Report on the status of mathematical technology transfer to the productive sector in Spain

A zoom on their situation in the Autonomous Community of Galicia

Report jointly elaborated by the Spanish Mathematics-Industry Network and the Technological Institute for Industrial Mathematics

May 2012

EUROPEAN SCIENCE FOUNDATION INFORMATION

The current situation of Mathematics in relation to industry in Spain

When we speak of the transfer of knowledge and technology to industry, the current state of Mathematics in Spain does not differ greatly from the overall situation observed at a European level. Over the course of recent years numerous studies[1] have been carried out proving that, although mathematics is an essential tool to enhance industrial innovation, there still remains a long road ahead to bring mathematical technology together with business and harmonise relations between the two realms. In many cases, whether due to lack of time, motivation or experience, mathematics researchers rarely include knowledge transfer among their main priorities. It is also difficult for companies to fully perceive the value that may be added by the involvement of mathematicians in meeting industry needs, the fact being that the business world is rarely aware of possible improvements that could be brought about through collaborating with mathematicians.

In 2006, 10 principal researchers from three Galician universities and integrated within *Nodo CESGA* (see annex I) set out to tackle this scenario, by bringing together key parts of the mathematics community in the *Workshop Arrancando Mathematica CONSULTING* (Kickstarting Mathematical Consulting Workshop) (http://mathematica.nodo.cesga.es/content/view/18/38/), creating the first collaborative forum of its kind at a national level on mathematical technology knowledge transfer. The point of departure, and indeed rationale, for the forum – which became known as the '*Ingenio Mathematica CONSULTING Platform*'[2] – was driven at the time by the limited number of Spanish research groups dedicated to mathematical knowledge transfer and the lack of co-ordination and collaboration within the field.

This workshop marked the beginning of a new era for Spanish mathematicians, with the birth of the *Plataforma CONSULTING* and the initiation of a series of far-reaching activities that have united industrial mathematics researchers in an act of significant dimensions and impact.

As project i-Math reaches its culmination, the point from which we departed has been altered, and although the initial barriers still persist, the fruit of the work put

---

[1] For studies at the national level in Spain, see [1] y [2]. At the European level, see the main conclusions presented at the Forward Look Final Conference on Mathematics and Industry on 2nd December 2010, organised by the European Science Foundation, as well as other related studies referenced on the Forward Look website [3] y [6].

[2] Singular research project for the period 2006-2011 financed by the Ministry for Science and Education (now known as Ministerio de Economía y Competitividad) and co-financed - for knowledge transfer purposes - by the Xunta de Galicia (Galician Regional Government), The Galician Mathematics Network for Consulting & Computing, the Galician IT Centre for Supercomputing and all three Galician universities (see http://www.i-math.org/).

in motion by researchers at *Nodo CESGA* in 2006 has opened new windows of opportunity to the Spanish mathematics community.

Knowledge transfer activities carried out by the Spanish mathematics community in recent years

Knowledge transfer activities developed by the Spanish mathematics community in recent years have been coordinated and promoted almost entirely by the i-MATH project's *Plataforma CONSULTING*, which to date (April 2012) comprises 65 Spanish research groups with substantial previous experience and marked potential for mathematical knowledge transfer to industry. These 65 groups belong to 33 universities (see annex II) and represent more than 470 researchers who, via the *Plataforma,* have decided to take up the challenge of industrial mathematics innovatively, adopting a predominantly proactive role.

As such, since the first *Workshop Arrancando Mathematica CONSULTING* in January 2006, where the Spanish researchers belonging to i-MATH met in order to share ideas and analyse the situation of industrial mathematics in Spain, set out criteria for boosting mathematical technology transfer, and search for activities that would permit a greater interconnection among the groups, they have developed a substantial number of far-reaching projects. Some of these are presented in this section, with reference to the paper *Informe de la Plataforma CONSULTING 2006-2012* (available on the project's website), which provides a more exhaustive description of the complete work carried out during that period.

1. Identification and analysis of available supply and experience in mathematical knowledge transfer present in Spanish research groups.

   In 2007 the Plataforma CONSULTING created the first ever map of the total available supply of mathematical technology in Spain. This work, initiated through the publication of the book TransMATH Oferta and followed by a series of revised editions in 2008, 2009, 2010 and 2011 (see [3], [5] – [8] in annex III), has succeeded in compiling a large quantity of valuable information about Spanish mathematical researchers' capacity in knowledge transfer.

2. Analysis of need and use of mathematical techniques by Spanish industry.

   The 2009 edition of TransMATH Demanda and its English language international version (see [4] and [6] in annex III) were incorporated into previous maps, bringing together a prospective national vision which reflects the level of knowledge, use and demand for mathematical technology within companies in Spain.

   The information compiled in these aforementioned publications was analysed, prepared and presented for publication in two books that reflect the intense activity of knowledge transfer developed during the years in which the i-MATH project was executed:

   - Mathematical Solutions for Innovative Companies. Catalogue of Services Offered by Spanish Researchers. Editorial: McGraw-Hill. 2012. See [1] in

annex III. This catalogue hopes to show the relevant role that mathematical technology can play in new proposals for innovation, contributing in turn to the development of efficient solutions to social, economic and technological problems. The principal target audiences for this catalogue are both public and private Spanish or Spanish speaking companies that need to simulate, predict or study the behaviour of products or processes that require the use of statistical techniques, data analysis or decision making support, and which want to propose unresolved challenges or problems where it is believed that mathematics could provide solutions.

- TransMath. Innovative Solutions from Mathematical Technology. Editorial: Springer. Springer Collection for Innovation. 2012: http://www.springer.com/mathematics/book/978-88-470-2405-2. See [2] in annex III. This publication was conceived to promote and boost the transfer of mathematical knowledge and technology to industry, as well as to society in general, on an international scale. The book is specifically aimed at the international mathematics community, including companies and industrial organisations with needs likely to be resolved through the application of mathematical techniques.

3. Establishing contacts with businesses

The lack of knowledge within the industrial sector about the possibilities offered by mathematical technology is a major hurdle to be overcome, and one where a proactive attitude on the part of mathematicians is essential. This has been tackled from within the 'i-MATH Knowledge Transfer Plan' through an ambitious partnership building programme, which included the identification of relevant companies, locating the best contact point within those companies, the diffusion of capabilities and mathematical technical expertise available from research groups, personalised visits in order to detect problems or needs within companies, and subsequent monitoring and quality control of the relationships established.

A total of 442 points of contact were established between November 2010 and April 2012 within a range of different industrial entities, and 134 meetings held in person with companies or organisations from diverse sectors of economic activity throughout Spain. These opportunities for contact, which were widely taken up within industry, have resulted in the identification of more than 40 new needs or challenges in companies to be resolved through the application of mathematical or statistical techniques. The success achieved through this programme of visits, which actively continues through the i-MATH project, has corroborated the importance of taking the initiative on behalf of the mathematics community in contacting and building relationships with companies.

4. 'Meeting Spaces' with industry

This work has complemented the building of contacts with industry in opening up new channels for bringing the mathematics community ever closer, without the need for companies to make binding commitments. To achieve this, it was fundamental to motivate and help companies identify industrial challenges that could be shared with mathematics researchers at distinct events or 'meeting spaces', including consultation seminars or study groups, based on the style of the 'European Study Groups with Industry', mathematics-industry interactive forums, industry days, modelling weeks, industrial problem solving workshops in the Mathematical Engineering Masters course where the companies would play the principal role, or even the coordination of interdisciplinary working groups in order to solve specific problems.

Through these initiatives, a total of 17 'meeting spaces' were organised between April 2010 and January 2012, in which 88 problems were presented by 80 different companies or industrial organisations. The 'spaces' have involved the participation of more than 430 researchers from a range of fields, particularly from applied mathematics and statistics and operations research, paving the way for new collaborations, as well as strengthening already existing relationships.

5. Support in intellectual property registration and capitalising on the investigation's findings

In the majority of cases, the application of mathematical techniques and methods for the solving of industrial problems brings about the development of personalised software. It is common, however, that researchers develop software packages in the process of their research, even without the collaboration with industry, that in the long run are never transferred. The objective of this activity was to analyse these packages, identifying those which had the scope for being registered as intellectual property and transferred to a company, or put to use through the creation of new IT companies now emerging at the heart of universities. In total 21 software packages which met the criteria for being registered and transferred were identified. All received support oriented at their being applied, either through publication in the i-MATH software repository3, with the objective of being diffused and shared at an international level, or through the support of professionally qualified technicians, specialists in the analysis and development of software for registration as intellectual property. They also received support in developing business plans and feasibility studies for the creation of new IT companies.

The outcome was the preparation of 4 new software packages for registration, in areas as diverse as the simulation of geophysical flows,

---

estimation of nonparametric models of regression, the numerical resolution of electromagnetic problems, and the simulation of 3D wind fields. Similarly, work has been undertaken on the creation of 3 new companies whose viability emerged as a result of the research carried out.

The Spanish Mathematics-Industry Network (*Red math-in.net*)

Since 2006, through activities such as those previously mentioned, the intensity of the work carried out by the *Plataforma CONSULTING* in promotion, information and relationship building, has generated new possibilities for collaboration, bringing the Mathematics community in Spain ever closer to industry. Whatsmore, the impact on industry increases exponentially in proportion to the level of funding for developing new relationships with companies, bringing about greater coordination among those research groups involved. If this level of activity is maintained, we foresee a very positive future scenario for mathematical knowledge transfer in Spain. Thus, as the i-MATH project comes to a close, the continuity of these activities gives way to the creation of new frameworks as catalysts for knowledge transfer, such as the recently created network *math-in.net*, which currently incorporates more than 300 researchers and support staff from research groups belonging to the *Plataforma CONSULTING*, those with the greatest level of experience in knowledge transfer (see annex II).

The network *math-in.net*, formally constituted on 30th September 2011 and coordinated and managed from the University of Santiago de Compostela (see annex IV), is an evolution of the *Plataforma CONSULTING* and began life as a forum for communication, and exchange of information and experiences for promoting the transfer of research within the sphere of Mathematics. Its aims are the following:

- To promote and facilitate strategic relations among research groups within the sphere of Mathematics and industry.
- To increase the presence of Mathematical methods and techniques in the manufacturing sector, favouring the participation of those research groups from within the field of Mathematics in strategic collaborative projects with industry.
- To provide a catalyst for improvements in existing knowledge in research groups within the sphere of mathematics through the running of valuable training programmes aimed at industry.
- To facilitate the international dissemination of the results of Mathematics research groups, promoting alliances with institutions in other countries through participation in R&D projects.
- To promote and lead collaborative national and international research projects.
- To guarantee Mathematics research groups a competitive advantage through the patenting and application of the results of their investigations.
- To create a favourable environment for the creation of technology-based companies arising from the results of work carried out by Mathematics research groups.
- To reinforce trust and interest from industry in the mathematics community.

