

# Southern Catalonia, Knowledge Region

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# The measure of progress

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## Editorial

Data has become indispensable element to evaluating public policies and the development of societies and countries. Statistics show the impact of policies and, therefore, can guide future decision making and management actions.

The European Union's main source of statistical information for decision-making is Eurostat, which collects regional and national data from across Europe.

The European Union has developed a set of criteria (known as NUTS by their acronym in French) for referencing the subdivisions of its member states. The territorial subdivisions of member states are thus divided into three levels, NUTS1, NUTS2 and NUTS3, from larger to smaller areas. According to this model, Catalonia and Tarragona are classified as NUTS2 and NUTS3, respectively. The NUTS classification permits, among others, interregional comparison and the allocation of structural funds.

Eurostat's regional databases provide a broad range of indicators on many different topics (demographics, economics, education, etc.) for the various NUTS classification levels. Indicators on innovation and progress such as R&D spending, employment in high-tech sectors or information and communication technologies are not available at NUTS3 level. This means it is impossible to do a full analysis of the Tarragona region to determine the measures that need to be adopted to turn it into a knowledge society.

We therefore need a stable information system that provides a detailed data on key indicators so that we can (1) measure internal capacities and potentialities, (2) design an action plan, (3) monitor progress, and (4) provide tools to enable decision making that fosters regional development.

To address this need, the Chair for University and the Knowledge Region is developing the Southern Catalonia Information System to address the information deficit. The Information System aims to provide and interpret quality data to ensure the most effective deployment of policies aimed at regional development.

This issue focuses on statistical data and its use. The first article gives an in-depth analysis of European databases. There is also an article describing some of the specifications and challenges involved in establishing the Southern Catalonia Information System. Continuing our series of studies of regions similar to Southern Catalonia is an article on Malaga, which is an example of innovation in Spain. Finally, we take a look at the innovative research and internationalization strategy of Plásticos Castellà / Jabil Nipro, one of the leading companies in our region.

For more information regarding events and documents relating to knowledge regions, you can check our website. You can also send us your ideas and opinions to help us improve and create a true knowledge region of knowledge for all.

**Francesc Xavier Grau Vidal**

Director of the Chair for University and Knowledge Region URV



# Catalonia and Tarragona in Eurostat and other EU Databases

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by Francesc Xavier Grau Vidal

“You can’t improve what you can’t measure”. This has already become a common place, but it is intrinsically true. The idea has been stated in many different ways, probably most completely by H. James Harrington: “Measurement is the first step that leads to control and eventually to improvement. If you can’t measure something, you can’t understand it. If you can’t understand it, you can’t control it. If you can’t control it, you can’t improve it”. Clearly, any project that is intended to improve a system, region or country requires measurement and monitoring systems, systems for selecting representative statistics, and stable and coherent data. For this reason, the work conducted by Europe via Eurostat is so important since it provides regions and countries with a **broad, coherent, stable and complete database** with which to monitor their position and perhaps compare themselves to homologous entities. Comparison is not always odious and here it is essential because there are absolute bases for hardly anything. Only by comparing equals can one gauge one’s relative accomplishment in a particular field of activity.

Annex 1 [1] lists the 275 indicators by which Eurostat provides information about NUTS2 regions. Specifically, these include most of the important ones for monitoring the Europe 2020 objectives. Of these indicators, only 53 provide information about NUTS3 regions and this information is concentrated in several fields: the agro-environment, demography, economy, patents, company demography, transportation, disparity in employment rates, tourist establishments, and crime. They do not provide information about NUTS3 regions on

such significant fields for society and the knowledge economy as education, R&D expenditure, employment (particularly employment in the high-technology sectors), human resources in science and technology, health, business structure, information and communications technologies, energy and the environment, agricultural holdings, or tourist activity. As we can see, the information on NUTS3 that is available from Eurostat is scant and incomplete and therefore insufficient for making any diagnosis or monitoring the development of a region by any parameters that define a society or knowledge economy.

**The operational existence of a Knowledge Region can be defined when there exists, firstly, the capacity at regional level to design, agree and implement plans of action for developing a social and economic structure that is (more) based on knowledge and, secondly, the capacity to monitor and reformulate those plans.** There is no doubt that this capacity exists in Catalonia as it does in the European NUTS2 regions. However, comparatively speaking, it is a huge waste of the potential of Catalonia and its regions that this capacity is limited to Catalonia as a whole when statistically (and culturally) Catalonia ought to develop the strategy of a country, just as countries of a similar or smaller size can (most EU countries, in fact).

In any case, no canonical definition of a Knowledge Region exists. Many initiatives around the world, and especially in Europe, have promoted instruments for enabling or boosting the development of these knowledge-based societies and economies. In the last few years both around the world and in Europe, additional elements of a social nature have been incorporated into the definition of this development and specifically into the definition of the innovation tools that make this development possible, with emerging concepts such as RRI (Responsible Research and Innovation) and Social Innovation. Indeed the Europe 2020 framework programme promotes RRI through, for example: RRI Tools, run by La Caixa; Irresistible; Great, which focuses on questions of governance; and the recently initiated HEIRRI (Higher Education Institutions and Responsible Research and Innovation), led by the UPF (Universitat Pompeu Fabra) and involving the participation of the rest of the Catalan public universities via GUNI-ACUP (The Global University Network for Innovation – Associació Catalana d'Universitats Públiques). With regard to social innovation, it is worth mentioning the Basque initiative RESINDEX (Regional Social Innovation Index), which is an index for measuring social innovation, and the publication *A Blueprint for Social Innovation Metrics* by Tepsie, another European project. In a wider context, also significant are the efforts made towards a quantitative definition of broader progress that covers social as well as economic aspects, such as Social Progress Imperative, a social progress index based on a range of social and environmental outcome indicators organised in three dimensions of social progress: Basic Human Needs, Foundations of Wellbeing, and Opportunity. As we can see, this is a vital element of development as a society, which finds its space for implementation in the regions.

The closest approximation today to a set of indicators for the knowledge society is the European Innovation Scoreboard. This annual report on innovation in the EU provides a set of indicators for the comparative evaluation of the performance in research and innovation of the EU member states as well as of the strengths and weaknesses of their research and

innovation systems. The aim is to help member states evaluate areas they need to concentrate on in order to improve their performance in innovation, which is considered to be the foundation of the knowledge society.

The report is accompanied by a regional version, the Regional Innovation Scoreboard, whose fourth edition of Regional Innovation Indicators (2016) provides a comparative evaluation of the innovation results of 214 regions from 22 EU countries plus Norway (due to their size, Estonia, Cyprus, Latvia, Lithuania, Luxembourg and Malta are only included at the national level). Catalonia is, of course, one of these regions. One of the main points raised in the report is that every leader of regional innovation in the EU (36 regions) is located in just six countries: Germany, Denmark, Finland, France, the Netherlands, Sweden and the United Kingdom. This indicates that excellence in innovation today is concentrated in relatively few areas of Europe. The RIS3 projects must be able to extend innovative economic activity to other parts of Europe, including Catalonia. To do so more effectively and analogously to these leading countries, the strategy must be extended to the various Catalan regions which, like Tarragona, have sufficient potential as well as the means to do so.

