

# Research at the University of Barcelona



UNIVERSITAT DE  
BARCELONA

May 2016



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**Coordination**

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**Acronyms**

**SGRs:** Research groups recognized by the Generalitat de Catalunya (Catalan Government); **ICREA researchers:** those part of the Catalan Institution for Research and Advanced Studies (ICREA), a foundation supported by the Catalan Government; **RyC researchers:** those of the Ramón y Cajal programme (Spanish Government).

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## Foreword to the 2016 Edition

It is a pleasure to present the **2016 edition** of the **University of Barcelona Research Report**, which offers an overview of the research assets, projects and the most relevant results obtained for the **period 2010-2015**. The University of Barcelona is a **research-intensive institution** that promotes and gives institutional support to **multidisciplinary research** developed by active teams with international recognition. Our research groups enjoy state-of-the-art facilities and the latest technology, which the University of Barcelona makes available to all researchers at the University, to other public institutions, and also to private companies through the corresponding agreements.

The broad and **comprehensive** nature of the University of Barcelona allows us to cover all the **major branches of knowledge**, including the Experimental and Health Sciences, Social Sciences, Humanities, Engineering and Fine Arts. International impact, cooperation in education, a commitment to innovation in research and a responsibility to knowledge transfer are the main hallmarks of our institution. The University of Barcelona is the top-ranked university in Spain; it continues to place highly in world rankings and is positioned at an outstanding level in Europe. The UB is also the only Spanish institution ranked amongst the top 200 universities in the world according to the Academic Ranking of World Universities 2015 (ARWU). It is also one of the best 50 universities for scientific productivity in the world, and the only Spanish university to be found in this select group, according to URAP 2015-2016 (University Ranking by Academic Performance).

**The University of Barcelona is the only Spanish university** that is a member of the League of European Research Universities (**LERU**), which comprises the 21 best research-intensive universities in Europe. The active participation of the University in the LERU greatly contributes to our international dimension, and serves to strengthen our institutional policies on research and to bolster the social, economic and academic impact of our many research projects currently underway in a wide range of academic fields. Our contribution to LERU is also reflected by the fact that six representatives of our university are members of the steering committees of different LERU communities of experts, and up to 25 representatives of the University of Barcelona regularly attend and participate in LERU meetings, with support from the Vice-Rectorate for Research, Innovation and Transfer. At the request of LERU, the independent consultancy BiGGAR Economics produced a report in 2015 on the **"Economic contribution of LERU universities"**. The main conclusion of the report is that investment in higher education, research and innovation is not only returned but also profitable.

The overriding mission of universities, fully shared by the University of Barcelona, comprises the generation of new knowledge through competitive research and innovation and an ongoing commitment to promoting these efforts through the responsible transfer of knowledge and technology to society. During the period covered in this report (from 2010 to 2015), research groups pertaining to the University of Barcelona have been granted **more than 6,800 research projects**, have produced **more than 14,300 ISI publications** and have generated **237 patents, industrial secrets and intellectual properties**. Research at the UB is carried out by **323 research groups**, recognised by the Catalan Government, and it guarantees outstanding interdisciplinarity through the **research institutes of the University of Barcelona**. In this report, we present the **14 UB-specific research institutes** that are currently active and **10 Catalan research institutes** in which professors and re-

searchers of the University are involved. Joint efforts and collaboration with foreign institutions around the world for creating synergy of expertise have led to the recent appointment of the University of Barcelona by the European Institute of Innovation and Technology (EIT) to create the new research structure called **EIT Health**, a consortium which offers best-in-class research capabilities, higher education and business expertise.

I encourage you, therefore, to read this report and to consider it a modest introduction to the exciting research activity in which the researchers of the University of Barcelona and the institution itself are fully engaged.

**Jordi Alberch**

Vice-Rector for Research, Innovation and Transfer  
University of Barcelona

Barcelona, May 2016



## The University of Barcelona as a Leading Research University



The University of Barcelona is a student-oriented research university with more than 560 years of history. The in-depth, multi-disciplinary experience accumulated over the decades in several research areas has placed the University of Barcelona in a prominent position on the international research scene. The main research areas at the University are Life and Medical Sciences, Experimental Sciences (physics, mathematics, geology and chemistry), Economics, Business, Law, Humanities (philology, philosophy, history and geography) and Educational and Behavioural Sciences. More than 5,200 researchers, technicians and research assistants are working mainly within the 323 research groups that are recognized and supported by the Generalitat de Catalunya (Catalan Government). **The University of Barcelona is the only Spanish university** represented in the **League of European Research Universities (LERU)**, which comprises the 21 best research-intensive universities in Europe.

Our research has great potential in terms of contributing to the economy and the social impact it generates. Data provided by the reports “Economic Contribution of the LERU Universities” and “**Economic Contribution of the University of Barcelona**” show that our University is a key agent in Catalan and Spanish business sectors, as its direct and indirect activity supports 22,000 jobs in Catalonia and 26,500 in Spain. Furthermore, these reports state that for each single euro it receives, the University of Barcelona generates 4.97 euros in European economics.\*



The University of Barcelona is now, more than ever, a driver of Catalan and European economies, as we fulfil a recognised and active role, at an exciting crossroads where international students, academics and researchers alike are more than welcome to take part and join us, contributing to research projects of increasing international impact. Our ambition is that soon all research carried out at the University of Barcelona will be recognised as leading work at an international level.

### Strategic Research Initiatives

The University of Barcelona encourages researchers to join efforts and forces with foreign institutions around the world to create a synergy of expertise. With this objective, the University has co-coordinated the Spanish participation in the InnoLife consortium, which was selected by the European Institute of Innovation and Technology (EIT) to deploy a **Knowledge Innovation Community (KIC)** in the field of health. Currently, the University of Barcelona holds the presidency of the **Spanish node of EIT Health**, a consortium which offers best-in-class research capabilities, higher education and business expertise at European level. This association comprises 18 leading organizations — universities, companies, research centres, hospitals and technological centres — committed to health innovation and its impact on the improvement of citizens' quality of life. This represents one of the most important successes of the University of Barcelona in the last five years, as it recognises the international excellence and scientific competitiveness of its health-related research. In addition, the Barcelona headquarters will open up access to European funds for education, business creation and innovation projects not only to researchers but also to other stakeholders, such as for spin-offs or institutes in which the UB participates.



\* [www.ub.edu/web/ub/ca/menu\\_eines/sala\\_de\\_prensa/dossiers\\_prensa/dossiers/pdf/LERU\\_Economic\\_Contribution\\_-\\_Report.pdf](http://www.ub.edu/web/ub/ca/menu_eines/sala_de_prensa/dossiers_prensa/dossiers/pdf/LERU_Economic_Contribution_-_Report.pdf)

Similarly, the University of Barcelona is giving institutional support to stimulate the participation of our researchers in the RIS3CAT programme, an initiative promoted by the Generalitat de Catalunya and supported by the European Commission (Europe 2020 strategy). Likewise, the University of Barcelona is an active member of international research networks, such as: (i) **EuroMarine**, a European marine science network; (ii) **Eurolife**, a consortium of European institutions committed to research and higher education in the field of life and health sciences and which is now coordinated by the University of Barcelona, and (iii) the **European Consortium for Political Research** (ECPR), an association for academic institutions concerned with the teaching and research of political science and international relations.

## Good Research Practices

In recent years, the University of Barcelona has made an effort to improve the University's policies and practices in terms of recruitment, hiring and general working conditions for its researchers. In 2015, the University was awarded the **HR Excellence in Research**, an accreditation and seal conferred by the Directorate-General for Research and Innovation of the European Commission. With this accreditation, the European Commission certifies that the University of Barcelona is a research-intensive university committed to the continuous improvement of its human resources policies, according to the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

The University of Barcelona stipulates that everyone involved in research, including investigators and trainees, works to the highest standards to promote the assurance of research integrity in fulfilment of the mission and goals of the University. To achieve these principles, the University of Barcelona provides the academic community with several platforms. The **Bioethics and Law Observatory** (OBD) carries out its activity through interdisciplinary and secularist viewpoints. The aim is to provide arguments and proposals to encourage autonomy and responsibility in bioethical decisions that result in the construction of a more transparent and democratic society. The OBD is the contact and information point of the **University of Barcelona's Bioethics Commission** (CBUB), which evaluates the ethics of the research projects to be carried out by members of the University of Barcelona community (academics and researchers) submitted in competitive calls. Additionally, an institutional **Biosafety Commission** was created in 2015, to ensure fulfilment of the required obligations imposed by regulations on biosafety issues.

## World Reputation

The University of Barcelona occupies a competitive position at national, European and worldwide levels in the most important ranking tables based on a range of variables.

The University of Barcelona is the top-ranked university in Spain according to the prestigious **QS World University Rankings** 2015. The University continues at number 166 in the world rankings, and has risen one place to rank at position 72 at European level. According to these rankings, it is outstanding in Life Sciences and Medicine — position 87 — and Social Sciences — position 129 — and particularly in Natural Sciences, where it climbs to position 62. In the **QS World University Rankings by Subject 2015**, the University of Barcelona stands out among the top 200 worldwide universities in 27 out of 36 subject areas. Furthermore, according to the latest edition of **The Times Higher Education**, the University of Barcelona has risen to position 174, and it is consequently included in the top 200 universities in the world. In the latest edition of this international ranking by subject (**The Times Higher Education by subject**), the University of Barcelona ranks 65 in the world's top 100 universities in the field of Biomedicine and Health Sciences. Additionally, the



HR EXCELLENCE IN RESEARCH





University of Barcelona is the top Spanish higher education centre and it occupies position 116 in the world rankings, according to the **Centre for World University Rankings** (CWUR).

The University of Barcelona is included once again in the world's top 100 universities in two international prestigious rankings, sitting at number 90 in the **Best Global Universities** (BGU) and at position 76 in the **National Taiwan University Ranking** (NTU Ranking). The University of Barcelona is the top higher education centre in Spain in both rankings.

## Awards and Distinctions

In the last call of the Severo Ochoa and María de Maeztu distinctions conferred by the Spanish Ministry of Economy and Competitiveness, the Institute of Cosmos Sciences of the University of Barcelona (ICCUB) and the Barcelona Graduate School of Mathematics (BGSMath), a centre affiliated with the University of Barcelona, received the **distinction María de Maeztu**. Moreover, the Institute for Bioengineering of Catalonia (IBEC), an Institute in which the University of Barcelona participates, has been granted a new accreditation through the **Centres of Excellence Severo Ochoa** programme.

Furthermore, **5 researchers** from the University of Barcelona received awards at the 9th edition of the **ICREA Academia** programme. This programme contributes to the intensification of research carried out by university professors who are in a fully active and expansive phase of their research careers. **ICREA** (Catalan Institution for Research and Advanced Studies) is a foundation supported by the Catalan Government and currently employs **40 researchers** that perform their work **with the University of Barcelona**.

## Facts and Figures

- 17 faculties, 106 departments, 67 bachelor's degrees, 141 university master's degrees and 48 doctoral programmes
- More than 5,300 researchers, technicians and research assistants
- Over 65,000 students. More than 10,000 students awarded bachelor's and master's degrees. More than 650 doctoral theses submitted every year
- 14 University of Barcelona research institutes, 10 Catalan research institutes in which the University of Barcelona participates, 10 observatories and 3 documentation centres
- 323 research groups recognized by the Generalitat de Catalunya (Catalan Government) which included, during the period 2010-2015, some 40 ICREA researchers, 32 Ramón y Cajal researchers, 9 Juan de la Cierva and 8 Beatriu de Pinós researchers
- 663 active research projects and more than 62.7 million euros obtained from active national and international research projects and contracts with companies
- More than 4,000 scientific publications in 2015 (ISI)
- The Learning and Research Resources Centre (CRAI) offers general library services and a range of specialized teaching support and research support services
- The Scientific and Technological Centres (CCiT-UB): a comprehensive and state-of-the-art research support facility with 36 technical units
- The Bosch i Gimpera Foundation (FBG): promoting and managing the transfer of knowledge and technology generated at the University of Barcelona.

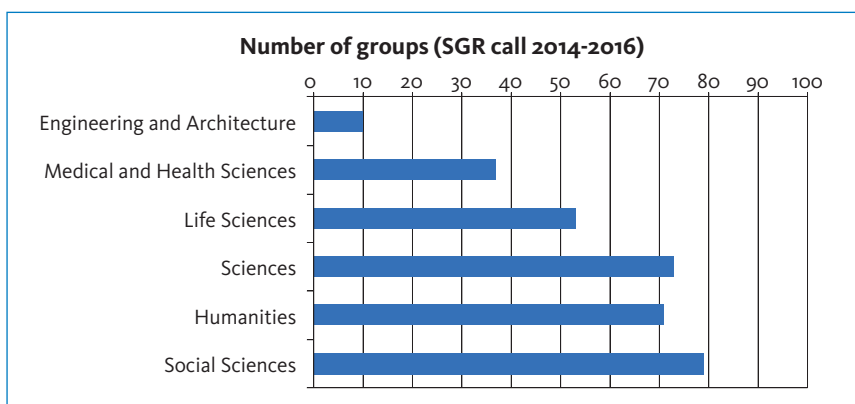
Source: The University of Barcelona in figures (October 2015) and UB Office of Research Management – OGR (UB-GREC Database, March 2016).



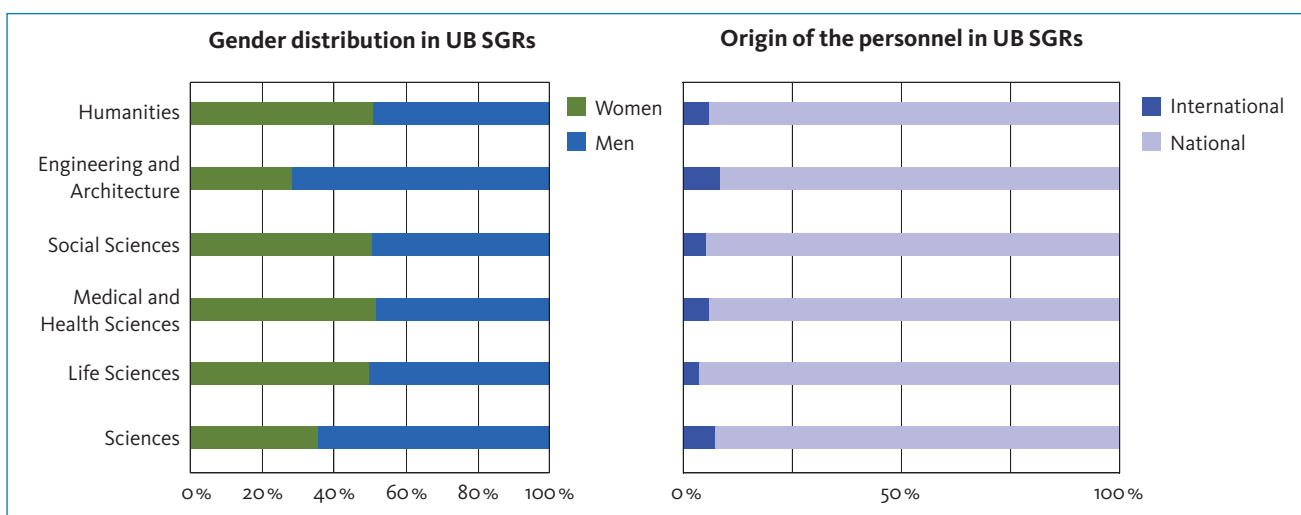
# 1. RESEARCH GROUPS: SGRs

The most significant research at the UB is carried out by the **UB's 323 research groups** that have been recognized and supported by the Generalitat de Catalunya (Catalan Government) through the **SGR Call 2014-2016**, which aims to give support to the research activities conducted by the best teams. Within these 323 SGR Groups, 9 of them are interuniversity SGR research groups with double affiliation (that is, the UB and another Catalan institution). Altogether, there are **292 UB Consolidated Research Groups** (GRC, groups with a consolidated joint project that has allowed them to develop a stable scientific activity and to obtain results and contributions recognized in their area of expertise) and **22 UB Emerging Research Groups** (GRE, groups with a brief record of joint work but with potential to become reference groups within a period of three years).

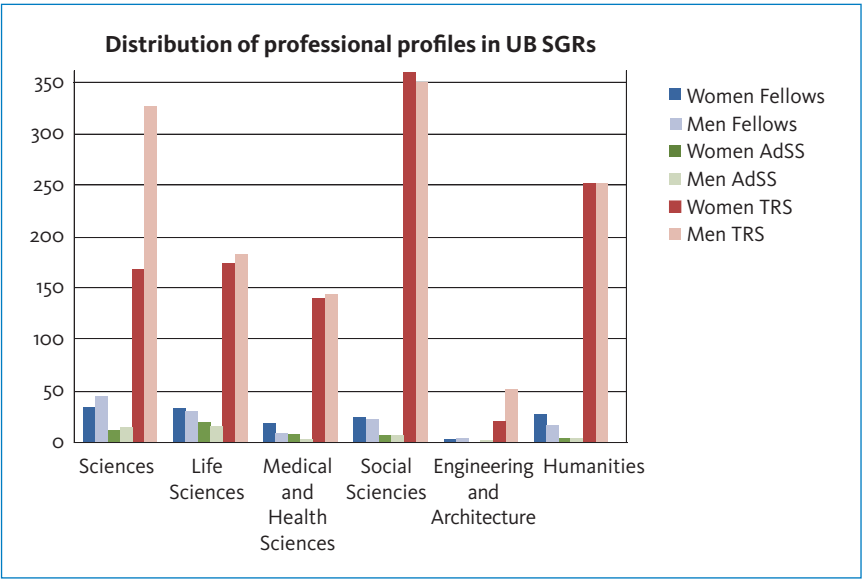
According to their main fields of knowledge, established by the Catalan Government, these 323 SGR UB Groups are distributed in **6 categories**, which include Social Sciences (economics, business, law, sociology, education), Humanities (geography and history, philology, philosophy and fine arts), Sciences (chemistry, geology, physics and mathematics), Life Sciences, Medical and Health Sciences, and Engineering and Architecture.



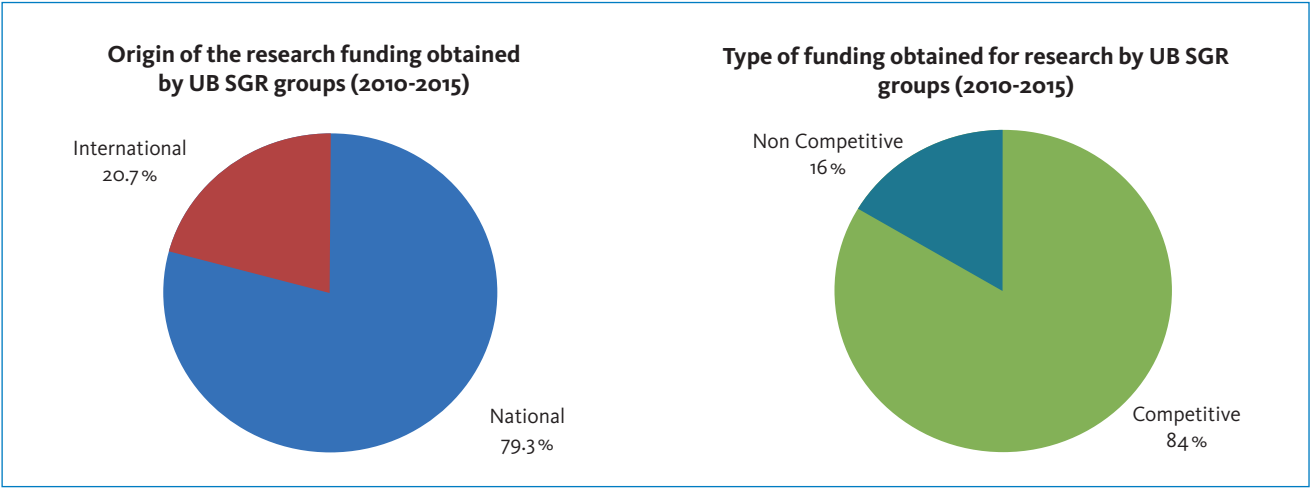
Considered globally, there is a fair gender distribution within the SGR groups, with 46.9% of active members being women, although there is a significant deviation in Sciences (maths, physics, chemistry) and Engineering and Architecture. As for the origin of UB researchers in terms of their nationality, 6.4% of staff come from abroad.



The following graph shows the breakdown of **different professional profiles** in UB SGRs into three groups: **Research Fellows**, **Administrative and Services Staff (AdSS)** and **Teaching and Research Staff (TRS)**.

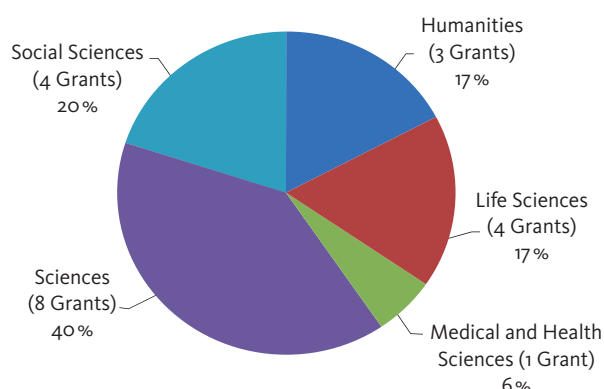


As for the research funding obtained by UB SGRs between 2010 and 2015, 84 % came from competitive calls and up to 20.7 % of this funding was of international origin, mainly from European Union calls of the Horizon 2020 programme.