- To reinforce the technological image of the mathematics community in Spain.

The network *math-in·net* allows for greater coordination among the different research groups involved, to join forces and take advantage of resources and tools for the mutual benefit of all members, through joint strategic planning and the development of new collaborative methods and working processes. The creation of a coordinated structure in Spain was necessary in order to maintain and multiply the impact in industry, in line with similar networks that exist in the rest of the world (MITACS in Canada, Industrial Mathematics KTN in the UK or MASCOS in Australia).

Galician research groups leading the way in mathematical knowledge transfer to industry.
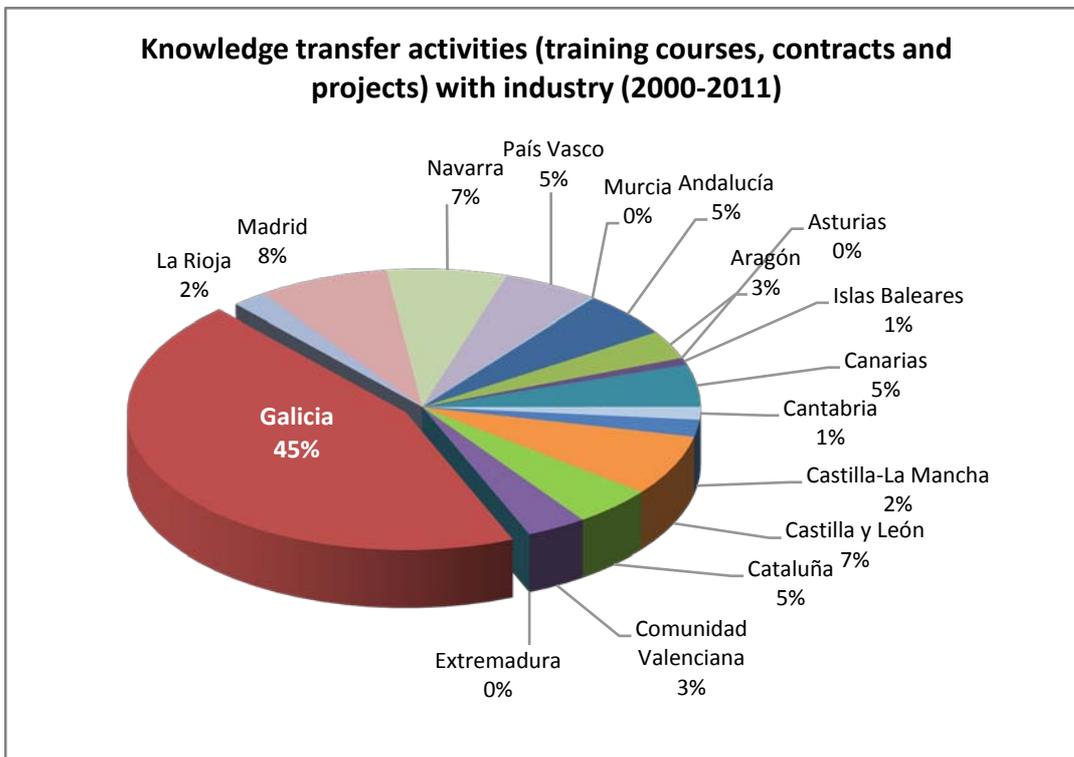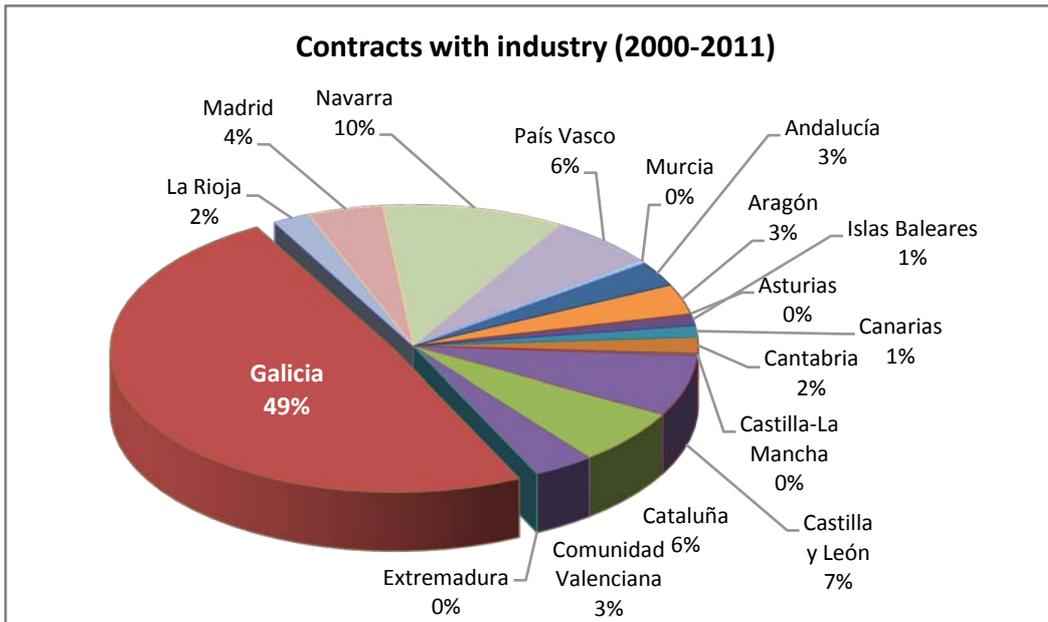
Current Situation

In the design and implementation of this series of activities intended to boost mathematical knowledge transfer in Spain, the breadth of involvement from research groups across Spain is most noteworthy. However, among all the Autonomous Communities (regions), the research groups from Galicia stand out as the principal advocates.

The position of leadership, which is currently occupied by Galician Industrial Mathematics, is both nationally and internationally recognised, thanks to the accumulation of the Galician research groups' intense work in knowledge transfer over the past 20 years. This leadership role has enabled Galician groups, through *Nodo CESGA,* to adopt the role of coordination and management both of the i-MATH project's *Plataforma CONSULTING* as well as the network *math-in.net*.

Nodo CESGA was therefore responsible for the coordination of the knowledge transfer activities carried out within the framework of the i-MATH project, with the objective of taking initiatives for the transfer of mathematical knowledge to the manufacturing sector, promoting the use of mathematical methods and techniques in industry and in companies in general, and researching areas of interest for technological development. In this manner, they have employed the wealth of knowledge and experience of Galician mathematics in knowledge transfer to industry, acknowledging their leadership in the field on a national level. Currently, *Nodo CESGA* coordinates nine research groups from all three Galician universities in the fields of Applied Mathematics, Statistics and Operations Research applied to industry, companies and public administrations. The nine groups include nearly 200 researchers, of which almost half have PhDs. In the last six years they have received funding of more than 6.5 million euros from public administrations for research work. Whatsmore, over the same period, funding received through direct contracts with companies was worth almost 3 million euros.

Project i-MATH has focused almost all its activity on the transfer of research in mathematics carried out by Spanish universities, and the launching of innovative initiatives that contribute to the improvement of communication channels between universities and industry. In practice, between 2006 and 2012, they carried out more than 100 initiatives in this field, of which more than 70% were run by Galician researchers collaborating with *Nodo CESGA.* Also, in accordance with the "Catalogue of Services Offered by Spanish Researchers", (Editorial McGraw-Hill, 2012), around half of the experiences in contracts and projects with companies correspond to research groups at *Nodo CESGA*.

Contracts with industry (2000-2011)

- Madrid 4%
- Navarra 10%
- La Rioja 2%
- País Vasco 6%
- Murcia 0%
- Andalucía 3%
- Aragón 3%
- Islas Baleares 1%
- Asturias 0%
- Canarias 1%
- Cantabria 2%
- Castilla-La Mancha 0%
- Castilla y León 7%
- Cataluña 6%
- Comunidad Valenciana 3%
- Extremadura 0%
- Galicia 49%

Knowledge transfer activities (training courses, contracts and projects) with industry (2000-2011)

- País Vasco 5%
- Navarra 7%
- Murcia 0%
- Andalucía 5%
- Madrid 8%
- La Rioja 2%
- Asturias 0%
- Aragón 3%
- Islas Baleares 1%
- Canarias 5%
- Cantabria 1%
- Castilla-La Mancha 2%
- Castilla y León 7%
- Cataluña 5%
- Comunidad Valenciana 3%
- Extremadura 0%
- Galicia 45%

On an international scale, the involvement of Galician research groups stands out across all initiatives related to mathematical knowledge transfer carried out at a European level. A result of which is their participation in 'Forward Look on Mathematics and Industry', organised by the European Science Foundation and the inclusion of the network *math-in.net* in the European Consortium for Mathematics in Industry (ECMI).

In addition, the University of Santiago de Compostela, through the *Nodo CESGA* coordinator, Peregrina Quintela, is the only Spanish member of the promotional

consortium of the European Institute for Mathematics and Industry that has recently presented a grant application to the VII Framework Programme's Capacities programme, within the area of Research Infrastructures. This proposal, coordinated by the European Science Foundation and comprising another 5 contractual members (European Mathematical Society, Università degli Studi di Firenze, MATHEON/Technische Universität Berlin, Fondation Sciences Mathématiques Paris y Lunds universitet) and 11 associates (Smith Institute, ICM-Univ. Warzawa, Mathematics Applications Consortium for Science and Industry-MACSI, European Consortium for Mathematics in Industry-ECMI, MITACS, Institute of Mathematics and its Applications-IMA, MASCOS, Meiji Institute of Mathematical Sciences Tokyo, School of Mathematical Sciences-Fudan University, University of the Witwatersrand-Johannesburg and the University of Santiago de Compostela) representing a total of 16 countries.