**Figure 1.** Regions by performance in innovation

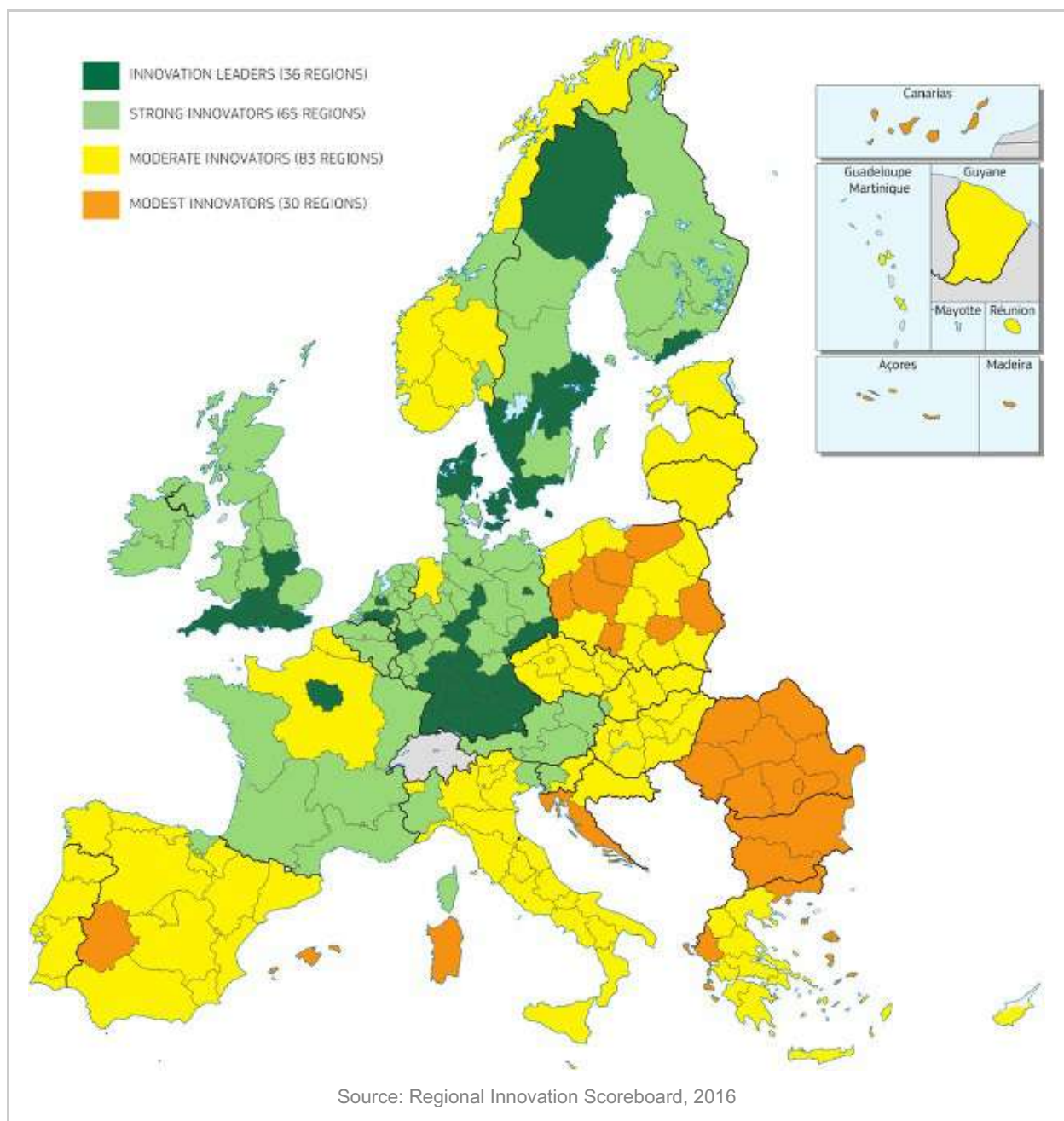


Figure 1 shows the distribution of the regions according to their performance as measured by innovation indicators. Clearly, the modest innovators and moderate innovators are concentrated in southern and Eastern Europe. Of all the countries in southern Europe, the Basque Country is the only region classed as having a strong performance in innovation. Innovation leaders are located in the more competitive EU countries. In this context, Catalonia appears to have lost ground in the last few years. No data are available for NUTS3 regions.

**Figure 2.** The 25 innovation indicators of the European Innovation Scoreboard. The indicators highlighted with a coloured circle are those used by the Regional Innovation Scoreboard