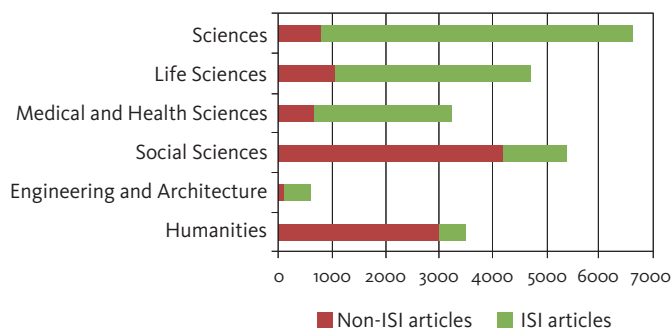
During the last 5 years, the **University of Barcelona** has competed very successfully for **European Research Council (ERC) grants**. The high quality of candidates has meant that, for example, three out of the six researchers from the ERC Starting Grants for Catalan research awarded in 2013 are now developing their projects at the UB Faculty of Physics. According to AGAUR, the Catalan Agency for the Management of University and Research Grants, the University of Barcelona accounts for 7.8% of ERC Grants awarded to a total of 59 Catalan institutions (period 2007-2015). The graph below shows the **percentage of funding obtained by UB SGRs per knowledge area**. **In total there were 20 ERC Grants** (10 Starting Grants, 1 Consolidator Grant, 7 Advanced Grants and 2 Proofs of Concept) **awarded to the UB** in the ERC calls for 2010-2015.

**% of Funding obtained by the UB SGRs in each Area from ERC Grants (Calls 2010-2015)**

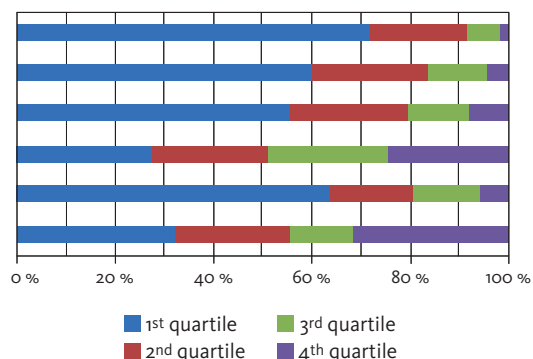


**Analysis of the scientific output of UB SGRs** for the period 2010-2015 shown for the 6 knowledge areas:

**Analysis of articles published (2010-2015)**

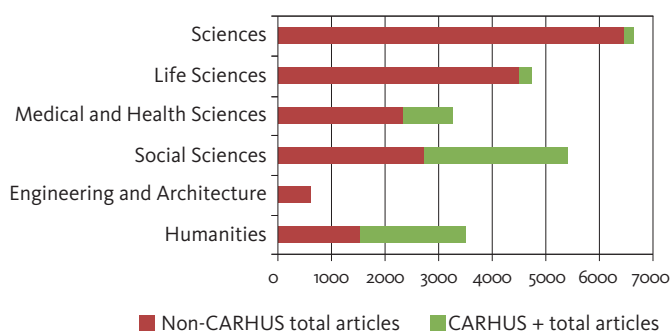


**% of ISI publications per quartile (2010-2015)**

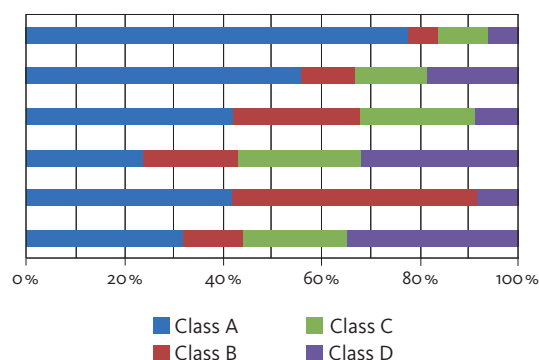


The **CARHUS+ analysis** of the articles published by the 323 UB SGRs research groups, from 2010 to 2015, is shown in the following graphs:

**CARHUS+ analysis of articles published (2010-2015)**



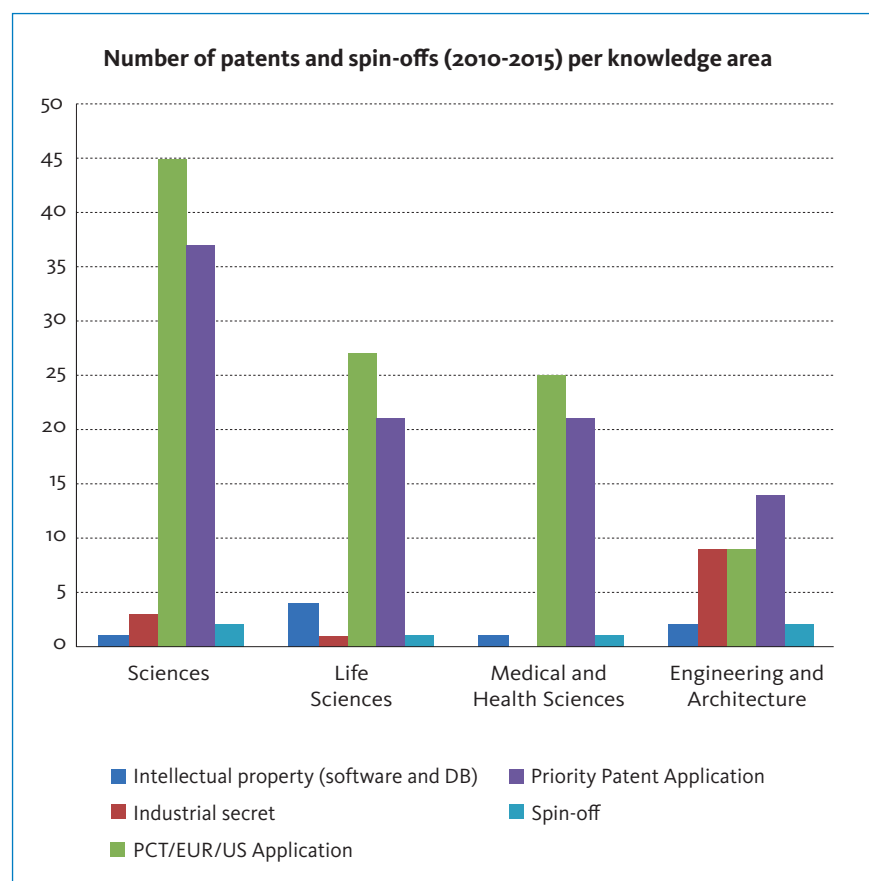
**% of CARHUS+ publications per class (2010-2015)**



In order to join forces with R&D activities and to improve the quality of their innovation capacities, the UB conducts a number of projects **promoting knowledge and technology transfer** in basic research, between the UB and private companies and public institutions. The University of Barcelona hereby ensures that such institutions can play an instrumental role in technological innovation and fully develop the potential of the quaternary sector.

Collaboration between the UB research groups and the business sectors is managed by the **Bosch i Gimpera Foundation (FBG)**, which takes care of all those aspects involved in the knowledge transfer activity of the UB. Researchers at the UB can transfer their research findings using a variety of mechanisms, including **contract research agreements, collaborative research agreements, patent licensing** and **company creation**.

The **transfer indicators for the 323 SGR groups at the UB** during the last five years are shown in the figure below.



The University of Barcelona holds the 49th world position and it is the only one at national level which appears within the 50 best universities regarding scientific productivity (URAP 2015-2016, University Ranking by Academic Performance). It has improved its ranking position compared to past years and the overall economic impact of the University on society remains very high. However, there is also an objective fact: the revenue generated by research in terms of patents, spin-off companies and so on is much lower than it should be. Therefore, we need to expand our vision and reinforce the mechanisms to achieve better impact of our research for society.



## 2. OVERVIEW OF THE H2020 PROGRAMME\*

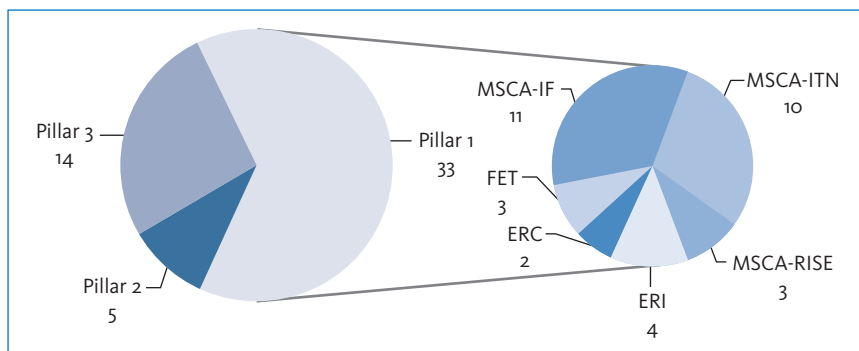
Horizon 2020 is built around three pillars to reinforce excellence in European research, to promote industrial initiatives and to address the main social challenges.

- **Pillar 1: “Excellent Science”** – Including grant for individual researchers from the European Research Council and Marie Skłodowska-Curie fellowships, Future and Emerging Technologies and European Research Infrastructures.

The University of Barcelona has been awarded 33 projects in this pillar and coordinates one. The revenues obtained in each sub-programme are detailed in this table:



|                                                                                                                                           |            |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------|
| ERC: European Research Council                                                                                                            | €2,500,000 |
| FET: Future and Emerging Technologies                                                                                                     | €1,220,000 |
| MSCA-IF: Marie Skłodowska-Curie actions – Individual Fellowships                                                                          | €1,990,000 |
| MSCA-ITN: Marie Skłodowska-Curie actions – Innovative Training Networks                                                                   | €4,550,000 |
| MSCA-RISE: Marie Skłodowska-Curie actions – International and inter-sectorial cooperation through Research and Innovation Staff Exchanges | €274,500   |
| ERI: European Research Infrastructures, including e-infrastructures                                                                       | €1,040,000 |

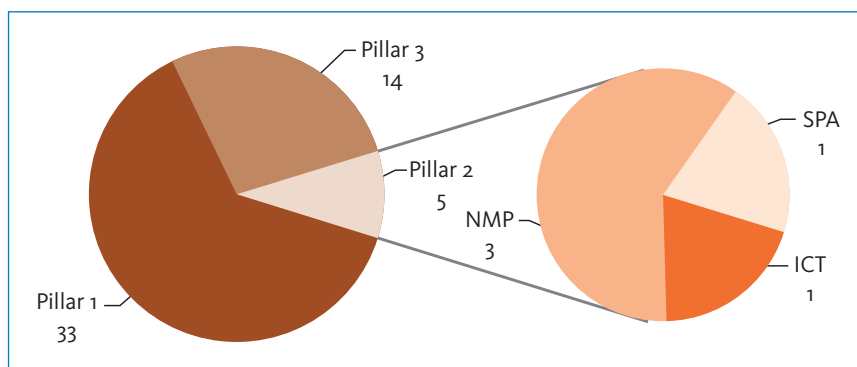


- **Pillar 2: “Industrial Leadership”** – Including grants related to industrial technologies (ICT, nanotechnologies and Space).

In this pillar, the University of Barcelona has been awarded 5 projects. The revenues obtained in the three sub-programmes are detailed in this table:

|                                                                         |          |
|-------------------------------------------------------------------------|----------|
| ICT – LEIT Information and Communication Technologies                   | €212,000 |
| NMP – LEIT Nanotechnologies, Advanced Materials, Advanced Manufacturing | €912,000 |
| SPA- LEIT Space                                                         | €126,000 |

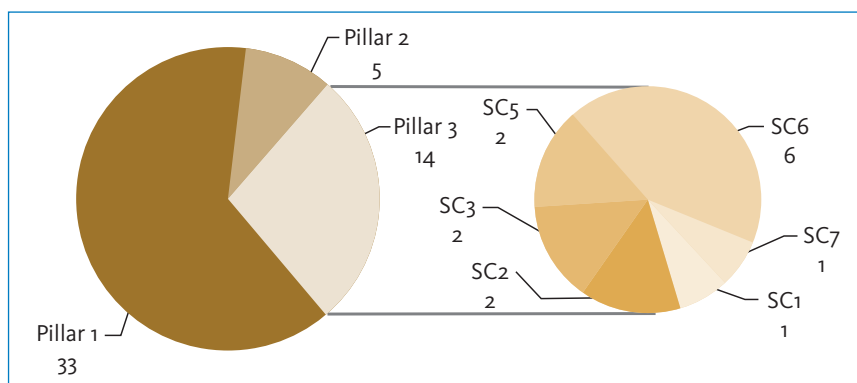
\* As of December 2015.



- **Pillar 3: “Societal Challenges”** – Including research towards meeting seven broad challenges (see table below).

The University of Barcelona is coordinating 5 projects of the 14 obtained in Pillar 3. In the following table, the funding obtained in each sub-programme is detailed:

|                                                                                                                        |            |
|------------------------------------------------------------------------------------------------------------------------|------------|
| SC1 Health, Demographic Change and Wellbeing                                                                           | €252,000   |
| SC2 Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy | €843,000   |
| SC3 Secure, Clean and Efficient Energy                                                                                 | €735,000   |
| SC4 Smart, Green and Integrated Transport                                                                              | 0          |
| SC5 Climate Action, Environment, Resource Efficiency and Raw Materials                                                 | €525,000   |
| SC6 Europe in a Changing World – Inclusive, innovative and reflective societies                                        | €1,396,000 |
| SC7 Secure Societies – Protecting freedom and security of Europe and citizens                                          | €552,000   |



## Significant European Research Projects at the University of Barcelona\*

The European Union (EU) is the largest international funding organisation for research at the University of Barcelona. Horizon 2020 is the main EU Research and Innovation programme, with nearly 80 billion euros of funding available over 7 years (2014 to 2020). Since the implementation of this programme, the University of Barcelona has been awarded **58 EU projects**, and **coordinates 6 of these**. The total revenue at the University of Barcelona **as of December 2015** was **more than 19 million euros**.



### H2020 research projects

#### Coordinated by the UB

##### Social Platform on Cultural Heritage and European Identities (CULTURALBASE)

RODRÍGUEZ, ARTURO. Department of Sociological Theory, Philosophy of Law and Methodology of the Social Sciences (Faculty of Economics and Business). H2020-REFLECTIVE-SOCIETY-2014. 7 partners. UB funding: €224,425.

Through a comprehensive perspective that includes the most relevant social and political connections, the project aims to address the proposed topic from a double standpoint, namely, an analytical as well as a public policy perspective. We start from the idea that since the second half of the last century culture has experienced a profound mutation, through which its position and role in the social dynamics have been transformed.



##### Philosophical Problems, Resilience and Persistent Disagreement (DIAPHORA)

ROSENKRANZ, SVEN. Department of Logics, History and the Philosophy of Science (Faculty of Philosophy). H2020-MSC-ITN-2015. 7 partners. UB funding: €781,946.

DIAPHORA serves as a European research and training platform for collaborative research on the nature of philosophical problems, their resilience and the sources of persistent divergence of expert opinion about them, and their relation to conflicts in the practical sphere.



\* As of December 2015.

### **Giving Focus to the Cultural, Scientific and Social Dimension of EU – CELAC Relations (EULAC Focus)**

TORRENT, RAMON. Department of Public Economy, Political Economy and Spanish Economy (Faculty of Economics and Business). H2020-INT-SOCIETY-2015. UB funding: €294,285.



EULAC-Focus delivers a significant contribution to the improvement of EU-CELAC relations through a better understanding of three dimensions: cultural, scientific and social. The main objective is that of “giving focus” to these three dimensions of EU-CELAC relations, with a view to determining synergies and cross-fertilization, as well as identifying asymmetries in bi-lateral and bi-regional relations.

### **Tackle Insecurity in Marginalized Areas (MARGIN)**

BARTOLOMÉ, ANTONIO RAMÓN. Department of Teaching and Learning and Educational Organization (Faculty of Education). H2020-FCT-2014. 7 partners. UB funding: €437,433.



The MARGIN project coordination activities are intended to contribute to the creation of sustainable modes of cooperation between stakeholders dealing with security issues. The project provides policy makers with evidence-based tools for developing and assessing strategies targeted at the reduction of insecurity among different demographic and socioeconomic groups.

### **New commercial EUropean RICE (*Oryza sativa*). Harboring salt tolerance alleles to protect the rice sector against climate change and apple snail (*Pomacea insularum*) invasion (NEURICE)**

NOGUÉS, SALVADOR. Department of Plant Biology (Faculty of Biology). H2020-SFS-2015-2. UB funding: €671,436.



The general objective of the NEURICE project is to identify and introduce genetic variation in European rice varieties for obtaining commercial varieties tolerant to salinity in order to (i) mitigate the imminent effects of salinization and deterioration of water quality in the Mediterranean basins, and (ii) to avoid the decline in production observed after seawater treatments performed in rice paddies.

### **Solidarity in European societies: Empowerment, Social Justice and Citizenship (SOLIDUS)**

SOLER, MARTA. Department of Sociological Theory, Philosophy of Law and Methodology of the Social Sciences (Faculty of Economics and Business). H2020-EURO-SOCIETY-2014. 14 partners. UB funding: €397,576.

This project aims at analysing in depth the acts of solidarity which are being developed across Europe, the extent to which they respond to dialogic and inclusive processes, and the related outcomes and policy developments. The project starts from previous findings on successful actions which are combating the crisis through acts of solidarity.



### **UB participates as a partner in more than 45 European research projects**

In the following list, projects which have obtained funding worth more than €240,000 are presented in alphabetical order according to their acronym.

#### **Magnetically Actuated Bio-Inspired Metamaterials (ABIOMATER)**

SAGUÉS, FRANCESC. Department of Physical Chemistry (Faculty of Chemistry). H2020-FETOPEN-2014-2015-RIA. 5 partners. UB funding: €571,875.

This project will deliver a new class of metamaterials whose functionality can be controlled by external magnetic fields. The materials consist of micromotors, comprising an anisotropically “hard” and “soft” ferromagnetic particle pair embedded in a polymer matrix, and promise wide-ranging technological applications.



#### **Algebraic Representations in Computer-Aided Design for Complex Shapes (ARCADES)**

D'ANDREA, CARLOS ANTONIO. Department of Algebra and Geometry (Faculty of Mathematics). H2020-MSCA-ITN-2015. UB funding: €247,872.

ARCADES aims at disrupting the traditional paradigm in Computer-Aided Design (CAD) by exploiting cutting-edge research in mathematics and algorithm design. The participants span a multidisciplinary and multisectorial spectrum for realising our vision, all being international leaders at various stages of the pipeline.



### **Archaeological Automatic Interpretation and Documentation of Ceramics** (ArchAIDE)

BUXEDA, JAUME. Department of Prehistory, Ancient History and Archaeology (Faculty of Geography and History). H2020-REFLECTIVE-6-2015. UB funding: €267,625.

The objectives of ArchAIDE are to support the classification and interpretation work of archaeologists with innovative computer-based tools, able to provide the user with features for the semi-automatic description and matching of potsherds over the huge existing ceramic catalogues.

### **Comorbid Conditions of Attention Deficit / Hyperactivity Disorder (CoCA)**

CORMAND, BRU. Departments of Genetics (Faculty of Biology). H2020-PHC-2015. UB funding: €252,000.



Understanding mechanisms underlying comorbid disorders poses a challenge for developing precision medicine tools. Psychiatric disorders are highly comorbid, and are among the last areas of medicine, where classification is driven by phenomenology rather than pathophysiology. We will study comorbidity between the most frequent psychiatric conditions, ADHD, mood/anxiety and substance use disorders, and a highly prevalent somatic disease, obesity. ADHD, a childhood-onset disorder, forms the entry into a lifelong negative trajectory characterized by these comorbidities.

### **The Elusives Enterprise: Asymmetries of the Invisible Universe (ELUSIVES)**

GONZÁLEZ, MARÍA CONCEPCIÓN. Department of Structure and Constituents of Matter (Faculty of Physics). H2020-MSCA-ITN-2014. UB funding: €247,872.



ELUSIVES is a European ITN project, which focuses on Neutrino and Dark Matter phenomenology and their connection, with emphasis on the role of the symmetry relating matter and antimatter. Experimental and theoretical aspects are also encompassed. This is the first transnational such programme, exploiting capital investment in new experiments to overcome the fragmentation of research.

### **De-Fluoridation Technologies for Improving Quality of Water and Agro-animal Products Along the East African Rift Valley in the Context of Adaptation to Climate Change (FLOWERED)**

SOLER, ALBERT. Department of Crystallography, Mineralogy and Mineral Deposits (Faculty of Geology). H2020-WATER-2015. UB funding: €395,787.



FLOWERED's objective is to contribute to the development of a sustainable water management system in areas affected by fluoride (F) contamination in water, soils and food in the African Rift Valley countries (Ethiopia, Kenya, Tanzania), thus to improve the living standards (environmental, health and food security) of its population.



### Fragments Training Network (FRAGNET)

BARRIL, XAVIER. Department of Physical Chemistry (Faculty of Pharmacy). H2020-MSCA-ITN-2015. 8 partners. UB funding: €495,745.

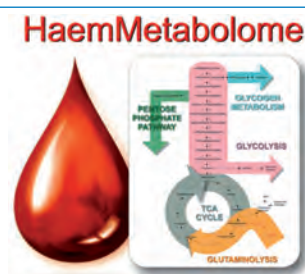
The promise of more efficient lead discovery is fuelling the enthusiasm for fragment-based lead discovery (FBLD). In this approach, highly sensitive biochemical and biophysical screening technologies are being used to detect the low affinity binding of low molecular weight compounds (the so-called fragments) to protein targets that are involved in pathophysiological processes. By investigating the molecular interactions between fragment hit(s) and the target protein, a detailed understanding of the binding event is obtained. This enables the rational and efficient optimisation of the hit fragment.



### Deciphering the Metabolism of Haematological Cancers (HaemMetabolome)

CASCANTE, MARTA. Department of Biochemistry and Molecular Biology (Faculty of Biology). H2020-MSCA-ITN-2015. 4 partners. UB funding: €743,618.

A systems biomedicine approach will be integrated to build genome-scale transcriptional models that explain deregulated metabolic pathways relevant for the development of haematological malignancies. This work will not only open new avenues for drug discovery but will also provide a multi-disciplinary framework for student training in biomedical technologies.



### Mastering Skills in the Training Network for Attention Deficit Hyperactivity and Autism Spectrum Disorders (MiND)

CORMAND, BRU. Department of Genetics (Faculty of Biology). H2020-MSCA-ITN-2014. UB funding: €247,873.

