

RESEARCH
AND INNOVATION
STRATEGY FOR SMART
SPECIALISATION (RIS3)
OF CASTILLA Y LEÓN
2014-2020

EXECUTIVE SUMMARY

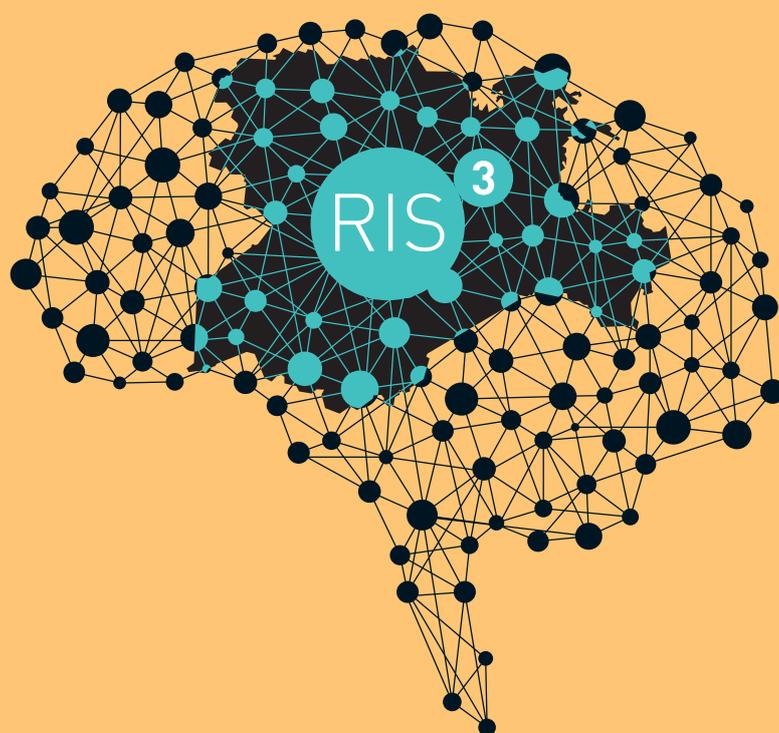
RIS³ CASTILLA Y LEÓN
2014-2020



Junta de
Castilla y León



CASTILLA Y LEÓN



The Research and Innovation Strategy for Smart Specialisation (RIS3) of Castilla y León 2014-2020 has been coordinated by the Science and Technology Coordination Commission of Castilla y León, and approved by the Government Council of Castilla y León on April 16th, 2014

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Castilla y León



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INTRODUCTION

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A BASIC COORDINATES OF CASTILLA Y LEÓN

TERRITORIAL FRAMEWORK AND DEMOGRAPHIC SITUATION

With a regional territorial area of 94,224 km² (the most extensive Spanish region and one of the largest of the European Union), Castilla y León is structured in nine provinces and 2,249 city and town councils (almost 30% of the existing ones in Spain).

Figure 1. Location of Castilla y León and territorial division in its 9 provinces



The extension of the region and its geographic situation (Castilla y León borders on nine regions in Spain and on Portugal) make Castilla y León an important communication hub at Spanish and European level in the central axis of the Continental Diagonal. This strategic location endorses the regional policy of development of infrastructures that Castilla y León is undertaking.

Castilla y León had a population of 2,519,875 inhabitants in 2013 (Source: INE, Spanish Statistical Institute). During the 90's the region has lost population, however, this trend has changed in the last few years (since 2000, the population has increased in 40,757 inhabitants).

EVOLUTION OF THE PRODUCTIVE STRUCTURE OF CASTILLA Y LEÓN

During the last decade, an important transformation of the economic structure of Castilla y León has taken place, with a continuous modernization and an increasing convergence to the European Union.

The modernization of the structure of the region is reflected in the loss of weight of the agrarian sector and the process of tertiary transformation of the regional economy. The table shows the evolution of the economic structure in the region.

Table 1. Sectoral distribution of Gross Added Value in Castilla y León. Taxes not included

Sector and Year	1982	1990	2009	2012
Agriculture	30.4	19.9	5.3	5.8
Industry&Energy	19.4	20.5	17.9	19.8
Construction	9.2	10.1	12.3	8.4
Services	40.5	49.5	57.3	58.8

Source: Regional Accounting, INE.



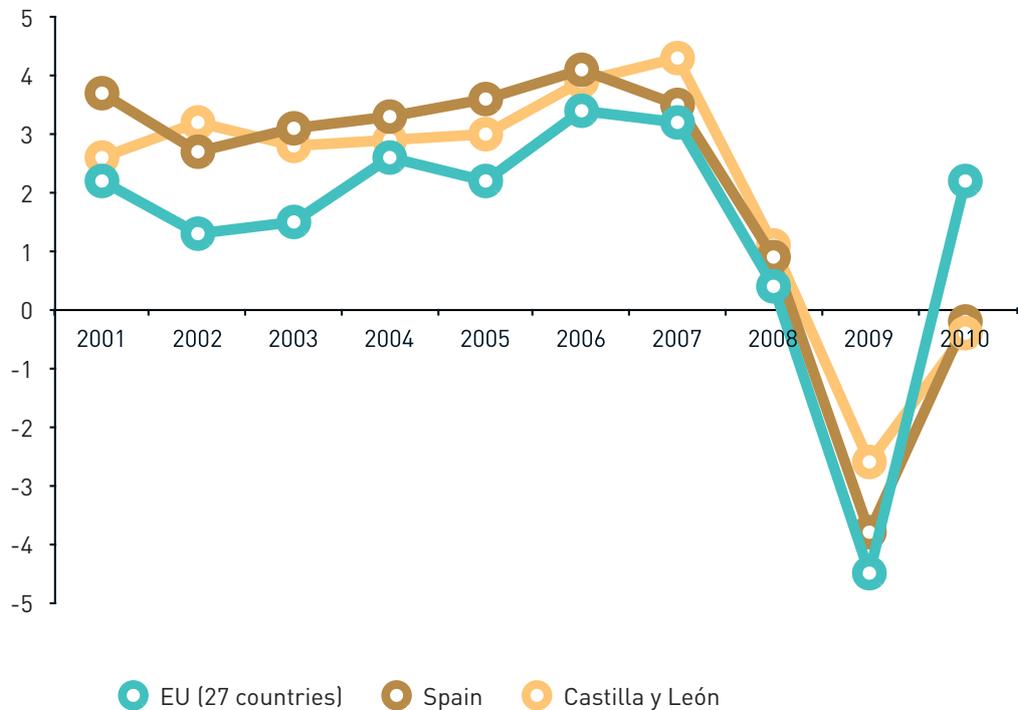
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EVOLUTION OF GROWTH AND CONVERGENCE WITH THE EUROPEAN UNION

The growth of Gross Domestic Product (GDP) in Castilla y León between 2000 and 2008 has been higher than the average growth of the European economy, which has allowed our region to approach the European Union.

In comparison with our economic environment, our region has grown at the same rate than the Spanish average and higher than EU-27 and the Euro Zone until 2009. In 2010 the growth of the Gross Value Added at basic prices was -0.2%, somewhat above than the national average (-0.4%) and below the European average (2.2%).

Figure 2. Annual economic growth rate in Castilla y León, Spain and Europe. Gross Value Added at basic prices



Source: EUROSTAT.

According to the data published by EUROSTAT, Castilla y León has reduced in 17.8 percentage points the gap in GDP with the European Union since the incorporation of Spain to the European Union in 1986. In 2000 the GDP per inhabitant of Castilla y León was equivalent to 74% of the UE-27 average. In 2009 the GDP per inhabitant of Castilla y León was equivalent to 93% of the UE-27, and finally 89% in 2011 (Source: EUROSTAT).

Due to these growth rates, Castilla y León has left the condition of objective 1 region in the European Union, becoming objective "employment and competitiveness" region as of the 1st of January 2007, and being in the group of "More developed regions" for the period 2014-2020.



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B SCIENCE AND TECHNOLOGY: A PRIORITY FOR THE REGIONAL GOVERNMENT OF CASTILLA Y LEÓN



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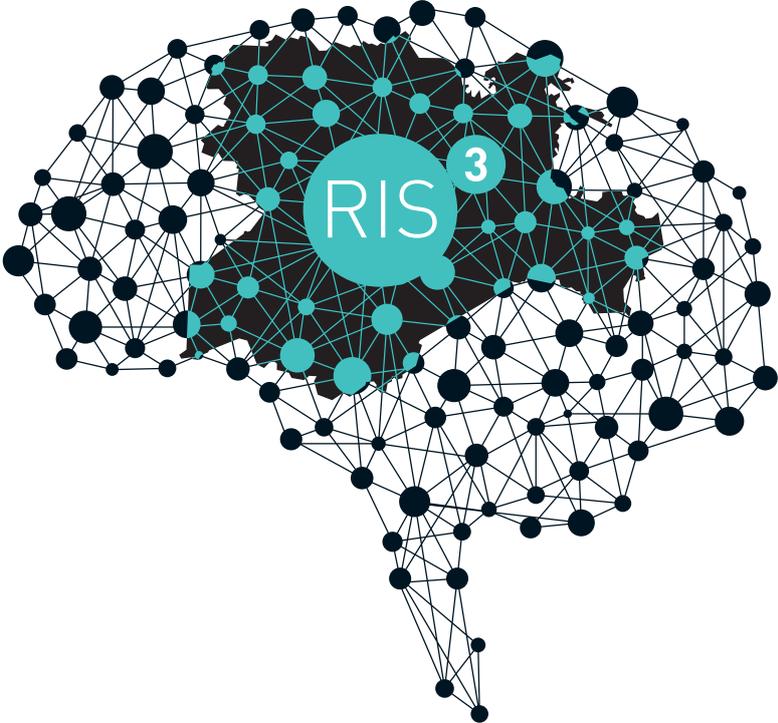
The modernization of the economic structure of the region and the need of a continuous improvement of the competitiveness of the industrial tissue have made R&D, innovation and the information society one of the key issues for the region, the science and technology policy becoming a priority for the Regional Government of Castilla y León.