Nodo CESGA have also led the creation of various European networks for the promotion of knowledge transfer. As such, in 2010 they prepared a 'COST Action' (see www.cost.esf.org) for the creation of a European network on Industrial Mathematics in the fields of materials and the environment. The Action, submitted at the 9th COST Call for Proposals, did not receive funding, although it did obtain a high grade from its joint evaluation and given the interest in the project, its members were encouraged by the programme's national contact point and the coordinator of the corresponding dominion, to reapply to future calls for proposals. The Action, led from Spain by the Galician research group mat+i (via the *Nodo CESGA* coordinator Peregrina Quintela), had the support of 5 European countries: Germany, Austria, France, Italy and Sweden. The members of the Action were:

- Peregrina Quintela, Universidad de Santiago de Compostela, ES
- Ronny Ramlau, Industrial Mathematics Institute. Johannes Kepler University Linz, AT
- Francisco Chinesta, Ecole Centrale de Nantes, FR
- Volker Mehrmann, DFG Research Center MATHEON, DE
- Konrad Steiner, Felix Klein Center for Industrial Mathematics. Fraunhofer ITWM, DE
- Luca Formaggia, Politecnico di Milano, IT
- Ricardo Cao Abad, University of A Coruña, ES
- Uno Nävert, Fraunhofer-Chalmers Research Centre for Industrial Mathematics, SE

Likewise, in 2012 the Galician groups led two proposals for the creation of European networks which were recently submitted to the COST call for proposals. The first of which, *'Against wildfires: a multidisciplinary approach'* is related to the fields of Statistics and Operations Research and is led by the Galician research group MODESTYA, via their IP Wenceslao González. It has the support of 6 countries: Greece, Hungary, Italy, Portugal, Sweden and Switzerland. The members of the Action are:

- Wenceslao González-Manteiga, University of Santiago de Compostela, ES
- Laureano F. Escudero, University Rey Juan Carlos, ES
- Kamil Feridun Turkman, University of Lisbon, PT

- Stefan Sperlich, Faculté des Sciences Economiques et Sociales Geneve, CH
- András Zempléni, Eötvös Loránd University, HU
- Professor Ljusk Ola Eriksson, Swedish University of Agricultural Sciences, SE
- Emilio Chuvieco, University Alcala de Henares, ES
- José Miguel Pereira, Technical University of Lisbon, PT
- Prof. Gherardo CHIRICI, Universit degli Studi del Molise Contrada, IT
- Spiridon Kaloudis, Technological Education Institute of Lamia Department of Forestry and MNE, EL

The second Action, '*EnergIMath - Creating an Industrial Mathematics Community for New Materials to provide Energy Efficiency solutions across Europe*', related to the field of Applied Mathematics, is led by the Galician group mat+i through their principal researcher Peregrina Quintela. It has the support of 5 countries: Germany, Austria, France, Ireland and Sweden. The following members participate in the Action:

- Peregrina Quintela, University of Santiago de Compostela, ES
- Ewald Lindner, Institute of Computational Mathematics. Johannes Kepler University Linz, AT
- Francisco Chinesta, Ecole Centrale de Nantes, FR
- Barbara Wagner, Institut für Mathematik. Technische Universität Berlin, DE
- Stephen O'Brien, MACSI. University of Limerick, IE
- Uno Nävert, Fraunhofer-Chalmers Research Centre for Industrial Mathematics, SE

Galician Research Group Map

The experience of collaboration with industry of the 9 Galician research groups that are currently members of *Nodo CESGA* (see annex I), has its origin in the 1980s. Since then they have signed more than one hundred contracts, collaborative agreements and training programmes (see annex IV "*Nodo CESGA* contracts and projects 1998-2010") with companies and institutions from a range of sectors (see annex V "Clients by sector"). The 9 Galician groups which constitute *Nodo CESGA* have been the most active and have developed more projects related to knowledge transfer to the manufacturing sector than other Spanish research groups. For more details on the experiences of and services offered by Galician research groups see the book 'Mathematical Solutions for Innovative Companies. Catalogue of Services Offered by Spanish Researchers', Edit. McGraw-Hill. 2012).

Creation of ITMATI

The creation and launch of the Technological Institute for Industrial Mathematics, ITMATI, is another step forward in the consolidation of Galician Industrial Mathematics as a leader in its field. Both nationally and internationally its position has been recognised thanks to the intensity of the work over the last 20 years by Galician research groups in technological knowledge transfer to companies and other agents across all manufacturing sectors. As such, this hub for Industrial Mathematics in Galicia has been financed and strengthened to the extent that is has become a national and international reference point, exponentially increasing the impact on companies, and generating a measurable leap forward both qualitatively and quantitatively in terms of companies' investment in R&D and innovation.

The current recognition and position of excellence held by Mathematics in Galicia, not only nationally but also internationally, is testament to its outstanding contribution to knowledge transfer to industry. At *Nodo CESGA* the principal researchers for project i-MATH, the instigator of this initiative, have made contact with the governing bodies of the three Galician universities with the objective of promoting the creation of a centre from which Galicia would become a reference point for Industrial Mathematics in Spain. The creation of the institute would allow for the definitive consolidation of a Galician hub for Mathematics and Industry, positioning the skills and capacity of Galician research groups as an international reference point.

Objectives and Future plans

The Technological Institute for Industrial Mathematics (ITMATI) is starting out with the aim of becoming a technological centre and an international reference point in the field of industrial mathematics. The Institute represents a significant milestone in the growth of available resources, alongside the 3 universities and the Foundation for the Centre of Supercomputing of Galicia (CESGA), to promote technological mathematics knowledge transfer and to give efficient and flexible solutions to meet the demand from companies, industry and public administrations. Its primary mission is to contribute to the strengthening and boosting of competitivity in the sphere of industry and business and to support innovation within the manufacturing sector, through the achievement of excellence in research and the development of advanced mathematical technology oriented towards knowledge transfer to industry.

The specific aims of the Institute are the following:

- To bring together and coordinate basic and applied research, functioning as a centre for technological knowledge transfer to industry on a regional, national and international scale.
- Act as facilitator and advocate for the introduction and application of mathematical techniques and methods in Galician, Spanish and international manufacturing sectors.

- Contribute to the generation of technological knowledge and its application in the development and strengthening of competitivity in companies in the field of technology and innovation.
- The production, promotion and distribution of knowledge, especially in the field of Applied Mathematics, Statistics and Operations Research, as well as training of technical personnel and scientific experts in related technologies and methodologies.
- Fomenting academic and scientific collaborations with Spanish and overseas universities and centres for research and knowledge transfer, both in the field of mathematics as well as in other disciplines, promoting interdisciplinary working relationships.
- Contribute to the strengthening of relations between bodies which generate knowledge and companies and provide support services for business innovation.

In order for ITMATI to accomplish these aims it has made a great commitment in terms of human capital by incorporating an organisation oriented specifically to business and industry within its ranks, enabling it to respond to problems and needs flexibly and efficiently as they arise. As well as scientific personnel, ITMATI also has staff specialised in project management and knowledge transfer in technology and innovation. In this manner, the transmission of knowledge generated at universities in the field of industrial mathematics is optimised for its application in manufacturing sectors.

On top of this, reflecting the strength of interest which this initiative has generated and its potential impact on industry, in the medium term ITMATI is hoping to become a Centre for Technology of global recognition and a point of reference for research and technological knowledge transfer in the field of Industrial Mathematics. In order to achieve all these objectives, since its conception, ITMATI has had the support from the governing bodies of all 3 Galician universities and from numerous companies from a range of industrial sectors (see annex VI).

Advocates of the Technological Institute for Industrial Mathematics

The Technological Institute for Industrial Mathematics is promoted by 11 principal researchers belonging to 9 Applied Mathematics, Statistics and Operations Research groups from the 3 Galician universities integrated within *Nodo CESGA*:

1. Lino José Álvarez Vázquez. Simulation and Control Research Group. University of Vigo.
2. Alfredo Bermúdez de Castro López-Varela. Mathematical Engineering Research Group. University of Santiago de Compostela.
3. Carmen María Cadarso Suárez. Interdisciplinary research group on Statistics, Computing, Medicine and Biology. University of Santiago de Compostela.

4. Ricardo Cao Abad. Modelling, Optimization and Statistical Inference Research Group. University of A Coruña.
5. José Durany Castrillo. Differential Equations and Numeric Simulation Research Group. University of Vigo.
6. Ignacio García Jurado. Modelling, Optimization and Statistical Inference Research Group. University of A Coruña.
7. Wenceslao González Manteiga. Research Group on Models for optimization, decision, statistics and applications. University of Santiago de Compostela.
8. Peregrina Quintela Estévez. Mathematical Engineering Research Group. University of Santiago de Compostela.
9. Jacobo de Uña Álvarez. Research Group on Statistical Inference, Decision Making and Operations Research. University of Vigo.
10. Carlos Vázquez Cendón. Research Group on Numeric Models and Methods in Engineering and Applied Sciences. University of A Coruña.

The team of advocates benefits from wide-ranging experience and recognition for the development of solutions for the world of business, either working independently, in collaboration with companies themselves or with teams from other areas of knowledge.

In addition to these eleven researchers, the Foundation for the Centre of Supercomputing of Galicia (CESGA), since the conception of *Nodo CESGA* in 2007, has been the administrative headquarters of the project, supplying technical resources for the development of activities. The Foundation CESGA is represented by its director, Javier García Tobío.

University of A Coruña

- Modelling and Statistical Inference. Principal Researcher: Ricardo Cao.
- Modelling and Statistical Inference. Principal Researcher: Ignacio García.
- Numeric Models and Methods in Engineering and Applied Sciences. Principal Researcher: Carlos Vázquez

University of Santiago de Compostela

- Mathematical Engineering Research Group. Principal Researcher: Alfredo Bermúdez de Castro.
- Mathematical Engineering Research Group. Principal Researcher: Peregrina Quintela. Coordinator of *Nodo CESGA*.
- Interdisciplinary research group on Statistics, Computing, Medicine and Biology. Principal Researcher: Carmen María Cadarso.
- Statistical Modelling and Applications. Principal Researcher: Wenceslao González.
- Mathematical Models and Numeric Simulation in Solid Mechanics. Principal Researcher: Juan Manuel Viaño.

University of Vigo

- Statistical Inference. Principal Researcher: Jacobo de Uña.
- Optimization, Control and Numeric Modelling. Principal Researcher: Lino José Álvarez.
- Differential Equations and Numeric Simulation. Principal Researcher: José Durany

Foundation CESGA:

- Applications and Projects. Principal Researcher: Andrés Gómez.