The pan-European training network MiND aims to educate a new generation of researchers in the field of neurodevelopmental disorders, through innovation-oriented research combined with highly interdisciplinary and intersectoral international training. MiND can be expected to impact patients and society by improving our understanding of disease biology, by developing novel diagnostic and treatment strategies, and by raising awareness for the necessity of research of neurodevelopmental disorders from childhood to adulthood.



### Modulation of Glycolytic Flux as a New Approach for Treatment of Atherosclerosis and Plaque Stabilization: a Multidisciplinary Study (MOGLYNET)

CASCANTE, MARTA. Department of Biochemistry and Molecular Biology (Faculty of Biology). H2020-MSCA-ITN-2015. 5 partners. UB funding: €420,145.



The mission of MoGlyNet is to define a joint doctorate educational training model in Drug Discovery and Development where Academia and Industry join their forces for: (a) creating a common platform of knowledge for early stage researchers; (b) exploiting this platform to train a new generation of cutting-edge researchers and professionals, and (c) establishing structures for long-term cooperation.

### Nanomaterials for the Restoration of Works of Art (NANORESTART)

CAMPO, MARIA GEMA. Department of Painting (Faculty of Fine Arts). H2020-NMP-2014. 26 partners. UB funding: €183,346.



The challenge of NANORESTART will be to address the lack of methodologies for the conservation of modern and contemporary artworks within a new framework with respect to the state of the art of conservation science. NANORESTART is devoted to the development of nanomaterials to ensure long-term protection and security of modern/contemporary cultural heritage, taking into account environmental and human risks, feasibility and materials costs.

### Transport of Soft Matter at the Nanoscale (NANOTRANS)

PAGONABARRAGA, IGNACIO. Department of Fundamental Physics (Faculty of Physics). H2020-MSCA-ITN-2015. 10 partners. UB funding: €495,745.



Topics we will study within NANOTRANS are at the core of modern technology (i.e., active design of “smart” nanomaterials, nanofluidic and “lab on a chip” devices, sustainable nanocompounds, energy storage, contaminants dissemination in the environment, oil recovery, drug delivery and disease treatment).

### The Novel Materials Discovery Laboratory (NoMaD)

ILLAS, FRANCESC. Department of Physical Chemistry (Faculty of Chemistry). H2020-EINFRA-2015-1. 11 partners. UB funding: €414,366.



Computational materials science is increasingly influential as a method of identifying critical materials for R&D. Enormous amounts of data, precious but heterogeneous and difficult to access or utilise, are already stored in repositories scattered across Europe. The NoMaD CoE will open new HPC opportunities by enabling access to this data and delivering powerful new tools to search, retrieve and manage it.

### Perception and Action in Complex Environments (PACE)

LÓPEZ, JOAN. Department of Basic Psychology (Faculty of Psychology). H2020-MSCA-ITN-2014. 10 partners. UB funding: €247,873.

The PACE research and training programme sits at the interface between basic science, technology and clinics, in order to unveil how humans control and adapt their movements in complex, naturalistic environments. Such a research agenda has major consequences for understanding how these movements are impacted by specific brain insults and how these impairments can be compensated for via new rehabilitation methods.



### A comprehensive and standardised e-infrastructure for analysing medical metabolic phenotype data (PhenoMeNal)

CASCANTE, MARTA. Department of Biochemistry and Molecular Biology (Faculty of Biology). H2020-EINFRA-2014-2. UB funding: €365,938.

The PhenoMeNal project will develop and deploy an integrated, secure, permanent, on-demand and service-driven, privacy compliant and sustainable e-infrastructure for the processing, analysis and information-mining of the massive amount of medical molecular phenotyping and genotyping data that will be generated by metabolomics applications now entering research and clinic.



### Protective Composite Coatings via Electrodeposition and Thermal Spraying (PROCETS)

DOSTA, SERGI. Department of Materials Science and Metallurgical Engineering (Faculty of Chemistry). H2020-NMP-PILOTS-2015. 16 partners. UB funding: €503,500.

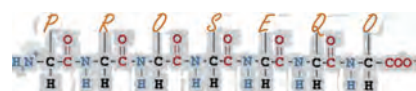
PROCETS main target is to deliver protective coatings covering a wide range of applications, such as automotive, aerospace, metal-working, oil and gas and cutting tools industries, via thermal spray and electroplating methods utilizing more environmental friendly materials compared to those currently used.



### Protein Sequencing Using Optical Single Molecule Real-time Detection (PROSEQO)

RITORT, FELIX. Department of Fundamental Physics (Faculty of Physics). H2020-FETOPEN-2014-2015-RIA. 5 partners. UB funding: €649,644.

The advent of analytical techniques with extremely low limits of detection has led to dramatic progress, mostly in the field of nucleic acids sequencing. Despite the advent of next-generation sequencing platforms, the current genome sequencing tasks remain formidable, and revolutionary advances in DNA sequencing technology are still demanded. In this project, we build upon current state-of-the-art sequencing technologies to develop novel proof-of-principle technologies for high-throughput protein sequencing and single molecule DNA/RNA sequencing.



### **Riblet-Surfaces for Improvement of Efficiency of Wind Turbines (Riblet4Wind)**

GUILEMANY, JOSEP MARIA. Department of Materials Science and Metallurgical Engineering (Faculty of Chemistry). H2020-LCE-2014-2. 7 partners. UB funding: €471,750.



The main objective of Riblet4Wind is the transfer of a technology that has already demonstrated its capacity for increasing energy efficiency in the aeronautics sector to the wind energy industry. Application of functional coatings with Riblet structures improve the drag-to-lift ratio of rotor blades significantly.

### **Theoretical Chemistry and Computational Modelling (TCCM)**

NOVOA, JUAN JOSÉ. Department of Physical Chemistry (Faculty of Chemistry). H2020-MSCA-ITN-2014. UB funding: €248,054.



European Joint Doctorate on  
Theoretical Chemistry and  
Computational Modelling

Theoretical Chemistry and Computational Modelling (TCCM) is emerging as a powerful tool to help in the rational design of new products and materials. To achieve this goal, it is necessary to go beyond the traditional electronic structure studies, and merge complementary techniques that are normally not available within a single research group. The TCCM aims at applying computational modelling to problems demanded by the industry and with high societal relevance, namely materials with special properties, biomolecules for new therapies and energy storage.

## 3. ERC GRANTS

### ERC Grants – Active at the University of Barcelona in 2015

The European Research Council (ERC) encourages the highest quality research in Europe through competitive funding and supports investigator-driven frontier research across all fields, on the basis of scientific excellence.

The University of Barcelona **during 2015** had three active ERC Advanced Grants, six ERC Starting Grants and a Proof of Concept Grant.



#### Advanced Grants

**Trajectories of Modernity – Comparing Non-European and European Varieties (TRAMOD)**

WAGNER, PETER. Department of Sociological Theory, Philosophy of Law and Methodology of the Social Sciences (Faculty of Economics and Business). ERC funding: €2,373,364.

**Grassroots Economics: Meaning, Project and Practice in the Pursuit of Livelihood (GRECO)**

NAROTZKY, SUSANNA ELENA. Department of Cultural Anthropology and the History of America and Africa (Faculty of Geography and History). ERC funding: €2,408,302.

**Production and Distribution of Food During the Roman Empire: Economics and Political Dynamics (EPNet)**

REMESAL, JOSE. Department of Prehistory, Ancient History and Archaeology (Faculty of Geography and History). ERC funding: €2,432,056.

#### Starting Grants

**Design and Preparation of Functional Molecules for Quantum Computing and Information Processing (FuncMolQIP)**

AROMI, GUILLEM. Department of Inorganic Chemistry (Faculty of Chemistry). ERC funding: €1,499,800.

**Holography for the LHC Era (HoloLHC)**

MATEOS, DAVID JULIAN. Department of Fundamental Physics (Faculty of Physics). ERC funding: €1,419,424.

**Tuning Attention During Language Learning (TuningLang)**

DE DIEGO, RUTH. Department of Basic Psychology (Faculty of Psychology). ERC funding: €1,485,600.

**Elucidating Early Pathogenic Mechanisms of Neurodegeneration in Parkinson's Disease Through a Humanized Dynamic In Vitro Model (PD-HUMMODEL)**

CONSIGLIO, ANTONELLA. Institute of Biomedicine of the University of Barcelona. ERC funding: €1,324,802.

**Nanodevice Engineering for a Better Chemical Gas Sensing Technology (BetterSense)**

PRADES, JUAN DANIEL. Department of Electronics (Faculty of Physics). ERC funding: €1,416,492.

**Dynamics and Assemblies of Colloidal Particles Under Magnetic and Optical Forces (DYNAMO)**

TIERNO, PIETRO. Department of Structure and Constituents of Matter (Faculty of Physics). ERC funding: €1,309,320.

#### Proof of Concept Grant

**A System for Embodied Relational Experiences (SERE)**

SLATER, MELVYN. Department of Personality, Assessment and Psychological Treatments (Faculty of Psychology). ERC funding: €149,946.

### ERC Grants awarded to UB Researchers in the 2015 call:

Two new ERC grants were awarded to the University of Barcelona at the last ERC call.

#### Proof of Concept Grant

##### **Personified Self Interaction (PSI)**

SLATER, MELVYN. Department of Personality, Assessment and Psychological Treatments (Faculty of Psychology).  
ERC funding: €149,984.

#### Consolidator Grant

##### **Testing the Role of Mediterranean Thermohaline Circulation as a Sensor of Transient Climate Events and Shaker of North Atlantic Circulation (TIMED)**

CACHO, EVA ISABEL. Department of Stratigraphy, Paleontology and Marine Geosciences (Faculty of Geology).  
ERC funding: €2,400,000.



## 4. HIGH IMPACT PUBLICATIONS IN 2015

In 2015, researchers at the University of Barcelona produced more than 4,000 publications (ISI – Web of Science). The high number, quality and citations of these research articles placed the University of Barcelona as the top Spanish higher education centre, occupying a competitive position at national, European and worldwide levels.

The following list details selected recent publications by one or several authors of the University of Barcelona in high impact journals:

- CMS Collaboration and LHCb Collaboration. 2015. Observation of the rare  $B\text{-}s(o)\rightarrow\mu^{+}\mu^{-}$  decay from the combined analysis of CMS and LHCb data. **NATURE**. 552, 68-72.
- Haile-Selassie, Y.; **Gibert, L.**; Melillo, S. M. et al. 2015. New species from Ethiopia further expands Middle Pliocene hominin diversity. **NATURE**. 521, 483-488.
- Puente, X. S.; Bea, S.; Valdés Mas, R.; [...]; López Otín, C.; **Campo, E.** 2015. Non-coding recurrent mutations in chronic lymphocytic leukaemia. **NATURE**. 526, 519-524.
- The 1000 Genomes Project Consortium. 2015. A global reference for human genetic variation. **NATURE**. 526, 68-74.
- Carrasco-González, C.; **Torrelles, J. M.**; Cantó, J. et al. 2015. Observing the onset of outflow collimation in a massive protostar. **SCIENCE**. 348(6230), 114-117.
- The GTEx Consortium. 2015. The Genotype-Tissue Expression (GTEx) pilot analysis: Multitissue gene regulation in humans. **SCIENCE**. 348(6235), 648-660.
- Heyn, H.; **Esteller, M.** 2015. An adenine code for DNA: a second life for N6-methyladenine. **CELL**. 161(4), 710-713.
- Tan, L.; Zhang, K. X.; Pecot, M. Y.; [...]; **Morey, M.**; Zipursky, L. S. 2015. Ig superfamily ligand and receptor pairs expressed in synaptic partners in Drosophila. **CELL**. 163(7), 1756-1769.
- Ho, P.-C.; Bihuniak, J. D.; Macintyre, A. N.; Staron, M.; [...]; **Perales, J. C.** et al. 2015. Phosphoenolpyruvate is a metabolic checkpoint of anti-tumor T cell responses. **CELL**. 162(6) 1217-1228.
- Reddy, P.; [...]; **Manau, D.**; **Civico, S.**; **Cardellach, F.**; [...]; **Campistol, J. M.** et al. 2015. Selective elimination of mitochondrial mutations in the germline by genome editing. **CELL**. 161(3), 459-469.
- **Mitjà, O.**; [...]; **Sanz, S.**; **Alonso, P. L.**; Asiedu, K.; **Bassat, Q.** 2015. Mass treatment with single-dose azithromycin for yaws. **THE NEW ENGLAND JOURNAL OF MEDICINE**. 372(8), 703-710.
- **Mayor, A.**; **Bardají, A.**; [...]; **Dobaño, C.**; Sevene, E.; **Alonso, P. L.**; **Menéndez, C.** 2015. Changing trends in *P. falciparum* burden, immunity, and disease in pregnancy. **THE NEW ENGLAND JOURNAL OF MEDICINE**. 373, 1607-1617.
- Galie, N.; **Barberà, J. A.**; Frost, A. E. et al. 2015. Initial use of ambrisentan plus tadalafil in pulmonary arterial hypertension. **THE NEW ENGLAND JOURNAL OF MEDICINE**. 373(9), 834-844.
- Lange, P.; Celli, B.; **Agustí, A.** et al. 2015. Lung-function trajectories leading to chronic obstructive pulmonary disease. **THE NEW ENGLAND JOURNAL OF MEDICINE**. 373(2), 111-122.

- **Kulis, M.**; Merkel, A.; [...]; Gut, I. G.; **Campo, E.**; **Martín-Subero, J. I.** 2015. Whole-genome fingerprint of the DNA methylome during human B cell differentiation. *NATURE GENETICS*. 47(7), 746-756.
- **Pérez-Lluch, S.**; **Blanco, E.**; [...]; **Ruiz-Romero, M.**; **Corominas, M.**; Guigó, E. 2015. Absence of canonical marks of active chromatin in developmentally regulated genes. *NATURE GENETICS*. 47(10), 1158-1167
- Vizoso, M.; Ferreira, H. J.; Lopez-Serra, P.; Carmona, F. J.; [...]; **Esteller, M.** 2015. Epigenetic activation of a cryptic *TBC1D16* transcript enhances melanoma progression by targeting *EGFR*. *NATURE MEDICINE*. 21(7), 741-750.
- Dieterich, E.; **Camuñas-Soler, J.**; **Ribezzi-Crivellari, M.**; Seifert, U.; **Ritort, F.** Single-molecule measurement of the effective temperature in non-equilibrium steady states. 2015. *NATURE PHYSICS*. 11(11), 971-977.
- Mariotti, M.; [...]; **Serras, F.**; **Corominas, M.**; Gabaldon, T.; Guigo, R. 2015. Evolution of selenophosphate synthetases: emergence and relocation of function through independent duplications and recurrent subfunctionalization. *GENOME RESEARCH*. 25(9), 1256-1267.
- **Munné, S.** 2015. Senescence: Is it universal or not? *TRENDS IN PLANT SCIENCE*. 20(11), 713-720.
- Marcé, R.; **Obrador, B.**; **Morguí, J. A.**; **Riera, J. L.**; **López, P.**; **Armengol, J.** 2015. Carbonate weathering as a driver of CO<sub>2</sub> supersaturation in lakes. *NATURE GEOSCIENCE*. 8(2), 107-111.
- **Sia, D.**; Losic, B.; **Moeini, A.**; [...]; Mazzaferro, V.; **Llovet, J. M.** 2015. Massive parallel sequencing uncovers actionable FGFR2-PPHLN1 fusion and ARAF mutations in intrahepatic cholangiocarcinoma. *NATURE COMMUNICATIONS*. Vol: 6, Article Number: 6087.
- Herms, A.; [...]; **Rentero, C.**; **Tebar, F.**; **Enrich, C.**; Parton, R. G.; Gross, S. P.; **Pol, A.** 2015. AMPK activation promotes lipid droplet dispersion on deetyrosinated microtubules to increase mitochondrial fatty acid oxidation. *NATURE COMMUNICATIONS*. Vol: 6, Article number: 7176.
- Setu, S. A.; Dullens, R. P. A.; **Hernández Machado, A.**; **Pagonabarraga, I.**; Aarts, D.; Ledesma Aguilar, R. 2015. Superconfinement tailors fluid flow at microscale. *NATURE COMMUNICATIONS*. Vol: 6, Article number: 7297.
- De la Fuente, M.; Skinner, L.; Calvo, E.; Pelejero, C.; **Cacho, I.** 2015. Increased reservoir ages and poorly ventilated deep waters inferred in the glacial Eastern Equatorial Pacific. *NATURE COMMUNICATIONS*. Vol: 6, Article number: 7420.
- Prades, R.; [...]; **Selva, J.**; [...]; **Egea, G.**; Plesnila, N.; Teixidó, M.; **Giralt, E.** 2015. Applying the retro-entio approach to obtain a peptide capable of overcoming the blood-brain barrier. *ANGEWANDTE CHEMIE INTL EDITION*. 54(13), 3967-3972.
- **Presa, A.**; **Brissos, R. F.**; **Caballero, A. B.**; **Borilovic, I.**; **Korrodi-Gregório, L.**; **Pérez-Tomás, R.**; Roubeau, O.; **Gamez, P.** 2015. Photoswitching the cytotoxic properties of platinum (II) compounds. *ANGEWANDTE CHEMIE INTL EDITION*. 54(15), 4561-4565.
- **Pereira-Lopes, S.**; **Tur, J.**; **Calatayud-Subias, J. A.**; **Lloberas, J.**; Stracker, T. H.; **Celada, A.** 2015. NBS1 is required for macrophage homeostasis and functional activity in mice. *BLOOD*. 126(22), 2502-2510.

## 5. RESEARCH INSTITUTES OF THE UNIVERSITY OF BARCELONA

|                                                                 |                                                                                                                                                                                                            |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Institute of Cosmos Sciences                                    |  <br>Institut de Ciències del Cosmos |
| Institute of Nanoscience and Nanotechnology                     | <br>INSTITUT DE NANOCIÈNCIA I NANOTECNOLOGIA                                                                            |
| Institute of Theoretical and Computational Chemistry            | <br>Institut de Química Teòrica i Computacional                                                                         |
| Institute of Mathematics                                        |  <br>Institut de Matemàtica          |
| Geomodels Research Institute                                    | <br>geomodels<br>Institut de recerca                                                                                    |
| Biodiversity Research Institute                                 | <br>Institut de Recerca de la Biodiversitat                                                                             |
| Institute of Biomedicine                                        | <br>Institut de Biomedicina                                                                                            |
| Institute of Neurosciences                                      | <br>UNIVERSITAT DE BARCELONA<br>Institute of Neurosciences                                                            |
| Nutrition and Food Safety Research Institute                    | <br>Institut de Recerca en Nutrició i Seguretat Alimentària                                                           |
| Water Research Institute                                        | <br>Institut de Recerca de l'Aigua<br>UNIVERSITAT DE BARCELONA                                                        |
| Institute for Research on Applied Regional and Public Economics | <br>Institut de Recerca en Economia Regional i Pública                                                                |
| Institute for Research on Medieval Cultures                     | <br>Institut de Recerca en Cultures Medievales                                                                        |
| Legal Research Institute                                        | <br>Institut de Recerca, Facultat de Dret                                                                             |
| Institute of Ancient Near Eastern Studies                       | <br>Institut d'Estudis d'Orient Antic                                                                                 |



## Research Institutes of the University of Barcelona

UB research institutes promote and undertake **interdisciplinary and/or specialized research activities** in various fields of **Science, Technology, Social Sciences, Humanities and the Arts**. They also provide scientific and technical consultancy services in their areas of expertise. The **University of Barcelona** has **14 UB-specific research institutes**, and is a full member of the respective boards of a number of other research institutes.

All UB research institutes target highly competitive joint research, conduct innovative projects and promote the transfer of research results to society. Their mission is to:

- Promote interdisciplinarity and specialization
- Coordinate the research developed by different research groups
- Provide scientific and technical advice

### 14 UB-specific Research Institutes

- Institute of Cosmos Sciences (ICCUB)
- Institute of Nanoscience and Nanotechnology (IN2UB)
- Institute of Theoretical and Computational Chemistry (IQTUB)
- Institute of Mathematics (IMUB)
- Geomodels Research Institute
- Biodiversity Research Institute (IRBio)
- Institute of Biomedicine (IBUB)
- Institute of Neurosciences (UBNeuro)
- Nutrition and Food Safety Research Institute (INSA-UB)
- Water Research Institute (IdRA)
- Institute for Research on Applied Regional and Public Economics (IREA)
- Institute for Research on Medieval Cultures (IRCVM)
- Legal Research Institute (TransJus)
- Institute of Ancient Near Eastern Studies (IPOA)

The **strength of these research institutes is an important asset** for the whole UB in terms of fundraising for research, both in the national and the international arenas, and because they have become true hubs of knowledge for research at the UB.

The projects (inputs) obtained from 2010 to 2015 by researchers belonging to one of these institutes represented 50.6% of the total number of projects conducted by all researchers affiliated with the University of Barcelona. The economic value of these projects represented 60.8% of the total funding for research projects managed by UB researchers overall. UB institutes have obtained 86.1% of this financing through competitive calls, while 19.6% has been granted by international agencies.

The Institute of Cosmos Sciences of the UB (ICCUB) is an interdisciplinary centre devoted to fundamental research in the field of cosmology, also paying attention to the technological applications of the sciences of the cosmos in general.

It brings together researchers from the departments of Astronomy and Meteorology, Structure and Constituents of Matter, Fundamental Physics, Applied Mathematics, Organic Chemistry and Electronics.

In 2015, the ICCUB received the María de Maeztu distinction awarded by the Spanish Ministry of Economy and Competitiveness to six Spanish centres. The award honours excellence at research centres located at universities.



## RESEARCH LINES AT THE ICCUB

### 1. Cosmology and Gravitation

- Dark matter and dark energy in cosmology.
- Quantum and semi-classical gravity.
- Black holes and gravity.

### 2. Cosmology and Large Scale Structure

- Large scale structure.
- Microwave background radiation anisotropies.
- Baryonic acoustic oscillations.
- Supernova cosmology.
- Dark matter and dark energy.
- Lyman-alpha emission from galaxies at high redshifts.
- Reionization of the intergalactic medium.