SOME SIGNIFICANT MILESTONES

The regional R&D policy history in Castilla y León dates back to the mid 80's, right after the creation of the Autonomous Community of Castilla y León. The following Tables show the highlights in the regional science and technology policies since then:

Table 2. Milestones in Castilla y León's Science and Technology policies

	SIGNIFICANT MILESTONES
1983	First call of research projects.
1985	Decree supporting Technological Innovation.
1990	Boecillo Technology Park.
1992	Technology Centres Law.
1995	Agency for Economic Development.
1997-2000	Regional Technology Plan.
1999	Regional Law for Research and Science.
2002	Law of Promotion and General Coordination of R&D&I.
2002-2006	Regional R&D&I Strategy 2002-2006.
2003-2006	Regional Strategy for the Information Society
2003	Regional Observatory for the Information Society.
2003	Universities Law (modified in 2010).
2006-2009	Framework Agreement for Industrial Competitiveness and Innovation.
2007-2013	Regional R&D&I Strategy 2007-2013.
2007-2013	Regional Strategy for the Information Society 2007-2013.
2007	Commissioner for Science and Technology.
2008-2013	University-Business Strategy 2008-2013.
2010-2013	II Framework Agreement for Industrial Competitiveness and Innovation.
2014-2020	Research and Innovation Strategy for Smart Specialisation (RIS3) of Castilla y León 2014-2020.



PART 1

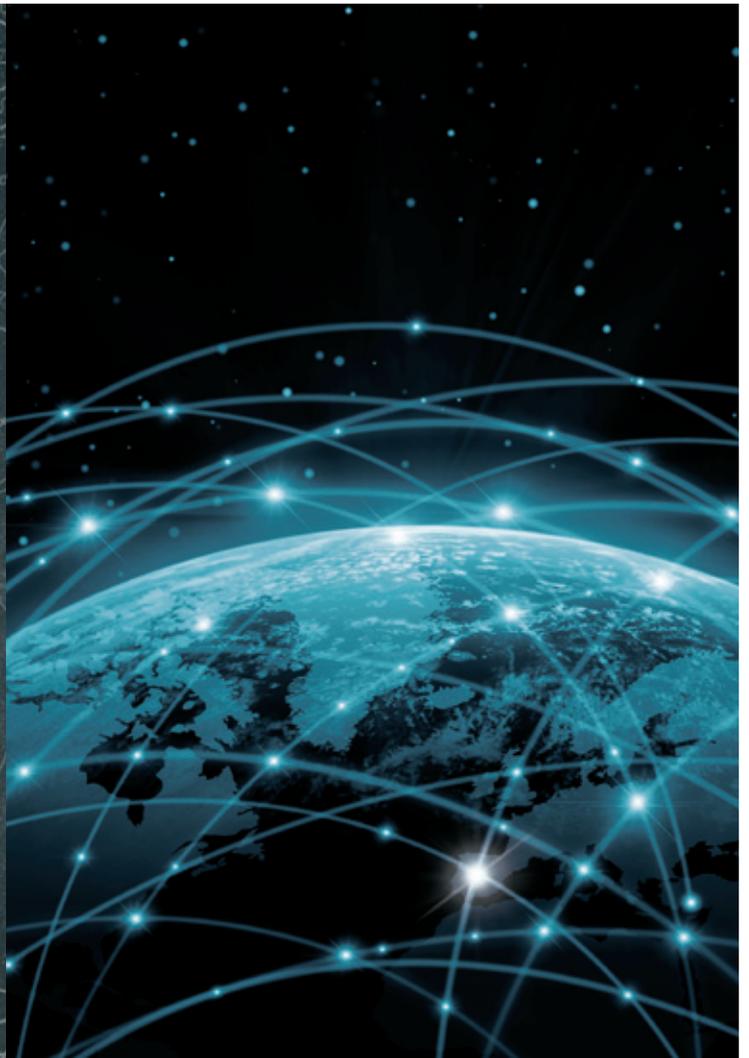
CONTEXT ANALYSIS AND STARTING POINT

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1 CONCEPT AND METHODOLOGY

1.1 RESEARCH AND INNOVATION STRATEGY FOR SMART SPECIALISATION (RIS3) ORIGINS AND CONCEPT

The **smart specialisation** concept arises from the strategic reflection carried out between 2006-2009 by a panel of experts supported by the European Commission², whose mission was studying the causes of a growing gap in R&D efforts between Europe and the United States and its impact on economic growth. In order to reverse this situation, it was concluded that European regions needed to identify technological patterns of knowledge that are potentially generators of their competitive advantages and prioritize their policies and resources towards those patterns.

This reflection has had significant implications for European Union science and technology policy for the 2014-2020 programming period. The European Commission has therefore set **smart specialisation as a prior condition for investments in two key cohesion policy objectives** for the 2014-2020 period: R&D and Information Society³. Innovation strategies for smart specialisation consist of integrated economic and region-wide transformation agendas, whose key features are:

- Integration of R&D and Information Society policies.
- Concentration on priorities, challenges, and development needs based on knowledge, thereby stimulating private investment.
- Participatory process to build a shared vision among companies, citizens, universities, research centers and Government.
- Future vision that makes use of strengths, competitive advantages and potential for excellence, all with an outward perspective.
- Based on objective data and including solid supervision and evaluation systems.

RIS3 is the regional 2014-2020 R&D and Information Society's planning document. It is the **continuation of a path** that Castilla y León started in 1997, which was the precursor of many elements reflected in the previous table and today form part of the European Union's approach.

Beginning in 2014, RIS3 is the continuation of the two Castilla y León regional government planning initiatives dealing with science and technology: **The 2007-2013 Castilla y León Regional R&D Strategy and the 2007-2013 Castilla y León Regional Strategy for a Digital Knowledge Society**.

1.2 METHODOLOGY

The elaboration of the Castilla y León RIS3 has followed the six-step methodology published by the European Commission's Smart Specialisation Platform⁴, in a process carried out between September 2012 and January 2014.

The **first step** has consisted of an analysis of the regional innovative potential of Castilla y León.

² Knowledge for Growth Group (K4G).

³ The 2011/0276 (COD) Regulatory proposal through which common provisions were established relating to cohesion policy funds included in an explicit manner. Among "ex-ante" conditions was the existence of a Regional Research and Innovation Strategy for Smart Specialisation (RIS3) and a chapter dedicated to digital growth.

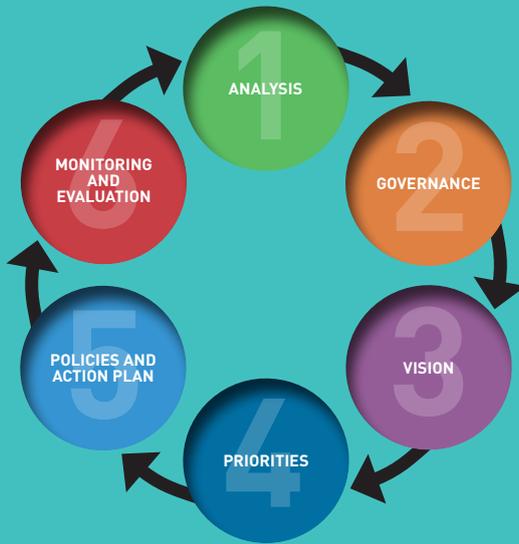
⁴ Guide to Research and Innovation Strategies for Smart Specialisation, Smart Specialisation Platform, March 2012.



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The **second step** has established a participatory process for RIS3 elaboration, including **interviews and work groups** with participation of representatives from government, businesses, business associations, universities, research centers, technology transfer instruments and society in general through the Castilla y León Regional Government Open Government Platform.

Figure 3. RIS3 creation process



The **third step** has consisted of a **shared vision** that includes clear focus on **regional development, which maintains consensus** of all players committed to the RIS3 process. The results of these first phases have been a **SWOT Analysis** (Strengths, Weaknesses, Opportunities, and Threats) for the **R&D and Information Society** situation in Castilla y León that has been the basis for establishing RIS3 programmes and objectives, and the identification of **Castilla y León's Specialisation Patterns**.

In the **fourth step**, horizontal objectives have been identified out of the SWOT analysis, and thematic priorities have been established from specialisation patterns.

The **fifth step** consists in the deployment of objectives and priorities in action **programmes**. Finally, the **sixth step** has led to the creation of a **monitoring and evaluation system**, establishment of a RIS3 **participatory governance structure** and the allocation of resources during 2014-2020.

Figure 4. Participatory governance



2 CONTEXT ANALYSIS



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The international financial crisis has had a significant impact in Castilla y León, becoming evident in macroeconomic variables such as the **employment market** (while the unemployment rate remains below the national average) or in the number of active companies in activity sectors such as those linked to construction, road transport and business-linked activities. In 2012, the number of business in Castilla y León was 162,153. Micro-enterprises dominate in the Castilla y León business structure.

The regional **GDP** in 2012 was 5.28% of the national GDP. Its itemization⁵ showed a very powerful service sector (58.8% in 2012) in comparison with other sectors of activity, which hold less weight in the economy: industry and energy with 19.8%, construction holding 8.4%, and agriculture at 5.8%.

The region's **population** has held stable in recent years but in Castilla y León the population of people 65 and older (23.3%) is approximately five points above the national average (17.9%). Among the positive aspects of the regional context analysis, it can be mentioned that Castilla y León's **employed population (39.2%) has attained slightly higher levels of education** than the national average (38.6%).

The region's progress in **exports** has been positive, and it is competitive in traditional activities and/or industries at the worldwide level. Among exports, products that have greater technological content are also those that fetch positive trends. The region's most dynamic and significant export products are those linked to motor vehicle, as well as pharmaceutical products and food products.

Castilla y León's **Science-Technology-Business-Society System** has been built in recent decades from a legal basis, institutional architecture and a series of planning elements among which are the 2007-2013 Castilla y León Regional R&D Strategy and 2007-2013 Castilla y León Regional Strategy for a Digital Knowledge Society, which have finished recently. All these efforts have led to a system in which businesses, universities, research centers, and knowledge transfer centers have generated gradual convergence with the national average in terms of performance indicators.



⁵ Net taxes on products are considered an additional component in the regional GDP, for which itemization in financial sectors does not add up to 100%.

2.1 R&D IN CASTILLA Y LEÓN



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The convergence process for **Gross Domestic Expenditure in R&D (GERD)** compared with the entirety of Spain has slowed down in recent years. Taking the decade of 2002-2012 as a reference, R&D expenditure grew until 2009 but in 2010 and 2011 there was a decrease in this indicator, attributable to the financial crisis. In 2012, thanks to the regional companies' investment effort (with 61.8% of spending on R&D), Castilla y León has started to regain its position in the Autonomous Communities rankings, and reached the fifth place, behind the Basque Country, Navarre, Madrid and Catalonia. Castilla y León's GERD in 2012 was 1.12% of GDP with a 12% increase from 2011 while on a national level, this figure was 1.30% in 2012 and 1.33% in 2011.

Castilla y León's **business expenditure on innovation** has maintained the same tone as R&D expenses over GDP, demonstrating positive evolution until 2009 and then dropping in the following two years and rising 11.0% in 2012 compared with 2011, a 564.4 million Euro expenditure in 2012. In relation to the national expenditure, spending on innovation by Castilla y León companies have increased in significance, increasing from 2.82% in 2003 to 4.21% in 2012.