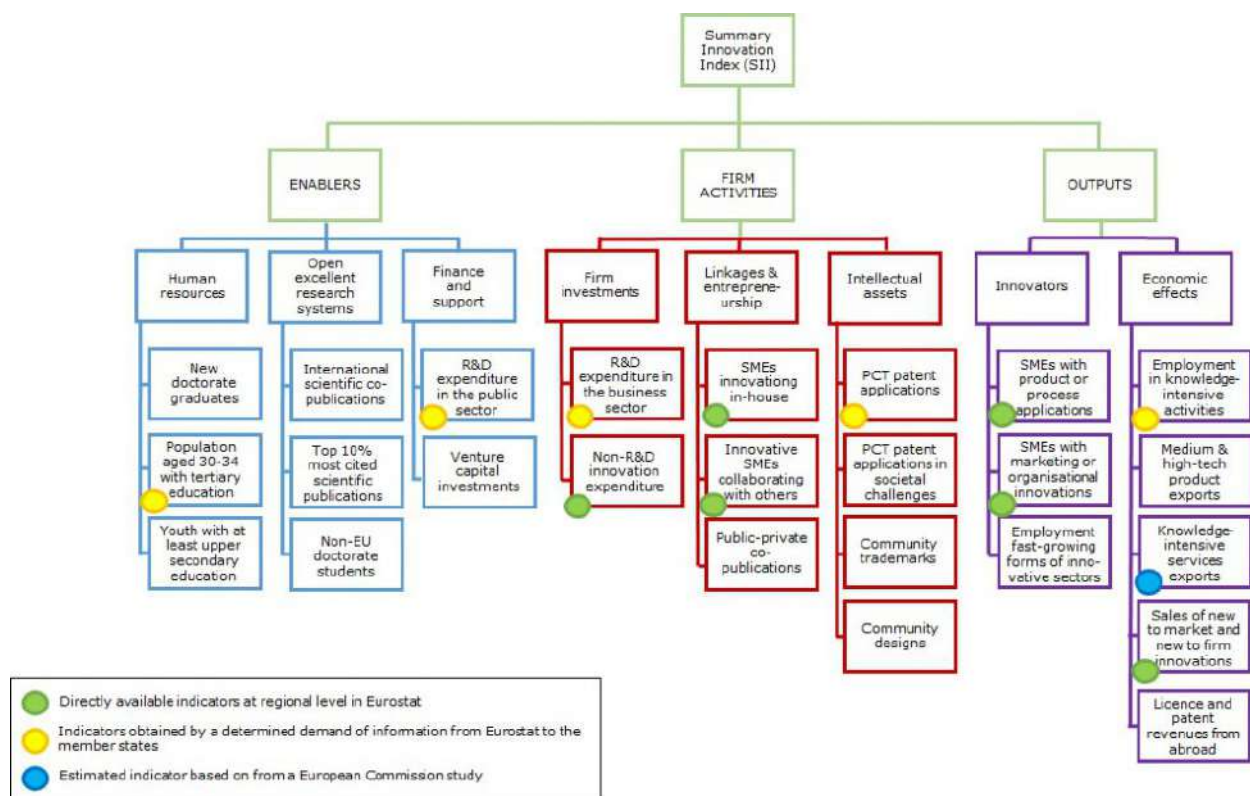


Figure 2 shows the 25 indicators used by the European Innovation Scoreboard for all countries of the European Union. Those highlighted with a coloured circle are the 12 indicators also available for regional evaluation. The yellow circles point to indicators that are directly available at the regional level from Eurostat. These are: population aged 30 – 34 with tertiary education; R&D expenditure in the public sector; R&D expenditure in the business sector; PCT patent applications (worldwide); and employment in knowledge – intensive activities. The blue circle points to an indicator for knowledge – intensive services exports, which is estimated from a European Commission study. Information for the remaining 6 indicators was obtained by way of a specific request for information from member states by Eurostat. These 12 indicators therefore represent the core of those that can be used to monitor the development of a region as a knowledge region and are only available at the NUTS2 classification level. It is hoped that Eurostat will continue compiling data in the future since the first four editions have helped to increase the volume of information.

The Regional Innovation Scoreboard 2016 report is accompanied by an annex for each country and an evaluation of the indicators for each region. It is interesting to discover what it says about Catalonia:

Catalonia is a Moderate Innovator. Innovation performance has declined (-7%) compared to two years ago. The radar graph shows that relative strengths compared to the EU-28 are in Tertiary education attainment, Employment in knowledge-intensive industries, and Exports of medium and high tech products. ...Relative weaknesses are in Non-R&D innovation expenditures, Innovative SMEs collaborating with others, and SMEs with marketing or organizational innovations.

**Figure 3.** Evolution of the Innovation Index (left) for Catalonia and position of the indicators, according to the Regional Innovation Scoreboard (2016)



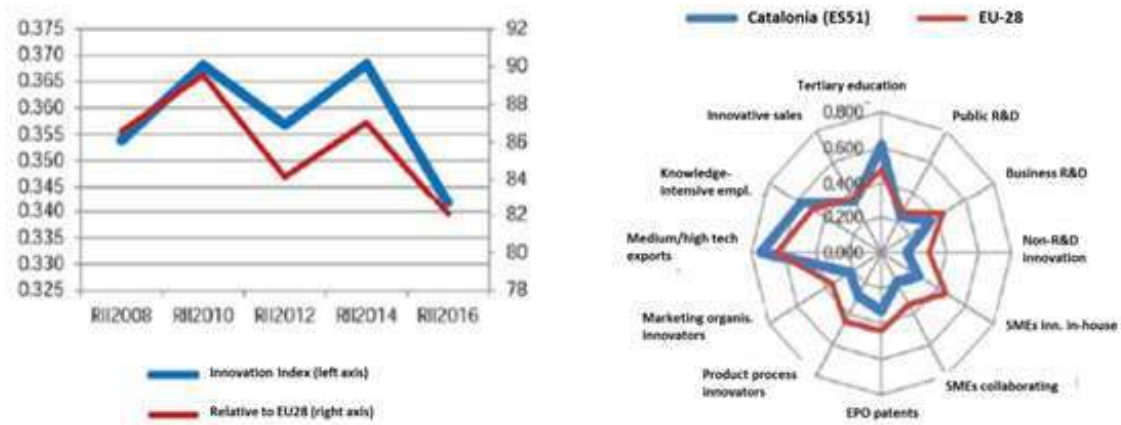
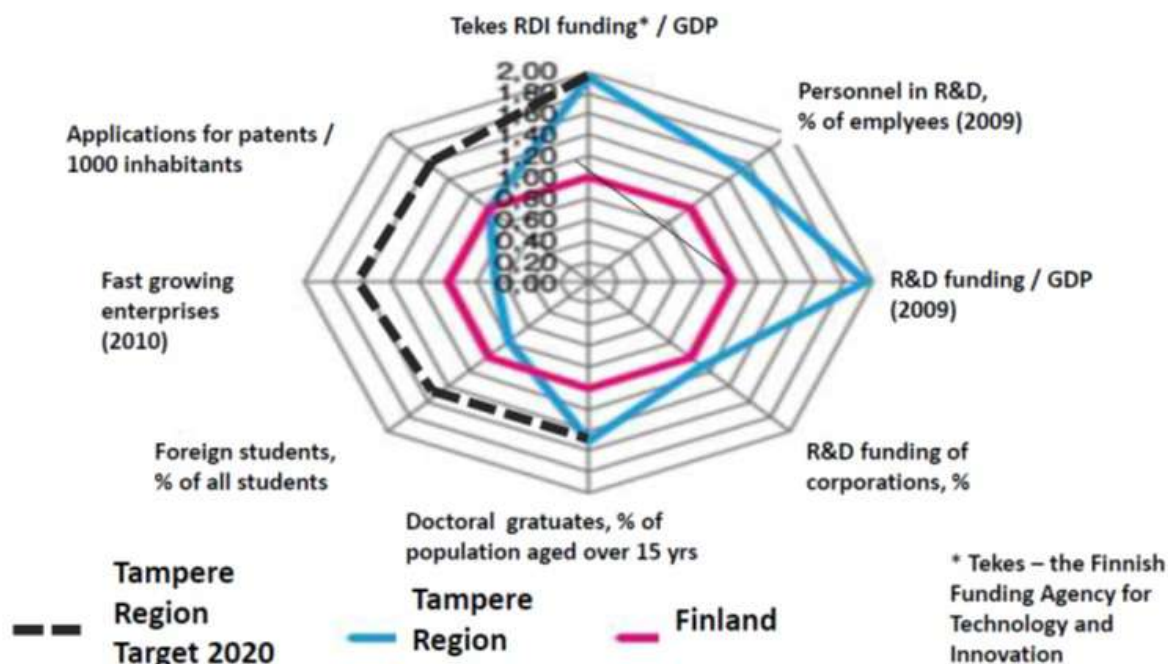


Figure 3 has been obtained directly from the above-mentioned annex. It shows the evolution of the global innovation index for Catalonia, which clearly indicates that Catalonia has lost ground compared to Europe as a whole. The figure also shows the set of 12 indicators analysed in a radar graph for easy visualisation of Catalonia's relative position to the EU as a whole in each of these indicators.