### 3. Experimental Particle Physics

- Physics of B and charm mesons.
- Charge-Parity (CP) symmetry violation.
- Deviations from the Standard Model in rare B meson decays.
- Quarkonium.
- Grid and cloud computing.
- Design of Geiger mode avalanche photodiodes.
- Study of the radiation hardness of avalanche photodetectors.
- Instrumentation for high-energy, astrophysics and medical imaging experiments.

### 4. Galaxy Structure and Evolution

- Dark matter clustering and halo properties.

- Galaxy evolution in groups and clusters.
- Kinematics and structure of the galaxy.
- Data reduction of the GAIA mission.

### 5. High Energy Astrophysics

- High-Energy and Very-High-Energy gamma-ray sources.
- Multi-wavelength observations and modelling.
- Microquasars.

### 6. Nuclear and Hadron Physics

- Hadron physics. Strangeness and charm in the nuclear medium.
- Lattice QCD of low-energy hadronic interactions.
- Nuclear structure. Nuclear symmetry energy.
- Relativistic heavy ion collisions.
- Dense and hot nuclear matter and applications.
- Radiation transport and matter-radiation interactions.

### 7. Space Science and Technology

- Astrodynamics.
- Astronomical image processing.
- Chirality and prebiotic chemistry.
- Heliospheric physics and space weather.
- Microgravity.

### 8. Star Formation

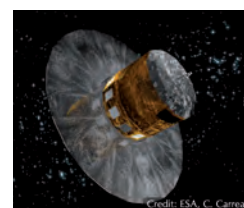
- Outflows, jets, and accretion disks in low- and high-mass young stellar objects.

- Jets in planetary nebulae.
- Computational models of star-forming clouds and star formation.

### 9. Theoretical Particle Physics

- Standard Model and beyond at the LHC.
- B-physics. Analysis and physical reach of the LHCb detector.
- Studies of the physics of future colliders.
- Physics of neutrinos. Astrophysics and cosmology.
- QCD in extreme conditions. Heavy ion experiments at the LHC, FAIR and other accelerators.
- String theory: unification of fundamental forces.
- Applications of the gauge/string duality to QCD.
- Theoretical studies on Higgs production in the colliders within the Standard Model and beyond.

The ICCUB's Gaia group has been deeply involved in the ESA's Gaia mission from the very beginning



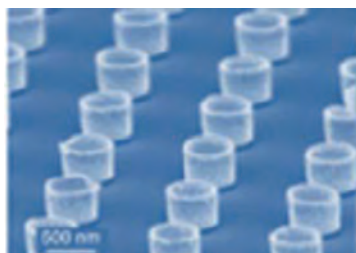
(1998) in the management and reduction of data from the mission as well as in some of the topics where Gaia will be crucial.

## FACTS AND FIGURES AT THE ICCUB

| Established in                  | 2006                                                                               |                                                  |
|---------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------|
| Staff statistics (2015)         | Teaching and research staff                                                        | 98 (of which: 9 ICREAs; 5 RyC)                   |
|                                 | Fellows and administrative and service staff                                       | 22                                               |
|                                 | Number of nationalities represented among the staff                                | 10                                               |
|                                 | Gender distribution of the staff (% of women)                                      | 19.39 %                                          |
| Research indicators (2010-2015) | ISI publications                                                                   | 1409                                             |
|                                 | % of ISI publications in 1st quartile                                              | 85.45 %                                          |
|                                 | Financing secured                                                                  | 19.69 m €                                        |
|                                 | Number of ERC grants                                                               | 2 ERC Starting Grants (granted in 2009 and 2012) |
| Transfer indicators (2010-2015) | Patents: 9 priority patents, 9 PCT/EUR/USA patents and 1 trade secret; 2 spin-offs |                                                  |
| Director                        | Lluís Garrido                                                                      | garrido@ub.edu                                   |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.





**Nanocup-shaped nanoparticles**

(by A. Conde, A. Labarta and X. Batlle)

In 2006, the University of Barcelona created the Institute of Nanoscience and Nanotechnology (IN2UB) to coordinate the multidisciplinary research activities being carried out by several research groups of the University. The IN2UB aims to contribute to the progress of science while at the same time promoting industrial excellence.

Members of the IN2UB come from different scientific disciplines, such as Physics, Chemistry, Pharmacy, Biochemistry and Medicine. In this framework, the IN2UB aims to promote, both internally and internationally, collaboration between different groups and research centres by strengthening interdisciplinary activities which integrate both basic and applied research.

## RESEARCH LINES AT THE IN2UB

### 1. Modelling and Simulation of Systems and Properties of Matter at Nanoscale:

- Confinement-related phenomena: reactivity, magnetism, optoelectronics and quantum photonics.
- Transport and conduction.
- Surface effects.
- Electronic structure and excitations.
- Bose-Einstein condensates and quantum confined gases.

### 2. Nanobiotechnology

- Functionalization of surfaces.
- Cellular and molecular biomechanics.
- Biomimetic structures and systems.
- Nanofluidics and nanorobotics. Nanomotors.
- Diagnosis in nanomedicine: marking and molecular observation.
- Nanobiosensors; DNA and protein chips; lab on chip.

### 3. Nanopharmacotherapy:

- Nanostructured systems for controlled drug release. Nanocapsules.
- Nanostructured systems interaction with biological structures.
- Bioavailability, toxicity and therapeutic efficiency of nanostructured systems.
- Non-viral vectors. Gene therapy. Pharmacogenomics and nutrigenomics.
- Molecular internalization. Molecular marking. Detoxification.

### 4. Nanomagnetism, Nanoelectronics and Nanophotonics

- Magnetic nanoparticles and unimolecular magnets.
- Dynamic processes in nanomagnetism. Interaction with microwaves.
- Magnetoelectronics.
- NEMS (nanoelectromechanical systems).
- Electronic, optoelectronic and photonic nanodevices, nanosensors and nanosystems. Photonic crystals.

### 5. Nanostructured Materials:

- Synthesis, nanomanufacturing and nanomanipulation.
- Thin layers, nanostructured multilayers and coatings.
- Nanoparticles, gels, nanofibres, nanorods and nanotubes.
- Nanostructured metallic oxides.
- Nanocompounds.
- Mesoporous materials and nanopatterns.

### 6. Nanoenergy: Production, Storage and Environment

- Catalytic nanostructures for energy production. Fuel cells.
- Nanomaterials for solar cells and photocatalytic processes.
- Nanostructured systems for energy storage.
- Functional nanorods and nanothreads.
- Nanosensors for pollution and gas detection.

## FACTS AND FIGURES AT THE IN2UB

|                                        |                                                                                       |                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>Established in</b>                  | 2006                                                                                  |                                                                       |
| <b>Staff statistics (2015)</b>         | Teaching and research staff                                                           | 152 (of which: 1 ICREA; 4 RyC)                                        |
|                                        | Fellows and administrative and service staff                                          | 30                                                                    |
|                                        | Number of nationalities represented among the staff                                   | 14                                                                    |
|                                        | Gender distribution of the staff (% of women)                                         | 41.76 %                                                               |
| <b>Research indicators (2010-2015)</b> | ISI publications                                                                      | 2036                                                                  |
|                                        | % of ISI publications in 1st quartile                                                 | 60.66 %                                                               |
|                                        | Financing secured                                                                     | 34.44 m €                                                             |
|                                        | Number of ERC grants                                                                  | 1 ERC Advanced Grant (2011);<br>3 ERC Starting Grants (2011 and 2014) |
| <b>Transfer indicators (2010-2015)</b> | Patents: 26 priority patents, 33 PCT/EUR/USA patents and 4 trade secrets; 3 spin-offs |                                                                       |
| <b>Director</b>                        | Jordi Borrell                                                                         | in2ub@ub.edu                                                          |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.



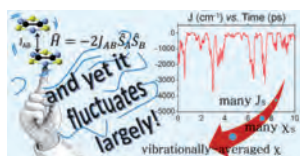
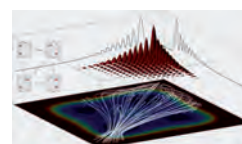
The Institute of Theoretical and Computational Chemistry of the University of Barcelona (IQTCUB) is made up of 38 researchers, experts in several fields of theoretical and computational chemistry. The research activity carried out at the IQTCUB covers methods and computational tool development, application of several techniques of electronic structure and simulation to problems in materials science, reaction dynamics in chemical reactions as well as in biological systems and soft-matter. The main goal is to foster synergies between researchers, encouraging the interdisciplinary activities that allow us to tackle new challenges. Another important goal is to share expertise in handling computational resources, which are the main tools in this type of research.



## RESEARCH LINES AT THE IQTCUB

### Methods, Algorithms and Computational Tools Development

Theories and algorithms dedicated to accounting for electronic correlation, nuclear motion, quantum structure-activity, continuous symmetry measures, molecular modelling, variational state transition theory and magnetic resonance. Further developing of Monte Carlo, molecular dynamics and Brownian dynamics is also envisaged.

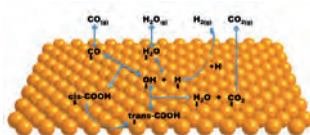
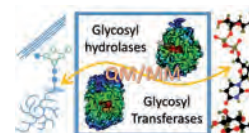


### Computational Materials Science

We employ computational methods, ranging from high-level quantum chemistry and ab initio molecular dynamics to classical simulation methods, to investigate the bulk, surface and nanoscale properties of a broad class of solid materials, such as complex inorganic compounds, molecular crystals and heterogeneous catalysts.

### Computational Biochemistry and Soft Matter

Using a battery of computational methods, from electronic structure based methods to classical simulations, we investigate the structure and reactivity of proteins and enzymes, drug design, processes in cellular membranes, enzymatic reactions in crowded media and soft nanoparticles in solution.



### Reactivity and Reaction Dynamics

Research in this area uses quantum, classical and statistical mechanics methods to analyse the dynamics of elementary reactions, electronic excited states and atmospheric and combustion reactions. Continuum methods are also used to investigate macromolecular complexation reactions in aqueous media.

## FACTS AND FIGURES AT THE IQTCUB

|                                 |                                                     |                                |
|---------------------------------|-----------------------------------------------------|--------------------------------|
| Established in                  | 2006                                                |                                |
| Staff statistics (2015)         | Teaching and research staff                         | 38 (of which: 3 ICREAs; 1 RyC) |
|                                 | Administrative and service staff                    | 1                              |
|                                 | Number of nationalities represented among the staff | 4                              |
|                                 | Gender distribution of the staff (% of women)       | 15.38 %                        |
| Research indicators (2010-2015) | ISI publications                                    | 655                            |
|                                 | % of ISI publications in 1st quartile               | 75.27 %                        |
|                                 | Financing secured                                   | 6.47 m €                       |
| Transfer indicators (2010-2015) | 1 intellectual property (software and database)     |                                |
| Director                        | Francesc Illas                                      | francesc.illas@ub.edu          |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.



The Institute of Mathematics of the UB (IMUB) has been devoted to fostering and supporting research in all areas of mathematics since June 2000, by hosting conferences, workshops, seminars and advanced courses, and promoting interdisciplinary collaboration among researchers from different fields. The Institute has 14 research groups and 63 active members from the faculties of Mathematics, Biology and Philosophy of the UB.

Collaboration with other entities is fostered in the IMUB by inviting guest researchers who are welcome for short visits or long stays upon invitation by IMUB members. Graduate student grants are offered every year, as are opportunities for short postdoctoral stays. *Collectanea Mathematica*, the oldest mathematical journal in Spain, is edited by the IMUB and published by Springer.

The IMUB is a unit of the Barcelona Graduate School of Mathematics (BGSMath), a collaborative venture of the Faculty of Mathematics of the UB jointly with the Centre de Recerca Matemàtica (CRM) and other centres of UAB and UPC. Its primary objective is to provide doctoral and postdoctoral training at the highest level with international visibility. The BGSMath received in 2015 a María de Maeztu distinction awarded by the Spanish Ministry of Economy and Competitiveness to six Spanish research entities of excellence located at universities.

#### RESEARCH LINES AT THE IMUB

|                                                                                    |                                                                                                                 |                                                                                                   |                                                                                                |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|  | <b>Algebra</b><br>Commutative algebra<br>Computational algebra<br>Homological algebra                           | <b>Discrete Mathematics</b><br>Algorithmics<br>Combinatorics                                      | <b>Number Theory</b><br>Algebraic number theory<br>Arithmetic geometry                         |
|                                                                                    | <b>Analysis</b><br>Complex analysis<br>Real and functional analysis                                             | <b>Geometry and Topology</b><br>Algebraic geometry<br>Algebraic topology<br>Differential geometry | <b>Probability and Statistics</b><br>Mathematical finance<br>Statistics<br>Stochastic analysis |
|                                                                                    | <b>Applied Mathematics</b><br>Astrodynamics<br>Celestial mechanics<br>Dynamical systems<br>Holomorphic dynamics | <b>Mathematical Logic</b><br>Algebraic logic<br>Model theory<br>Set theory                        |            |



#### FACTS AND FIGURES AT THE IMUB

|                                        |                                                     |                           |
|----------------------------------------|-----------------------------------------------------|---------------------------|
| <b>Established in</b>                  | 2000                                                |                           |
| <b>Staff statistics (2015)</b>         | Teaching and research staff                         | 63 (of which: 2 ICREAs)   |
|                                        | Number of nationalities represented among the staff | 3                         |
|                                        | Gender distribution of the staff (% of women)       | 20.63 %                   |
| <b>Research indicators (2010-2015)</b> | ISI publications                                    | 398                       |
|                                        | % of ISI publications in 1st quartile               | 37.94 %                   |
|                                        | Financing secured                                   | 4.33 m €                  |
| <b>Director</b>                        | Carles Casacuberta                                  | carles.casacuberta@ub.edu |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.

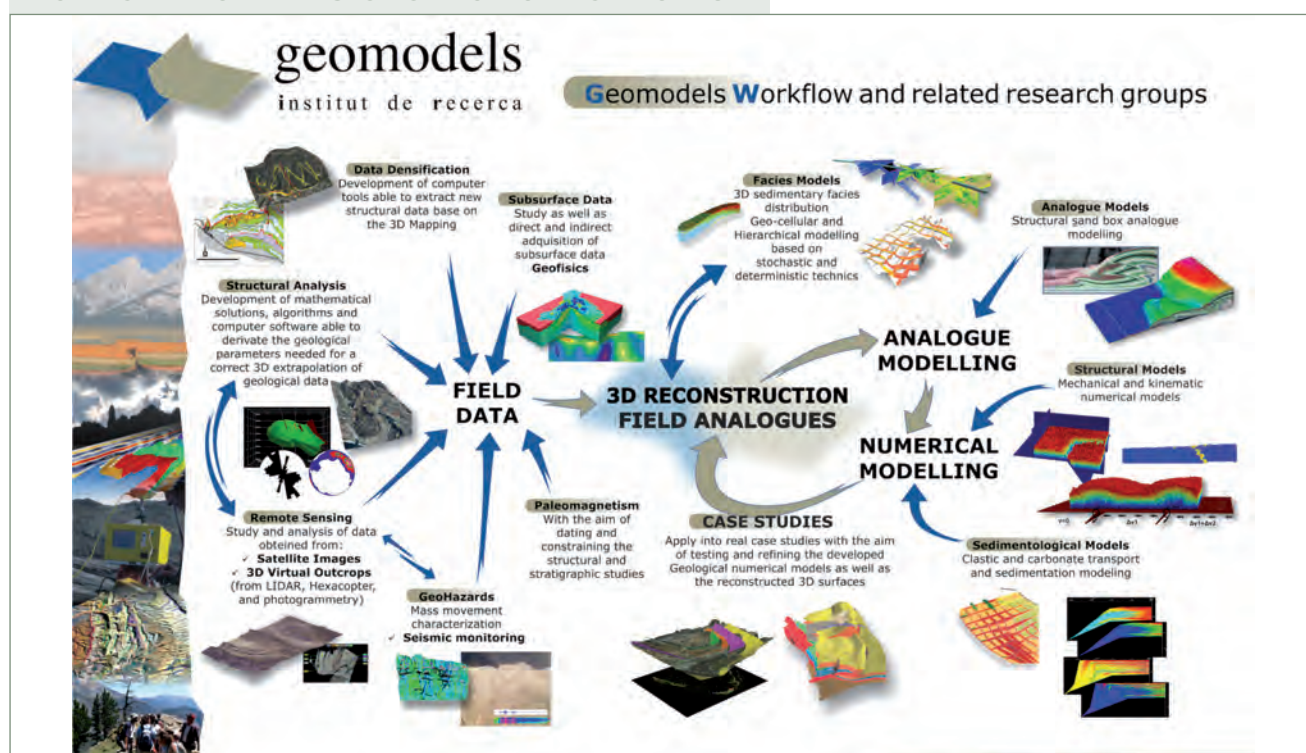
The main goal of the GEOMODELS Research Institute is the development of new technologies and their incorporation into the Earth Sciences research area. More specifically, the creation of new modelling techniques to characterize and correctly understand geological systems in terms of: generation, placement and quality of geologic resources and reservoirs; geo-mechanical terrain behaviour, and natural hazards and their impact on the surface.

A multidisciplinary team has been established aiming to model geological processes in order to improve their quantification and the prediction of related phenomena in space and time. More specifically, we deal with 3D characterization of geological bodies, the numerical simulation of processes within these bodies and the use of the resultant 3D models to tackle hazard scenarios.

The GEOMODELS Research Institute is a multidisciplinary research centre assembling geological and engineering methodologies. The results are scientific (improvement of knowledge and characterization of geological processes) and technological (development of new methodologies and modelling tools).



### RESEARCH LINES AT THE GEOMODELS RESEARCH INSTITUTE



### FACTS AND FIGURES AT THE GEOMODELS RESEARCH INSTITUTE

|                                        |                                                     |                        |
|----------------------------------------|-----------------------------------------------------|------------------------|
| <b>Established in</b>                  | 2008                                                |                        |
| <b>Staff statistics (2015)*</b>        | Teaching and research staff                         | 39 (of which: 1 ICREA) |
|                                        | Fellows and administrative and service staff        | 9                      |
|                                        | Number of nationalities represented among the staff | 2                      |
|                                        | Gender distribution of the staff (% of women)       | 29.17 %                |
| <b>Research indicators (2010-2015)</b> | ISI publications                                    | 308                    |
|                                        | % of ISI publications in 1st quartile               | 53.25 %                |
|                                        | Financing secured                                   | 10.08 m €              |
| <b>Director</b>                        | Josep A. Muñoz                                      | jamunoz@ub.edu         |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.

\* According to the Geomodels Research Institute Management, there are 30 more researchers and administrative personnel as permanent collaborators.





The Biodiversity Research Institute (IRBio) aims to become the country's focal point for the study and management of biodiversity. It primarily centres its activities on the assessment and cataloguing of living forms, the better understanding of ecosystem processes, the origin, evolution and function of species and their classification, as well as the proper management and conservation of wildlife. In the context of the latter activity, one of the main tasks of the Institute is to provide scientific advice on management to public administrations, private entities and environmental organizations. The Institute also carries out substantial applied work in fields related to biodiversity.

The Institute is staffed by specialists in all major taxa of organisms, from microbes to vascular plants and mammals, including man, who conduct their work on all main terrestrial, freshwater and marine ecosystems. The research perspectives are equally broad, ranging from genomes to ecosystems and applying morphological, molecular, biogeographical, quantitative and bioinformatic approaches.

The Mediterranean region, which supports an exceptional biological richness which is subject to equally exceptional human pressure, is a main focus of attention. It is followed by Latin America, a continent that hosts some of the most biodiverse places on earth and where IRBio researchers have a long tradition of conducting studies and academic work. Finally, a number of projects have also focused on other geographic regions, including Northern Africa, Southwest Asia and Antarctica.

#### RESEARCH LINES AT THE IRBIO



1. Genetics and Genomics
2. EvoDevo
3. Systematics
4. Paleobiology
5. Biogeography and phylogeography
6. Autoecology: habitat use and trophic resources
7. Behavioural Biology
8. Biology of population
9. Community ecology
10. Conservation and management of biodiversity
11. Agroecology



#### FACTS AND FIGURES AT THE IRBIO

| Established in                  | 2008                                                |                               |
|---------------------------------|-----------------------------------------------------|-------------------------------|
| Staff statistics (2015)*        | Teaching and research staff                         | 79 (of which: 1 ICREA)        |
|                                 | Fellows and administrative and service staff        | 32                            |
|                                 | Number of nationalities represented among the staff | 3                             |
|                                 | Gender distribution of the staff (% of women)       | 36.94 %                       |
| Research indicators (2010-2015) | ISI publications                                    | 1020                          |
|                                 | % of ISI publications in 1st quartile               | 51.18 %                       |
|                                 | Financing secured                                   | 13.66 m €                     |
|                                 | Number of ERC grants                                | 1 ERC Starting Grant (2008)   |
| Transfer indicators (2010-2015) | 3 intellectual properties (software and database)   |                               |
| Director                        | Àlex Aguilar                                        | aaguilar@ub.edu; irbio@ub.edu |

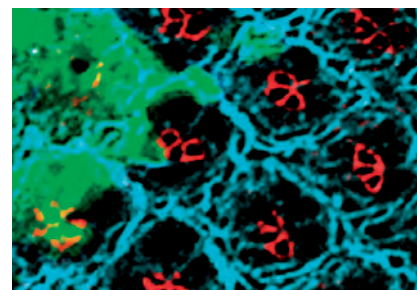
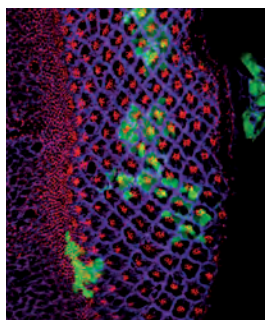
Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.

\* According to the Biodiversity Research Institute, there are 115 more researchers and administrative personnel as permanent collaborators.

The **Institute of Biomedicine of the University of Barcelona** (IBUB) conducts basic research and provides an interactive framework for scientists from different fields to conduct multidisciplinary integrated research in biomedicine.