Annex II. *Plataforma CONSULTING* Research Groups

The *Plataforma Consulting* unites all those i-MATH researchers that have shown interest and capacity for establishing relations for knowledge transfer with industry. In fact 473 researchers take part in this platform, integrated within the 65 research groups as shown in the following table. Shown in orange are those groups which as well as forming part of the *Plataforma Consulting* are also members of the network *math-in.net* (29 in total):

Research Groups. *Plataforma CONSULTING* and *Red math-in.net*	
AALN - Algoritmos precisos y estables en Álgebra Lineal Numérica	Universidad Carlos III de Madrid
ACEIA - Álgebra Computacional e Inteligencia Artificial	Universidad Complutense de Madrid
ADF - Área de Dinámica de Fluídos	Instituto Nacional de Técnica Aeroespacial
BIGNUM - Modelización numérica de fluidos biológicos y geofísicos	Universidad de Castilla la Mancha
CAG - Algebra y Geometría Computacional	Universidad de Cantabria
CG - Criptografía y Grafos	Universidad de Lleida
CODA - Grupo de Investigación de Estadística y Análisis de Datos	Universitat de Girona
CYOPT - Control y Optimización	Universidad de Cantabria
DATFUN - Métricas Probabilísticas y Datos Funcionales	Universidad de Cantabria
DDA – SIANI. Modelización y Simulación Computacional	Universidad de Las Palmas de Gran Canaria
DECYL - Datos, Estadística, Calidad y Logística	Universidad Pública de Navarra
DEPREN - Deporte Rendimiento	Universidad Politécnica de Madrid
EDANYA - Ecuaciones Diferenciales, Análisis Numérico y Aplicaciones.	Universidad de Málaga
EDNL - Ecuacións Diferenciais No Lineales	Universidad de Santiago de Compostela
EE - Estadística Espacial	Universidad Pública de Navarra
EOPT – Estadística y Optimización	Universidad del País Vasco
FUNAPHY - Functional Analysis and Applications to Physics	Universidad Politécnica de Valencia
GAUCA - Grupo de Álgebra de la UCA.	Universidad de Cádiz
GEM - Geometría de Espacios de Moduli	Universidad Autónoma de Madrid
GEUVA – Grupo de Aplicaciones Estadísticas de la Univarsidad de Valladolid	Universidad de Valladolid
GIO – Grupo de Investigación Operativa	Universidad de Murcia
GIOPTIM – Grupo de Investigación en Optimización	Universidad de Sevilla
GIOS – Grupo de Investigación, Optimización y Simulación	Universidad de Zaragoza
GMFN - Grupo de Modelado de Fenómenos Naturales.	Universidad de Oviedo
GNOM – Group of Numerical Optimization and Modelling	Universidad Politécnica de Cataluña
GOMA - Grupo de Optimización Matemática Aplicada.	Universidad de La Laguna
GOR - Grupo de Optimización de Recursos	Universidad de Murcia
GPB97 - Modelos de Estadística e Investigación Operativa	Universidad de Sevilla
GRASS – Grup de Recerca en Anàlisi Estadística de la Supervivència	Universitat Politècnica de Catalunya
GREMA - Grupo de Investigación en Estadística Matemática y sus Aplicaciones	Universitat Politècnica de Catalunya
GRID[ECMB] – Grupo Interdisciplinar de Estadística, Computación, Medicina y Biología	Universidad de Santiago de Compostela

GSC - Grupo de simulación y control	Universidad de Vigo
GSCUPM – Grupo de Sistemas Complejos	Universidad Politécnica de Madrid
GSD - Grupo de Sistemas Dinámicos Discretos	Universidad Autónoma de Barcelona
GSO – Grupo de Soluciones de Optimización	Universidad de Valladolid
HYPCHAOP – Hiperciclicidad y caos de operadores	Universidad Politécnica de Valencia
INFERES - Inferencia Estadística, Decisión e Investigación Operativa	Universidad de Vigo
INTERTECH - Grupo de Modelización Interdisciplinar	Universidad Politécnica de Valencia
KINETIC - Propiedades cualitativas de Ecuaciones en Derivadas Parciales Cinéticas y de Difusión	Universidad Autónoma de Barcelona
LOGRO - Grupo de Investigación en Localización	Universidad de Sevilla
M2NICA - Modelos y métodos numéricos en Ingeniería y Ciencias Aplicadas	Universidade da Coruña
M2S2M - Modelado Matemático y Simulación de Sistemas Medioambientales	Universidad de Sevilla
MAI – Grupo de Ecuaciones Diferenciales y Simulación Numérica	Universidad de Vigo
MAT+I - Grupo de Investigación en Ingeniería Matemática	Universidad de Santiago de Compostela
MCS-UAB - Servei de Consultoria Matemàtica	Universidad Autónoma de Barcelona
MODES - Modelización e Inferencia Estadística	Universidade da Coruña
MODESI - Modelos Estocásticos	Universidad de Zaragoza
MODESMAN - Grupo de Modelización Estadística para Problemas Medioambientales	Universidad Jaume I de Castellón
MODESTYA - Modelos de optimización, decisión, estadística y aplicaciones	Universidad de Santiago de Compostela
MODSOL – Solubilidad, integrabilidad y caos en sistemas clásicos y cuánticos	Universidad Complutense de Madrid
MOSISOLID - Modelos Matemáticos y Simulación Numérica en Mecánica de Sólidos	Universidad de Santiago de Compostela
OEDGROUP – Optimum Experimental Design Group	Universidad de Almería, Universidad de Castilla-La Mancha y en la Universidad de Salamanca
OREL - Optimización de Recursos, Estadística, Transporte y Logística	Universidad de Cádiz
PROMALS – Grupo de Investigación en Programación Matemática, Logística y Simulación	Universidad Politécnica de Cataluña
PSYCOTRIP - Grupo de Investigación de Programación y Cálculo Simbólico	Universidad de La Rioja
RITO – Risk, Time & Optimization	Universidad Rey Juan Carlos
RUTYLO - Algoritmos para Problemas de Rutas y Localización	Universidad de Valencia
RUTYMETA - Rutas y metaheurísticos	Universidad de Valencia
SSD - Seminari de Sistemes Dinàmics	Universidad de Lleida
TAMI - Tratamiento y Análisis Matemático de Imágenes Digitales	Universidad de las Islas Baleares
TAPO - Teoria de Aproximación y Polinomios Ortogonales	Universidad de Almería
TD-ULPGC - Técnicas Estadísticas Bayesianas y de Decisión en Economía y Empresa	Universidad de Las Palmas de Gran Canaria
TOREFA - Teoría de operadores: sus retículos y espacios de funciones analíticas	Universidad de Sevilla
TTM - Grupo de transferencia de tecnología matemática	Universidad del País Vasco
VARIDIS – Discrete Manifolds and Potential Theory	Universidad Politécnica de Cataluña

Annex III. References: Platform CONSULTING publications related to knowledge transfer to business

[1] P. Quintela, G. Parente, M. T. Sánchez, A. B. Fernández, Soluciones Matemáticas para Empresas Innovadoras. Catálogo de Servicios Ofertados por Investigadores Españoles. McGraw-Hill, 2012. ISBN 978-84-481-8227-4.

[2] P. Quintela, A. B. Fernandez, A. Martinez, G. Parente, M. T. Sanchez,TransMATH: Innovative Solutions from Mathematical Technology. Springer, 2012 (prevista publicación en julio 2012). ISBN 978-88-470-2405-2.

[3] P. Quintela, M. T. Sánchez, A. Martínez, G. Parente, TransMATH: Investigadores en Matemáticas para dar Soluciones Innovadoras. 2011.
http://www.i-math.org/files/mapa_consulting

[4] P. Quintela. W. González, M. T. Alonso, M. J. Ginzo, M. López, i-MATH Map of Company Demand for Mathematical Technology. Nino-Centro de Impresión Digital, 2010. ISBN 978-84-693-1704-4.

[5] TransMATH: Investigadores en Matemáticas para dar soluciones innovadoras 2010. Nino-Centro de Impresión Digital, Santiago de Compostela. 2009. Dep. legal C 4153-2009. ISBN: 978-84-692-8278-6 **http://www.i-math.org/files/mapa_consulting**

[6] Mapa i-MATH de demanda empresarial de tecnología matemática. ISBN: 978-84-692-7832-1. Nino-Centro de Impresión Digital, Santiago de Compostela. 2009. **http://www.i-math.org/files/mapa_demanda**

[7] Actualización del Mapa de Oferta Tecnológica de i-MATH. Publicación digital 2 de Octubre. 2008. **http://www.i-math.org/files/mapa_consulting** Nino-Centro de Impresión Digital, Santiago de Compostela. 2009. Dep. legal C 1136-2009.

[8] Mapa de Oferta Tecnológica de i-MATH. Publicación digital. 15 de Septiembre, 2007. **http://www.i-math.org/files/mapa_consulting**

[9] A. Bermudez, J. Durany, P. Quintela, Libro de Actas de IV Jornadas de Consulta Matemática para Empresas e Instituciones. I-MATH 2008-2011. Santiago de Compostela, 2012.
http://mathematica.nodo.cesga.es/jornadas/docs/Libro_IV_Jornadas_Consulta.pdf

[10] A. Bermudez, J. Durany, P. Quintela, Libro de Actas de III Jornadas de Consulta Matemática para Empresas e Instituciones. I-MATH 2008-2011. Santiago de Compostela, 2011. ISBN 978-84-694-0567-3, DL: C 1222-2011.CLAVE: L
http://mathematica.nodo.cesga.es/jornadas/docs/Libro_III_Jornadas_Consulta.pdf

[11] A. Bermudez, J. Durany, I. García, P. Quintela, J. Solá-Morales, Libro de Actas de II Jornadas de Consulta Matemática para Empresas e Instituciones. I-MATH 2008-2011. Santiago de Compostela, 2010. ISBN 978-84-692-8277-9, DL: C 63-2010.CLAVE: L
http://mathematica.nodo.cesga.es/jornadas/docs/Libro_II_Jornadas.pdf

[12] A. Bermudez, J. Durany, I. García, P. Quintela, J. Solá-Morales, Libro de Actas Jornadas de I Jornadas de Consulta Matemática para Empresas e Instituciones. I-MATH 2008-2011. Santiago de Compostela, 2008, DL: C 2257-2008. CLAVE: L.

http://mathematica.nodo.cesga.es/jornadas/docs/LibroJornadas.pdf

[13] P. Quintela, M. J. Esteban, W. González, M. C. Muñiz, J. Rubio, J. J. Salazar, Proceedings of the RSME Conference on Transfer and Industrial Mathematics. Santiago de Compostela, 2011, ISBN 978-84-9887-715-1.
http://mathematica.nodo.cesga.es/images/workshops/RSME/Presentaciones/proceedings_rsme.pdf

Annex IV. *Plataforma CONSULTING* Management Committee and the Network *math-in.net* Board of Directors

Plataforma CONSULTING Management Committee

- Peregrina Quintela. Coordinator. Mathematical Engineering Research Group. University of Santiago de Compostela.
- Alfredo Bermúdez de Castro. Mathematical Engineering Research Group. University of Santiago de Compostela.
- Aureli Alabert. Mathematical Consultancy Service. Autonomous University of Barcelona.
- Julio Rubio. Programming and Symbolic Calculus Research Group. University of La Rioja.
- Laureano Escudero. Risk, Time & Optimization Group. University Rey Juan Carlos.