Any project aimed at developing the Tarragona region as a knowledge region in the operational sense described earlier, i.e. **developing at the Southern Catalonia regional level, firstly the capacity to design, agree and implement plans of action for developing a social and economic structure that is (more) based on knowledge and, secondly, the capacity to monitor and reformulate those plans**, will require obtaining data with the same level of quality and comparability as those provided by Eurostat and those used for the Regional Innovation Scoreboard. Ideally, other indicators with a social component should now be added, such as those proposed by RESINDEX (Regional Social Innovation Index) or the Social Progress Imperative. To analyse and monitor the position of the Tarragona region, however, the determining factor would be the ability to construct a graph like the one in Figure 3, just as the region of Tampere (Pirkanmaa, Finland) with a GDP of 17,435 million euros and 500,000 inhabitants has done, thus enabling them to set out their objectives graphically (see Figure 4).

**Figure 4.** Positioning and objectives of the region of Tampere by indicators of development and innovation. Tampere is a model for the Tarragona region.



Without reflecting on the current political framework, in which Catalonia is a Spanish autonomous community, there are several ways in which Southern Catalonia could achieve the status of a region. What may be considered the preferable route, and which would afford Southern Catalonia the status of a NUTS2 region – thus opening up opportunities and levels of information that are currently restricted to Catalonia – would be to modify the map of Spanish NUTS1 regions (essentially an administrative decision) and divide the current EST region (which, as the second of 117 EU regions and twice the recommended size for NUTS1 regions, is abnormally large as well as inoperative) into two similar-sized regions (of the maximum size envisaged for NUTS1 regions): NORD-EST (Catalonia) and EST (the Valencian Community and the Balearic Islands). This would enable NUTS2 regions to be defined within Catalonia with more appropriate dimensions for European NUTS2 regions. A second option would be similar to the one adopted for Finland: the current organisation system could be maintained but regional strategic development competences at the NUTS3 level could be transferred and activated by law, with the creation or operative identification of *regional councils*. This option would not solve the problem of the availability of NUTS2 classification data for these internal regions and the *regional council* itself would be responsible for collecting them, as does, for example, the Council for the region of Tampere.

For any of these or other options, a question remains regarding the definition of the expansion of the region. The current Tarragona NUTS3 region exactly matches the Spanish division of the territory into provinces. However, Catalonia has applied a moratorium on its *Law of Vegueries* and therefore still has to consolidate its own internal division. Clearly, this is not a minor or a technical matter, but introducing applicability criteria for regional policies based on smart specialisation through research and innovation in the new Europe 2020 framework could help provide a better operative definition that should also take into account the historical relationships between territories.

## Main conclusions from section

1. The operational existence of a Knowledge Region can be defined when there exists, firstly, the capacity at regional level to design, agree and implement plans of action

for developing a social and economic structure that is (more) based on knowledge and, secondly, the capacity to monitor and reformulate those plans.

2. Eurostat provides information in the NUTS2 classification about 275 indicators. These include most of the important ones for monitoring the Europe 2020 objectives. Of these indicators, only 53 provide information about NUTS3 regions and they do so only in certain fields. They do not provide information about NUTS3 regions on such significant fields for society and the knowledge economy as education, R&D expenditure, employment (particularly employment in the high-technology sectors), human resources in science and technology, health, business structure, information and communications technologies, energy and the environment, agricultural holdings, or tourist activity.
3. The Regional Innovation Scoreboard monitors the innovation performance of over 200 European NUTS2 regions using 12 of the 25 indicators that are used to monitor the performance of the countries. Catalonia has lost ground in the last few years (falling from 89% of the EU average in 2010 to 82%).
4. Developing the Tarragona region as a knowledge region will require the availability of data with the same level of quality and comparability as those provided by Eurostat and those used for the Regional Innovation Scoreboard.
5. The best option would be to enable Southern Catalonia to achieve NUTS2 classification status by modifying the map of the Spanish NUTS1 regions. This would involve dividing the current EAST region into two – NORTH-EAST (Catalonia) and EAST (the Valencian Community and the Balearic Islands) – and defining NUTS2 regions inside Catalonia with dimensions that are appropriate for European NUTS2 regions. Alternatively, the current organisation system could be maintained but regional strategic development competences at the NUTS3 level could be transferred and activated by law through the creation or operative identification of regional councils.
6. Introducing applicability criteria for regional policies based on smart specialisation through research and innovation could, in the new Europe 2020 framework, help to provide a better operative definition of regional organisation in Catalonia. This regional organisation should also take into account the historical relationships between territories.

**Francesc Xavier Grau Director of the Chair for University and Knowledge Region URV**

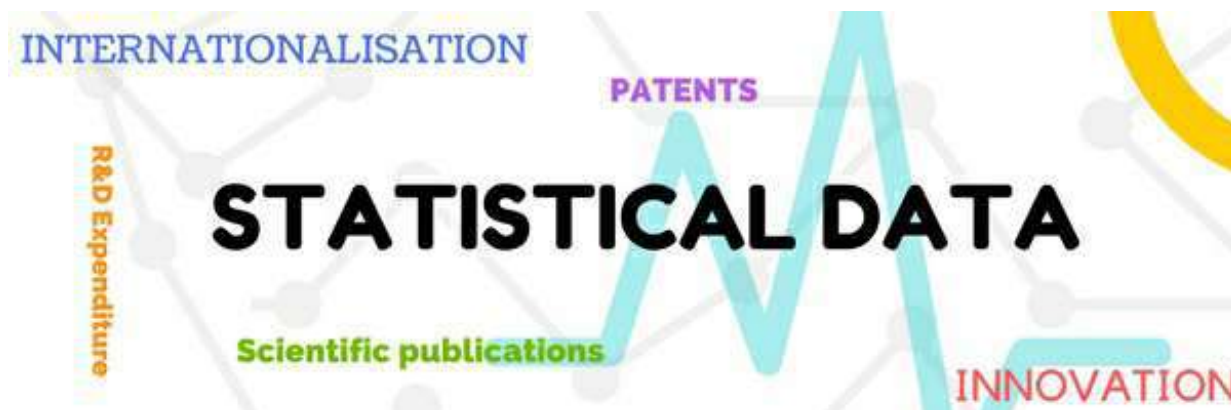
For further information on this topic, please see the document: **GRAU, F.X.**, *Southern Catalonia, Knowledge Region*, Publicacions URV, 2016.