The number of **innovative companies** (with more than 10 employees) has been experiencing a downward trend since 2004 at both regional and national levels, although it has seen small upturns in Castilla y León. In the period 2010-2012, the number of innovative companies in Castilla y León reached 958, counting 20,815 innovative companies at the national level. The number of innovative companies over the total number of companies in Castilla y León and Spain have had very similar averages (13.7% and 13.2%, respectively).

Concerning **human resources**, the personnel employed in R&D activities in full-time equivalent (FTE) per thousands of working people in Castilla y León has evolved positively in the 2002-2012 period while the number of researchers has maintained a more stable evolution. In 2012, the figure was 9,547 people who worked in R&D, and out of these, 5,075 were researchers. These figures for all of Spain were 208,831 and 126,778, respectively.

Castilla y León's participation in the European Union's Seventh Framework Programme for R&D accounts for 2.1% of the national total during the 2007-2012 period that in turn makes up 8.3% of the total budget granted to EU-27 countries. In terms of sector distribution, the greatest volume of subsidies is noteworthy for Health Care, Energy, Energy Efficient Buildings, and Information and Communication Technologies (ICT). With respect to the **Sixth R&D National Plan**, Castilla y León's participation's is slightly lower than what it corresponds to in terms of GDP or population. The latest available data assigns economic returns for Castilla y León participation in national R&D programmes compared with the national total of 3.5% in 2012.

Finally, Castilla y León has traditionally shown weaknesses in what is referred to as the protection of research results and their use. **Patent applications** in Castilla y León are less than the national and European averages. The number of patents applied for with the Spanish Patent and Trademark Office in 2012 was 125 for Castilla y León and 3,361 for Spain, which represents 49.7 patent applications per million inhabitants of Castilla y León and 71.4 in Spain.

2.2 INFORMATION SOCIETY IN CASTILLA Y LEÓN

Castilla y León has a good development of **telecommunications infrastructures**. Since January 2012, broadband coverage throughout the region has been available (universal service). Concerning Internet access technology, data for the first quarter of 2013 in Castilla y León are very positive, and for the most part, are above the national average. As for speeds, 64.3% of the population has access to 30 Mbps broadband, and 53.3% to 100 Mbps. From 2010 to 2013, the percentage of residents with broadband Internet access increased significantly, with 18.90 percentage points. However, broadband penetration is below the national average. Castilla y León's significant area as well as the dispersion of its population has caused difficulties in telecommunication infrastructure deployment.

As for ICT use by **citizens**, the percentage accessing the Internet has improved in 2013 and is now above the national average for the first time. Additional noteworthy data is the positive evolution of technology by the youngest part of the population, especially in the 10 to 15-year-old age range.

There are large differences in ICT equipment and usage in **companies** with more than 10 employees and companies with less than 10 employees (micro-enterprises and independent contractors), where usage data and ICT availability continue to be low with minor annual economic growth. In 2012, specifically, only 68% of companies with fewer than 10 employees had computers compared with 71.6% at the national level. In the case of companies with more than 10 employees, these percentages increased to 98%. 63.7% of micro-enterprises and independent contractors have Internet access, lightly below the 65.7% national average. This figure rises to 97.1% for companies with more than 10 employees. There has been significant growth in recent years of mobile Internet access in companies, which is replacing fixed lines in some cases.

Concerning the **digital municipal government**, almost half of the local authorities with over 5,000 inhabitants in Castilla y León have a city councillor post or specific area for ICT and most have staff dedicated to managing new information and communication technologies.

The **Regional e-Government** has a 90% average online presence for administering basic public services within the Castilla y León regional government. These percentages, for procedures directed to both citizens and companies, are greater than the national average, an effort made closer in the last two years. 80.8% of total online services can be carried out completely via the Internet. Usage data from companies using the Castilla y León Online Government is better than the usage of these services by citizens: 93% of companies with Internet connection interacted with the Regional Government in 2012 (which has been above the national average for the last three years). Of these, 74.9 % interacted with the Regional Government to declare taxes electronically, which is still below the percentage that used it to submit public tender offers.

With regard to the **level of ICT penetration in education**, 100% of the region's primary and secondary education public schools had Internet access, with very high broadband connection percentages, a much higher figure than the national average. Concerning the ratio of students per computer, this figure has been decreasing in Castilla y León as well as at the national level, in both primary and secondary education.

Regarding the **level of ICT penetration in health care**, the integration of the clinical history in primary services has been carried out with specialized attention in six out of the eleven health-care areas in Castilla y León, with access to Electronic Medical Records (EMR) possible from 101 health centers to their hospital of reference.



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3 SWOT ANALYSIS



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The analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) compiles and integrates quantitative and qualitative analytical conclusions in the Strategy's creation framework. It is the point between analysis and diagnostics from a regional context and innovation potential for Castilla y León and the RIS3.

3.1 R&D&I SWOT

STRENGTHS

- **Experience in design and launch of R&D Regional Strategies.**
- **Technological infrastructure existence:** technology parks, science parks, unique technological-scientific facilities, etc.
- **Working population's educational level higher** than the national level.
- **There is awareness in the private sector regarding execution of expenses in R&D with relative significance above awareness in the national population.**
- **Castilla y León is competitive in traditional activities and/or sectors at an international level.** Strategic sectors in the region are resistant to the financial crisis with productive specialisation and/or driving forces for innovation: agriculture and food industry, automotive technology, pharmaceuticals, and environment.

OPPORTUNITIES

- **The region's economic specialisation and existing capacities allow for leading future trends** to be made use of in the fields of health care, quality of life, environment, and food and agriculture.
- **Technological specialisation permits the development of applications in the fields of advanced materials,** production processes, ICT, and biotechnology, and contributes to the interrelatedness between economic sectors, and the cross-cutting role of ICT technology, energy and environment, and biotechnology.
- **There is potential for the integration of value chain actions and economic interaction: agriculture and food industry-ICT-goods manufacturing;** biotechnology-assisted health care; furniture-textile-stonework; heritage-Spanish language, and others.
- **New programming period for the 2014-2020 Structural Funds** and new European Community positions in order to carry out R&D policy regional instrumentation change and overcome the culture and politics of dependence on subsidies.
- **Potential to find synergies and complementarities** in the application of funds and strengthen financial instrument integration policies to increase regional leadership.
- **Reposition financial instruments** and redefine the Government's role in providing **innovative services to companies.**

WEAKNESSES

- **Significant financial crisis:**
 - The convergence process in R&D expenditure has slowed down in relation to the Spanish average, with further decreases in the number of staff appointed to R&D, innovative companies, and a
 - general loss of excitement has occurred on part of regional players.
- **Although there is certain level of vision for collaboration and coordination,** it is not sufficient and a greater level of institutional leadership in R&D actions is required.
- **Insufficient budget in key areas related to offering and/or promoting advanced public services** in the fields of funding, internationalization, innovation, and entrepreneurial development (start-ups, growth, clusters, etc.). Generally specialized human resources in administrative management.
- **Scientific specialisation has little relationship to regional economic specialisation;** the weakness in the University-Company relationship persists and positions of the regional universities have fallen behind national university rankings.
- **The entrepreneurial fabric's technological level and capacity for absorption of knowledge is limited.** Reduced scale of companies with management training requirements.
- **Insufficient preparation of university graduates in the skills and abilities that companies require.** Decapitalization of human resources in research entities and talent and brain drain.
- **Decreased globalization of innovation** and minimal participation in international funding sources.

THREATS

- **Prolonged effects of the financial crisis** and difficulty in entering financial markets.
- **Limitations of companies to funding, especially newly created SMEs** and innovative companies.
- **Decline in private investment,** decrease in R&D investment.
- **Reduction of budget earmarked for R&D** that leads to a reduction of public capacities for the support of structures, human resources, and development of initiatives.
- **Loss of support structure for R&D** because of the financial crisis and risk of system failure due to budget reasons.



3.2 INFORMATION SOCIETY SWOT



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STRENGTHS

Territory

- Availability of broadband coverage throughout the region (universal service).
- Presence of leading ICT related reference centers and facilities in the region.

Companies

- Widespread use of electronic banking, digital signature, and online processing, especially when dealing with the Public Government.
- Wide offering of qualified professional profiles trained in ICT coming out of the region's university and vocational training systems.
- The region's ICT sector has specialisation capacities in the fields of mobility and security.

Citizens

- Positive indicators: number of homes with computers and devices and Internet access, high use of eCommerce, high percentage of digital natives; use of mobile devices.

Public Government

- Broad development of e-Government and availability of applications and resources that can be shared among Public Government Bodies.
- Presence of a regional Open Government strategy.
- Presence of a region-wide administrative structure (e.g., local and provincial governments) and other consolidated initiatives for ICT-related support for small-scale local entities.
- Presence of a significant number of qualified ICT professionals in Public Government Bodies.
- High level of development of e-Prescription and Electronic Medical Records in the region and health-care staff used to managing the technology in their daily activities.
- Presence of an ICT implementation model in the field of education.

OPPORTUNITIES

Territory

- Importance of ICT in the objectives and priorities of the new European funding framework.
- ICT, as a cross-cutting technology in the region's specialisation pattern.
- Nearshoring: capacity for the region to allow ICT companies to set up operations in the region.
- Satellite technologies and mobile broadband make service extension easier.

Companies

- Increase in consumer demand for new digital contents.
- ICT use makes globalization of companies easier.
- e-Commerce and electronic marketplaces act as supplementary sales channels.
- New funding models for innovative companies and support for entrepreneurs.
- New technologies and trends: social networks, mobility, and geolocation services; telecommuting; cloud computing, and new pay-per-use models, Open Data; new models for collaboration with other companies.

Citizens

- Existence of constantly increasingly usable technologies for private citizens and the opening of new access channels for information and training.
- Great potential for the Spanish e-ID in providing public and private digital services.

Public Government

- Use of ICT in the public sector and new public-public and public-private partnership models that permit costs savings and make use of synergies.
- Use of ICT to boost energy savings and develop smart cities.
- New educational models via ICT and ICT as tools for efficient provision of public health services at a distance with the use of eHealth and telecare.



WEAKNESSES

Territory

- Large-area region with complicated mountain geography that makes ICT infrastructure deployment more difficult.
- Public and private ICT infrastructure economic sustainability.

Companies

- Lack of network capillarity in the region for companies and economic activities related to ICT and excessive disintegration of projects.
- Productive fabric primarily consisting of micro-enterprises and independent contractors from traditional sectors with low ICT adoption levels, above all in retail business.
- Infrequent use of ICT in the organization of work and large imbalances in the use of ICT depending on the company size.
- Lack of adaptation of regulated training (University, Vocational Training) for the ICT market.
- Difficulty in globalization of the regional ICT sector.