The IBUB's objectives are:

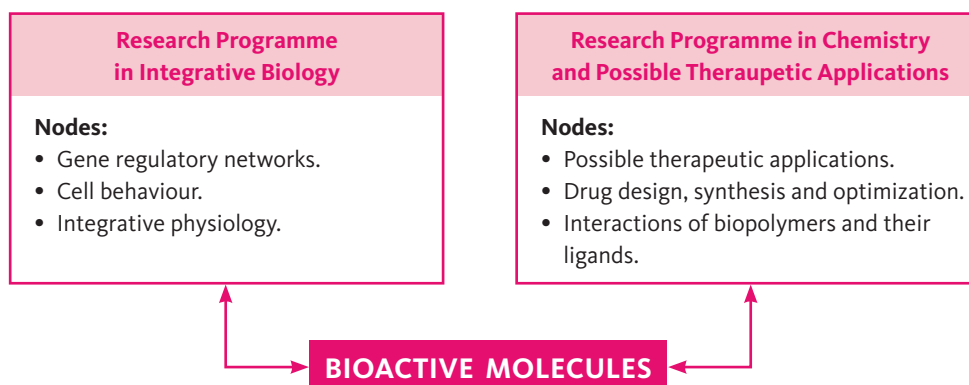
- To generate knowledge of biological systems using an integrative approach to identify objectives in therapy and the design of bioactive molecules with therapeutic potential.
- To generate advances in the quality of the community's living standards and of public health, promoting this at an international level and with a framework based on sustainability and high ethical standards.
- To act as a quality centre for biomedical research training, so maintaining the Institute's founding mission as an entity that brings together UB researchers from the University's faculties of Biology, Chemistry, and Pharmacy.



Images by F. Serras (IBUB)

### RESEARCH LINES AT THE IBUB

At the time of writing, the IBUB is comprised of research groups actively coordinated in the form of the following programmes and nodes:



### FACTS AND FIGURES AT THE IBUB

|                                        |                                                                                  |                                |
|----------------------------------------|----------------------------------------------------------------------------------|--------------------------------|
| <b>Established in</b>                  | 2005                                                                             |                                |
| <b>Staff statistics (2015)</b>         | Teaching and research staff                                                      | 134 (of which: 1 ICREA; 2 RyC) |
|                                        | Fellows and administrative and service staff                                     | 6                              |
|                                        | Number of nationalities represented among the staff                              | 4                              |
|                                        | Gender distribution of the staff (% of women)                                    | 50 %                           |
| <b>Research indicators (2010-2015)</b> | ISI publications                                                                 | 1423                           |
|                                        | % of ISI publications in 1st quartile                                            | 71.40 %                        |
|                                        | Financing secured                                                                | 40.36 m €                      |
|                                        | Number of ERC grants                                                             | 1 ERC Starting Grant (2013)    |
| <b>Transfer indicators (2010-2015)</b> | Patents: 24 priority patents; 23 PCT/EUR/USA patents; 1 trade secret; 1 spin-off |                                |
| <b>Director</b>                        | Marçal Pastor                                                                    | mpastor@ub.edu                 |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.



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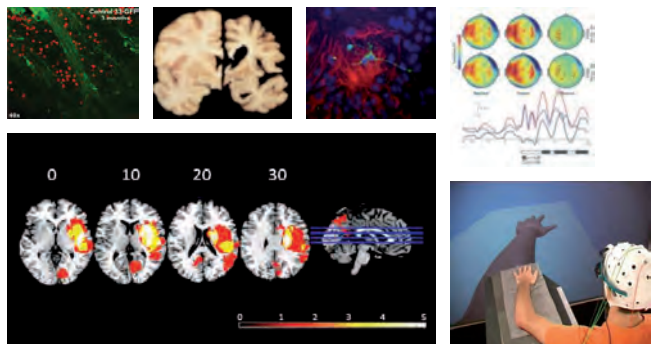
Institute of Neurociencies

The **Institute of Neurosciences** of the University of Barcelona was established in 2015 from the former *Institute for Brain, Cognition and Behaviour (IR3C)*. The new **Institute of Neurosciences** is a large synergetic platform that gathers together about 300 staff from the faculties of Psychology, Medicine, Biology and Pharmacy of the University of Barcelona with a common interest and a joint goal: to understand brain function in all its levels of complexity and analysis, and to decipher how the brain subserves human behaviour in normal and pathological conditions.

Research at the **Institute of Neurosciences** embraces all aspects of neural science, including molecular genetics, molecular and cellular neurobiology, electrophysiology, neuropathology, and cognitive and computational neuroscience, neuroimaging, neurology, psychiatry, neuropsychology, virtual reality and clinical psychology.

#### RESEARCH PROGRAMMES AT THE INSTITUTE OF NEUROSCIENCES

- Cognitive Neuroscience and Neuropsychology
- Cognition, Behaviour and Computation
- Clinical and Applied Psychology
- Pathophysiology of Nervous System Diseases
- Neurobiology and Neuropharmacology
- Neurology and Psychiatry



#### NEUROSCIENCES IN FACTS AND FIGURES AT THE UNIVERSITY OF BARCELONA

|                                        |                                                                                                                  |                                                                                                     |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Established in</b>                  | 2015 (from the former Institute for Brain, Cognition and Behaviour, established in 2008)                         |                                                                                                     |
| <b>Staff statistics (2015)</b>         | Teaching and research staff                                                                                      | 146 (of which: 4 ICREA and 7 RyC)                                                                   |
|                                        | Fellows and administrative and service staff                                                                     | 44                                                                                                  |
|                                        | Number of nationalities represented among the staff                                                              | 12                                                                                                  |
|                                        | Gender distribution of the staff (% of women)                                                                    | 50 %                                                                                                |
| <b>Research indicators (2010-2015)</b> | ISI publications                                                                                                 | 2036                                                                                                |
|                                        | % of ISI publications in 1st quartile                                                                            | 60.66 %                                                                                             |
|                                        | Financing secured                                                                                                | 28.36 m €                                                                                           |
|                                        | Number of ERC grants                                                                                             | 1 ERC Advanced Grant (2009),<br>2 ERC Proof of Concept (2014, 2015),<br>1 ERC Starting Grant (2013) |
| <b>Transfer indicators (2010-2015)</b> | Patents: 13 priority patents, 12 PCT/EUR/USA patent; 2 Intellectual properties; 1 industrial secret; 2 spin-offs |                                                                                                     |
| <b>Director</b>                        | Carles Escera                                                                                                    | cescera@ub.edu; ubneuro@ub.edu                                                                      |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March, 2016.



The **Nutrition and Food Safety Research Institute (INSA-UB)** is backed by several research groups belonging to the UB faculties of Pharmacy, Biology, Chemistry, and Geography and History, as well as others from associated centres and hospitals linked to the UB. The administrative office is located in Campus Torribera. INSA-UB aims to meet the needs of today's society in terms of research, training and service provision in sectors related to the agro-food industry.



### Mission

- To carry out high-quality research and ensure its relevance to food science and human health.
- To foster technology transfer and offer expert advice and training to the food industry and government bodies.
- To provide consumers with information based on scientific research.



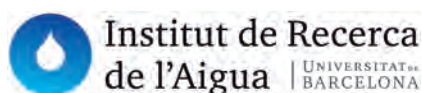
### RESEARCH LINES AT THE INSA-UB

|                                                                                                                                          |  |
|------------------------------------------------------------------------------------------------------------------------------------------|--|
| Composition and nutritional value of food.                                                                                               |  |
| Functional foods: health effects of foods and food ingredients, from the molecular level to studies with experimental models and humans. |  |
| Effects of microorganisms (and related technology) on the nutritive value of food.                                                       |  |
| Hygiene, quality and food analysis: application of techniques of biotechnology and genetic engineering. Sensory analysis.                |  |
| Food Safety: Identification of microorganisms and chemicals, safety and risk assessment studies, expert assessment for industrial needs. |  |
| New technologies in the production, processing and preparation of food and issues related to environmental protection.                   |  |
| Food habits; educational training in food issues and advice to the food industry.                                                        |  |

### FACTS AND FIGURES AT THE INSA-UB

| Established in                  | 2005                                                                        |                                                  |
|---------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------|
| Staff statistics (2015)         | Teaching and research staff                                                 | 71 (of which: 2 RyC)                             |
|                                 | Fellows and administrative and service staff (2015)                         | 16                                               |
|                                 | Number of nationalities represented among the staff                         | 3                                                |
|                                 | Gender distribution of the staff (% of women)                               | 63.24 %                                          |
| Research indicators (2010-2015) | ISI publications                                                            | 700                                              |
|                                 | % of ISI publications in 1st quartile                                       | 68.29 %                                          |
|                                 | Financing secured                                                           | 11.47 m €                                        |
|                                 | Patents: 2 priority patents; 1 PCT/EUR/USA patents, 1 intellectual property |                                                  |
| Director                        | Rosa M. Lamuela                                                             | lamuela@ub.edu;<br>insa.campusalimentacio@ub.edu |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.



Water is essential for life and for the development of our society. Water plays a major role in society, politics and the economy, and its management is one of the challenges that must be tackled in the twenty-first century. The fight against contamination, the call for rational water use, efforts to overcome shortfalls in supply and the forecast and management of extreme situations (droughts and floods) are all priorities that need professionals with the capacity and the criteria for action. The required actions range from highly specific aspects of local supply to involvement in European or international strategies.

For this reason, and to improve interdisciplinary research, the University of Barcelona founded the Water Research Institute (IdRA). The Institute strengthens the University's potential through specific structures and instruments devised to channel research and teaching in the field of water. Researchers affiliated with the Institute belong to the 9 faculties and 20 different departments of the University of Barcelona.

### RESEARCH LINES AT THE WATER RESEARCH INSTITUTE

Water quality (physics, chemistry, microbiology, parasitology, biology, etc.).  
Health issues related to water resources.  
Unconventional water resources.  
Natural mineral water.  
Advanced wastewater treatment.  
Aerobic and anaerobic digestion systems in wastewater and sludge.  
Microbial source tracking.  
Biofilms in water.  
River and reservoir ecology.  
Eutrophic systems.  
Cyanobacteria and aquatic microalgae.  
Biodiversity of freshwater algae.  
Agronomy and improving crop yields for increased efficiency in water use.  
Methods for the use of water resources: geological, geochemical and geophysical.  
Seawater: properties, dynamics and behaviour.  
Oceanography.  
Modelling contaminated aquifers: salt intrusion and industrial or agricultural pollution.

Legislation affecting water: legal regime pertaining to water quality and dumping.  
Economic instruments of environmental policy and water demand management.  
Climate change: variability and associated risk.  
Climatology: urban, synoptic, historical and agricultural.  
Climatic atlas and precipitation analysis.  
Analysis of hydrometeorological risks and of the related communication and social aspects.

History of the use and management of water resources.  
Socioeconomic and political repercussions of variations in the availability of water.  
Waterscapes: archaeological, cultural and scenic heritage.  
Water archaeology, past human-water relationships.  
Landscape, visual poetics and water aesthetics.



### FACTS AND FIGURES AT THE WATER RESEARCH INSTITUTE

| Established in                  | 2005                                                                       |                                          |
|---------------------------------|----------------------------------------------------------------------------|------------------------------------------|
| Staff statistics (2015)*        | Teaching and research staff                                                | 90                                       |
|                                 | Fellows and administrative and service staff                               | 8                                        |
|                                 | Number of nationalities represented among the staff                        | 3                                        |
|                                 | Gender distribution of the staff (% of women)                              | 47.96 %                                  |
| Research indicators (2010-2015) | ISI publications                                                           | 790                                      |
|                                 | % of ISI publications in 1st quartile                                      | 60.25 %                                  |
|                                 | CARHUS+ publications                                                       | 97                                       |
|                                 | % of CARHUS+ publications in level A                                       | 40.20 %                                  |
|                                 | Financing secured                                                          | 14.06 m €                                |
|                                 | Number of ERC grants                                                       | 1 ERC Advanced Grant (2009)              |
| Transfer indicators (2010-2015) | Patents: 2 priority patent, 8 PCT/EUR/USA patents; 1 intellectual property |                                          |
| Director                        | Francisco Javier Martín Vide                                               | jmartinvide@ub.edu; institutaigua@ub.edu |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.

\* The Water Research Institute has 13 more researchers and administrative personnel as permanent external collaborators.

The Institute for Research on Applied Regional and Public Economics (IREA) was founded in 2005 to bring together researchers working in three government-consolidated research groups in the area of applied economics: Regional Quantitative Analysis (AQR), Risk in Finance and Insurance (Riskcenter), and Governments and Markets (GiM), the three groups attached to the UB Department of Econometrics, Statistics and Applied Economy.



#### The IREA conducts research in four different fields:

- The quantitative study of regional and urban economic activity and the analysis of regional and local economic policy.
- The study of public economic activity in financial markets, using techniques in industrial organization to empirically assess the impact of privatization, regulation and competition in public service markets.
- The analysis of risk factors in finance and insurance.
- The development of micro- and macro-econometric techniques in the applied analysis of economic activity, focusing on the quantitative assessment of public policy.



#### RESEARCH LINES AT THE IREA

##### 1. Regional Quantitative Analysis Group-AQR

- Regional economic growth.
- The labour market.
- Productivity and technological capital: Innovation and human capital.
- Spatial economics.
- Regional and urban strategic indicators.
- Studies in economic impact.
- Macroeconomic predictions, simulations and monitoring of the current economic situation.
- Survey design and use.
- Sector analysis.
- Econometric methods for applied economics.

##### 2. Research Group on Governments and Markets-GiM

- Company privatization and outsourcing of public services.
- Networking industry regulation: economics and policy.
- Empirical industrial economics. Economic analysis of competitors.
- Research in regional and urban economics.
- Transport infrastructures: economics and policy.

##### 3. Risk in Finance and Insurance Group- Riskcenter

- Financial economics.
- Risk management and quantification.
- Longevity and dependence insurance.
- Internal models of solvency II.
- Operational risk.

#### FACTS AND FIGURES AT THE IREA

|                                        |                                               |                               |
|----------------------------------------|-----------------------------------------------|-------------------------------|
| <b>Established in</b>                  | 2005                                          |                               |
| <b>Staff statistics (2015)*</b>        | Teaching and research staff (2013)            | 49                            |
|                                        | Gender distribution of the staff (% of women) | 42.86 %                       |
| <b>Research indicators (2010-2015)</b> | ISI publications                              | 251                           |
|                                        | % of ISI publications in 1st quartile         | 34.66 %                       |
|                                        | CARHUS+ publications                          | 224                           |
|                                        | % of CARHUS+ publications in level A          | 48.21 %                       |
|                                        | Financing secured                             | 7.14 m €                      |
| <b>Director</b>                        | Jordi Suriñach                                | jsurinach@ub.edu; irea@ub.edu |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.

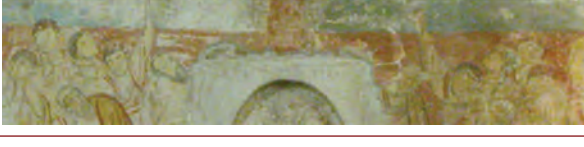
\* According to the IREA, there are 24 more members that have recently joined the Institute and who are processing their formal adhesion.



The Institute for Medieval Cultures (IRCVM) aims to bring research on medieval times to the maximum level of excellence and become in this way a benchmark for the study of the medieval Catalan world and beyond. The IRCVM was set up in 2007 with the main purpose of coordinating research and researchers from different disciplines at the UB who are specialists in the Middle Ages.

The IRCVM fosters the training and the specialisation of future medievalist experts through the Master's Programme on Medieval Cultures and the UB Doctorate Programme on Medieval Cultures.

### RESEARCH LINES AT THE IRCVM

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>EpiMed:</b> Medieval epigraphy. Redefinition of the theoretical framework related to the fact of writing and reading in medieval times and <i>Corpus</i> of epigraphy from the "Marca Hispanica" to the Crown of Aragon. Research Laboratory with the participation of: Casa de Velázquez, <i>Centre d'Études Supérieures de Civilisation Médiévale</i> (CESCM)- <i>Université de Poitiers</i> and IRCVM-UB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |
| <b>Laboratory of Medieval Cartography.</b> Laboratory for the integration of GIS into medieval research.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
| <b>Medieval Hospitals.</b> Project for the study of medieval hospital structures. In collaboration with the Hospital de la Santa Creu i Sant Pau Foundation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| <b>Medieval Literature.</b> Project to create a sound collection of medieval literature at the University of Barcelona.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| <b>Publications:</b> <ul style="list-style-type: none"> <li>• <b>IRCVM-Medieval Cultures</b>, in collaboration with Viella Editrice (Roma): <a href="http://www.viella.it/libri/collana/46">www.viella.it/libri/collana/46</a></li> <li>• <b>Lliçons/Lessons</b>, in collaboration with Publicacions i Edicions-UB: <a href="http://www.publicacions.ub.edu/articulos.aspx?modo=cq&amp;fam=LLI%C3%87ONS%20/%20LESSONS">www.publicacions.ub.edu/articulos.aspx?modo=cq&amp;fam=LLI%C3%87ONS%20/%20LESSONS</a></li> <li>• <b>SVMMA. Revista de Cultures Medievales/ SVMMA. Journal of Medieval Cultures</b>: <a href="http://revistes.ub.edu/index.php/SVMMA/index">http://revistes.ub.edu/index.php/SVMMA/index</a></li> <li>• <b>Medievalistes en Bloc</b>, in collaboration with Sàpiens (Barcelona): <a href="http://blogs.sapiens.cat/medievalistesenbloc/">http://blogs.sapiens.cat/medievalistesenbloc/</a></li> </ul> |                                                                                      |

### FACTS AND FIGURES AT THE IRCVM

| Established in                         | 2007                                                |                               |
|----------------------------------------|-----------------------------------------------------|-------------------------------|
| <b>Staff statistics (2015)</b>         | Teaching and research staff                         | 67 (of which: 1 ICREA)        |
|                                        | Fellows                                             | 3                             |
|                                        | Number of nationalities represented among the staff | 2                             |
|                                        | Gender distribution of the staff (% of women)       | 53.73 %                       |
| <b>Research indicators (2010-2015)</b> | ISI publications                                    | 34                            |
|                                        | % of ISI publications in 1st quartile               | 2.94 %                        |
|                                        | CARHUS+ publications                                | 255                           |
|                                        | % of CARHUS+ publications in level A                | 31.37 %                       |
|                                        | Financing secured                                   | 2.65 m €                      |
|                                        | Number of ERC grants                                | 1 Starting ERC Grant (2009)   |
| <b>Director</b>                        | Meritxell Simó                                      | msimotor@ub.edu; ircvm@ub.edu |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.



Transjus, the Legal Research Institute of the University of Barcelona, was created with the idea of becoming a transversal centre of research, involving university experts coming from different disciplines at the international, European, national, regional and local levels. The fields of expertise at Transjus cover social and legal sciences, reflecting the structure of the Faculty of Law at the UB and the background of its researchers. The Transjus Institute aims to promote the interaction of the disciplines of law, political sciences, psychology and economics.

These interactions between disciplines allow a more accurate and appropriate analysis of social reality, which is a prerequisite to proposing more effective solutions. This coordinated approach is becoming increasingly necessary because, as is also evident in other fields of research, the most interesting topics are often at the intersections of different branches of knowledge.



## RESEARCH LINES AT TRANSJUS

### Individual, family and women's rights

Equality policies have made a considerable impact in recent years in virtually all aspects of law, and in the public and private arenas. Research in this field includes studies on new forms of family, aging, non-discrimination and affirmative action, among others.

### Governance, transparency, financial crisis and corruption in the context of socio-economic crisis

The perception of the quality of democracy in a country implies active measures from procedural law and the guarantees that this can offer. Private and public ethics, good governance

and good administration, along with preventive measures against corruption, are some of the areas of research that can fit this purpose.

### Environment, territory and sustainability

Territory management and town planning, housing, energy sources, environmental sustainability, climate change, the links between city and human rights are all challenges that will shape tomorrow's society. Beyond the right to a safe environment or to sustainable development, which are rights traditionally linked to the areas of administrative, criminal or public international law, the key aspects to guarantee a sustainable management of a ter-

ritory must also involve multidisciplinary political and legal considerations.

### Cooperation, peace and international security

Cooperation between different actors and international subjects is one of the main principles of contemporary international law that aims to achieve world peace among nations. It also affects other human activities that are regulated by criminal and procedural law (international criminal law, universal jurisdiction, extradition), by international civil and private law (family adoption), commercial and tax law and the relations between governments.

## FACTS AND FIGURES AT TRANSJUS

| Established in                  | 2012                                                |                                               |
|---------------------------------|-----------------------------------------------------|-----------------------------------------------|
| Staff statistics (2015)         | Teaching and research staff                         | 62                                            |
|                                 | Number of nationalities represented among the staff | 2                                             |
|                                 | Gender distribution of the staff (% of women)       | 46.77 %                                       |
| Research indicators (2010-2015) | ISI publications                                    | 20                                            |
|                                 | % of ISI publications in 1st quartile               | 25 %                                          |
|                                 | CARHUS+ publications                                | 415                                           |
|                                 | % of CARHUS+ publications in level A                | 30.36 %                                       |
|                                 | Financing secured                                   | 3.16 m €                                      |
| Director                        | Joan J. Queralt                                     | director.transjus@ub.edu; joan.queralt@ub.edu |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.

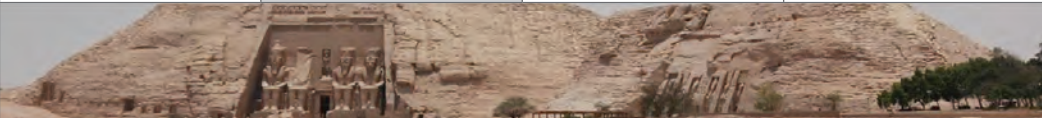


The presence of the Interuniversity Institute of Ancient Near Eastern Studies (IPOA) in our university environment is justified by the nature of the discipline – highly specialized, complex, and of interest to a minority who have to meet the strictest requirements of linguistic training.