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[1] See the annex on line.

# How is innovation measured?

 [diaridigital.urv.cat/en/how-is-innovation-measured/](http://diaridigital.urv.cat/en/how-is-innovation-measured/)



by Àlex Fabregat Tomàs and Aleyois Haro Peralta

Peter F. Drucker, “If you can’t measure it, you can’t improve it”

The widely recognized positive relationship between innovation, economic growth and competitiveness is key to developing systems for measuring the factors that influence innovation. Certainly, as the Oslo Manual identifies, companies’ innovative capacity is significantly affected by regional factors such as the presence of the universities, research institutes, technology and innovation centres, business clusters, private finance funds and initiatives to stimulate territorial growth. Therefore, it is crucial to be able to identify, measure and manage the main elements that foster innovative activity and the development of specific sectors at a regional level, so that public policies can be oriented towards innovation and entrepreneurship. In this regard, the European Commission’s Smart Specialisation Platform has drawn up the Guide on Research and Innovation Strategies for Smart Specialisation (RIS3) to help EU member states and regions to develop strategies for intelligent specialisation. The main goal is for regions to identify the areas of economic and knowledge-based specialisation best suited to their assets, capabilities and innovation potential.

Currently, the metrics used to evaluate innovation capacity in the EU are applied at regional level, which corresponds to level NUTS2 of the Union’s current criteria for territorial classification. In Spain, this corresponds to the autonomous communities, which represent the second tier of government. Under this classification, the autonomous community of Catalonia is one of the NUTS2 regions with more weight in demographic and macro-economic terms. Consequently, current studies have a fundamental limitation in that they fail to reflect the wide socio-economic variation within Catalonia. It is therefore essential to apply the criteria on a smaller scale (i.e. the NUTS3/provincial level) in order to develop regional policies that can maximize the growth potential of each region on the basis of its strengths and characteristics.

In this regard, by applying a system of indicators at the NUTS3 level, policy makers could (i) carry out analyses at regional level by increasing the amount of data obtained; (ii) measure



the evolution and impact of innovation policies and (iii) carry out benchmarking exercises in order to identify regional strengths and weaknesses and good practices from other systems. Thus, the aim is to create a scoreboard to support decision-making regarding innovation and regional development in both the public and private spheres.

The Regional Innovation Scoreboard (RIS) is the accepted instrument for measuring the impact of innovation policies at regional, so the first step is to increase level of data in the analysis by applying the RIS indicators at NUTS3 level. The data used to compile RIS are derived from the European Commission’s main statistical database, Eurostat, which mostly draws on data obtained from each member state. The metrics applied to innovation by member states and Eurostat are obtained using input-output models that often have significant limitations when it comes to capturing the complex dynamics that determine the level of innovation in a given region. Recently, the databases have been complemented by composite indicators and indices designed to provide a more rigorous picture of the European innovation map.

Table 1 shows the source of the data at NUTS2 level and the availability of data at NUTS3 level for each of the 18 composite RIS indicators. As can be seen, there is no data available for estimating most of the indicators at the provincial level. This limitation to expanding RIS results to NUTS3 level raises two issues: (i) the availability of disaggregated data at provincial level and (ii) the reproducibility of the procedure for determining the composite indicator.

Regarding the first issue, the Community Innovation Survey (CIS) is conducted at NUTS2 level, as is the case with most surveys carried out within individual member states and across the EU as a whole. Typically, the disaggregation of provincial results does not satisfactorily increase the representativeness of the data. One possible solution is to correct the lack of representativeness at NUTS3 level by modifying the survey methodology and extending the territorial scope of the sample; however, this is almost unfeasible due to the high associated cost.

**Table 1.** Source of data at NUTS2 level (RIS) and availability of data at NUTS3 per composite indicator

RIS INDICATOR	NUTS2 data source (RIS)	NUTS3 data availability
Population with tertiary education (%)	Eurostat	IDESCAT
Population in life-long learning (%)	Eurostat	IDESCAT
International scientific publications	CTWS*	<i>Web of Science</i>
Top 10% most cited scientific publications	CTWS*	<i>Web of Science</i>
R&D expenditure in the public sector (% GDP)	Eurostat	No
R&D expenditure in the business sector (% GDP)	Eurostat	No
Non R&D innovation expenditure (% turnover)	CIS**	No
Innovation in products or processes	CIS**	No
Innovation in marketing or management	CIS**	No
Original innovations	CIS**	No
Collaborations in innovation	CIS**	No
Public-private co-publications	CTWS*	<i>Web of Science</i>
Patent applications	Eurostat	Eurostat
Trademark applications	Eurostat	Eurostat
Design applications	Eurostat	Eurostat
Employment in knowledge-intensive activities	Eurostat	No
High-tech product exports	DG Growth	No
High-tech sector income	CIS**	No

Source: Compilation based through RIS 2017 \*Data facilitated by the CWTS (University of Leiden) under the agreement with the Directorate General for Research and Innovation. Data from the Web of Science. \*\*Community Innovation Survey: a harmonized survey for collecting business innovation data at community level. In Spain this is carried out by the Instituto Nacional de Estadística (INE).