Citizens

- Aged population with less training and knowledge of use of ICT tools. High percentage of the population that shows a lack of interest in ICT among people who do not use the Internet.

Public Government

- In some cases, limited leadership, resistance to change and insufficient internal coordination among public institutions for ICT application.
- Lack of simplification of government processes for them to be implemented electronically, especially in Local Governments.
- Lack of previous analysis in Public Government Bodies for social and economic return on investment related to ICT use.
- Hesitation in using ICT in the classroom by a certain percent of teachers and difficulty in extending digital public services in the field of health care due to region-wide dispersion.

THREATS

Territory

- Low profitability in the area for operators for telecommunication infrastructure in the rural environment.
- Difficulty in extending telecommunications infrastructures due to the differentiated application and specificity of particular aspects of environmental and urban planning standards.

Companies

- Loss of competitiveness when companies do not face adaption to ICT in a globalized setting.
- Costs associated with product distribution in eCommerce platforms.
- Complex ICT-related regulatory framework.

Citizens

- Low confidence level in the digital setting.

Public Government

- e-Government services are difficult to use and digital certification systems are complex.
- Rapid technological change that makes adaptation to public Administrations difficult.
- ICT-related regulatory modifications that can implicitly bring about significant changes with economic and time frame implementation difficulties.
- Lack of interoperability and standardization of digital contents and services.



4 CASTILLA Y LEÓN SPECIALISATION PATTERNS

Specialisation pattern analysis has been carried out on three dimensions. **Castilla y León's economic specialisation pattern** is defined by six large macro-activities that make up 59% of our economy and meet diverse criteria: specialisation compared with the national average, ability to compete in outside markets, temporary positive evolution despite the financial crisis, and potential for development. On the other hand, an analysis of scientific publications, patents, and international projects identifies principal **scientific specialisation** fields (where there is critical mass, impact, and specialisation in relation to the world) and **technological specialisation**. Areas in which there is a potential to establish comparative and competitive advantage in Castilla y León from a triple perspective (economic, scientific, and technological) have been looked at through a RIS3 participatory process, resulting in the specialisation pattern as a combination of these perspectives:

Figure 5. Castilla y León specialisation pattern components

ECONOMIC SPECIALISATION PATTERN

- Food and agriculture industry
- Automobile industry, Components, and Equipment
- Health Care and Quality of Life
- Tourism, Heritage, and Spanish Language
- Energy and Industrial Environment
- Habitat

SCIENTIFIC SPECIALISATION PATTERN

- Medicine
- Agriculture, Biology, and Veterinary Sciences
- Chemistry and Material Sciences
- Earth and Environmental Sciences
- Engineering

TECHNOLOGICAL SPECIALISATION PATTERN

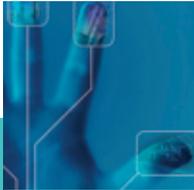
- Advanced Materials
- ICT
- Biotechnology
- Advanced Processes and Manufacturing

The following tables show Castilla y León's specialisation patterns using the economic pattern's macro-activities as a starting point, and including information that refers to:

- Scientific areas of knowledge that are strong in the region (scientific pattern) and can provide support to the development of activities.
- Existing technologies in the region (technological pattern) that will allow competitive and innovative development for each macro-activity.

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- Leading European regions with whom Castilla y León can establish collaborative relationships and agreements related to R&D, due to the similarity of their specialisation patterns.
- Industry-wide technologies and opportunities, some of which are already in effect. Others, although they do not form part of the Castilla y León specialisation pattern, are of interest in order to advance regional specialisation in the coming years.



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AGRICULTURE AND FOOD INDUSTRY			
Economic pattern	Its core activities are the agriculture and food industry (specifically meats, dairy, and milling) and beverage manufacturing. It is closely linked to the agricultural, livestock, and forestry sectors.		
Scientific pattern	Agricultural and Biological Sciences and Veterinary: <ul style="list-style-type: none"> • Food Science • Animal Science and Zoology • Food Animals • Small Animals and Equine • Ecology, Evolution, Behaviour and Systematics • Agronomy and Crop Science and Soil Science • Forestry Chemistry <ul style="list-style-type: none"> • Analytical Chemistry • Spectroscopy 	Chemical engineering <ul style="list-style-type: none"> • Bioengineering • Chemical Engineering Engineering <ul style="list-style-type: none"> • Industrial Engineering Environmental Sciences <ul style="list-style-type: none"> • Environmental Chemistry • Water Science and Technology Pharmacology, Toxicology and Pharmaceutics <ul style="list-style-type: none"> • Toxicology • Pharmaceutical Science 	
Technological pattern	Capacities	<ul style="list-style-type: none"> • Cluster VITARTIS • Biotechnology Institute (INBIOTEC), CARTIF Foundation, Technological Agricultural Institute of Castilla y León (ITACyL), Natural Resources and Agrobiologic Institute (IRNASA, CSIC), Technological Center for Cereals and Grain (CETECE), Technological Agricultural and Food Institute (ITAGRA), Center for Food Quality, Universal Institute for Sustainable Forest Management, Luso Hispanic Center for Agricultural Research (CIALE), Experimental Agriculture Station (EAE), Service Center and Forestry Promotion and Industry of Castilla y León (CESEFOR), Society of Public Infrastructure and Environment of Castilla y León (SOMACYL) 	
	Technologies	Advanced Materials	
		<ul style="list-style-type: none"> • Food packaging and preservation technology (smart multi-use, bio-sourced, and biodegradable materials) 	
		IT	
Technologies	<ul style="list-style-type: none"> • Robotics • Artificial vision • Precision agriculture, geolocation, agricultural sensing systems, etc. • IT traceability and consumer information systems • Remote Management and Geographic Information Systems (soil maps, pest control, etc.). • Environmental information systems (sensors, real time measurement) 		
	Biotechnology		
	<ul style="list-style-type: none"> • Application of molecular tools to improve crops and food safety and quality • Green biotechnology: fertilization, breeding & genetics, crop optimization, prevention of disease and pests • Energy crops • Livestock production technology: animal wellbeing, breeding and genetics, animal feed, reproduction • Vegetable biomaterials • Biosensors • Biocatalysts • Food biotechnology: starters, food ingredients, etc. • Immunonutrition • Biopreservatives for extending useful life of agri-food industry product 		
Possible regions of reference	Advanced Processes and Manufacturing		
	<ul style="list-style-type: none"> • Food safety • Functional foods and bioactive compounds • Agri-business waste use and processing • Energy efficiency technology in processes • Emerging food processing technologies (high pressure, vacuum frying, etc..) • Forest management technology, use and new uses for forest products and forestry 		
Possible regions of reference	<ul style="list-style-type: none"> • Zuid-Holland (Holland) • Noord-Holland (Holland) • Noord-Brabant (Holland) • Gelderland (Holland) • Midtjylland (Denmark) • Ireland • Emilia-Romagna (Italy) 	<ul style="list-style-type: none"> • Tuscany (Italy) • Trentino Alto Adige (Italy) • Sassari (Italy) • Lombardy (Italy) • Scotland (United Kingdom) • Ardeal (United Kingdom) • Lower Austria (Austria) 	<ul style="list-style-type: none"> • Upper Austria (Austria) • Scotland • Bretagne (France) • Pays de la Loire (France)
Other technologies of interest for Castilla y León	<ul style="list-style-type: none"> • Functional foods • Life Cycle analysis • Ecolabelling • e-Commerce • Mycological Production technology • 3D printing 		

There is a **very high level of correlation in this macro-activity with scientific and technological specialisation patterns** and it is therefore very interesting for Castilla y León's smart specialisation.



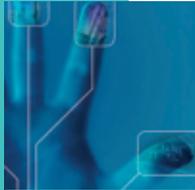
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AUTOMOBILE INDUSTRY, COMPONENTS, AND EQUIPMENT

Economic pattern	Shaped from the core motor vehicle manufacturing activity, trailers, and semi-trailers, manufacture of machinery and equipment and other transportation material. Its importance lies in the location of automobile manufacturing and component companies and a certain level of specialisation in aeronautics. Similarly, manufacture of goods is included in this macro-activity due to its sharing of certain technologies.	
Scientific pattern	Engineering <ul style="list-style-type: none"> Industrial Engineering Chemical Engineering <ul style="list-style-type: none"> Chemistry and Technology of Processes Mathematics and Computation <ul style="list-style-type: none"> Artificial Intelligence and Vision Computational Theory and Computational Mathematics 	Environmental Sciences <ul style="list-style-type: none"> Water Science and Technology Management, Monitoring, Policy and Law Material Science and Physics <ul style="list-style-type: none"> Polymers and Plastics Metals and Alloys
Technological pattern	Capacities	<ul style="list-style-type: none"> Automotive Forum of Castilla y León (FACYL) and Cluster of Capital Goods and Industrial Automation of Castilla y León (CBECyL) Foundation for Research and Development in Transport and Energy (CIDAUT Foundation), CARTIF Foundation, Technological Institute of Castilla y León (ITCL), Miranda de Ebro Technology Center (CTME)
	Technologies	Advanced Materials <ul style="list-style-type: none"> Advanced composites for transportation uses Materials with optimized mechanical properties Ceramic materials for transportation uses Smart and multiuse materials Recyclable and recycled materials High-power laser applications
		IT <ul style="list-style-type: none"> Robotics Artificial vision Real-time monitoring Predictive control of machinery: sensors, embedded systems, data mining, etc. Intelligent roadway infrastructure (sensors, monitoring, etc.)
		Biotechnology <ul style="list-style-type: none"> Biofuels Biocatalysts Biopolymers
		Advanced Processes and Manufacturing <ul style="list-style-type: none"> Discrete event simulation and process modelling Smart control systems and process flexibility systems Energy efficiency technology in processes Diesel and gasoline motors
Possible regions of reference	<ul style="list-style-type: none"> Stuttgart (Germany) Darmstadt (Germany) Hamburg (Germany) Rheinland-Pfalz (Germany) Oberbayern (Germany) Karlsruhe (Germany) Oberpfalz (Germany) 	<ul style="list-style-type: none"> Ile de France (France) Torino (Italy) West Greece (Greece) Central Hungary (Hungary) Vastsverige (Sweden) Hovedstaden (Denmark) Vienna (Austria)
Other technologies of interest for Castilla y León	<ul style="list-style-type: none"> Multi-scale modelling Carbon nanotubes Alternative vehicles Active navigation systems Life Cycle analysis Ecodesign/intelligent design 	<ul style="list-style-type: none"> Embedded technology Induction loaders Fuel cells 3D printing Lean manufacturing
<p>There is a very high level of correlation in this macro-activity with technological specialisation patterns via the scientific specialisation pattern and it is therefore very interesting for Castilla y León's smart specialisation.</p>		



