International academic staff by origin. EU in blue, Iberoamerica in orange, and rest of the world in pink.

USA	26.562
UK	24.338
Sweden	22.534
Spain	12.356
Italy	10.071
Portugal	9.196
UE-21	14.955
OECD	15.028

Table VI – Expenditure per higher education student and year in USD dollars (2012).

SPANISH UNIVERSITY SYSTEM AT A GLANCE (IV)

Adult population with a university degree	Total		Bachelor		Master		PhD	
	25-64	25-34	25-64	25-34	25-64	25-34	25-64	25-34
USA	44,2	45,7	21,6	24,9	10,2	9,3	1,6	1,2
UK	42,2	49,2	21,8	30,5	8,0	9,9	1,2	1,0

Sweden	38,7	46,0	15,5	22,2	12,0	12,9	1,5	0,7
Spain	34,7	41,5	9,4	11,2	13,9	17,0	0,7	0,3
Italy	16,9	24,2	3,3	8,8	13,2	14,9	0,4	0,4
Portugal	21,7	31,4	4,6	10,1	16,6	21,0	0,6	.
UE-21	31,7	39,5	12,2	17,6	12,9	16,1	0,9	0,7
OECD	33,5	40,7	15,1	20,7	11,4	13,6	1,0	0,7

Table VII – Percentage of adult population with a university degree (2014).

Annex 2: Questionnaire for interviews

General questions:

- How can the university global perspective/local engagement be balanced? Should the university be more focused on regional/local priorities or on responding to global challenges and play a key role at international level?
- Which are the skills/capacities of graduates that are most valued by employers in Navarre?
- Do you think that evaluation mechanisms for university professors and researchers performance are contributing to more university-region engagement?

Theme 1 – Alignment of HEI to RIS3

RIS3 design and governance

- Did the HEI play a proactive involvement in the RIS3 in identifying the region's research and knowledge strengths/assets as part of the RIS3 development process?
- Have the capacities of the HEIs (both educational/training offer and scientific and technological capabilities) been considered for the final selection of the RIS3 priorities and objectives?
- Who in the HEI was involved? Did individual academics contribute or was the process managed centrally?
- What role does the HEI play in the leadership and governance of RIS3 in the region (e.g. membership of boards or other strategic groups)? How visible has the HEI leadership been in spearheading and supporting the process to date?

Current contribution of HEIs to RIS3

- How closely do the selected RIS3 priorities map onto research and teaching strengths of the HEIs?
- Is the current HEI curricular offer aligned with the current regional economic demands? In which way the university is adapting the curricular offer to the future needs and expected socio-economic development of the region?
- Are there non-teaching or research activities (e.g. business support, knowledge exchange etc.) specifically targeted at firms in priority areas?

Future role in RIS3

- In terms of research, are there any new or additional activities planned which will (further) strengthen the capacity of the HEI in the RIS3 priorities?
- In terms of teaching, what new programmes or modules (undergraduate and post graduate) are planned in the priority areas? Will local businesses/clusters have any input in designing or shaping new programmes?
- Does the HEI have an explicit strategy to increase research capacity/investment/funding applications in any of the priority areas?

Barriers and gaps

- What are the main barriers for the HEIs and other types of organisations to work together in the development of the RIS3?
- What are the main capabilities of the HEI that are not currently being fully mobilised and could help address the regional innovation resource/capability gaps?

Theme 2 - Incentives to HEIs and university researchers to be involved RIS3 and regional development activities.

Awareness

- Are university communities at large aware of smart specialisation, and specifically aware of the Navarre RIS3? Should universities develop specific tools or informative campaigns to raise awareness of RIS3 in the university community?

Incentives, tools and programs

- What actions can be taken (on all sides) to better align activities (including priorities, incentives, timelines, etc.) in order to foster the necessary collaboration between HEIs and other regional actors?
- Can you bring examples of tools/mechanisms/good practices that have been implemented in other regions/countries and discuss the interest of implementing something similar in Navarre?
- Do you think that University-Business collaborations should form part of the toolkit of regional policy makers in their attempts to realize smart specialization strategies? What examples exist in that regard that you know of?

Theme 3 – An additional theme was included in the interviews that was not foreseen initially and was not sent to the interviewees prior to the interviews: inter-regional cooperation, and specifically, cooperation in the perimeter defined by the Euroregion Aquitaine-Euskadi-Navarre.

- Does your institution currently have well-established, structured and long-standing collaborations within Euroregion Aquitaine-Basque Country-Navarre? Does the alliance of Navarre with Aquitaine and Basque Country have had any impact in your role and contribution to the RIS3?

Annex 3: List of interviews

The interviewed stakeholders were the following:

Organisation	Position	Name	Inteview date
1. Public University of Navarre (UPNA)	Rector	Alfonso Carlosena	22.11.2016
	Vice-rector for Academic Policy	Carmen Jarén	22.11.2016
	Vice-rector for Research	Ramón Gonzalo	22.11.2016
	Director of INARBE (Institute for Advanced Research in Business and Economics)	Pablo Arocena	23.11.2016
	Head of Business Development of Research Institutes	Begoña Vicente	02.12.2016
2. University of Navarre (UNAV)	Vice-Rector for Academic Policy	Pablo Sánchez	24.11.2016
	Vice-Rector for Research	Iciar Astiasarán	24.11.2016
3. Government of Navarre	Director General for Universities and Educational Resources	Nekane Oroz	24.11.2016
	Director General for Industry, Energy and Innovation	Yolanda Blanco	02.12.2016
4. ADITECH	Director General	Juan Ramón de la Torre	23.11.2016
	Technology Cooperation & Excellence Manager	Paula Noya	23.11.2016
5.Grupo Cooperativo Alimentación Natural (AN)	Director for Fundación Grupo AN	Maite Muruzabal	23.11.2016
6. Navarre Business Confederation (CEN)	Responsible for international projects	José Manuel Olivar	Telephone conversation

Annex 4: List of exploratory workshop participants

European Commission	
Susana Elena Perez	Joint Research Centre
Javier Gómez Prieto	Joint Research Centre
Eskarne Arregui Pabollet	Joint Research Centre
Navarre stakeholders	
Luis Goñi Nancy Tarjenian	SODENA
Carmen Mier Gómez	Government of Navarre, International Department
Mikel Irujo	Brussels Office Director
Luis Orús Javier Baigorri Lopez	Centro de Referencia Nacional en Energías Renovables y Eficiencia Energética para la formación de ciclos superiores (CENIFER)
Eduardo Aznar Zozaya	Centro Nacional de Energías Renovables CENER
Javier Mata	University of Navarre (UNAV)
Alberto Alfaro Santiago Iraburu Benito Gómez	Public University of Navarre (UPNA)
Manuel Rodríguez Juan Ramón de la Torre	ADITech
Camino Correia	Zabala Innovation Consulting

Annex 5: List of HESS Final Workshop participants

- Luis Goñi, Sodena
- Ramón Gonzalo, UPNA
- Carmen Jaren, UPNA
- Tomás Gómez-Acebo, UNAV
- Pablo Arocena, INARBE
- Iciar Astiasarán, UNAV
- Juan Ramón De la Torre, ADITech
- José Manuel Olivar, CEN
- Javier Alonso, Government of the Basque Country
- Xabier Hualde, Eurorregion Aquitaine-Navarre-Basque Country
- Mikel Navarro, Orkestra
- José Luis Fernández, Tknika,
- Igor Campillo, HESS expert
- Eskarne Arregui, European Commission, JRC

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