The Institute aims to introduce new study and research plans in key areas of the history of culture, which are also of great social interest today. These studies are a complement to, and a natural progression for, study plans in Semitic philology, classical philology, ancient history, linguistics and theoretical philosophy.

The IPOA is a meeting point for interdepartmental and interuniversity research. It offers a full series of courses in the field, which are too complex and specialized to be included in the standard academic programmes; so alongside its research commitments, the Institute also fulfils a unique social and academic function.

#### RESEARCH LINES AT THE IPOA-UB

|                                                                                      |                                                                                      |                |  |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------|--|
| Assyriology                                                                          |   |                |  |
|                                                                                      | Archaeology                                                                          |                |  |
|  |                                                                                      | Semitics       |  |
|                                                                                      |                                                                                      | Indo-Iranology |  |
| Egyptology                                                                           |  |                |  |

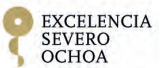
#### FACTS AND FIGURES AT THE IPOA-UB

|                                 |                                                     |                |
|---------------------------------|-----------------------------------------------------|----------------|
| Established in                  | 1993                                                |                |
| Staff statistics (2015)         | Teaching and research staff                         | 7              |
|                                 | Fellows and administrative and service staff        | 1              |
|                                 | Number of nationalities represented among the staff | 1              |
|                                 | Gender distribution of the staff (% of women)       | 14.29 %        |
| Research indicators (2010-2015) | ISI publications                                    | 1              |
|                                 | CARHUS+ publications                                | 15             |
|                                 | % of CARHUS+ publications in level A                | 6.67 %         |
|                                 | Financing secured                                   | 0.93m €        |
| Director                        | Adelina Millet                                      | amillet@ub.edu |

Data available at GREC (the Current Research System Information developed by the University of Barcelona), as of March 2016.



## 6. RESEARCH INSTITUTES IN WHICH THE UNIVERSITY OF BARCELONA PARTICIPATES\*

|                                                          |                                                                                                                                                                                                                             |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| August Pi i Sunyer Biomedical Research Institute         | <br>Institut d'Investigacions Biomèdiques August Pi i Sunyer                                                                             |
| Bellvitge Institute of Biomedical Research               | <br>Institut d'Investigació Biomèdica de Bellvitge                                                                                       |
| Barcelona Institute for Global Health                    |                                                                                                                                          |
| Institute for Research in Biomedicine                    |                                                       |
| Institute for Bioengineering of Catalonia                |  <br>Institute for bioengineering of Catalonia        |
| Centre for Research on Ecology and Forestry Applications |                                                                                                                                          |
| Centre for Research in Agricultural Genomics             |  <br>CENTRE FOR RESEARCH IN AGRICULTURAL GENOMICS |
| Catalonia Institute of Energy Research                   | <br>Institut de Recerca en Energia de Catalunya<br>Catalonia Institute for Energy Research                                             |
| Institute for Space Studies of Catalonia                 |                                                                                                                                        |
| Barcelona Institute of Economics                         | <br>Institut d'Economia de Barcelona                                                                                                   |

\* Selection based on impact of research and the relationship with the University of Barcelona.



The August Pi i Sunyer Biomedical Research Institute (IDIBAPS) was founded in 1996. The fundamental mission of IDIBAPS is **to integrate state-of-the-art basic research and quality clinical research in order to acquire and transfer knowledge regarding the main health problems present in our society, with the final purpose of improving their prevention and treatment**. IDIBAPS aims to ensure that medical challenges are smoothly translated into basic research, and that the results obtained in laboratories can be effectively used to benefit patients. Improving people's health is its ultimate mission.

The IDIBAPS scientific staff has been **recruited by the Institute itself** or come from its **constituent institutions: Hospital Clínic de Barcelona, the University of Barcelona School of Medicine, and the CSIC's Barcelona Biomedical Research Institute**. The researchers working in IDIBAPS have complementary basic and clinical profiles.

The **growing implication** of this institute in **major national and international projects** is remarkable. The participation of the IDIBAPS in the Networked Biomedical Research Centres (Centros de Investigación Biomédica en Red, **CIBERs**), promoted by the Spanish Ministry of Science and Innovation, is very significant. The IDIBAPS likewise participates in and leads projects of the Cooperative Research Thematic Networks (Redes Temáticas de Investigación Cooperativa, **RETICs**), promoted by the Ministry, and the number of projects financed by the European Commission in which it takes part also continues to grow.

#### RESEARCH AREAS AT THE IDIBAPS

|                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Area 1. Biological Aggression and Response Mechanisms</b>                         | Area 1 is formed by 9 teams that conduct research into the response mechanisms to biological aggressions from different standpoints. This area carries out a wide range of activities, which are divided up into two parts. Firstly, the study of infectious and toxic agents, and secondly, immunological and inflammatory reactions of the body.                                                                                                                                                              |  |
| <b>Area 2. Respiratory, Cardiovascular and Renal Pathobiology and Bioengineering</b> | The area has 10 teams, and is focused on the study of three vital parts of the body: the respiratory, cardiovascular and renal systems. It deals with the various pathologies and risks affecting these systems, from different standpoints.                                                                                                                                                                                                                                                                    |  |
| <b>Area 3. Liver, Digestive System and Metabolism</b>                                | Area 3 has 16 teams and is formed by researchers who combine their skills in clinical, experimental and basic research. Its translational research approach has succeeded in contributing important breakthroughs in terms of knowledge, diagnostic techniques and the treatment of pathologies of interest to the groups.                                                                                                                                                                                      |  |
| <b>Area 4. Clinical and Experimental Neuroscience</b>                                | This area of IDIBAPS specialises in the study of neurological and psychiatric diseases. Based on the excellent cooperation between the experimental and clinical units, its 11 teams conduct research into topics ranging from the study of the structure/function relationship in the nervous system and its basic molecular mechanisms for neurotransmission and cell death to the development and evaluation of new experimental therapies. It also includes innovative trends such as systems neuroscience. |  |
| <b>Area 5. Oncology and Haematology</b>                                              | The 13 teams composing this area perform basic, experimental and clinical research tasks in the fields of oncology and haematology. Their aim is to improve prevention, prognosis and treatment in a group of diseases that is becoming more and more common in modern-day society: cancer processes.                                                                                                                                                                                                           |  |
| <b>Transversal research groups</b>                                                   | Some teams linked to IDIBAPS undergo a transversal research that feeds from various disciplines or provide services to other teams. Here are included researchers in pharmacology, primary care and nursing.                                                                                                                                                                                                                                                                                                    |  |

#### FACTS AND FIGURES AT THE IDIBAPS

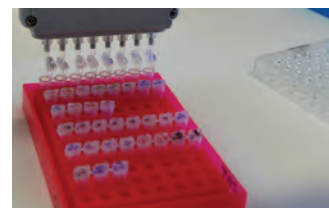
|                                        |                                                                   |                                |
|----------------------------------------|-------------------------------------------------------------------|--------------------------------|
| <b>Established in</b>                  | 1996                                                              | www.idibaps.org                |
| <b>Staff statistics (2015)</b>         | Research staff                                                    | 482 (of which: 5 ICREA; 4 RyC) |
|                                        | Fellows and administrative and service staff                      | 384                            |
|                                        | Number of nationalities represented among the staff               | > 10                           |
|                                        | Gender distribution of the staff (% of women)                     | 75%                            |
| <b>Research indicators (2010-2014)</b> | ISI publications                                                  | 4787                           |
|                                        | % of ISI publications in 1st quartile                             | 65%                            |
|                                        | Financing secured                                                 | 24 m € (2014)                  |
| <b>Transfer indicators (2010-2014)</b> | Patents: 12 priority patents, 10 PCT/EUR/USA patents; 4 spin-offs |                                |
| <b>Director</b>                        | Ramon Gomis                                                       | ramon.gomis@idibaps.org        |

Source: Information provided by the IDIBAPS (February 2016).

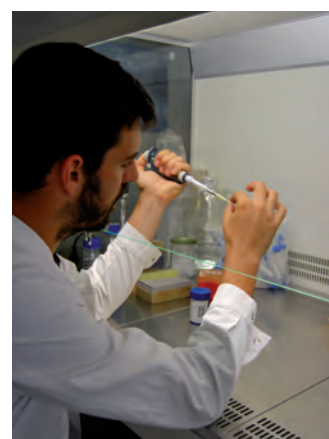
The Bellvitge Biomedical Research Institute (IDIBELL) is a research centre that integrates biomedical research carried out at the Bellvitge University Hospital (HUB), the Catalan Institute of Oncology (ICO) and the UB's Bellvitge Campus, located in the city of Hospitalet de Llobregat in south Barcelona, and the Viladecans Hospital (HV).

The institution has the vision of becoming a premier location for **translational research** with a focus on **human health research**. The strategic objective of the centre is to translate scientific discoveries into improved health by facilitating innovation and technological transfer actions, in order to enable an efficient application of the knowledge generated by our researchers for the **improvement of the health and the quality** of people's lives and for economic development.

The high quality of the research conducted in IDIBELL has been acknowledged by the Carlos III Health Institute, which awarded it Health Research Institute accreditation in March 2009.



|                                                             |                                                 |
|-------------------------------------------------------------|-------------------------------------------------|
| Six major areas or programmes have been defined at IDIBELL: |                                                 |
| <b>Area 1</b>                                               | Cancer and human molecular genetics             |
| <b>Area 2</b>                                               | Neurosciences                                   |
| <b>Area 3</b>                                               | Infectious pathology and transplants            |
| <b>Area 4</b>                                               | Growth factors, hormones and diabetes           |
| <b>Area 5</b>                                               | Inflammatory, chronic and degenerative diseases |
| <b>Area 6</b>                                               | Epigenetics and cancer biology                  |



#### FACTS AND FIGURES AT THE IDIBELL

|                                   |                                                                 |                                                |
|-----------------------------------|-----------------------------------------------------------------|------------------------------------------------|
| <b>Established in</b>             | 2004                                                            | www.idibell.org                                |
| <b>Staff statistics (2014)</b>    | Research staff                                                  | 734 (of which: 2 ICREAs)                       |
|                                   | Fellows and administrative and service staff                    | 229 fellows + 160 support and admin staff      |
|                                   | Number of nationalities represented among the staff             | 25 (15 % total staff from abroad)              |
|                                   | Gender distribution of the staff (% of women)                   | 60 %                                           |
| <b>Research indicators (2014)</b> | ISI publications                                                | 957                                            |
|                                   | % of ISI publications in 1st quartile                           | 52 %                                           |
|                                   | Budget secured                                                  | 27.2 m €                                       |
|                                   | Number of ERC Grants                                            | 1 ERC Consolidator Grant<br>1 Proof of Concept |
| <b>Transfer indicators (2014)</b> | Patents: 11 priority patents, 4 PCT/EUR/USA patents; 1 spin-off |                                                |
| <b>Director</b>                   | Jaume Reventós                                                  | director@idibell.org                           |

Source: Information and images provided by the IDIBELL (January 2016).



The Barcelona Institute for Global Health — ISGlobal — is the fruit of an innovative alliance between academic, government, and philanthropic institutions to contribute to improving global health and promoting health equity through excellence in research and the translation and application of knowledge. The Institute, which originated in a joint initiative of the Hospital Clínic of Barcelona and the University of Barcelona, has amassed over 30 years of experience in the field of global health. Its ultimate goal is to help close the gaps in health disparities between and within different regions of the world.

ISGlobal promotes multidisciplinary, translational and cross-cutting research in order to maximize our impact. We have currently the following research programmes:

- **Malaria** (with a special emphasis on Malaria Elimination)
- **Chagas Disease**
- **HIV/AIDS and Sexually Transmitted Infections**
- **Viral and Bacterial Infections** (mostly Antibiotic Resistance)
- **Maternal, Child and Reproductive Health**
- **Emerging Activities**, which acts as an incubator for activities that could eventually lead to a new programme. It currently includes research on Population Movements and Health (including emerging health threats such as Ebola, Dengue and Chikungunya), Leishmaniasis and Tuberculosis.

The establishment and maintenance of collaborations with other research and health institutions around the world is crucial for the development of our activities. The centre has successfully built and maintains collaborations with around 200 institutions from 40 countries in the 5 continents. These collaborations allow us to establish research programmes in endemic areas linking with local institutions that enable translation of research results into national health policies.

In addition, we established three long-term partnerships in three different regions of the world:

- **Mozambique**, with the Mahiça Health Research Centre (CISM, [www.manhica.org](http://www.manhica.org)), focused on maternal and child health, malaria, HIV, tuberculosis and other neglected diseases.
- **Bolivia**, with the Universidad Mayor de San Simón de Cochabamba, the Viedma Hospital, CEADES and the Ministry of Health, focused on Chagas disease and leishmaniasis.
- **Morocco**, with the University Hospital of Rabat and the Ministry of Health, focused on maternal, child and reproductive health.

In recent years, the alliance between the Centre for Research in Environmental Epidemiology (CREAL) and ISGlobal has successfully developed a cutting-edge cluster of research expertise with the capacity to address health challenges, including infectious diseases and non-communicable chronic diseases, with a strong focus on their environmental determinants. This alliance is evolving into a merger of both centres in an integrated ISGlobal before the end of 2016.

#### FACTS AND FIGURES AT THE ISGLOBAL

|                                        |                                                       |                                                                                                 |
|----------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Established in</b>                  | 2010                                                  | <a href="http://www.isglobal.org">www.isglobal.org</a>                                          |
| <b>Staff statistics (2015)</b>         | Research staff                                        | 153                                                                                             |
|                                        | Fellows and administrative and service staff          | 83                                                                                              |
|                                        | Number of nationalities represented among the staff   | 21                                                                                              |
|                                        | Gender distribution of the staff (% of women)         | 70 %                                                                                            |
| <b>Research indicators (2010-2014)</b> | ISI publications                                      | 753                                                                                             |
|                                        | % of ISI publications in 1st quartile                 | 64 %                                                                                            |
|                                        | Financing secured                                     | 61.38 m €                                                                                       |
|                                        | International competitive projects lead by the centre | 12 European projects, 5 Bill and Melinda Gates Foundation projects, 3 US Federal Funds, 3 other |
| <b>Transfer indicators (2010-2014)</b> | 3 patents; 1 license; 1 spin-off                      |                                                                                                 |
| <b>Director</b>                        | Antoni Plasencia                                      | <a href="mailto:antoni.plasencia@isglobal.org">antoni.plasencia@isglobal.org</a>                |

Source: Information and image provided by ISGlobal (December 2015).

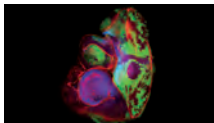
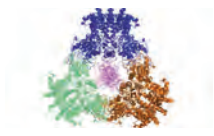
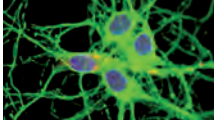
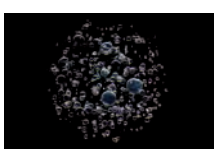
The Institute for Research in Biomedicine (IRB Barcelona) is an independent, non-profit research institution that is engaged in basic and applied biomedical science. Its aim is to improve quality of life through the application of advances in this field. It was founded in October 2005 by the Generalitat de Catalunya (Catalan Government), the University of Barcelona (UB) and Barcelona Science Park (PCB).

The IRB Barcelona aims to promote multidisciplinary research of excellence at the interface between Biology and Chemistry, and to foster collaboration between local organisations and international research institutes, and thus boost and coordinate interdisciplinary research in biomedicine.

The IRB Barcelona is located in Barcelona Science Park (PCB), a centre in which first-class public research converges with the private sector in a stimulating, excellent, scientific environment.



### RESEARCH AREAS AT THE IRB BARCELONA

|                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Cell and Developmental Biology.</b> This includes gene expression, developmental molecular biology, cell biology, functional genomics and proteomics of cell and embryo development and tissue regeneration.                                                                                                                                                                                                                         |    |
| <b>Structural and Computational Biology.</b> This includes the structural analysis of macromolecules and their interactions using a variety of techniques: X-ray, NMR, electron microscopy, macromolecular biophysics, bioinformatics and molecular modelling.                                                                                                                                                                          |   |
| <b>Molecular Medicine.</b> This includes the molecular bases of metabolic and genetic diseases, the study of diagnostic or therapeutic targets and the functional genomics and proteomics of pathologies and translational research.                                                                                                                                                                                                    |  |
| <b>Chemistry and Molecular Pharmacology.</b> This includes the design and synthesis of small molecules and macromolecules, with special emphasis on two aspects of combinatorial chemistry: the building of libraries and optimisation of the production of synthetic compounds, and biotechnologies for molecular selection directed at therapeutic targets and the establishment of the relationship between drugs and their targets. |  |
| <b>Oncology.</b> This includes the study of diverse aspects of tumour initiation and progression, the relationship between stem cells and cancer, and the identification of the programmes that drive tissue-specific metastasis.                                                                                                                                                                                                       |  |

### FACTS AND FIGURES AT THE IRB BARCELONA

|                                        |                                                     |                                                                                                       |
|----------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Established in</b>                  | 2005                                                | www.irbbarcelona.org                                                                                  |
| <b>Staff statistics (2015)</b>         | Research staff                                      | 265 (of which: 11 ICREAs; 3 RyC)                                                                      |
|                                        | Administrative and support staff                    | 51                                                                                                    |
|                                        | Number of nationalities represented among the staff | 34                                                                                                    |
|                                        | Gender distribution of the staff (% of women)       | 53 %                                                                                                  |
| <b>Research indicators (2010-2014)</b> | ISI publications                                    | 987                                                                                                   |
|                                        | % of ISI publications in 1st quartile               | 72.5 %                                                                                                |
|                                        | Financing secured                                   | 63.51 m € (2010-2014); 13.03 m € (2014)                                                               |
|                                        | Number of ERC Grants                                | 2 ERC Starting Grants/ 4 ERC Advanced Grants/<br>2 ERC Consolidator Grants/ 2 Proof of Concept Grants |
| <b>Transfer indicators (2010-2014)</b> | 27 patents; 7 licenses; 2 spin-offs                 |                                                                                                       |
| <b>Director</b>                        | Joan Guinovart                                      | info@irbbarcelona.org                                                                                 |

Source: Information and images provided by IRB Barcelona (January 2016).





The Institute for Bioengineering of Catalonia (IBEC) is a research institute that develops interdisciplinary research of excellence, from basic research to medical applications, in the fields of biomedical engineering and nanomedicine. Its aim is to be an international leader in bioengineering and to be the technological partner of choice for hospitals, biomedical research centres and universities in the surrounding area.

## RESEARCH AT THE IBEC

The novel vision promoted at IBEC is to exploit and connect the multidisciplinary of its groups, aligning their complementary capacities through three broad areas of expertise:

**Nanomedicine:** Nanobiosensing; microfluidics; nanofabrication using soft lithographies and related techniques; beyond-AFM/ST microscopy tools to characterize biological samples (optical, mechanical, electrical behaviour) at the nanoscale; mechanobiology protocols and their translation to clinical purposes; nano-scale characterization of bacterial-host interactions.

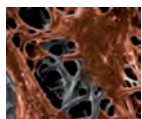
**Cell Engineering:** Biomaterials for regenerative medicine; reprogramming stem cells; control differentiation of stem cells; rapid prototyping for biomaterials; cell-material interaction, microencapsulation for antibacterials and other therapeutic agents.

**Intelligent Healthcare:** Application of advanced information and communication technologies to healthcare, such as modelling; signalling processing; automatics/control software for robotics; imaging; robotics (mechanics) for minimally invasive surgery.

To this end, IBEC focuses its scientific and technological work around three core application areas:



**Bioengineering for future medicine**, with the aim of developing technology that goes beyond the existing paradigm of hospital care to incorporate new areas such as photopharmacology, organs on chips and diagnosis based on the mechanical behaviour of cells and tissues. The future of medicine will mean personalised medicine, hand-held diagnostic platforms, wearable monitoring devices and other technological advances to make healthcare more effective, cheaper and more convenient.



**Bioengineering for regenerative therapies**, with the aim of developing regeneration technology to allow the creation of implants able to bring about the regeneration of damaged tissues or organs and to develop cell therapies.



**Bioengineering for active ageing**, with the aim of developing care and technology to meet the needs of an increasingly ageing population. Biomedical engineering can contribute greatly to improving the quality of life of older people.

## FACTS AND FIGURES AT THE IBEC

|                                 |                                                                                                                            |                                                                                                                             |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Established in                  | 2005                                                                                                                       | www.ibecbarcelona.eu                                                                                                        |
| Staff statistics (2015)         | Research staff                                                                                                             | 194 (of which: 4 ICREAs, 3 RyC)                                                                                             |
|                                 | Administrative and support staff                                                                                           | 34                                                                                                                          |
|                                 | Number of nationalities represented among the staff                                                                        | 22                                                                                                                          |
|                                 | Gender distribution of the staff (% of women)                                                                              | 51%                                                                                                                         |
| Research indicators             | ISI publications (2014)                                                                                                    | 98                                                                                                                          |
|                                 | % of ISI publications in 1st quartile (2014)                                                                               | 81%                                                                                                                         |
|                                 | Annual budget (2015)                                                                                                       | 7.29 m €                                                                                                                    |
|                                 | Number of ERC Grants                                                                                                       | 3 ERC Starting Grants (2012, 2013 and 2014) / 1 ERC Consolidator Grant (2013) and 2 Proof of Concept Grants (2012 and 2013) |
| Transfer indicators (2010-2014) | 19 priority patents: 15 EU/PCT patents, 3 ES filed patents and 1 German patent; 4 patents licensed/transferred; 1 spin-off |                                                                                                                             |
| Director                        | Josep Samitier                                                                                                             | info@ibecbarcelona.eu                                                                                                       |

Source: Information and images provided by IBEC (December 2015).

## Research, Innovation and Knowledge Transfer in Terrestrial Ecology

CREAF is a public research centre dedicated to terrestrial ecology and territorial analysis, producing knowledge and methodologies for conservation, management and adaptation of the environment to global change.

The centre's objective is to work as a bridge between academia, administrations and society, promoting awareness and exchanging knowledge within its scope of activities, at the local, regional and global levels.