HEALTH AND QUALITY OF LIFE			
Economic pattern	The manufacture of pharmaceutical and public health products and services is considered within economic activities.		
Scientific pattern	<p>Medicine</p> <ul style="list-style-type: none"> Hematology Cancer Research Neurosciences Pulmonary and Respiratory Medicine Community and Home Care Biophysics Critical Care and Intensive Care Medicine 	<p>Immunology and Microbiology</p> <ul style="list-style-type: none"> Applied Microbiology and Biotechnology <p>Pharmacology, Toxicology and Pharmaceuticals</p> <ul style="list-style-type: none"> Toxicology Pharmaceutical Science <p>Chemistry</p> <ul style="list-style-type: none"> Analytical Chemistry Spectroscopy <p>Engineering</p> <ul style="list-style-type: none"> Biomedical Engineering 	
Technological pattern	Capacities	<ul style="list-style-type: none"> The Oncology Cluster of Castilla y León (BIOTECyL) that brings together oncology and biopharmaceuticals, the Ophthalmology and Vision Sciences Cluster (Cluster4eye) and Cluster for Innovative Solutions for Independent Living (SIVI) Center for Cancer Research (CIC), Biology and Molecular Genetics (IBGM), Inter-university Institute of Neuroscience of Castilla y León (INCYL), Functional Biology and Genomics (IBFG), Institute for Biomedical Research of Salamanca (IBSAL), Institute of applied Ophthalmology (IOBA), Foundation for Haemotherapy and Blood Donation, Foundation for Research and Training in Health Sciences (Infosalud), Burgos Foundation for Health Research, Institute of Health Sciences Foundation of Castilla y León (IECSCyL), Health Care Research Foundation of León, SacyL Centers 	
	Technologies	Advanced Materials	<ul style="list-style-type: none"> Biopolymers Nanomaterials and nanoprepared applications Biocompatible materials
		IT	<ul style="list-style-type: none"> e-Health: monitoring, remote medicine and care systems Biological information technology
		Biotechnology	<ul style="list-style-type: none"> Therapeutic agents Pharmacological agents Cellular therapy Molecular diagnosis: application of platforms tools in health care, development of cellular models, biomarkers for diagnosis, recombinant DNA Immunonutrition Tissue engineering
		Advanced Processes and Manufacturing	<ul style="list-style-type: none"> Development of advanced biomedical devices
		Possible regions of reference	<ul style="list-style-type: none"> Vienna (Austria) Oberbayern (Germany) Karlsruhe (Germany) Tabingen (Germany) Darmstadt (Germany) Karlsruhe (Germany)
Other technologies of interest for Castilla y León	<ul style="list-style-type: none"> Management and administration of health systems: logistics, interoperability, LPS, transport using robots, electronic prescriptions, electronic medical record Imaging techniques Intelligent systems and robotics for disability services 3D printing Technological translation or reproduction of research results in Oncology 		
<p>There is a high level of correlation in this macro-activity with scientific specialisation patterns via the technological specialisation pattern and it is therefore interesting for Castilla y León's smart specialisation.</p>			



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TOURISM, HERITAGE AND SPANISH LANGUAGE									
Economic pattern	This area integrates those activities which strengthen tourism and in so doing also demonstrate a development potential based on an extraordinary contribution of resources, as is the regional cultural and natural heritage or the richness of the Spanish language. Similarly, the potential of professionals, companies, and specialists concerning management and participation in these activities is integrated.								
Scientific pattern	<table border="1"> <tr> <td> Arts and Humanities <ul style="list-style-type: none"> • Conservation • History Chemistry <ul style="list-style-type: none"> • Analytical Chemistry • Spectroscopy Material Science and Physics <ul style="list-style-type: none"> • Condensed Matter Physics </td> <td> Environmental Sciences <ul style="list-style-type: none"> • Environmental Chemistry • Water Science and Technology • Ecology • Management, Monitoring, Policy and Law Mathematics and Computation <ul style="list-style-type: none"> • Artificial Intelligence </td> </tr> </table>	Arts and Humanities <ul style="list-style-type: none"> • Conservation • History Chemistry <ul style="list-style-type: none"> • Analytical Chemistry • Spectroscopy Material Science and Physics <ul style="list-style-type: none"> • Condensed Matter Physics 	Environmental Sciences <ul style="list-style-type: none"> • Environmental Chemistry • Water Science and Technology • Ecology • Management, Monitoring, Policy and Law Mathematics and Computation <ul style="list-style-type: none"> • Artificial Intelligence 						
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Technological pattern	<table border="1"> <tr> <td>Capacities</td> <td> <ul style="list-style-type: none"> • Cluster of Digital Content in Spanish, Santa María la Real Foundation, Siglo Foundation for Tourism and Arts of Castilla y León • National Research Center on Human Evolution (CENIEH), CARTIF Foundation, Natural Heritage Foundation, Service Center and Forestry Promotion and Industry of Castilla y León (CESEFOR), Head of Upper Studies in Spanish </td> </tr> <tr> <td rowspan="5">Technologies</td> <td> Advanced Materials <ul style="list-style-type: none"> • New advanced materials for heritage site conservation • New treatment for stone, wood, and other materials </td> </tr> <tr> <td> IT <ul style="list-style-type: none"> • Diagnostic and preventative conservation technology • Language technology • Cultural offering promotion, dissemination, and marketing technology </td> </tr> <tr> <td> Biotechnology <ul style="list-style-type: none"> • Identification of physical-chemical variables and biodeterioration elements in heritage conservation • Biocleaning and bioconsolidation technology • Fossil DNA </td> </tr> <tr> <td> Advanced Processes and Manufacturing </td> </tr> <tr> <td> </td> </tr> </table>	Capacities	<ul style="list-style-type: none"> • Cluster of Digital Content in Spanish, Santa María la Real Foundation, Siglo Foundation for Tourism and Arts of Castilla y León • National Research Center on Human Evolution (CENIEH), CARTIF Foundation, Natural Heritage Foundation, Service Center and Forestry Promotion and Industry of Castilla y León (CESEFOR), Head of Upper Studies in Spanish 	Technologies	Advanced Materials <ul style="list-style-type: none"> • New advanced materials for heritage site conservation • New treatment for stone, wood, and other materials 	IT <ul style="list-style-type: none"> • Diagnostic and preventative conservation technology • Language technology • Cultural offering promotion, dissemination, and marketing technology 	Biotechnology <ul style="list-style-type: none"> • Identification of physical-chemical variables and biodeterioration elements in heritage conservation • Biocleaning and bioconsolidation technology • Fossil DNA 	Advanced Processes and Manufacturing	
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Possible regions of reference	<table border="1"> <tr> <td> <ul style="list-style-type: none"> • Emilia-Romagna (Italy) • Trentino Alto Adige (Italy) • Veneto (Italy) • Lazio (Italy) • Berfranken (Germany) • Berks, Bucks Oxon (United Kingdom) </td> <td> <ul style="list-style-type: none"> • Ile de France (France) • Brussels (Belgium) • Hovedstaden (Denmark) • Inner London (United Kingdom) • Berks, Bucks Oxon (United Kingdom) • Stockholm (Sweden) </td> </tr> </table>	<ul style="list-style-type: none"> • Emilia-Romagna (Italy) • Trentino Alto Adige (Italy) • Veneto (Italy) • Lazio (Italy) • Berfranken (Germany) • Berks, Bucks Oxon (United Kingdom) 	<ul style="list-style-type: none"> • Ile de France (France) • Brussels (Belgium) • Hovedstaden (Denmark) • Inner London (United Kingdom) • Berks, Bucks Oxon (United Kingdom) • Stockholm (Sweden) 						
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Other technologies of interest for Castilla y León	<ul style="list-style-type: none"> • E-learning platforms: new models • Augmented reality • Online sales platforms and new products for mobile devices • 4G 								
<p>There is a medium level of correlation in this macro-activity with scientific and technological specialisation patterns and it is therefore interesting for Castilla y León's smart specialisation.</p>									