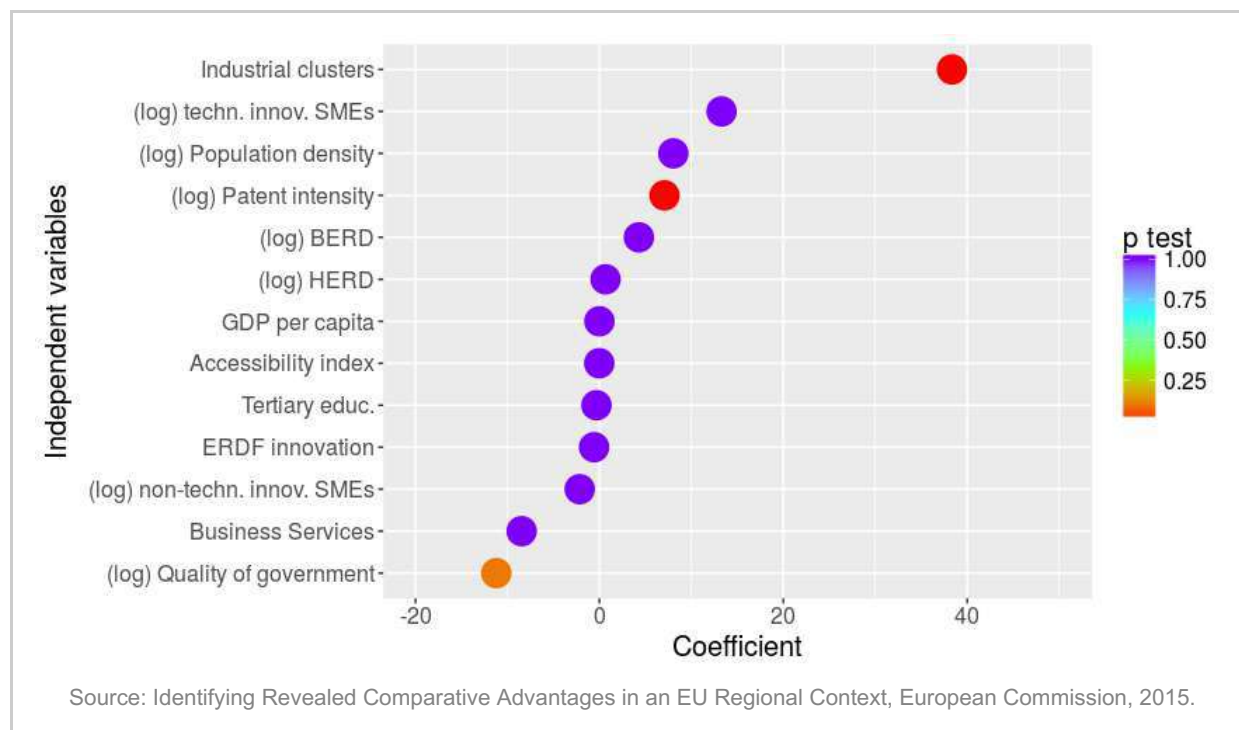
Regarding the second issue, reproducing the procedure to determine the composite indicator is limited by the fact that the application of some RIS indicators has been outsourced to other organizations. These shortcomings mean that it is impossible to apply the indicator at NUTS3 level.

To overcome these two limitations to determining some of the composite indicators at regional level, statistical learning tools can be used to construct a model to determine quantifiable relationships between the dependent variables (the indicators) and a set of independent variables in which some type of dependency is suspected.

Among the great variety of statistical learning tools available, the Multivariate Linear Model (MLR) is the most suitable option because it can identify the possible relationships between variables, is easy to interpret and can determine the specific weight of each of the independent variables. In fact, these tools have already been used in the RIS to determine the composite indicator *revealed export advantages* (RXA). Thus, the MLR has made it possible to investigate the dependence between RXA and 13 variables including, among others, the number of patents, the gross domestic product per capita, population density, etc.

To give an example, the graph shows the value of linear coefficients for the 13 independent variables in the set of regions with medium technological specialization. The colour represents the degree of statistical confidence in the estimation of the coefficient (higher in red). These results indicate that for this particular sample of regions, RXA clearly depends on the number of industrial clusters and the ability to patent.

**Figure 1.** Coefficient values for the MLR of revealed export advantages



Another advantage of MLRs is that they allow predictions to be made about the behaviour of the dependent variable under other conditions in accordance with the proposed model.

These types of tool therefore offer the most appropriate strategy for estimating indicators not available at NUTS3 level. The main difficulty lies in finding the set of variables on which the indicator in question is clearly dependent. The answer to this problem consists of establishing a set of NUTS2 regions whose characteristics are very similar to those of Tarragona and “training” the MLRs to determine how the indicator in question depends on the chosen variables.

Finally, it should be added that the process of constructing a scoreboard is also hindered by the need to measure the impact of innovation in key areas of regional development such as culture, society, health and the environment.

## “We have the economic and social conditions to become a knowledge region”

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### **Which are the principal strenghts of the Terres de l'Ebre campus?**

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Since its foundation, the Terres de l'Ebre Campus has promoted the Third Mission of the Universitat Rovira i Virgili, which supports the regional development of Southern Catalonia. The Campus' most evident strength is therefore its ability to listen to the demands of society and make them a reality. The university thus acts as a unifying element in the region.

### **Which are the most immediate challenges facing the campus?**

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To ensure that the University remains an open, intuitive and imaginative institution that accompanies people on their path towards knowledge. Furthermore, we are pleased by the fact that the activities we have promoted after listening to the demands of society have also been supported by other stakeholders in territory. Examples of are the Summer University, the Employment Forum, the Thursdays at Campus programme, the Group 2027 conferences...

What is your assessment of contribution by the Terres de l'Ebre campus and, more generally, by the URV to the project of turn Southern Catalonia into a knowledge region?

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I think it is very positive. Both the Terres de l'Ebre Campus and the University in general are institutions that approach their challenges head on. It is also worth mentioning that the Terres de l'Ebre Campus is a kind of “pilot scheme”, that is, a laboratory that has been developing the concept of the knowledge region since its foundation.



## **Which are the principal benefits to the Terres de l'Ebre Campus of taking part in the knowledge region?**

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The knowledge region provides an opportunity to collaborate and network with other institutions, to mix different disciplines and to create interesting new initiatives. A good example is the emergence of technological start-ups as a result of the Campus' activities with a wide range of other stakeholders.

## **What role should the Terres de l'Ebre campus play in the knowledge region?**

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The social transformations in the region oblige us to carry out scientific, sociological and cultural research to find tools that will allow us all to advance towards a shared identity and reality. This is and must be the main role of the Campus and the University.

## **What impact would it have for the Terres de l'Ebre Campus to take an active role in knowledge region?**

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The ideas and objective of Terres de l'Ebre Campus are aligned with the ideas of the Chair for University and Knowledge Region.

## **What role should universities play in the regional governance system that will be developed?**

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The University must be ahead of society, anticipating needs and weaknesses that perhaps have not been directly addressed. However, rather than specific mechanisms or entities of governance, at the Terres de l'Ebre Campus we have always believed that the best form of governance is one that emerges naturally. This is what lies behind the success of Terres de l'Ebre Campus.

## **What proposals would you make to encourage other organisations to get involved?**

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The Terres de l'Ebre campus has always provided a conduit for collaborations between different organisations, for example town halls, chambers of commerce, the Hospital Verge de la Cinta, nearby territories, etc. The 2027 Group is the clearest example of organisations coordinating their efforts to encourage change. The Biosphere Reserve project is also an example of successful cooperation between organisations with a common objectives.

## **What are the strongest economic sectors in the Terres de l'Ebre region? Which sectors do you think need to be strengthened from the point of view of knowledge economy?**

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Each part of the region has specific characteristics that need to be developed and enhanced if it is to increase its overall competitiveness. The character of the Terres de l'Ebre is particularly influenced by the river after which it is named. For example, the agri-food industry is a benchmark because 80% of the oil produced in Catalonia is produced in Terres de l'Ebre. In addition, we have two of the most important rice chambers (an association of business people to promote commercial interests on rice) in Catalonia. Therefore, we need focus our resources on enhancing these strengths and other, such as

the furniture and energy sectors.