CREAF's research portfolio is wide and multidisciplinary, including advances in basic research as well as important contributions to environmental topics of significant socioeconomic impact.

Our science responds to the research needs of local and international governmental organizations.



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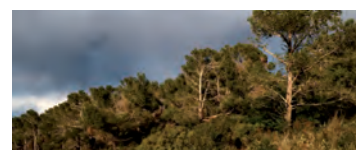
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### RESEARCH FIELDS

|  |                                                                                                                                                                                                                                                                                                                                                                                   |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Biodiversity</b> <ul style="list-style-type: none"> <li>• Population dynamics and genetics</li> <li>• Phenology and distribution of species</li> <li>• Interactions between species</li> <li>• Biological invasions</li> </ul>                                                                                                                                                 |
|  | <b>Functional Ecology and Global Change</b> <ul style="list-style-type: none"> <li>• Chemical ecology, ecotoxicology and metabolomics</li> <li>• Reserves and flows of carbon and nutrients</li> <li>• Water resources</li> <li>• Ecosystem-atmosphere interactions</li> <li>• Conservation of soil functions</li> </ul>                                                          |
|  | <b>Forest Ecology and Wildfires</b> <ul style="list-style-type: none"> <li>• Management and conservation of forests</li> <li>• Structure and dynamics of forest communities</li> <li>• Forest decline and regeneration</li> <li>• Forest fires</li> <li>• Forest databases</li> </ul>                                                                                             |
|  | <b>Environmental and Territorial Analysis and GIS</b> <ul style="list-style-type: none"> <li>• Regional environmental changes and processes</li> <li>• Development of the MiraMon GIS</li> <li>• Methods and standards in GIS and remote sensing</li> <li>• Thematic cartography and environmental information systems</li> <li>• Landscape fragmentation and dynamics</li> </ul> |

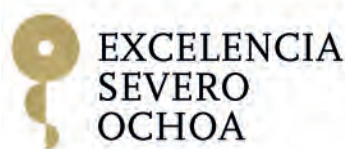
### FACTS AND FIGURES AT THE CREAM

|                                        |                                                     |                                                                     |
|----------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------|
| <b>Established in</b>                  | 1987                                                | www.creaf.cat                                                       |
| <b>Staff statistics (2015)</b>         | Research staff                                      | 87 (of which: 1 ICREAs; 12 CREAM, 18 UAB, 2 UB, 5 CSIC), 29 fellows |
|                                        | Administrative and support staff                    | 10 + 5                                                              |
|                                        | Number of nationalities represented among the staff | 10                                                                  |
|                                        | Gender distribution of the staff (% of women)       | 46 %                                                                |
| <b>Research indicators (2010-2014)</b> | ISI publications                                    | 130                                                                 |
|                                        | % of ISI publications in 1st quartile               | 86 %                                                                |
|                                        | Financing secured                                   | 3.51 m €                                                            |
|                                        | Number of ERC Grants                                | 1 ERC Synergy Grant                                                 |
| <b>Director</b>                        | Javier Retana                                       | javier.retana@uab.cat                                               |

Source: Information and images provided by the CREAM (January 2016).



*Crag strives to translate the results of its research into benefits for society. It also aims to train the next generation of plant and farm animal scientists, who will play a vital role in helping to address the societal and global challenges of this century.*

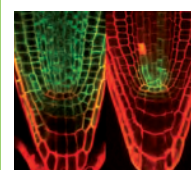


The Centre for Research in Agricultural Genomics (Crag) is an independent organization established as a consortium of four institutions: the Spanish National Research Council (CSIC), the Institute of Agrifood Research and Technology (IRTA), the Autonomous University of Barcelona (UAB) and the University of Barcelona (UB). This innovative arrangement **brings together diverse plant and farm animal research groups**, and provides a unique nurturing ground for research and training. In 2015 Crag received the **Severo Ochoa Centre of Excellence** award and the **Human Resources Excellence** in Research accreditation.

Research at Crag unites groups working on basic science in plant development, physiology, metabolism and genetics; groups in bioinformatics and genomics of plants and farm animals, and applied projects developed together with Agbio, Biotech and breeding companies. Crag therefore **brings together excellence in basic science and applied studies in close collaboration with industry**. The centre is organized into **four different scientific programmes**. These programmes are supported by several state-of-the-art technological platforms that are also open to the wider scientific community.

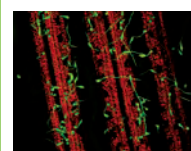
#### Plant Development and Signal Transduction

The sessile nature of plants makes these organisms very versatile and plastic in growing and adapting to a broad range of, and changing, environmental conditions. The common aim of the programme is to understand how these changes affect different aspects of plant development. Using a multidisciplinary approach we study aspects such as light perception, photoperiod, circadian clock, hormone signalling, signal transduction, floral transition or flower development, and seed development and germination.



#### Plant Responses to Biotic and Abiotic Stress

Plants have sophisticated mechanisms to defend against attacks of pathogenic organisms and adverse environmental conditions. The research groups integrated in this programme are interested in knowing the molecular mechanisms of recognition, the signalling pathways operating and the responses of plants facing biotic and abiotic stress conditions, including the development of practical applications to potentiate resistances or implement corrective actions.



#### Plant Metabolism and Metabolic Engineering

Plants are a primary source of nutrients, materials and chemicals for humans. The Plant Metabolism and Metabolic Engineering programme aims to generate fundamental knowledge of how plants control their primary and secondary metabolism to respond to environmental cues and eventually improve the quality of plant products.



#### Plant and Animal Genomics

The aims of the Plant and Animal Genomics programme are to understand the genome organization, variability and evolution of different crops and domestic animals and to elucidate the genetics of important traits of species of agricultural interest.



### FACTS AND FIGURES AT THE CRAG

|                                        |                                                                                                                                 |                                                                                    |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Established in</b>                  | 2008                                                                                                                            | www.cragenomica.es                                                                 |
| <b>Staff statistics (2015)</b>         | Research staff                                                                                                                  | 40 permanent (+ 32 postdocs + 4 career track fellows), 4 ICREAs, and 3 RyC)        |
|                                        | Fellows and technical, administrative and service staff                                                                         | 61 PhD fellows + 40 technical staff + 20 administration and general services staff |
|                                        | Number of nationalities represented among the staff                                                                             | 20                                                                                 |
|                                        | Gender distribution of the staff (% of women)                                                                                   | 52 %                                                                               |
| <b>Research indicators (2010-2014)</b> | ISI publications                                                                                                                | 320                                                                                |
|                                        | % of ISI publications in 1st quartile                                                                                           | 81 %                                                                               |
|                                        | Financing secured                                                                                                               | 33.17 m €                                                                          |
|                                        | Number of ERC Grants                                                                                                            | 1 ERC Starting Grant (2008) / 1 ERC Proof of Concept Grant (2014)                  |
| <b>Transfer indicators (2010-2014)</b> | Patents: 5 priority patents, of which 5 are EU/PCT patents, and 3 ES filed patents; 5 patents licensed/transferred; 2 spin-offs |                                                                                    |
| <b>Director</b>                        | José Luis Riechmann                                                                                                             | info@cragenomica.es                                                                |

Source: Information and images provided by Crag (January 2016).

The **Catalonia Institute for Energy Research, IREC** (Institut de Recerca en Energia de Catalunya) was funded in July 2008. In 2013 it achieved consolidation in both European and industrial projects. After eight years, it has built a stable team of valuable individuals who are committed to the scientific and technological growth of the centre, resulting in cutting-edge research and a constantly increasing flow of income.

Its **mission** is to contribute to the sustainable development of society and to greater industrial competitiveness, generating science and building technology. The target of its research activity is to become a centre of excellence and an international benchmark organization in the energy sector, through research, technology development and innovation.

### Orientation

The Institute works with a dual approach: 1) technological research and technical development, focused on collaboration with industry to create new products and new technical solutions, in the short and medium term; 2) applied and technological research, aimed at generating knowledge within groups of the Institute, with a medium or long-term application in mind. The Institute's position is defined by the balance and interaction between these two approaches. IREC collaborates with the government, universities and industry, and this is reflected in the structure of its Board of Trustees.

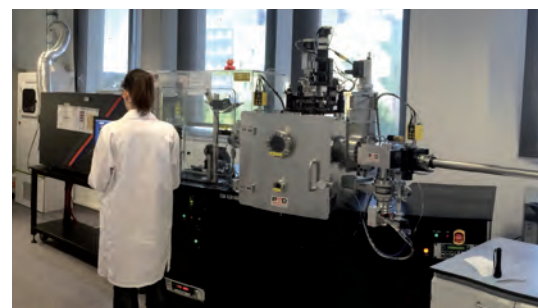
### Strategic Goals

- Generating proprietary specific disruptive scientific and technologic knowledge aimed at providing new and innovative solutions to companies, for the development of strategic medium and long term plans.
- Empowering knowledge transfer to the market through direct collaborations with companies, generating and licensing of patents, spin-offs, etc.
- Promoting local networking in the field of energy among different institutions, centres, organizations and universities and enhancing international presence and connection to promote scientific ideas that boost activity on energy as well as energy-related industry.

### Research Lines

IREC research lines are in accordance with European policy targets as well as with the energy-industry aims for energy strategy approved by the industrial and governmental members of the IREC Board of Trustees. Within this framework, the European Strategic Energy Technology Plan (SET-Plan) establishes a first reference for the strategic energy technology policy for Europe. It aims to accelerate the development and the deployment of cost-effective low carbon technologies and new energy generation, transport, distribution and end-user models. The strategic road-map stresses the importance of fostering basic and applied science as a way to obtain a breakthrough for future emerging technologies. The action plan also comprises measures related to planning, implementation, resources and international cooperation in the field of energy technology and innovation.

Under these boundaries, the most interesting topics, where European research would be the most effective for improving the industrial competitiveness, relate to basic materials science, physical chemistry of processes, heat and mass transfer phenomena, dedicated powerful tools to characterize materials and energy devices and systems, especially, for large scale facilities and engineering capabilities for transferring knowledge and understanding from science and technology to disruptive innovations for relevant novel energy systems and smart energy management models increasing efficiency of the used energy.



### FACTS AND FIGURES AT THE IREC

|                                        |                                                                                                        |                                                             |
|----------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <b>Established in</b>                  | 2008                                                                                                   | www.irec.cat                                                |
| <b>Staff statistics (2015)</b>         | Research staff                                                                                         | 71                                                          |
|                                        | Fellows and administrative and service staff                                                           | 19 fellows; 24 management staff; 14 technical support staff |
|                                        | Number of nationalities represented among the staff                                                    | 20                                                          |
|                                        | Gender distribution of the staff (% of women)                                                          | 37.7 %                                                      |
| <b>Research indicators (2010-2014)</b> | ISI publications                                                                                       | 305                                                         |
|                                        | % of ISI publications in 1st quartile                                                                  | 65.5 %                                                      |
|                                        | Financing secured                                                                                      | 10.2 m € (annual budget in 2014)                            |
|                                        | Number of ERC Grants                                                                                   | 1 ERC Consolidator Grant                                    |
| <b>Transfer indicators (2010-2014)</b> | Patents: 32 priority patents, of which 20 are EU/PCT patents and 12 Spanish filed patents; 2 spin-offs |                                                             |
| <b>Director</b>                        | Joan Ramon Morante                                                                                     | info@irec.cat                                               |

Source: Information provided by the IREC and [http://content.irec.cat/annual\\_report\\_2014/](http://content.irec.cat/annual_report_2014/)





The Institute for Space Studies of Catalonia (IEEC) is a private, non-profit foundation with a Board of Trustees formed by the Generalitat de Catalunya (Catalan government), the University of Barcelona (UB), the Autonomous University of Barcelona (UAB), the Polytechnic University of Catalonia (UPC) and the Spanish Research Council (CSIC).

The IEEC was created in 1996 to foster space R&D in Catalonia, to collaborate and participate in the development, promotion and dissemination of activities, studies and projects related to space technology and scientific research about and from space, to benefit all people, organisations and institutions with an interest in this field. Since its creation, the IEEC has focused its efforts on studying the earth as a planet (atmosphere, oceans, crust, etc.) and the cosmos (solar physics, planetology and interplanetary medium, stellar and galactic astrophysics, cosmology, fundamental physics, astro-particle physics, etc.).

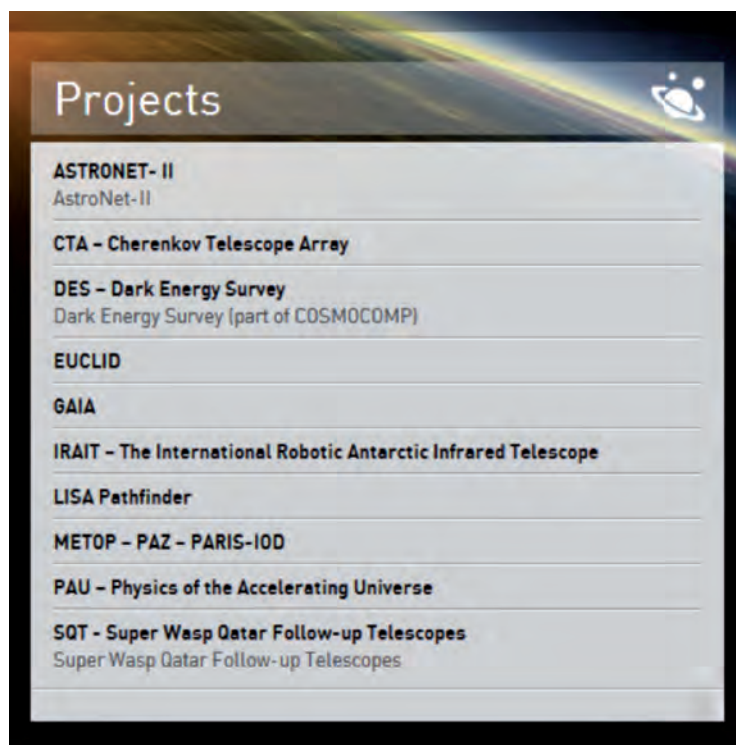
The IEEC is composed of **four research units**, which constitute the core of the R&D activity. They account for almost 250 researchers. Each one of these units was created and is governed by the rules of one of the academic institutions present in the Board of Trustees.

#### These units are:

- Astrophysics and Space Sciences (ACE-ICC-UB)
- Centre for Space Studies and Research (CERES-UAB)
- Space Science and Technology Research Group (CTE-UPC)
- Institute of Space Sciences (ICE-CSIC)

#### Relevant projects managed by IEEC:

- AstroNet-II
- CTA-Cherenkov Telescope Array
- DES-Dark Energy Survey
- EUCLID
- GAIA
- LISA Pathfinder
- METOP-PAZ-PARIS-IOD
- NanoSats
- PAU-Physics of the Accelerating Universe
- Montsec Observatory
- ROM SAF
- Echo
- MIRADAS



#### FACTS AND FIGURES AT THE IEEC

|                                 |                                                     |                                              |
|---------------------------------|-----------------------------------------------------|----------------------------------------------|
| Established in                  | 1996                                                | www.ieec.cat                                 |
| Staff statistics (2014)         | Research staff                                      | 210 (of which: 7 ICREAs; 7 RyC)              |
|                                 | Fellows and administrative and service staff        | 46 students, 9 administration, 1 IT services |
|                                 | Number of nationalities represented among the staff | 10                                           |
|                                 | Gender distribution of the staff (% of women)       | 26 %                                         |
| Research indicators (2010-2014) | ISI publications                                    | 1208                                         |
|                                 | % of ISI publications in 1st quartile               | 82.62 %                                      |
|                                 | Financing secured                                   | 17.8 m €                                     |
| Director                        | Jorge Torra                                         | ieec@ieec.cat                                |

Source: Information provided by IEEC (January 2016).



The Barcelona Institute of Economics (IEB) is a research centre whose goals are to promote and disseminate work in applied economics, and to contribute to the debate and decision-making process in economic policy.

Founded in 2001 within the University of Barcelona, the IEB enjoys the official recognition of the Catalan Government. In 2008, the Institute received a major boost with the creation of the IEB Foundation, with the active support of some private companies, the Barcelona City Council and Provincial Council. In 2014 the University of Barcelona joined the Foundation and the IEB was approved as a Research Institute in which the UB participates. The Institute hosts the UB's Chair in Fiscal Federalism (in cooperation with the Institute for Fiscal Studies) and the Chair of Energy Sustainability at the UB (funded by the Foundation for Energy and Environmental Sustainability).

Today the Institute is home to more than 60 researchers and PhD students. The members' research is conducted primarily in the fields of fiscal federalism and public economics, urban economics and innovation, transport economics and infrastructure, tax sys-

tem analysis and energy sustainability. This research is published in specialist academic journals of international renown. The IEB's research is also presented at conferences, seminars and workshops, and is often undertaken as part of competitive national and international projects.

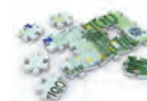
In order to promote and disseminate the research, the IEB publishes its own working papers, and periodically releases the IEB Report and the IEB's Report on Fiscal Federalism and Public Finance, and other publications such as the Newsletter and the Info IEB. Likewise, the Institute organizes a significant number of events to disseminate its research findings (seminars, workshops and summer schools), as well as those of a more instructional nature (symposia, conferences and congresses).

Thanks to its research excellence and the cooperation established between the university, the public sector and the business world, the IEB has become a reference research centre with international vocation.



### RESEARCH AREAS AT THE IEB

**Area 1. Fiscal Federalism.** This research programme promotes the study of public finances in multilevel systems of government (national, regional and local) and debate on local and regional funding. Its research covers topics such as the effects of the decentralization of public services, the allocation of certain taxes at sub-central level, and the effects of intergovernmental transfers.



**Area 2. Cities and Innovation.** This research programme promotes the study of urban and regional economics, focusing on competitiveness and prioritizing the issues that may be relevant to the design of public policies. The programme analyses "knowledge spill-overs", covering areas such as human capital, innovation, the role of universities in disseminating knowledge, and the location of the most advanced and innovative economic activities, and examines the effects of public sector intervention on economies.

**Area 3. Infrastructure and Transport.** The aim of this research programme is to promote research in this area from an economic viewpoint, in order to generate knowledge that is useful to society and is able to guide public policy. It focuses on the effects of infrastructure investments and transport policies on economic growth and the environment, and examines the impact of policies of regional distribution. The results of its research are published in academic journals and in broader forums involving public and private decision-makers.



**Area 4. Tax Systems Analysis.** The IEB research programme in tax systems analysis aims at promoting high quality research in the field of taxation, taking into account not only the traditional approach to optimal taxation, but also administrative issues and the decentralization or globalization context. The ultimate aim of the programme is to generate socially useful knowledge in this field. Special emphasis is put on empirical research, and on the analysis of the Spanish tax system.

**Area 5. The Chair of Energy Sustainability at the UB.** The Chair of Energy Sustainability at the UB promotes research into the production, supply and use of the energy needed to maintain social welfare and development, placing special emphasis on economic, environmental and social aspects.



**Area 6. Human Capital Research Group.** The mission of the Human Capital Research Group is to promote research related to the education and training of individuals and to foster the analysis of education systems and policies from an economic perspective.

### FACTS AND FIGURES AT THE IEB

|                                        |                                                     |                                                    |
|----------------------------------------|-----------------------------------------------------|----------------------------------------------------|
| <b>Established in</b>                  | 2014                                                | www.ieb.ub.edu                                     |
| <b>Staff statistics (2015)</b>         | Research staff                                      | 59                                                 |
|                                        | Fellows and administrative and service staff        | 8 fellows and 4 administrative and technical staff |
|                                        | Number of nationalities represented among the staff | 11                                                 |
|                                        | Gender distribution of the staff (% of women)       | 30.99 %                                            |
| <b>Research indicators (2014-2015)</b> | ISI publications (2014)                             | 38                                                 |
|                                        | % of ISI publications in 1st quartile (2014)        | 28.95 %                                            |
|                                        | CARHUS+ publications (2014)                         | 40                                                 |
|                                        | % of CARHUS+ publications in level A (2014)         | 40 %                                               |
|                                        | Financing secured                                   | 0.48 m €                                           |
| <b>Director</b>                        | Martí Parellada                                     | ieb.administracio@ub.edu                           |

Source: Images and Information provided by IEB (February 2016).



## 7. SCIENTIFIC AND TECHNOLOGICAL CENTRES OF THE UNIVERSITY OF BARCELONA

The Scientific and Technological Centres of the University of Barcelona (CCiTUB) are a research infrastructure facility with the main goal to support research and innovation in the areas of Chemistry, Materials Sciences and Biosciences. In order to accomplish this goal, the CCiTUB provide state-of-the-art characterization technologies and specialized technological advice to both the research community and industry. An important part of its task is oriented to methodological research in order to improve both the capabilities and infrastructure of the CCiTUB. They also have the mission to encourage and promote educational activities by organizing courses, scientific workshops, equipment demonstrations and technical seminars.

Additionally, the CCiTUB aim to enforce the university-industry relationship and promote innovation and technological transfer by participating in agreements and R+D+i projects with industry.

Currently, the CCiTUB occupy more than 12,000m<sup>2</sup> distributed in four of the six campuses of the University of Barcelona. They have a staff of 170 highly qualified technicians (60% with PhD qualifications) and manage a variety of instrumental technologies, grouped into 36 technology units, which include all kinds of advanced characterization techniques and microscopy, nuclear magnetic resonance, mass spectrometry, spectroscopy, high-performance biotechniques, radiation protection and animal facilities.

Significantly, the Nuclear Magnetic Resonance Unit has been recognized, since the year 2000, as a “Singular Scientific and Technological Facility” (ICTS) by the Spanish Government, and plays an important role in the development of NMR at international level performing very high field NMR experiments to study the structure and dynamics of complex molecules of biological interest and advising pharmaceutical companies about new NMR applications. This NMR Unit is also involved in other research areas such as chemistry; molecular, cellular and genetic biology; food science, technology and biotechnology.