ENERGY AND INDUSTRIAL ENVIRONMENT								
Economic pattern	This macro-activity includes two large-scale fields: on one hand, energy (gathering, management, and supply) and on the other hand, industrial environment (water management and distribution, waste management and decontamination). Together, these are significant in interregional commerce in Spain as well as an important potential for development in a linked manner with other relevant activities.							
Scientific pattern	<table border="1"> <tr> <td> Chemical Engineering <ul style="list-style-type: none"> Bioengineering Chemistry and Technology of Processes Engineering <ul style="list-style-type: none"> Industrial Engineering Material Science and Physics <ul style="list-style-type: none"> Condensed Matter Physics </td> <td> Earth Science <ul style="list-style-type: none"> Geology and Economic Geology and Earth surface processes Environmental Sciences <ul style="list-style-type: none"> Environmental Chemistry Water Science and Technology Ecology Management, Monitoring, Policy and Law Chemistry <ul style="list-style-type: none"> Analytical Chemistry Inorganic Chemistry Spectroscopy </td> </tr> </table>	Chemical Engineering <ul style="list-style-type: none"> Bioengineering Chemistry and Technology of Processes Engineering <ul style="list-style-type: none"> Industrial Engineering Material Science and Physics <ul style="list-style-type: none"> Condensed Matter Physics 	Earth Science <ul style="list-style-type: none"> Geology and Economic Geology and Earth surface processes Environmental Sciences <ul style="list-style-type: none"> Environmental Chemistry Water Science and Technology Ecology Management, Monitoring, Policy and Law Chemistry <ul style="list-style-type: none"> Analytical Chemistry Inorganic Chemistry Spectroscopy 					
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Technological pattern	<table border="1"> <tr> <td>Capacities</td> <td> <ul style="list-style-type: none"> Photovoltaic Solar Energy of Castilla y León Cluster (CYSOLAR), Spanish Association of biomass energy assessment (AVEBIOM), Environment, Sustainable Development and Engineering Cluster (AERIS) Regional Energy Agency (EREN), Foundation for Research and Development in Transport and Energy (CIDAUT), CARTIF Foundation, Agricultural Technological Institute of Castilla y León (ITACyL), Energy City Foundation (CIUDEN), Service Center and Forestry Promotion and Industry of Castilla y León (CESEFOR), Electrical Calibration Laboratory (LACECAL) </td> </tr> <tr> <td rowspan="5">Technologies</td> <td> Advanced Materials <ul style="list-style-type: none"> Lightweight materials for component development Absorption, power generation and energy storage materials (solar, wind, water, etc.) Advanced thermal insulation Gas treatment materials Combustion resistant materials New friction reducing materials New fluids for heat pumps </td> </tr> <tr> <td> IT <ul style="list-style-type: none"> Home automation Technology for energy efficiency in buildings Thermal network technology (district heating and cooling) </td> </tr> <tr> <td> Biotechnology <ul style="list-style-type: none"> Energy crops Environmental biotechnology Biofuels and biomass fuels Industrial biogas Integrated biorefinery </td> </tr> <tr> <td> Advanced Processes and Manufacturing <ul style="list-style-type: none"> Storage and intelligent management systems as well as hybridization and coordination operations between electrical production plans. Making use of waste (construction, agri-business, forestry, and industrial uses) CO2 and other atmospheric gas gathering, transport, and storage processes Geothermals Fuel cells / hydrogen cells </td> </tr> </table>	Capacities	<ul style="list-style-type: none"> Photovoltaic Solar Energy of Castilla y León Cluster (CYSOLAR), Spanish Association of biomass energy assessment (AVEBIOM), Environment, Sustainable Development and Engineering Cluster (AERIS) Regional Energy Agency (EREN), Foundation for Research and Development in Transport and Energy (CIDAUT), CARTIF Foundation, Agricultural Technological Institute of Castilla y León (ITACyL), Energy City Foundation (CIUDEN), Service Center and Forestry Promotion and Industry of Castilla y León (CESEFOR), Electrical Calibration Laboratory (LACECAL) 	Technologies	Advanced Materials <ul style="list-style-type: none"> Lightweight materials for component development Absorption, power generation and energy storage materials (solar, wind, water, etc.) Advanced thermal insulation Gas treatment materials Combustion resistant materials New friction reducing materials New fluids for heat pumps 	IT <ul style="list-style-type: none"> Home automation Technology for energy efficiency in buildings Thermal network technology (district heating and cooling) 	Biotechnology <ul style="list-style-type: none"> Energy crops Environmental biotechnology Biofuels and biomass fuels Industrial biogas Integrated biorefinery 	Advanced Processes and Manufacturing <ul style="list-style-type: none"> Storage and intelligent management systems as well as hybridization and coordination operations between electrical production plans. Making use of waste (construction, agri-business, forestry, and industrial uses) CO2 and other atmospheric gas gathering, transport, and storage processes Geothermals Fuel cells / hydrogen cells
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Possible regions of reference		<ul style="list-style-type: none"> Brussels (Belgium) Wallonia (Belgium) Aquitaine (France) 						
Other technologies of interest for Castilla y León	<table border="1"> <tr> <td> <ul style="list-style-type: none"> MOF materials Heat cogeneration and high efficiency energy Life cycle analysis Ecodesign/intelligent design Greenhouse gas emission minimization technology </td> <td> <ul style="list-style-type: none"> Comprehensive waste treatment Local energy storage systems Induction loaders Fuel cells Smart cities </td> </tr> </table>	<ul style="list-style-type: none"> MOF materials Heat cogeneration and high efficiency energy Life cycle analysis Ecodesign/intelligent design Greenhouse gas emission minimization technology 	<ul style="list-style-type: none"> Comprehensive waste treatment Local energy storage systems Induction loaders Fuel cells Smart cities 					
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<p>There is a medium level of correlation in this macro-activity with scientific and technological specialisation patterns and it is therefore interesting for Castilla y León's smart specialisation.</p>								



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HABITAT								
Economic pattern	This group of activities integrates the generation of unified solutions and creation of spaces related to construction, geared to personal consumer satisfaction, such as furniture or construction. These activities, in turn, hold significant weight in regional employment and are closely linked to the region, which makes them rural environment development factors.							
Scientific pattern	<table border="1"> <tr> <td> Engineering <ul style="list-style-type: none"> Industrial Engineering Mathematics and Computation <ul style="list-style-type: none"> Artificial Intelligence and Vision Material Science and Physics <ul style="list-style-type: none"> Polymers and Plastics </td> <td> Arts and Humanities <ul style="list-style-type: none"> Conservation Chemistry <ul style="list-style-type: none"> Analytical Chemistry Inorganic Chemistry Spectroscopy </td> </tr> </table>	Engineering <ul style="list-style-type: none"> Industrial Engineering Mathematics and Computation <ul style="list-style-type: none"> Artificial Intelligence and Vision Material Science and Physics <ul style="list-style-type: none"> Polymers and Plastics 	Arts and Humanities <ul style="list-style-type: none"> Conservation Chemistry <ul style="list-style-type: none"> Analytical Chemistry Inorganic Chemistry Spectroscopy 					
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Technological pattern	<table border="1"> <tr> <td>Capacities</td> <td> <ul style="list-style-type: none"> Group of Innovation Companies for Efficient Construction (AIECE), Confederation of Wood Business of Castilla y León (CEMCAL), Association of producers of natural stone of Castilla y León (PINACAL) Ultrashort Ultra-intense Pulsed Laser Center (CLPU), Service Center and Forestry Promotion and Industry of Castilla y León CESEFOR </td> </tr> <tr> <td rowspan="6">Technologies</td> <td> Advanced Materials <ul style="list-style-type: none"> Bio-sourced, recycled, and recyclable materials New treatments for stone and wood </td> </tr> <tr> <td> IT <ul style="list-style-type: none"> Infrastructure monitoring Home automation Preventative conservation technology Thermal network technology (district heating and cooling) </td> </tr> <tr> <td> Biotechnology </td> </tr> <tr> <td> Advanced Processes and Manufacturing <ul style="list-style-type: none"> Reuse and recycling of materials for construction Manufacture of laminated wood and new materials </td> </tr> </table>	Capacities	<ul style="list-style-type: none"> Group of Innovation Companies for Efficient Construction (AIECE), Confederation of Wood Business of Castilla y León (CEMCAL), Association of producers of natural stone of Castilla y León (PINACAL) Ultrashort Ultra-intense Pulsed Laser Center (CLPU), Service Center and Forestry Promotion and Industry of Castilla y León CESEFOR 	Technologies	Advanced Materials <ul style="list-style-type: none"> Bio-sourced, recycled, and recyclable materials New treatments for stone and wood 	IT <ul style="list-style-type: none"> Infrastructure monitoring Home automation Preventative conservation technology Thermal network technology (district heating and cooling) 	Biotechnology	Advanced Processes and Manufacturing <ul style="list-style-type: none"> Reuse and recycling of materials for construction Manufacture of laminated wood and new materials
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		Possible regions of reference	<table border="1"> <tr> <td> <ul style="list-style-type: none"> Etela-Suomen (Finland) Lombardy (Italy) Madrid (Spain) Luxembourg Veneto (Italy) </td> <td> <ul style="list-style-type: none"> Emilia-Romagna (Italy) Trentino Alto Adige (Italy) Lazio (Italy) Berfranken (Germany) </td> </tr> </table>	<ul style="list-style-type: none"> Etela-Suomen (Finland) Lombardy (Italy) Madrid (Spain) Luxembourg Veneto (Italy) 	<ul style="list-style-type: none"> Emilia-Romagna (Italy) Trentino Alto Adige (Italy) Lazio (Italy) Berfranken (Germany) 			
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Other technologies of interest for Castilla y León	<ul style="list-style-type: none"> Technology integration in smart buildings 4G Architecture. Wood construction Manufacture of laminated wood and new materials 							
<p>No significant level of correlation has been identified with scientific and technological specialisation patterns in this macro-activity.</p>								



ICT deserve special mention. This sector represents 1% of the region's GDP and there is no statistical evidence of a economic specialisation of Castilla y León in. However, they constitute a special case since it is the only sector considered as **Key Enabling Technology (KET)** with a business sector dedicated to its development. ICT also play a central role for citizens, Government, and the modernization of entrepreneurial activities.

ICT are present in all macro-activities and also, although not reflected in the previous tables due to the specificity of technologies, Castilla y León has strengths in very specific areas, such as mobile applications and technology, cyber security, Big Data, Internet of the Future, Cloud Computing, all of which are cross-cutting technologies for any economic activity and specifically for those mentioned in the region's economic pattern.

The correlation between the three patterns is imbalanced, affecting the selection of thematic priorities:

- **Agriculture and food industry, Automobile and components manufacturing, and Health and quality of life equipment** are economic macro-activities with high correlation and scientific and technological potential in the Autonomous Community, noteworthy for being considered action priorities in 2014-2020.
- **Tourism, Heritage, and Spanish Language**, with the least scientific and technological correlation, are activities linked intrinsically to the region, that potentially allow for generating new economic activity and an innovative expansion, starting from development of existing internal resources.
- **ICT, along with Energy and Industrial Environment**, are interesting not only from an economic standpoint but also from a technological point of view, to the extent that existing knowledge in the region provides greater benefit to other economic sectors.
- **Habitat**, in spite of the significance it has on regional GDP, does not have a specialisation in the region at the scientific or technological level in fields exclusive to this sector. However, the possibility of generating added value exists beginning with development of shared knowledge and technology with Agriculture and Food Industry (particularly in production), Cultural Heritage (treatment technologies) and by taking advantage of its important interrelationships with ICT, Energy and Industrial Environment (sustainability, reuse of materials, etc.).