Network *math-in.net* Board of Directors

- President: Peregrina Quintela. Mathematical Engineering Research Group. University of Santiago de Compostela.
- Vice President: Aureli Alabert. Mathematical Consultancy Service. Autonomous University of Barcelona.
- Secretary. Julio Rubio. Programming and Symbolic Calculus Research Group. University of La Rioja.
- Treasurer: Miguel Lezaun. Research Group on Mathematical Technology Knowledge Transfer. University of the Basque Country.
- Board Member: Alfredo Bermúdez de Castro. Mathematical Engineering Research Group. University of Santiago de Compostela.
- Board Member: Carlos Parés. Research Group on Differential Equations, Numerical Analysis and Applications, University of Malaga.
- Board Member: Laureano Escudero. Risk, Time & Optimization Group. University Rey Juan Carlos.
- Board Member: Pedro Fernández de Córdoba. Research Group on Interdisciplinary Modelling. Polytechnic University of Valencia.

In this annex data is presented relating to

- knowledge transfer contracts with companies in R&D (1998-2010), and
- knowledge transfer research projects in R&D (2005-2010)

corresponding to research groups from the University of A Coruña, University of Santiago de Compostela, and University of Vigo which make up part of *Nodo CESGA.*

Contracts with companies

During the period 1998-2010, Galician research groups signed 179 contracts with companies providing a total of € 4,488,702.16, 64% of which was concentrated in the most recent 6 years.

Number of contracts

In Graph 1 the distribution of the number of contracts throughout the period 1998-2010 is shown, assigning to each contract the year in which it was initiated, while Graph 2 counts the number of contracts that were valid for each year. Lastly, Graph 3 presents the number of contracts valid each year but weighted according to the number of days they were running for.

Example: A contract initiated on 1/11/2000 which ended on 31/1/2002 would only appear in the year 2000 in Graph 1, but in Graph 2 it would appear for the years 2000, 2001 and 2002. This same contract in Graph 3 would contribute 61/365 in 2000, 1 to 2001 and 31/365 to 2002.

In these graphs, an increasing trend can be observed in the number of contracts in the period 1998-2008, and a significant reduction of these contracts in the years 2009-2010.
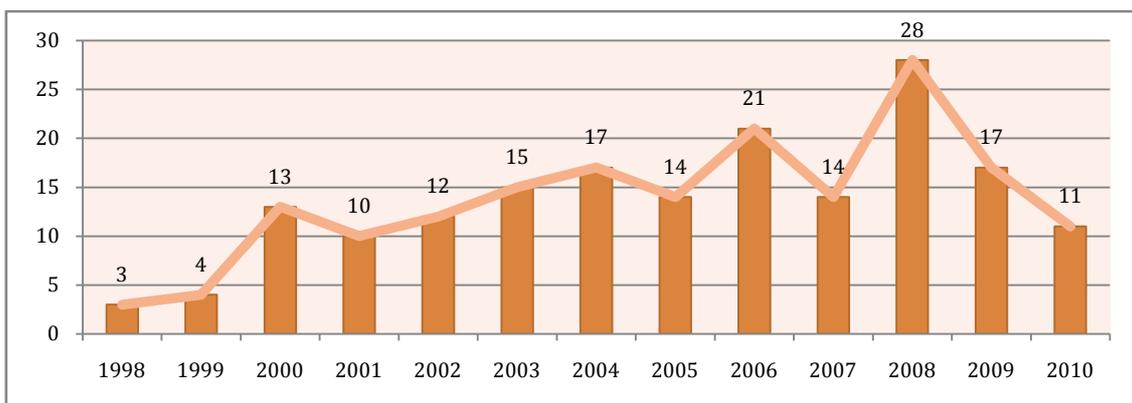
Graph 1. Number of contracts with companies according to contract start date
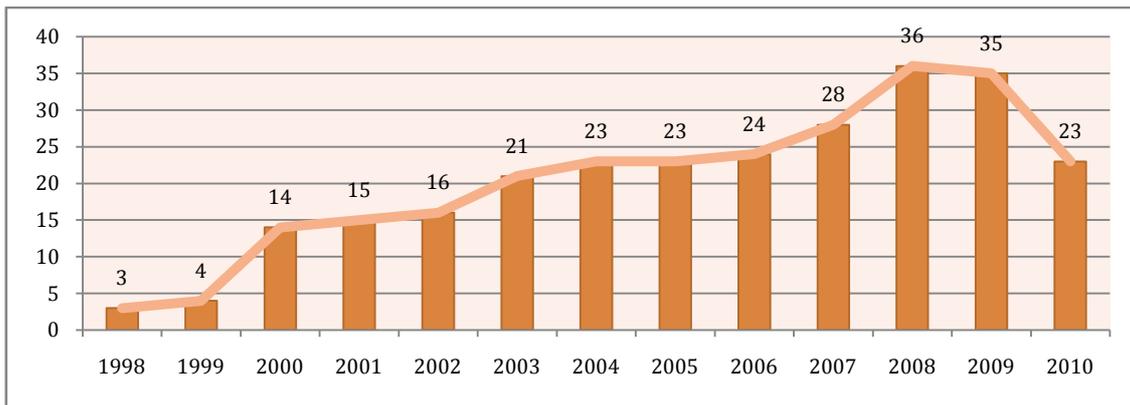
Graph 2. Number of contracts with companies according to the years in which the contract was valid
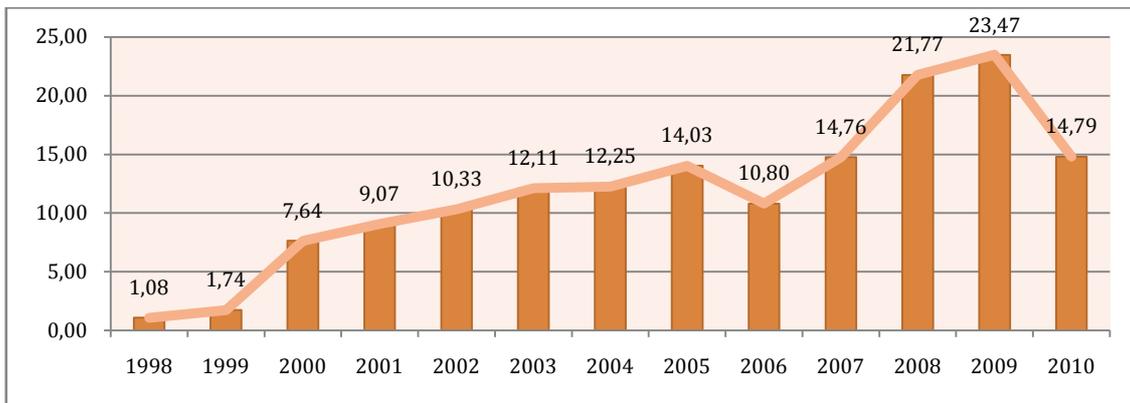
Graph 3. Number of contracts valid with companies weighted according to number of days they were running for

Economic income

In terms of the economic income associated with contracts with companies, Graph 4 represents contributions according to the year the contract was initiated. Also, in Graph 5, the contribution of each contract has been distributed among the years in which the contract was in force, weighted by the number of days for which the contract was in force in each given year.

Example: A contract initiated on 1/11/2000 which ended on 31/1/2002 (457 days) with a contribution of €600 would count in Gráfica 4 as €600 assigned to the year 2000, while in Gráfica 5 it would count as 61*€600/457 for 2000, 365*€600/457 for 2001 and 31*€600/457 for the year 2002.

Both in Gráfica 4 and Gráfica 5 it is possible to see that annual income from contracts with companies has been on the increase over the course of the years until it reached a maximum in the period 2008-2009, and experienced a brisk downturn in 2010, perhaps provoked by the current economic situation.
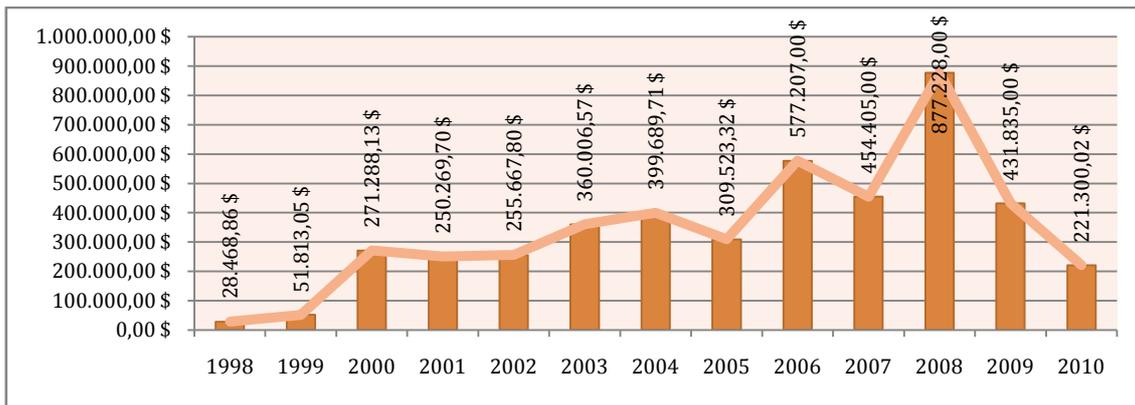
Graph 4. Income according to contract start date
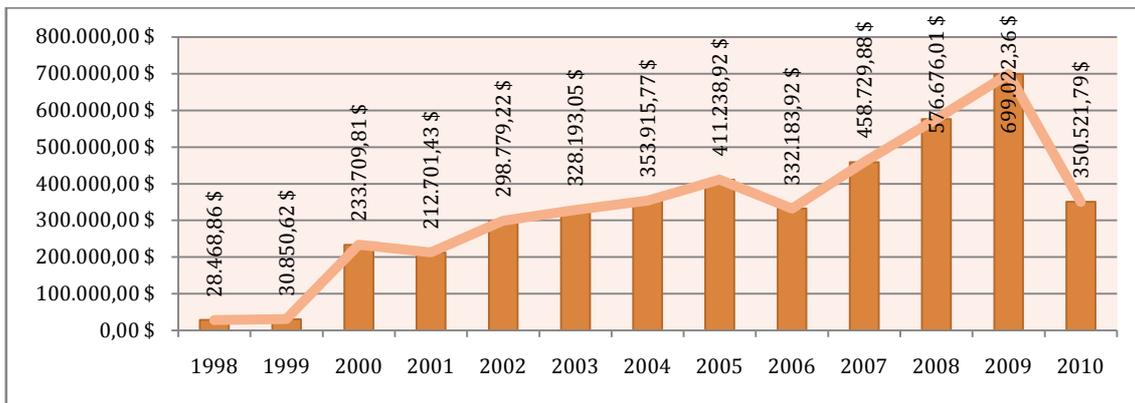
**Graph 5. Income according to years contracts were valid**