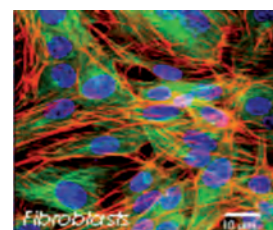
Since 2005 the CCiTUB have the ISO 9001: 2000 Certification for the quality of its management system. They are part of the TECNIO network of Technological Centres of Catalonia, are registered as Agroalimentary Laboratories of Catalonia and are also accredited by the Food and Drug Administration as a contract laboratory to carry out drugs tests.

Moreover, the CCiTUB are currently coordinating the *Spanish Network for Advanced Optical Microscopy*, created to facilitate knowledge transfer and to promote collaborations between different microscopy facilities, laboratories and institutes whose activity involves basic research and/or development in optical microscopy and digital imaging. The Advanced Optical Microscopy Unit of the CCiTUB has been recently recognized as a Spanish node in the Euro-Biolmaging programme, a large-scale **pan-European research infrastructure project** within the European Strategy Forum on Research Infrastructures (ESFRI) Roadmap.

CCiTUB services are used by more than one thousand users each year. These users come from different departments and institutes of the University of Barcelona, other universities and public entities and industry. Industrial customers represent many different sectors of the economy, including the pharmaceutical, cosmetic, chemical, environment, health, food, automotive and energy sectors.



[www.ccitub.edu](http://www.ccitub.edu)





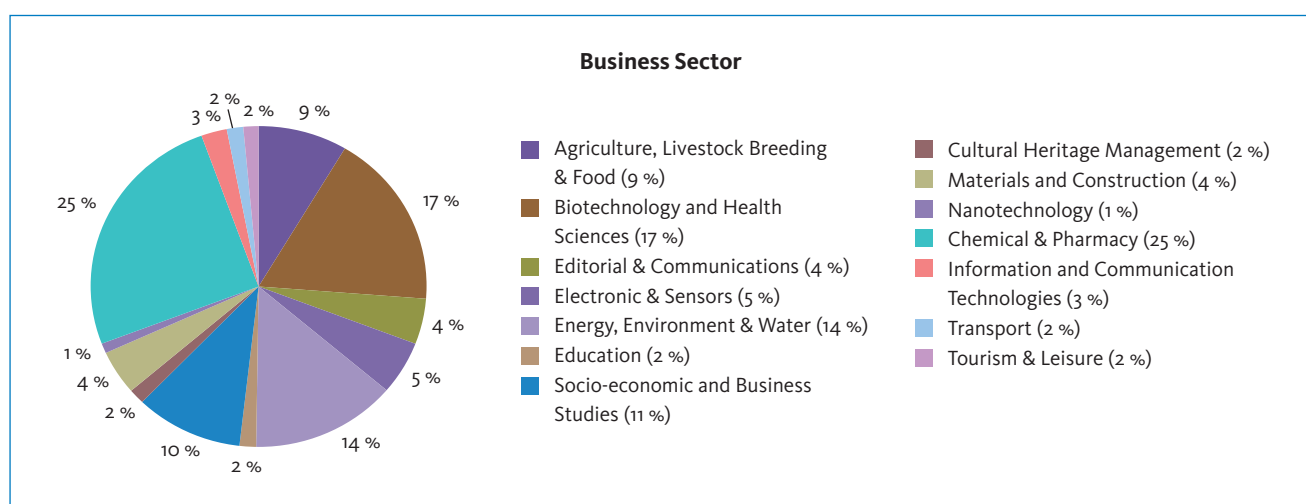
Specifically, during 2015, the CCiTUB worked for 479 researchers from 50 departments at University of Barcelona. The CCiTUB also provided services to 425 investigators from 96 public institutions, and 285 users from private companies, of which approximately 85% are SMEs with headquarters in the Catalan territory.

The experience of CCiTUB in recent years has shown that the involvement of support technical staff in research projects is becoming more essential, as they are responsible for delicate and highly innovative techniques, which are difficult to execute and that require very specific training and knowledge, rarely found within a single research group or a specific department level.

It is particularly interesting that the work carried out at CCiTUB laboratories usually involves the participation of several technological units, which reflects CCiTUB ability to respond to problems that require multidisciplinary application and use of different and complementary techniques. Thus, the CCiTUB guarantee comprehensive care for a high number of research projects by coordinating human resources and high performance equipment.

## 8. BOSCH I GIMPERA FOUNDATION

The **Bosch i Gimpera Foundation (FBG)** is the **University of Barcelona's centre devoted to knowledge transfer, technology and innovation**. The FBG promotes the research generated at the UB and works to ensure that the results of this research reach society through the creation of knowledge-driven companies, patent licensing and contracts with companies and institutions. The activities managed by the FBG and carried out by UB researchers include the realization of R&D projects, the development of advisory and consultancy tasks, the production of studies, reports or opinions, technical support and analysis services. **The FBG is also the Valorisation Unit of the UB** and is supported by ACCIÓ, the Catalan government's agency for promoting competitiveness among Catalan companies. The FBG also gives support to other institutions within the UB Group — a group of entities with legal autonomy over their capital, at the heart of which is the University of Barcelona, acting as the promoter, protector and founder of these entities.



### Activity indicators in 2015

**751** projects

**33.45** million euros in contract research

**726** companies and public institutions have developed R&D&I projects with the University of Barcelona

### Patents, valorisation and licensing

**53** new invention disclosures

**19** priority patent applications

**14** international patent applications

**20** licensing contracts signed

### Business creation and support for the entrepreneur

**23** business creation ideas received

**37** entrepreneurial projects advised

**6** technology-based companies created

**3** new spin-offs shareholding through CIC-UB (Innovative and Scientific Culture-UB)



## Research projects and services managed through the FBG (2010-2015)

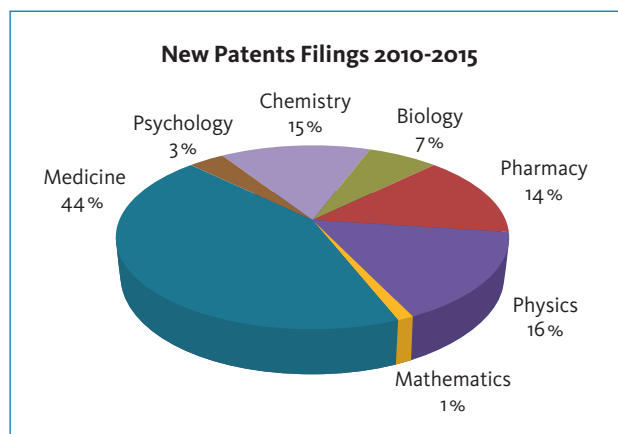
The Bosch i Gimpera Foundation (FBG) manages projects jointly developed by research groups, departments and research institutes of the University of Barcelona and public and private entities — such as collaborative or commissioned R&D, advisory and consultancy work for third parties, the production of studies, reports and opinions and technical support and analysis services, among others. This activity amounted to **68.73 million euros** in the period 2010-2015 **for a total number of 2,899 projects and service contracts**.

From 2012 to 2015, the FBG managed **86 grants**, funded by public and private institutions **that amounted to 6.61 million euros**. As **for research projects funded by the European Commission** in the same period, **174 contracts** were signed whose **revenues amounted to 64.67 million euros**. Altogether, **1,641 people** were hired in relation to these research projects.

## Patents, valorisation and licensing, and license agreements

As for patents, valorisation and licensing, **68 license agreements** were signed from 2010 to 2015.

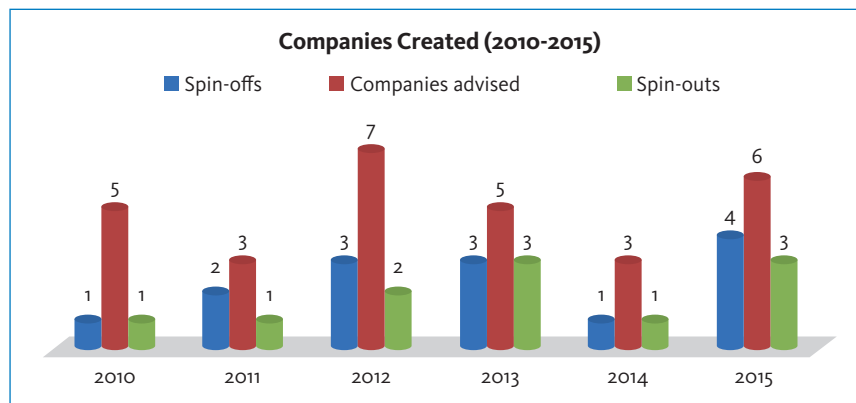
|                              | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Total 2010-2015 |
|------------------------------|------|------|------|------|------|------|-----------------|
| New invention disclosures    | 55   | 50   | 55   | 45   | 55   | 53   | 313             |
| Priority patent applications | 28   | 19   | 23   | 19   | 16   | 19   | 124             |
| New patents filings          | 92   | 71   | 75   | 55   | 55   | 91   | 439             |
| Granted patents              | 13   | 16   | 33   | 26   | 15   | 32   | 135             |
| License agreements           | 8    | 7    | 12   | 10   | 11   | 20   | 68              |



From 2010 to 2015, **34 technology-based companies** were created, **14 of which are spin-offs**. Furthermore, 87 projects were advised, including new entrepreneurial, business plan projects and companies in which the UB is a shareholder.

The FBG is responsible for monitoring those spin-offs in which the University of Barcelona is a shareholder, through the society Innovative and Scientific Culture UB (CIC-UB). From 2010 to 2015, CIC-UB became a shareholder in 11 active companies:

|                                  |                                                                                   |                                                                                    |                                                                                     |
|----------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Impetux Optics, S.L.             |  |  |  |
| Braingaze, S.L.                  |                                                                                   |                                                                                    |                                                                                     |
| Dapcom-Data Services, S.L.       |  |                                                                                    |                                                                                     |
| endoASIC Technologies, S.L.      |                                                                                   |                                                                                    |                                                                                     |
| Advanced Nanotechnologies, S.L.  |  |  |  |
| Smalle Technologies, S.L.        |                                                                                   |                                                                                    |                                                                                     |
| Iproteos, S.L.                   |                                                                                   |                                                                                    |                                                                                     |
| ImmunNovative Developments, S.L. |  |                                                                                    |                                                                                     |
| Cytes Biotechnologies, S.L.      |  |  |  |
| NeuroTransVirtual, S.L.          |                                                                                   |                                                                                    |                                                                                     |
| Nostrum BioDiscovery, S.L.       |                                                                                   |                                                                                    |                                                                                     |



In 2015, CIC-UB became a shareholder of one spin-off that was created in 2013.

The FBG has actively participated in the Barcelona Entrepreneurship Institute (BIE), jointly founded by the Bosch i Gimpera Foundation and the University of Barcelona.

The Bosch i Gimpera Foundation promotes the UB's **Centre for Innovation and Advanced Technologies** (CITA-UB), which aims to foster and encourage interdisciplinary transfer in various areas of science in order to transfer knowledge to society and thereby to contribute to improving business competitiveness. The CITA-UB is made up of groups that are active in transferring the UB Group's knowledge and technology to society.



**CITA-UB TECHNOLOGY AGENTS** in 2015 were:

|                                                                                     |                                                                                                                              |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|    | <p><b>CCiT-UB</b> – Scientific and Technological Centres of the University of Barcelona</p>                                  |
|    | <p><b>CELLTEC-UB</b> – Cellular and Molecular Technology Research Centre</p>                                                 |
|    | <p><b>CEMIC</b> – Micro-Nanosystems for Instrumentation and Communications Engineering Centre</p>                            |
|    | <p><b>CEQAP</b> – Centre for Environmental and Product Chemical Engineering</p>                                              |
|    | <p><b>CERETOX</b> – Centre of Research in Toxicology</p>                                                                     |
|   | <p><b>CPT</b> – Thermal Spray Centre</p>                                                                                     |
|  | <p><b>DIOPMA</b> – Centre for Design and Optimization of Processes and Materials</p>                                         |
|  | <p><b>ELECTRODEP</b> – Electrodeposition and Corrosion Laboratory</p>                                                        |
|  | <p><b>SDM</b> – Service of Medicines Development</p>                                                                         |
|  | <p><b>SINTEFARMA</b> – Centre for Research and Development in Organic Synthesis for the Pharmaceutical Chemical Industry</p> |
|  | <p><b>UQC</b> – Combinatory Chemistry Unit</p>                                                                               |

In 2015, the Bosch i Gimpera Foundation managed six of the **eight reference networks** currently promoted by the Catalan government:

- **XaRTA**, Catalan Reference Network on Food Technology
- **XREAP**, Reference Network for Research in Applied Economics
- **XREPP**, Reference Network in Economics and Public Policies
- **XRQTC**, Reference Network in Theoretical and Computational Chemistry
- **XRB**, Catalan Biotechnology Reference Network
- **XRAQ**, Reference Research Network in Aquaculture

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## 9. BARCELONA SCIENCE PARK

The Barcelona Science Park (PCB) drives research, knowledge transfer and innovation through smart management of spaces, services and relationships. Our aim is to dynamize the PCB Community — more than 2,000 researchers, entrepreneurs and business leaders, especially in the Life Sciences — to turn ideas into innovations.



Created in 1997 by the University of Barcelona, the PCB has more than 30,000 square metres of offices and laboratories, plus a wide range of scientific and technological services designed specially to facilitate R&D in the Health and Life Sciences. The PCB's offering, flexible and modular to meet clients' needs, allows us to accompany businesses as they grow and develop. We have a diversified catalogue of spaces that range from co-working rooms (offices) and shared laboratories, perfect for entrepreneurs and companies just getting started, to R&D laboratories that can adapt to the needs of large pharmaceutical or medical technology companies.

The scientific services of the PCB also adapt to demand, ranging from self-service access to basic technology through custom projects conducted by the PCB platforms, research centres and UB services at the Park.

This setting also features an ideal space for specialized scientific and non-scientific services companies — bioinformatics and information technology, patents and intellectual property management, business development, investment funds, training, etc. — and companies from a variety of sectors, including chemicals, cosmetics and the environment.

The PCB offers an environment that promotes interaction and collaboration among the top-notch research bodies and companies it houses. To dynamize the PCB community and connect it with the national and international innovation ecosystem, the Park organizes an extensive program of activities (seminars, conferences, networking sessions, informal meetings, etc.) and has created common spaces in all of its buildings to help generate synergies, boost cooperation and identify business opportunities.

One of the points that sets the Barcelona Science Park apart from other facilities is its wide range of scientific and technological services, geared towards both on-site clients and external research groups from here and abroad. This offering is complemented with a series of professional and general services, exclusively for on-site companies and institutions, and a program to dynamize the PCB community that seeks to boost interaction among members and the innovation ecosystem.

### Dynamization Activities

The PCB promotes a programme of 20-25 activities per year — networking events, conferences, panel discussions, training workshops, delegations to fairs, leisure activities, etc. — that aim to promote interaction and collaboration among members of the PCB community and key stakeholders in the national and international innovation ecosystem. Plus, the Park hosts around 300 events each year (seminars, conferences, congresses, courses, etc.) held by on-site and external organizations, most of which are open to the community.



## Scientific and Technological Services (exclusively for on-site companies and organizations)

On-site clients of the PCB are part of a pass system that gives them the following benefits: self-service access, and set rates by volume of use, to our package of Core Scientific Services (SCC). The pass system also gives access to the radioactivity facility, *Drosophila* service, shared chemistry room and special reaction service (open to external clients).

## PCB Community

The Barcelona Science Park brings together more than 50 companies (on-site and associated), large research centres, 12 units and scientific services of the University of Barcelona and fifteen non-profit organizations: a dynamic, innovative community of more than 85 organizations and 2,000 professionals.

### Companies

### R&D centres

### Non-profit organizations

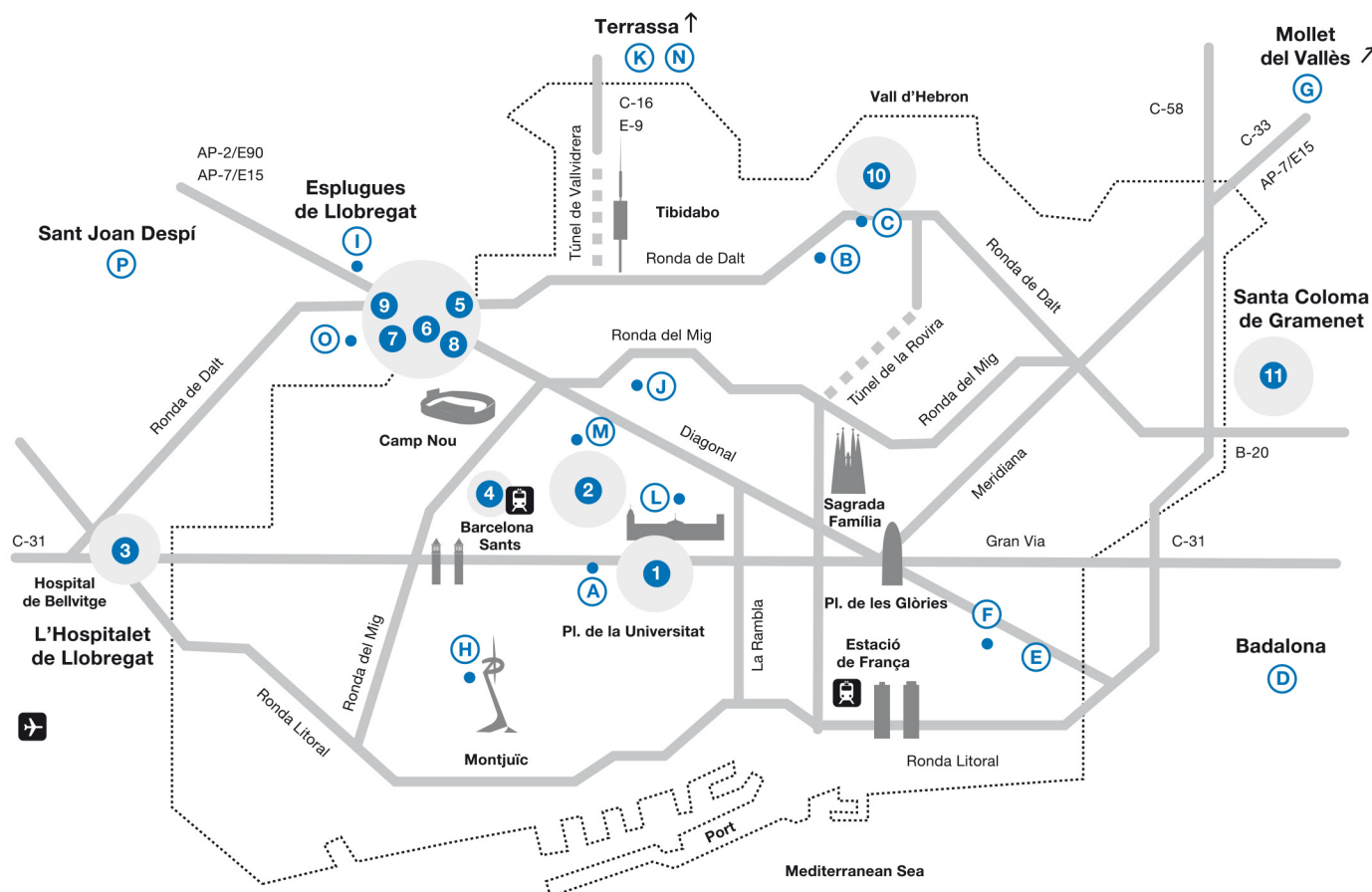
### University of Barcelona groups, units and services

Biomolecular NMR  
 Developmental Neurobiology and Cell Regeneration Group  
 International Campus of Excellence Office

International Research Projects Office  
 Macrophage Biology Group  
 Microbial Biotechnology and host-pathogen interaction  
 Patents Center  
 Research Group on Marine Geosciences  
 Translational Immunology Group

Centres Científics i Tecnològics  
 UNIVERSITAT DE BARCELONA  
 Fundació Bosch i Gimpera  
 Universitat de Barcelona

### Associated entities



#### 1 Humanities Campus

- Rector's Office, General Manager's Office and general services
- Faculty of Philology
- Faculty of Philosophy
- Faculty of Geography and History
- Faculty of Mathematics

#### 2 Medicine Campus Clinic August Pi i Sunyer

- Faculty of Medicine and Health Sciences
- Hospital Clínic of Barcelona
- Hall of Residence Ramon Llull

#### 3 Bellvitge Health Sciences Campus

- Faculty of Medicine and Health Sciences
  - Medicine
  - Nursing
  - Dentistry
- University Hospital of Bellvitge

#### 4 Faculty of Library and Information Science

#### Barcelona Knowledge Gateway Campus

- 5 ■ Faculty of Law
- Faculty of Economics and Business
- 6 ■ Faculty of Fine Arts
- Faculty of Biology
- Faculty of Pharmacy
- Faculty of Physics
- Faculty of Geology
- Faculty of Chemistry
- 7 ■ Barcelona Science Park
- 8 ■ Penyafort-Montserrat Hall of Residence
- 9 ■ Sports UB

#### 10 Mundet Campus

- Faculty of Education
- Faculty of Psychology
- Institute of Education Sciences

#### 11 Food and Nutrition Torribera Campus

- A ■ Area of Further Training School of Modern Languages (EIM)
- B ■ Center for International Historical Studies (CEHI)
- C ■ CETT University School of Hotel Management
- D ■ El Carme Cultural Centre Area of Further Training (EIM)
- E ■ Humanities and Social Sciences Park
- F ■ Institute for Lifelong Learning IL3
- G ■ Institute of Public Safety of Catalonia (ISPC)
- H ■ National Institute of Physical Education of Catalonia (INEFC)
- I ■ Sant Joan de Déu University School of Nursing
- J ■ Sant Jordi Hall of Residence
- K ■ School of Cinema and Audiovisual Studies of Catalonia (ESCAC)
- L ■ School of New Interactive Technologies (ENTI)
- M ■ School of Public Relations
- N ■ School of Trade and Distribution (ESCODI)
- O ■ Student Support Service (SAE)
- P ■ Torre de la Creu Area of Further Training (EIM)

#### University of Barcelona

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