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PART 2

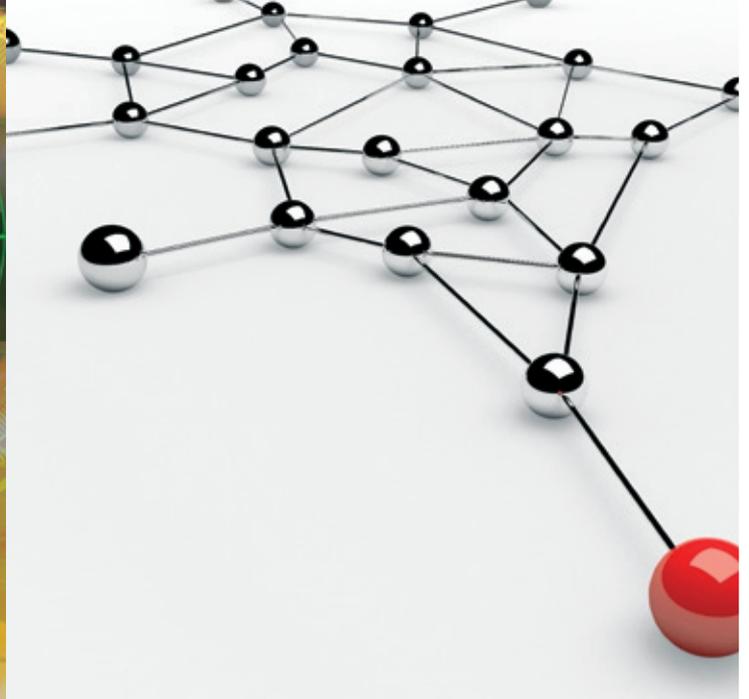
RESEARCH AND INNOVATION STRATEGY FOR SMART SPECIALISATION OF CASTILLA Y LEÓN 2014-2020

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5 STRATEGIC OBJECTIVES



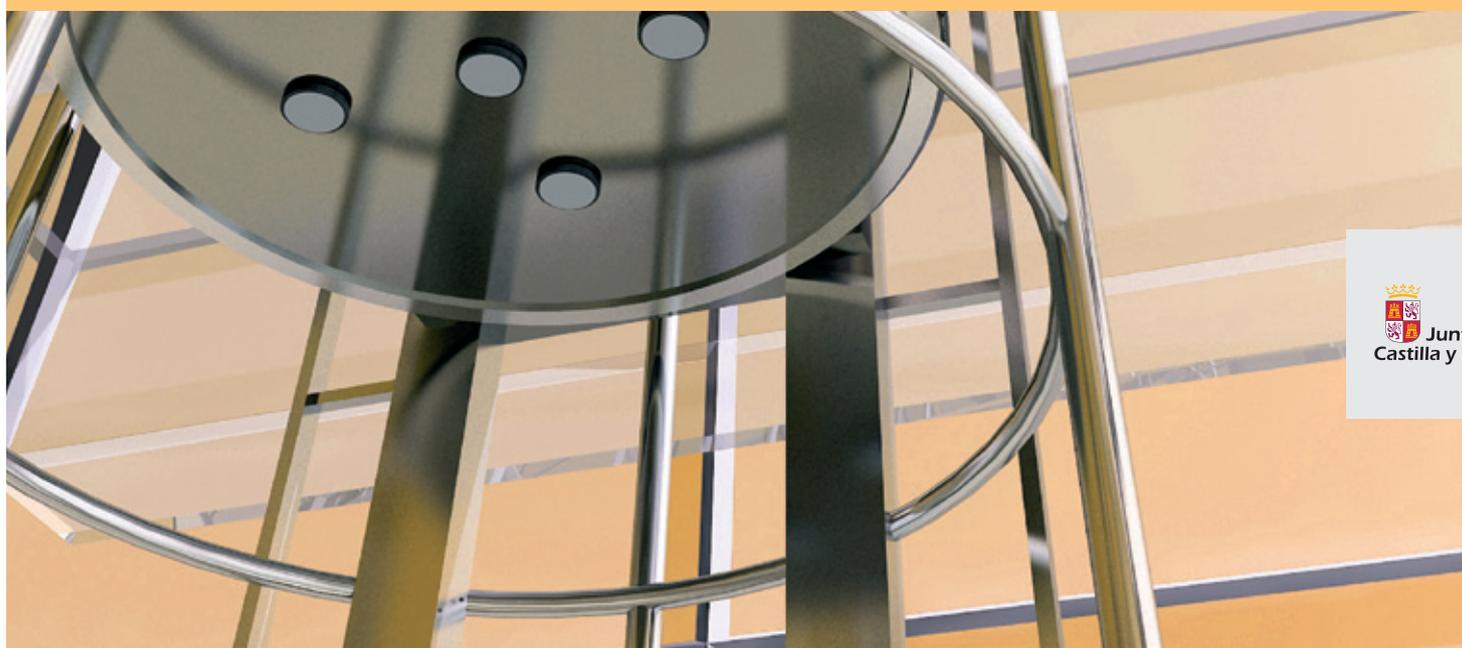
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The Research and Innovation Strategy for Smart Specialisation (RIS3) of Castilla y León 2014-2020 is conceived as an instrument to increase the competitiveness of the activities in which Castilla y León is specialized, through the development of all their scientific and technological potential, cooperatively relating regional actors to each other and to the outside, and maximizing existing resources and capabilities.

The RIS3 is the opportunity to significantly improve the R&D&I and Information Society regional policy of Castilla y León, a policy that allows addressing some of the challenges arising from the regional SWOT analysis, and that are specified in its strategic objectives:

STRATEGIC OBJECTIVES

1. Reinforce **a more competitive and sustainable economic** model for entrepreneurial innovation and a more efficient use of resources.
2. Move **towards scientific and technological leadership** in specific fields of potential for regional specialisation, configuring a more attractive science and technology system.
3. Improve **the regional innovation system's internationalization pathways** and the outward-looking perspective.
4. Promote **multidisciplinary collaboration** between knowledge generating agents, and the knowledge transfer.
5. Promote a **culture of innovation and creativity** in all social and economic settings.
6. Turn **Information and Communication Technologies into facilitators of innovation**, social and territorial cohesion, economic growth, rural development, and employment creation.



6 THEMATIC PRIORITIES



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The Regional Specialisation Pattern has been the starting point for identifying thematic priorities, which are the result of an exhaustive analysis and participatory process involving all of Castilla y León's Science-Technology-Business-Society System's players.

Beginning with the regional specialisation, boosting both existing economic activities and generation of new activities through diversification is sought. Support of smart specialisation and diversification will be carried out, above all, through the **application and development of technologies** identified in the technology specialisation pattern.

PRIORITIES

1. **Agriculture and Food Industry** and natural resources act as catalysts for the expansion of innovation throughout the region.
2. **Productive efficiency in transport sectors such as Automobiles manufacturing and Aeronautics**, making materials and components the keys to leadership and sustainability.
3. **Application of knowledge and technology in health and social care, demographic change and wellbeing** for the improvement of citizen quality of life.
4. **Natural Heritage, Cultural Heritage, and Spanish Language**, internal resources that are the base for regional sustainability.
5. **R&D in Information and Communication Technologies, Energy & Sustainability** for comprehensive global competitiveness based on cross-cutting technology and knowledge.



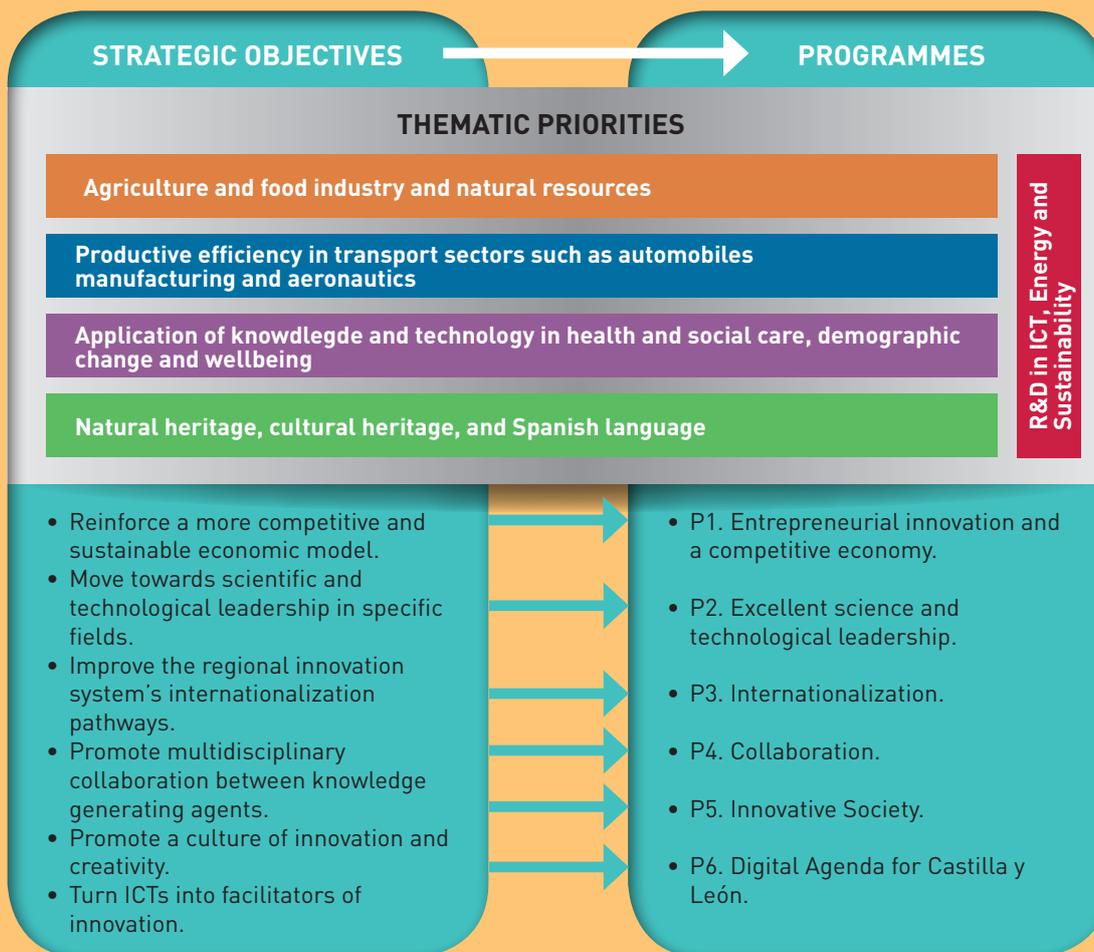
7 PROGRAMMES

Programmes materialize the initiatives and actions to be undertaken to achieve the Strategy's objectives. They are deployed for each strategic objective, and they are applicable to all thematic priorities of the Strategy.

Castilla y León's Smart Specialisation Strategy integrates **six programmes**, and a series of specific objectives to attain are defined in each programme. Programmes will develop **thematic priorities** to a greater or lesser extent, beginning with specific objectives defined in each of them.



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PROGRAMME 1. ENTREPRENEURIAL INNOVATION AND A COMPETITIVE ECONOMY

Programme 1 is focused on responding to the need **to boost competitiveness of regional companies on a base of innovation** and the importance of generating new economic activities, especially such activities that are linked to the region and those that, in turn, contribute to creating an interrelated economic fabric based on potentialities identified in the Strategy. It contains measures geared towards three specific objectives:

- 1.1 Support innovative efforts of the companies.
- 1.2 Boost creation of innovative companies based on patents, ideas, innovative projects and in sectors or activities linked to the region.
- 1.3 Improve training for innovation in sectors that can lead the change in the new production model.

PROGRAMME 2. EXCELLENT SCIENCE AND TECHNOLOGICAL LEADERSHIP

Programme 2 constitutes the core of science policy in the region, including measures promoting knowledge and technology generation with a **clear international leadership calling**, an improvement of **scientific quality and socioeconomic impact** in research activity and **human capital** support of the science and technology system. The programme's specific objectives are:

- 2.1 Boost niches of excellence and international leadership in technologies and scientific areas where there is competitive advantage and potential.
- 2.2 Increase research activity's quality and socioeconomic impact.
- 2.3 Support talent and human capital.