### **Do you think Southern Catalonia will evolve into a knowledge region?**

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I am fully convinced of it. We have the economic and social conditions necessary. The University is still in the initial stages of its development and is becoming a kind of laboratory of ideas. It is essential for it to be the driving force behind this model so that, as I said earlier, we can respond to society's needs.

# Studies of good practices in Knowledge Regions: Málaga (Spain)

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Studying other knowledge regions enables us to identify good practices in other regions. In this issue we introduce Málaga as interesting innovation example from Spain

In this section, we look at areas of Europe that have evolved into knowledge regions in recent years. We analyse the general aspects of one of these regions to help us identify the strategic model that Southern Catalonia needs to adopt if it is to become a knowledge region. The article also introduces certain concepts and variables about knowledge regions.

In the previous issue we introduced the region of Twente because of its configuration as a region of knowledge and, more specifically, because of the characteristics of its system of regional governance. In this issue we introduce Málaga as an interesting example from Spain.

## **Economic and sectoral considerations**

The region of Málaga (an NUTS3 region according to the European Union's classification system) is 7,308 square kilometres and has 1,453,000 inhabitants. Of these, 569,000 live in the provincial capital, although this rises to 1,218,000 for the whole metropolitan area,

which is the fifth largest in Spain and contains 74.76% of the regional population.

Malaga accounts for 3.12% of the national population and represents 2.27% of the national GDP. The tertiary sector plays an important role in the area (more than 80% of GDP comes from the services sector).

## University education system

The main institution is the Universidad de Málaga (UMA), which has 35,000 students, 65% of whom are from the province of Malaga, 14% from the rest of Andalusia (mainly Cordoba), 16% from the rest of Spain and 5% from other countries. The university system is complemented by a series of higher education centres, which are not affiliated with UMA, to specializing in tourism (Escuela Superior de Turismo Costa del Sol), marketing (ESIC) and audio-visuals (SchoolTraining) and by the American College de Marbella, where students can complete their university studies in the United States.

The *Strategic Plan of the University of Malaga 2013-2016* commits the institution to excellence in education, research and knowledge transfer, commitment to human capital, sustainability, social and economic development and social responsibility. The University's specialities are the aerospace sector, biotechnology for a healthy society, communications and mobility, energy and environment, tourism and territorial development, and transport.

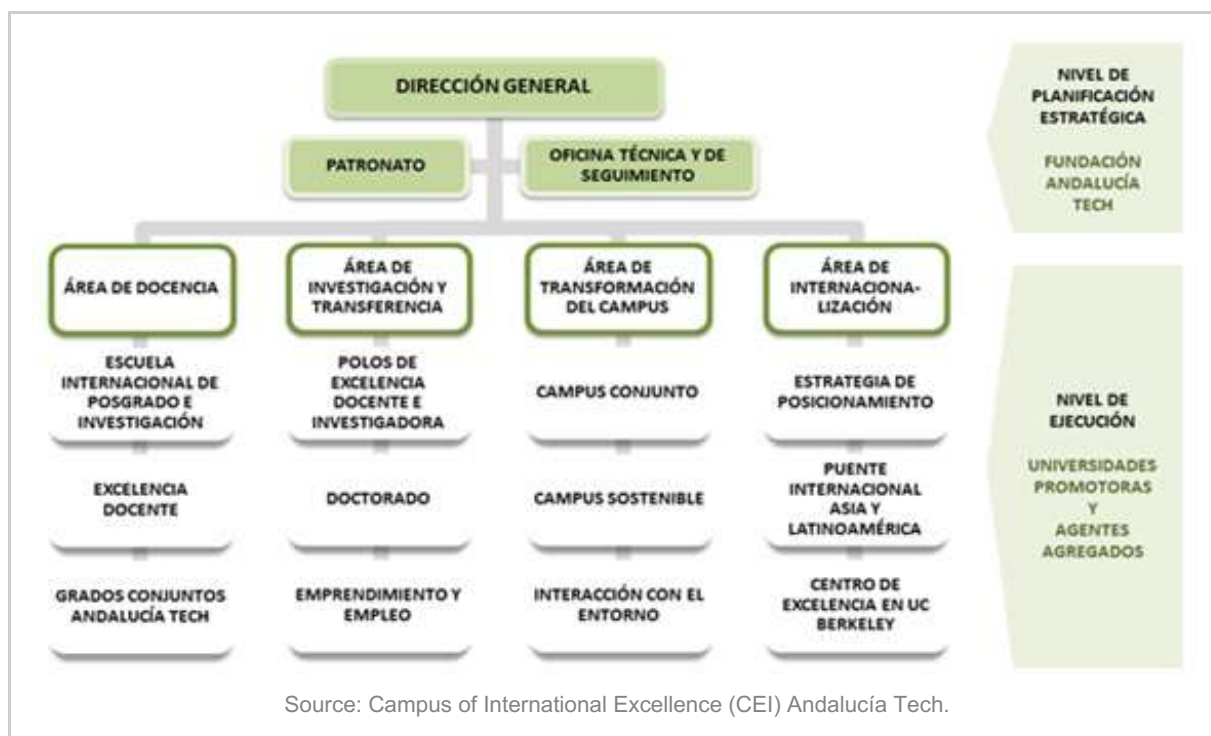
The UMA is not only based in the urban area of Malaga; it also has two associated university schools (Nursing in Ronda and Teaching in Antequera) and research centres in Churriana (Environment) and Campanillas (Biotechnology).

The active participation of the university in society is also reflected in the Plaza.UMA (Ciencia para la Sociedad), where, in collaboration with the Diputación de Málaga, the UMA has established a dialogue with society in order to determine how its knowledge can be put to the service of society and the territory.

A key element in the knowledge system of Malaga is the Campus of International Excellence Andalucía Tech (CEI), which is a collaboration structure between the UMA, the Universidad de Sevilla (US) and the business sector. The project is structured on the principles of aggregation, specialization and internationalization. Of particular note are the 150 organisations that have joined the project (public organizations, technological centres and parks and companies), the six specialised teaching and research areas and the attraction of international talent.

**Figure 1.** Governance structure of Campus of International Excellence (CEI) Andalucía Tech.





## Research, Development and Innovation (R&D&i)

The research, development and innovation system in Malaga has different nodes within a clearly linked structure based on knowledge-based strategies. The UMA, with its *I Plan Propio de Investigación y Transferencia*, created the *Oficina de Transferencia de los Resultados de la Investigación* (OTRI) as an essential instrument to develop knowledge transfer to the business and society of the province.

In addition to the business dimension, there are also various technological centres carrying out research or technology transference, such as Habitec and the Centro Andaluz de Innovación y Tecnologías de la Información y las Comunicaciones (CITIC).