Sectors

Gráfica 6 and Gráfica 7 collate the distribution of contracts with companies according to the main sector with which they are associated in the database. Gráfica 8 and Gráfica 9 present the distribution of income associated with contracts by sector.
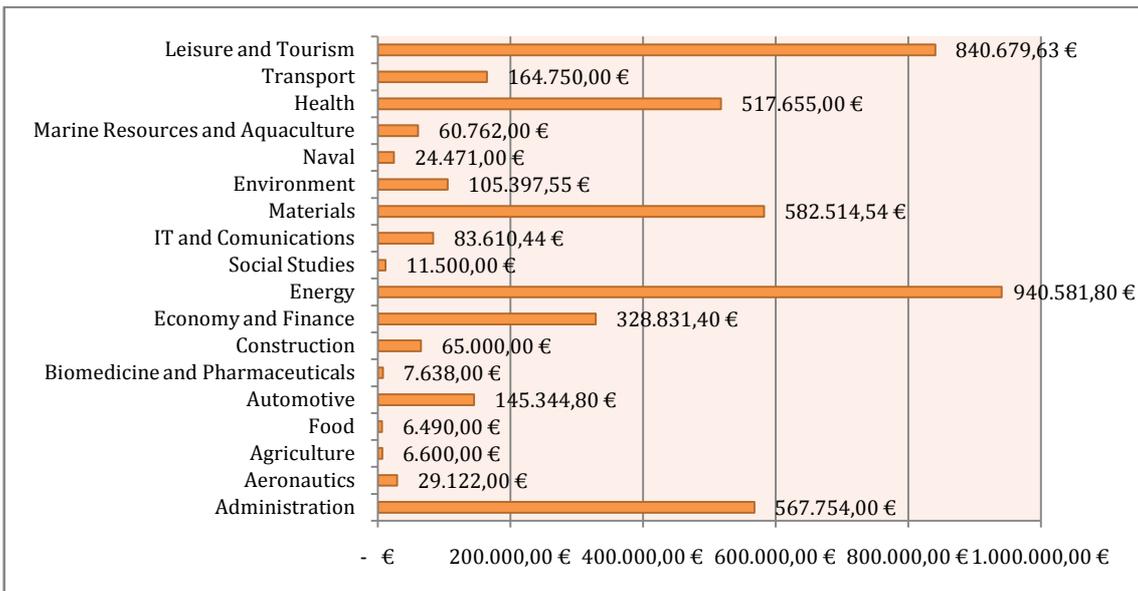
In this case, we observe that the majority of contracts (and income) correspond to the sectors of Administration, Economy and Finance, Energy, Materials, Health, and Leisure and Tourism.
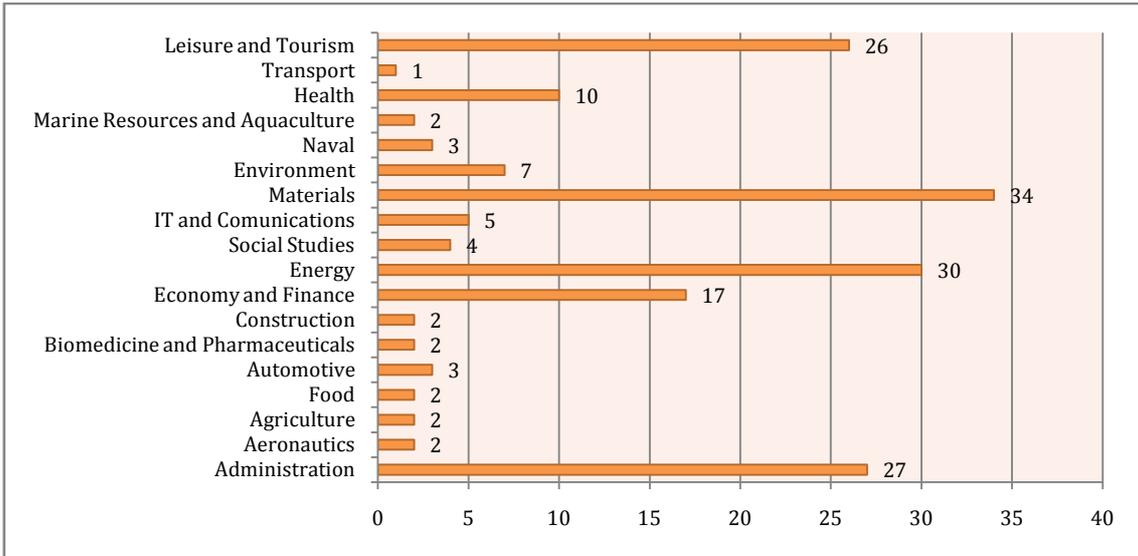
Graph 6. Number of contracts with companies by sector
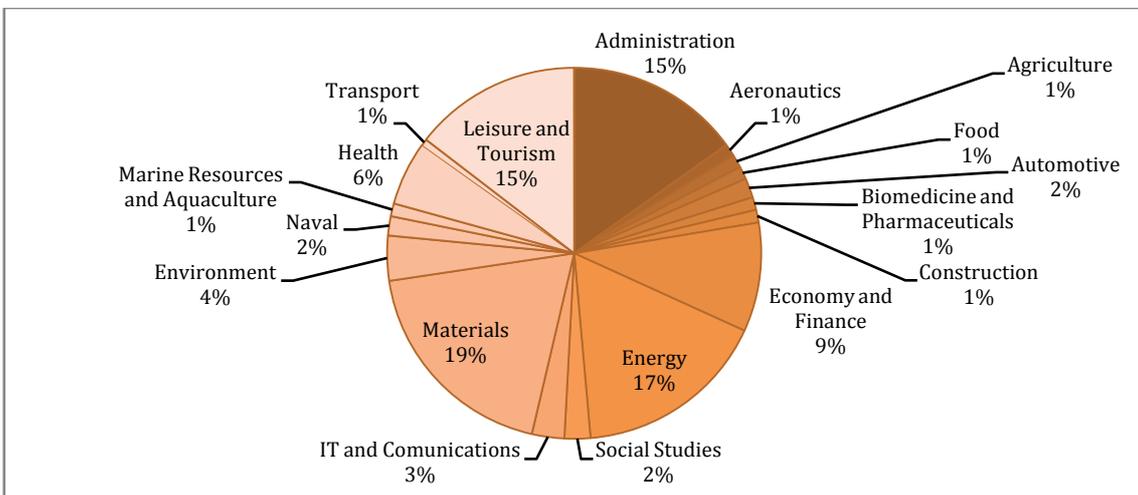
Graph 7. Percentages of contracts with companies by sector

Graph 8. Income from contracts with companies by sector
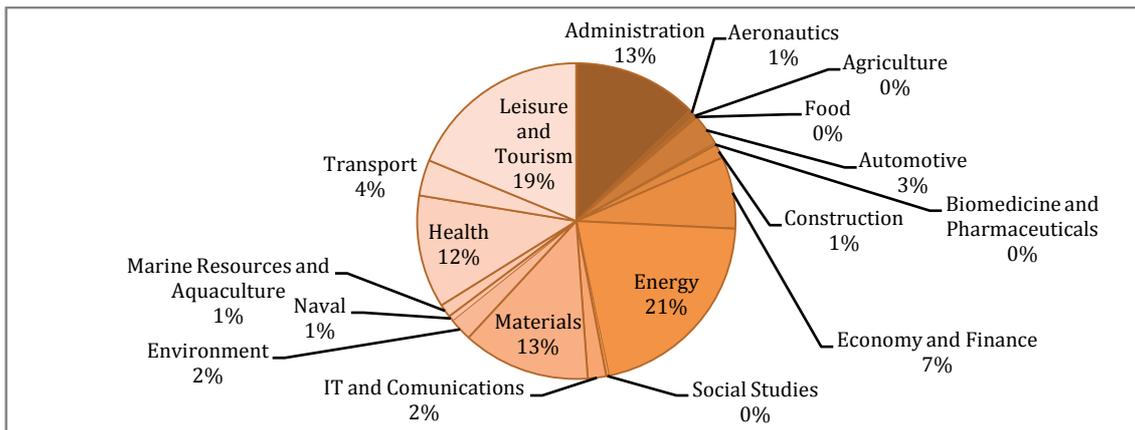
Graph 9. Percentages of income from contracts with companies by sector
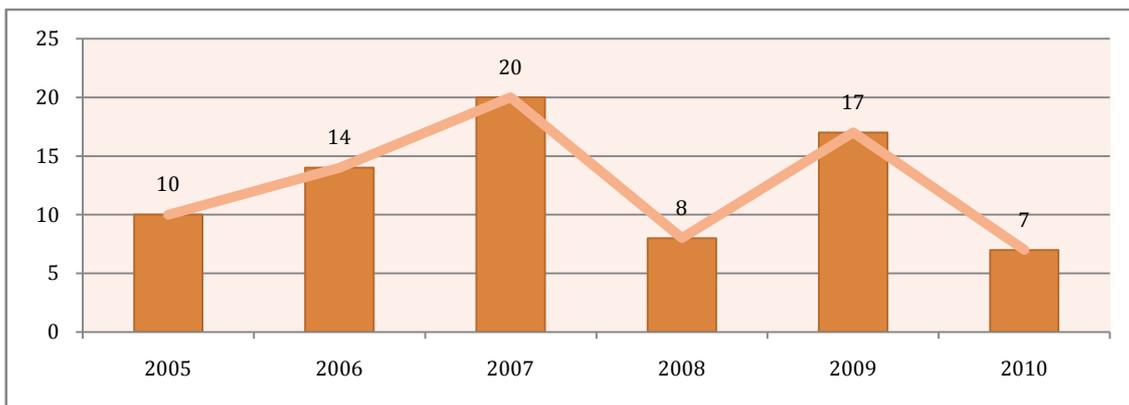
Research projects

In the database only information regarding research projects which began in the period 2005-2010 are compiled. In those 6 years the research groups succeeded in initiating 78 research projects, obtaining a total of €6,579,285 in funding.