PROGRAMME 3. INTERNATIONALIZATION

Programme 3 promotes **internationalization** as a crucial smart specialisation component in order to improve competitiveness at the global level, and in general, a vision towards overseas and outside the region of the regional R&D system. To this end, **innovation** and internationalization are two concepts covered jointly in RIS3, addressing two specific objectives:

- 3.1 Integrated focus of innovation and internationalization activities.
- 3.2 Increase participation of Castilla y León entities in international R&D programmes.



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PROGRAMME 4. COLLABORATION

Programme 4 focuses on collaboration as a fundamental issue in the current science and technology context. To this end, it addresses **entrepreneurial cooperation**, commitment to **interdisciplinary collaboration and/or between different research entities**, sharing and increasing value of knowledge and connection between higher education and innovation as the base of human capital in a smart specialisation scenario:

- 4.1 Facilitate technological collaboration between companies and open innovation.
- 4.2 Greater multidisciplinary collaboration between research groups and creation of research platforms that have critical mass.
- 4.3 Identify current industry-wide technological demand and contribute to knowledge transfer.
- 4.4 Increase the convergence between higher education and innovation.



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PROGRAMME 5. INNOVATIVE SOCIETY

Programme 5 takes into consideration the importance of **extending the innovative and creative spirit** throughout society. An entrepreneurial society is encouraged during **the phases of education** as well as by promoting **an increase of interest and awareness** in citizens due to the results of research. Its two specific objectives are:

- 5.1 Form attitudes and values for creativity and innovation and develop entrepreneurial skills in students and teachers in all education stages.
- 5.2 Bring society closer to scientific and technological achievements.

PROGRAMME 6. DIGITAL AGENDA FOR CASTILLA Y LEÓN

Programme 6 influences key aspects for carrying out the digital transformation of the society of Castilla y León and contains **Digital Agenda action lines for Castilla y León**, with four specific objectives:

- 6.1 The deployment of telecommunications networks and services to ensure digital connectivity.
- 6.2 Develop the digital economy for companies growth and competitiveness.
- 6.3 Boost eGovernment and improve the efficacy, efficiency, and quality of public services through intensive ICT use.
- 6.4 Stimulate the citizen digital adoption and social innovation.

8 GOVERNANCE



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Strategy Governance covers working structures, processes, and methodologies that enable the **coordination of actions of different agents involved in the Strategy's development, determine the condition of the Strategy at all times and adopt appropriate decisions** in order to adapt to changing conditions in the global competitive setting. In this manner, Strategy Governance ensures R&D&I and Information Society policies that are alive and continually updated and correspond to the regional reality.

Coordination of the Strategy's execution, participation of the Science-Technology-Business-Society System players, as well as inter-institutional coordination will be carried out by the following governing bodies:

GOVERNING BODY	FUNCTIONS (SUMMARY)
Castilla y León Regional Government	<ul style="list-style-type: none">Approval of Strategy and possible modifications or updates.
Science and Technology Coordination Commission *	<ul style="list-style-type: none">Coordination of the various Regional Ministries' activities.
Commissioner for Science and Technology	<ul style="list-style-type: none">Ensure coordination and consistency of RIS3 actions.
RIS3 Management Group	<ul style="list-style-type: none">Monitoring and increase complementarity of the RIS3 initiatives with the National Government actions and the Horizon 2020 Program.
RIS3 Working groups	<ul style="list-style-type: none">Monitoring of RIS3, and formulation of recommendations for improvement, on behalf of the Science-Technology-Business-Society System.

*Science and Technology Coordination Commission or body assuming its legal competences in the future.



9 MONITORING AND EVALUATION



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RIS3 monitoring consists of compiling information and analysing the actions launched during its development, with **the goal of assessing how well objectives and priorities are being met, as well as improving efficacy and efficiency**. The **Annual Actions Report** is the Strategy's main monitoring element.

RIS3 anticipates carrying out an **Interim Evaluation in 2017** and a **Final Evaluation in 2021**. Among other issues, the intermediate evaluation will review how well objectives have been met, speed of the execution of actions, efficacy, efficiency, and their sustainability, as well as the current validity of defined thematic priorities. The Final Evaluation will exhaustively analyze both the results attained and the impact of the actions carried out.

The following is the **system of indicators** that will constitute the base for the Strategy's monitoring system:

OBJECTIVES	OUTCOME INDICATORS	SOURCE	Baseline	2017 Objective	2020 Objective
OE1. Reinforce a more competitive and sustainable economic model for entrepreneurial innovation and efficient resource usage.	Gross Domestic Expenditure in R&D (GERD)/GDP	INE ⁽¹⁾	1.12%	1.5%	2.0%
	Business Expenditure in R&D (BERD)/GERD	INE	61.8%	64.0%	66.0%
OE2. Move towards scientific and technological leadership in specific fields of regional specialisation, configuring a more attractive science and technological system.	Normalized impact of scientific production in Castilla y León	Scopus ⁽²⁾	0.99 ⁽³⁾	1.10	1.20
OE3. Improve the regional innovation system's internationalization pathways and an outward looking perspective.	% of exports of products with greater technological content compared with total of exports	DATAKOMEX ⁽⁴⁾	65.6%	69.0%	72.0%
OE4. Promote multidisciplinary collaboration between knowledge generating players and sharing of knowledge.	% of researchers in the private sector	INE	32.6%	36.0%	40.0%
OE5. Promote a culture of innovation and creativity in all social settings.	Human resources in science and technology [% compared with the active population]	EUROSTAT ⁽⁵⁾	41.4%	43.0%	45.0%
OE6. Turn Information and Communication Technologies into facilitators of innovation, social and territorial cohesion, economic growth, rural development, and employment creation.	% of population with broadband coverage at speeds of 30 Mbps or higher	SETS ⁽⁶⁾	64.3% ⁽⁷⁾	75.0%	100%
	% of companies with less than 10 workers who are connected to the Internet	INE	63.7%	70.0%	75.0%
	% of population who use the Internet regularly ⁽⁸⁾	INE	64.7% ⁽⁹⁾	73.0%	79.0%
	% of population who purchased over the Internet in the last three months	INE	24.7% ⁽⁹⁾	37.0%	46.0%
	% of population over 65 who use the Internet regularly ⁽⁸⁾	INE	22.1% ⁽⁹⁾	36.0%	42.0%

¹ Latest data available from 2010.

² National Statistics Institute.

³ Scopus Database, Elsevier.

⁴ Application of historical data queried from the Spanish Foreign Trade Institute. Ministry of Economy and Competitiveness.

⁵ European Statistics Office.

⁶ Secretariat of State for Telecommunications and Information Society. Ministry of Industry, Energy, and Tourism.

⁷ Data corresponding to the first six months of 2013.

⁸ At least once a week during the last three months.

⁹ Data corresponding to 2013.

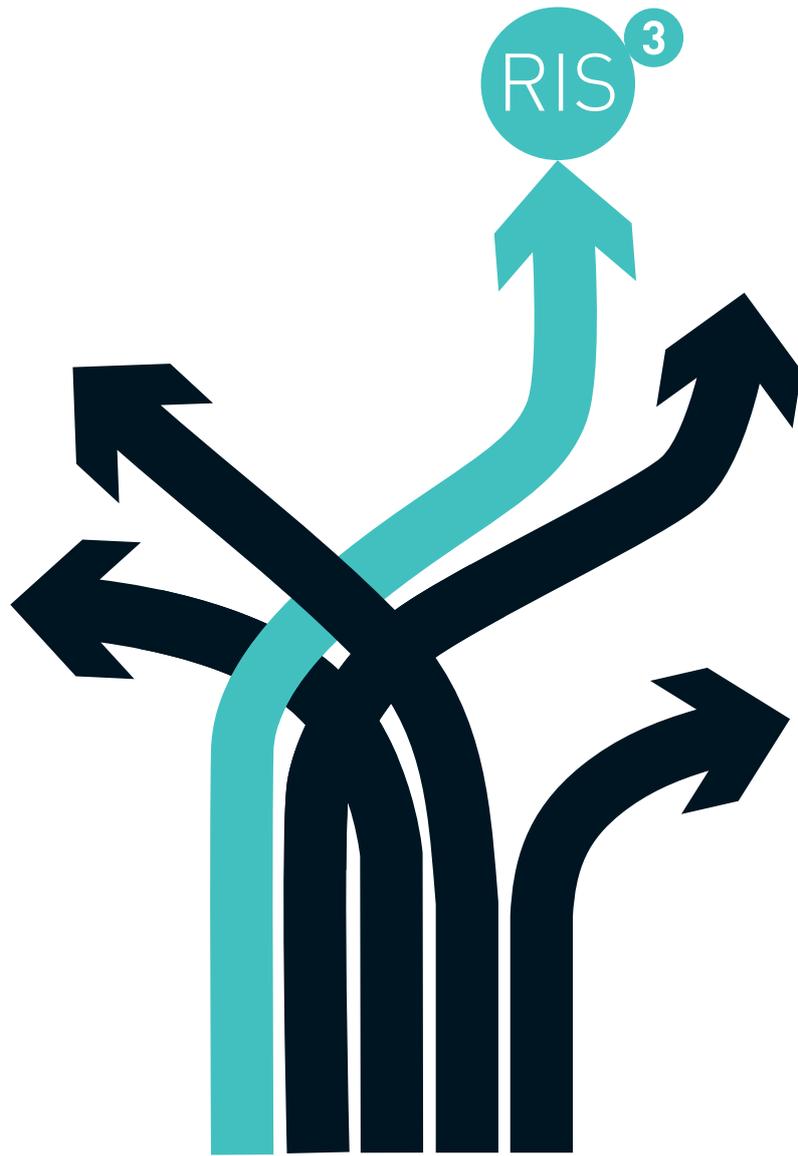
10 FINANCIAL PLAN



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The development of Strategy will involve both public and private resources. Public funding will come from Castilla y León Autonomous Community's General **Budgets** earmarked for science and technology, **tax expenditure** linked to the application of R&D&I tax deductions, **European Structural Funds** (ERDF, ESF, etc.), as well as the financial resources raised by regional entities at **national or European R&D&I programmes** (Horizon 2020, COSME, etc.). The following are anticipated financial resources that will mobilize RIS3 throughout its execution:

2014-2020 Budget Stance (millions of Euros)								
	2014	2015	2016	2017	2018	2019	2020	TOTAL
Public Resources	457	469	487	509	535	567	603	3,626
Castilla y León Regional Government	308	315	324	336	349	365	381	2,377
Other public resources	149	154	163	173	186	202	222	1,249
Private Resources	716	731	752	780	812	848	886	5,525
TOTAL	1,173	1,200	1,239	1,289	1,347	1,415	1,489	9,151



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