One of the main elements of the R&D&i system is the Parque Tecnológico de Andalucía (PTA), developed by the city council and the Andalusian Government. It is a place managed by representatives from National Government, city council, Andalusian Government, UMA and Unicaja, where SMEs and companies with a strong R&D&i component are located. It has received €790.5 million since its creation in 1992, with €613 million coming from private companies. The PTA's importance is also reflected in other figures, such as the 600 companies established there (32.37% of which are linked to the ITC), the 16,774 employees and the turnover of €1.625 million euros in 2016.

One of the most important R&D&i projects is the smart city strategy of Malaga, based on the application of technology to the public sector, energy sustainability and the management of mobility and public spaces, among others.

Ultimately, the focus on entrepreneurship is reflected in the multiple support structures in place, such as the various business incubators and the Open for Business Malaga project (oriented towards internationalisation).

All of these elements have made Malaga a national leader in technological innovation.

## Governance

The governance system of Malaga covers the entire province and consists of a network of different cooperating entities with no official leader.

One of the main entities is the Diputación de Málaga, which implements the main territorial policies and strategies in collaboration with other organisations. At the regional level, there is the Fundación MADECA, which consists of representatives from the regional council, the city council, the Andalusian Government, the UMA, the PTA, the Chamber of Commerce of Malaga, the Malaga Confederation of Businesses, CCOO, local action groups (Gudalteba, Antequera) and rural development groups (Axarquía, Serranía de Ronda, Valle del Guadalhorce and Sierra de las Nieves) among others.

MADECA is responsible for designing, managing and promoting initiatives for the socio-economic development of the region of Malaga, all of which form part of the Málaga Estrategia Territorial Avanzada (META) programme. Its main strategic lines are sustainability, innovation and entrepreneurship, economic growth and production, education and society.

The City Council's involvement is also reflected in the Fundación CIEDES, which also contains representatives from the regional council, the Andalusian Government, the UMA, the PTA, the Chamber of Commerce of Malaga, the Malaga Confederation of Businesses, CCOO and the port, among others. CIEDES is responsible for strategic planning in the metropolitan area within the Plan Estratégico de Málaga.

Promálaga is a company created by Malaga City Council which manages and promotes business and publishes documents relating to the territory such as Málaga para invertir.

The Malaga Valley Club is a group of presidents and leaders from the information society sector. They have more than 200 members, including representatives from Telefónica, Endesa, Oracle, Orange, Vodafone, Microsoft, Vocento, Nokia and IBM. Its objective is to design policies and lines of action in order to transform Malaga into a European leader in technology and talent attraction. The club is supported by the city council and focuses mainly on giving support and publicising the technological developments that take place in the province.

## **Comparison with Southern Catalonia**

Malaga's university system has elements in common with South Catalonia, such as the regional role played by their respective universities and the fact that both are campuses of international excellence.

Malaga and Southern Catalonia also have important tertiary sectors (particularly in coastal tourism) and predominantly rural and agricultural inland areas. Both regions also have good travel infrastructure in the form of a port, an airport, high-speed rail links, and a coastal road corridor).

In terms of R&D&i, both regions have knowledge-based and regional development strategies, technology transfer offices and research centres working in their respective specialised sectors.

Both regions have a similar system of governance in the form of regional councils with fairly similar competences.

However, we can observe some interesting differences, such as the fact that the campus of excellence, Andalucia Tech, is composed by UMA and US. Both institutions promote a more diversified study offer, joint degrees and are focused to strength their knowledge and innovation ecosystem.

There are also certain differences in the area of governance. For example, there are two foundations in Malaga (CIEDES and MADECA) that bring together public and private entities to promote provincial and metropolitan strategies. Both regions are fostering the transition to a knowledge-based economy and society. Southern Catalonia does not have any entity playing an equal role.

Another difference is Malaga's desire to attract talent through strategies to market the territory internationally (again with the collaboration of the business sector).

In conclusion, Malaga has plenty of interest for Southern Catalonia in terms of R&D&i, internationalisation, aggregation, governance and urban and territorial strategy, all of which are common and important elements on the way to becoming a knowledge region.

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In this edition, we discuss Nyro Plà • ca • Castellà (Tortosa), a business focusing on the production of plastic lids and screw caps with liners. The company stands out because of its innovation capacity and its adaptation to new challenges

In this section, we present those areas of Southern Catalonia that are good examples of the territory's configuration as a knowledge region. We present economic, social, cultural and natural spaces whose peculiarities and characteristics together constitute a social model based on knowledge, the objective of which is to help improve the quality of life of citizens living in the region.

**Nyro Plà • ca • Castellà** is a company dedicated to the manufacture of plastic and thermoplastic containers founded in 1973 in Tortosa. The company now forms part of the Nyro/Jabil group, the world leader in packaging, and is dedicated to the development of comprehensive packaging processes. Its clients include groups such as Unilever, Nestlé, Henkel, Danone and Procter & Gamble.

The company provides added value to its products through its emphasis on sustainability; that is, its packaging is made of 100% recyclable materials and can therefore be reused for the packaging of other materials.

## Research as a tool for innovation



One of the strategic points in the corporate plan is innovation, which has allowed the company to provide alternatives and improvements in their products. This was reinforced when the Nypro/Jabil group invested €8 million euros in 2016, which enabled the improvement of the production centres in Terres de l'Ebre and the creation of a European packaging technology centre, which aims to become a leader in research and logistics in Europe [1]. Specifically, the *Blue Sky* technology innovation centre, located in l'Aldea, enhances territorial development and provides almost 400 highly skilled jobs.

The company has developed the following lines of research: (1) research into new plastic materials, additives and bioplastics; (2) improvements in packaging design (i.e. less weight for the same quality); (3) the design of smart labels, new printing techniques, etc.; (4) improvements to the injection processes used in packaging manufacture.

In conclusion, Nypro Plà • ~~ca~~ • Castellà has consolidated its position as the leading plastic injection packaging company [2] by developing the largest number of patents regarding plastic injection.

## Internationalisation

The need to develop the business at European level led to the acquisition of a factory in Hungary belonging to the American company Nypro. As a result of an agreement between two companies, Nypro Plà • ~~ca~~ • Castellà now has an operational base in central Europe that allows it to supply to its northern costumers.

In 2015 the company was acquired by the American multinational Jabil, one of the largest manufacturing groups in the world and listed on the stock market. The new ownership has opened up new markets and boosted the company's capacity for internationalization and plastics research.

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[1] This information has been checked on-line.

See: <http://www.elpuntavui.cat/economia/article/18-economia/998880-injeccio-de-8-milions-deuros-a-plasticos-castella-per-a-recerca.html> [Last consultation: 24/01/2018]

[2] This information has been checked on-line. See:

[http://www.guiadeprensa.com/empresas/plasticos\\_castella](http://www.guiadeprensa.com/empresas/plasticos_castella) [Last consultation: 24/01/2018]