Number of projects

Gráfica 10 shows the number of projects granted during the period 2005-2010. As in the case of the contracts, Gráfica 11 shows the number of projects that were valid in each year. Again, we can weight the projects according to their duration in each of the years in which they are valid. The results obtained by carrying out this weighting are shown in Gráfica 12.

Example: In Gráfica 10, a project initiated on 1/11/2005 which ended on 31/1/2008 would only appear in the year 2005, while in Gráfica 11 it would count for the years 2005, 2006, 2007 y 2008. On the other hand, by weighting projects according to their duration in days, this same project would appear in Gráfica 12 as 61/365 in 2005, 1 in 2006 and 2007, and 31/365 in 2008.

As happened with the number of contracts, in Graph 10 a decrease in the number of projects granted was detected for 2010, although the fluctuation observed is due to the period of renovation of projects (usually every 3 years). This effect is thus diluted when the "duration of validity" of the projects is considered, in Graph 11 and Graph 12, with the extremities softened in terms of number of projects running across consecutive years.

Graph 10. Number of research projects according to their start date
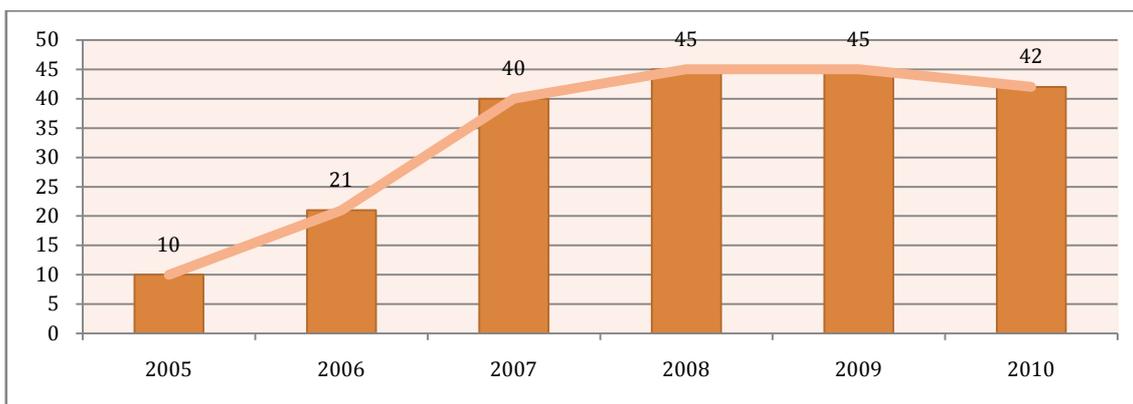
**Graph 11. Number of research projects according to project duration**
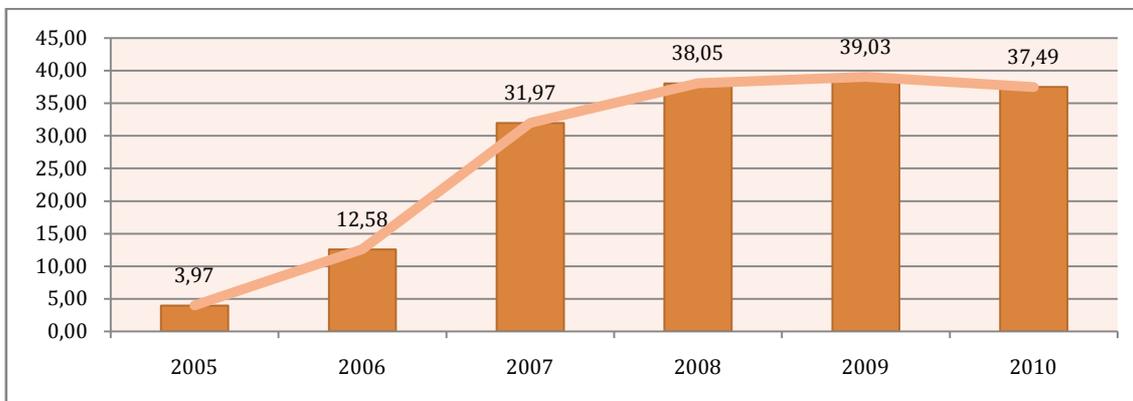
Graph 12. Number of research projects weighted according to the period of project duration

Economic income

Below we present the income associated with projects according to their start date (Gráfica 13) and according to their duration (Gráfica 14).

Example: A project initiated on 1/11/2005 which ended on 31/1/2008 (822 days) with a contribution of €600 would only appear in 2005 in Gráfica 13, while in Gráfica 14 the contribution would be distributed in the following way: 61*€600/822 for 2005, 1*€600/822 for 2006 and 2007, and 31*€600/822 for 2008.

In both graphs a fall in funding can be observed due to 2010 research projects.
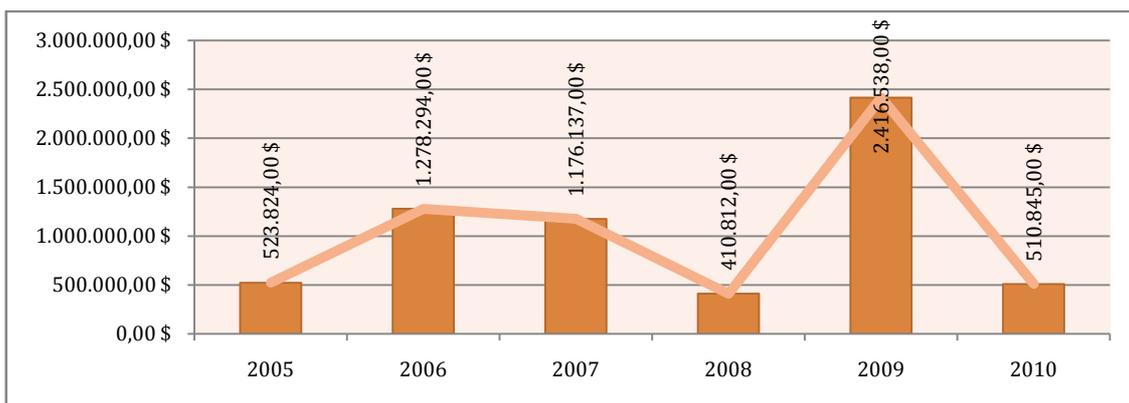


Graph 13. Income according to project start date
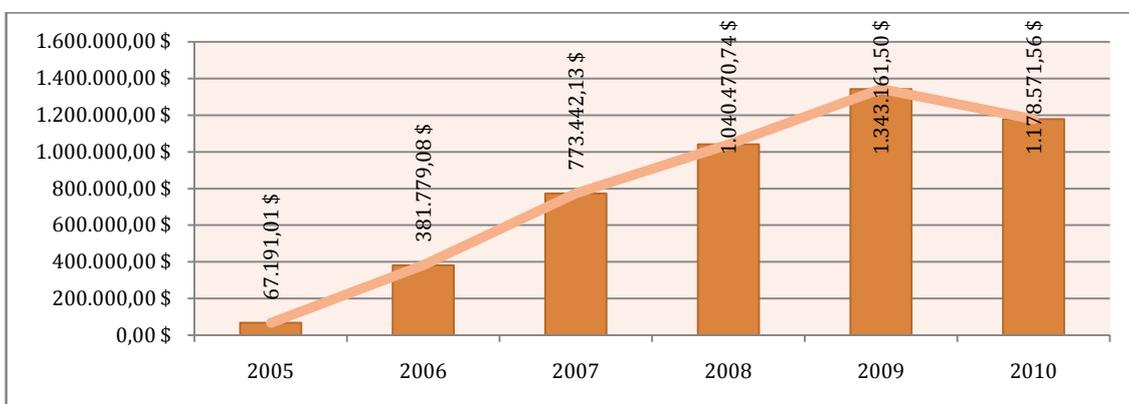
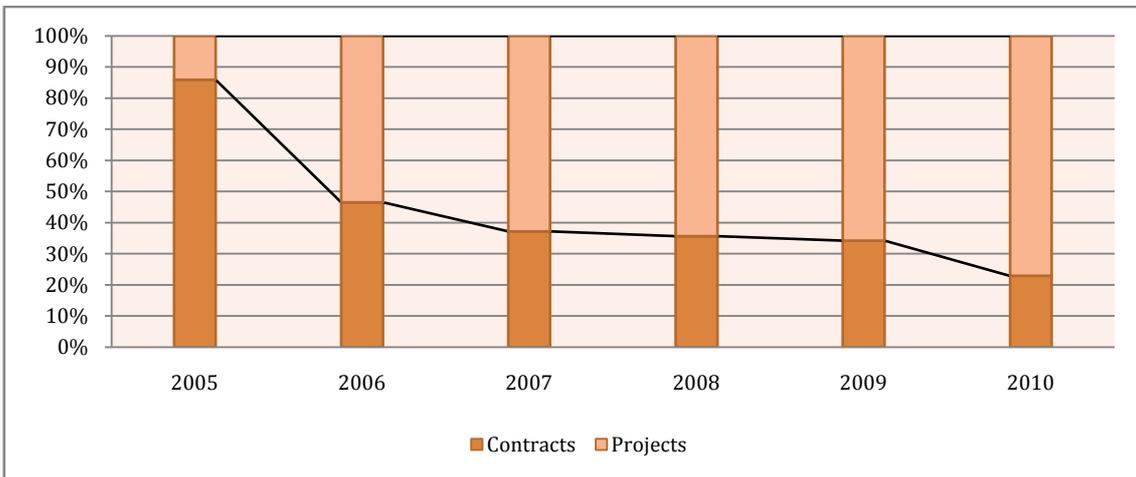**Graph 14. Income according to project duration**

Income from contracts vs. income from projects

Finally, Gráfica 15 and Gráfica 16 allow us to compare funding that research groups have obtained via contracts with companies and that which has been obtained through research projects (in terms of amount and percentage of the total, respectively).

As has been mentioned previously, in 2010 both contributions for contracts and projects saw a reduction (see Graph 15). Also, the percentage of funding obtained through contracts with companies has fallen notably over the time period, income generated through research projects gaining ever more importance (see Graph 16).
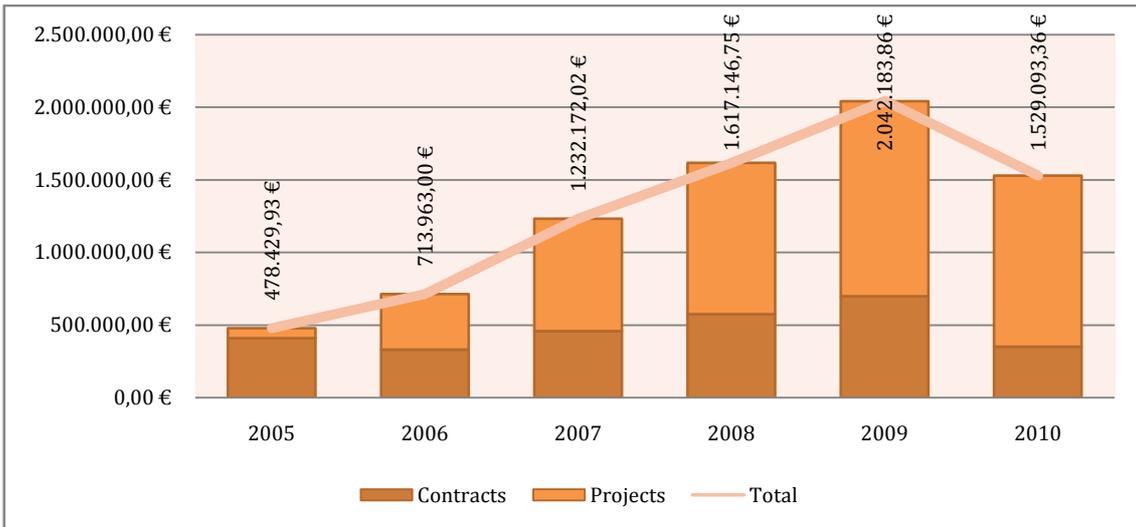
Graph 15. Income from contracts and projects according to their duration

Graph 16. Percentages of income from contracts and projects according to their duration

Annex V: Clients of *Nodo CESGA* research groups

The experience gained of collaboration with industry by the 9 Galician research groups currently included in *Nodo CESGA*, has its origins back in the 1980s. Since then they have signed a total of more than one hundred contracts, collaborative agreements, and training programmes with companies and institutions from diverse economic sectors among which the following stand out:

Sector	Company / Organisation
Administration	ACSUG, Ayuntamiento de Nigrán, Instituto de Investigaciones Marinas (CSIC), Consellería de Educación (Xunta de Galicia), Consello Social (Universidade de Santiago de Compostela), COTOP (Xunta de Galicia), Diputación de A Coruña, Diputación Provincial de Lugo, Dirección Xeral de Saúde Pública, Escola Galega de Administración Sanitaria, FORGA, Fundación CESGA, Instituto Cántabro de Estadística, Instituto Galego de Estatística, Servei de Estadística (Universitat Autònoma de Barcelona), Sociedade para o Desenvolvemento Comarcal de Galicia.
Aeronautics	Advanced Dynamics S.A., Avions Marcel-Dassault Breguet Aviation, Centro de Observación y Teledetección Espacial (COTESA), GMV Aerospace and Defence S.A.U., Micronics.
Agriculture	NORTAGRO S.L.
Food	Sidrería Gallega S.L., STOLT SEA FARM.
Automotive	Castrosúa S.A., CIDAUT, Citröen Hispania S.A., CTAG, Dayco Ensa, Dalphi Metal S.A., Grupo Antolín S.L., Unidad de Vehículos Industriales S.A. (UNVI)
Biomedicine and Pharmaceuticals	CIBER Epidemiología y Salud Pública, CSIC, PharmaMar S.A., GENENTECH ESPAÑA, IDIS, Novotec Consultores S.A.
Construction	Granitos Monte Faro S.A., Industrias González S.L.
Economy and Finance	Analistas Financieros Internacionales, Caixa Galicia, Fundación Caixa Galicia - Claudio San Martín, Fundación CESGA, Fundación para el Fomento de la Calidad Industrial y el Desarrollo Tecnológico de Galicia, Inditex S.A., Nova Caixa Galicia, Seguros CajaSur, Servei de Estadística (Universitat Autònoma de Barcelona), Tecnología de Información y Finanzas.
Energy	AIMEN, ALCOA, Empresa Nacional de Electricidad S.A., ENDESA, Europizarras S.A., FerroAtlántica, Iberdrola Energías Renovables de Galicia, Fundación Ciudad de la Energía, Fundación para el Fomento de la Calidad Industrial y el Desarrollo Tecnológico de Galicia, Norvento Enerxía, ORONA S. COOP, Repsol, SGL Carbón, TOTEMA ENGINEERING Ltd., UFISA SOLUZIONA S.A., UNION-FENOSA Generación S.A., Unión Española de Explosivos.
Social Studies	Equantia Global Business, IDOM S.A., Novotec Consultores S.A., Secretaria Xeral de Emigración (Xunta de Galicia).
IT and Communications	Addlink Software Científico, ALCOA-INESPAL S.A., Consellería de Cultura, Comunicación Social y Turismo (Xunta de Galicia), Dalphi Metal S.A.,

	ENDESA, FerroAtlántica, Fujitsu, Granitos Monte Faro S.A., Indizen Technologies, Industrias González S.L., Next Limit Technologies, Simpple S.L., Telefónica Investigación y Desarrollo S.A..
Materials	ALCOA-INESPAL S.A., FerroAtlántica, FINSA, Gamelsa, IDOM S.A., Ikerlan S. Coop, Inditex S.A., Instituto Tecnológico de Aragón (ITA), Labein Tecnalia, Laboratorio Oficial de Metrología de Galicia, Novotec Consultores S.A, Russula, Tecnologías Avanzadas Inspiralia S.A.
Environment	Applus Norcontrol S.L.U, Centro de Investigaciones Forestales de Lourizán, CIS-Madeira, Ecoembalajes España S.A., Fundación Instituto de Hidraúlica Ambiental de Cantabria, Lignitos de Meirama S.A. (LIMEISA), NorControl, S.A., Norvento
Naval	Baliño S.L., CIS Ferrol, DETEGASA, Navantia, Vicus Desarrollos Tecnológicos, Técnicas y Servicios de Ingeniería S.L. (TSIL).
Marine Resources and Aquaculture	Asociación de Oceanógrafos de Galicia, Centro Tecnológico de la Pesca (CETPEC), Clúster de Acuicultura de Galicia, Grupo de Recursos Marinos y Pesquerías - Universidade da Coruña, Impulso Industrial Alternativo S.A., Instituto Español de Oceanografía.
Health	Colexio Oficial de Médicos da Provincia da Coruña, Complejo Hospitalario Juan Canalejo, Complexo Hospitalario Arquitecto Marcide/ Prof. Novoa Santos, Conselleria de Sanidade (Xunta de Galicia), Consellería de Sanidade (Xunta de Galicia), Fundación Pública Escola Galega de Administración Sanitaria, Servizo Galego de Saúde (SERGAS), Subdirección Xeral de Información e de Servizos Tecnolóxicos.
Transport	Castrosúa S.A., European Railways.
Leisure and Tourism	Instituto Galego de Estatística, Turgalicia, S.A.

Annex VI: Collaborative bodies in the creation of ITMATI

In this annex we present the bodies that have shown interest in collaborating on the project for the creation and consolidation of the Institute

ADVOCATE INSTITUTIONS

- Universidade da Coruña
- Universidade de Santiago de Compostela
- Universidade de Vigo
- CESGA

COLLABORATING BODIES FORM THE INDUSTRIAL SECTOR

- Adviser Ingenieros, S.L.
- Banco Español de Crédito S.A., BANESTO
- BULL España
- Carrocera Castrosúa, S.A.
- Centro Tecnológico AIMEN
- Centro Tecnológico Ikerlan S. Coop.
- CIE Galfor, S.A.
- Consellería de Sanidade, Xunta de Galicia
- Cooperativa de Armadores de Pesca del Puerto de Vigo, S. Coop. Gallega
- Empresa Municipal de Aguas de La Coruña, EMALCSA.
- European Bulk Handling Installation, EBHI
- Everis Spain
- Facet Ibérica, S.A.
- FerroAtlántica, S.A.
- Fundación Barrié
- Funda ción Centro de Supercomputación de Galicia CESGA
- Fundación Ciudad de la Energía
- Gallega de Mecanizados Electrónicos,S.A. (GAMELSA)
- Gompute
- IBM, S.A.
- Hewlett-Packard S.L.
- Hijos de Rivera S.A., Estrella Galicia
- Hospital Clínico Universitario de Santiago de Compostela
- Industria de Diseño Textil S.A. INDITEX
- Instituto de Estudos Turísticos de Galicia
- Instituto de Hidráulica Ambiental de Cantabria, IH CANTABRIA
- Instituto de Investigaciones Marinas (CSIC)
- Instituto Galego de Estadística
- Navantia
- Novacaixagalicia
- Perama Ingeniería
- Russula, S.A.
- Servicio Galego de Saúde, SERGAS
- TA Instruments
- Tecnología, Información y Finanzas S.A, AFI
- Tecnologías Avanzadas Inspiralia S.L., ITAV
- Umana Innova, S.L.

- Vicus Desarrollos Tecnológicos, S.L.