

Ministry of Education Call for Proposals  
International Campus of Excellence

# PROMOTING KNOWLEDGE, ENCOURAGING INNOVATION

**UAB<sup>CEI</sup> PROJECT: ASSOCIATIONS**  
Document for the International Commission



Universitat Autònoma de Barcelona

**UABCEI PROJECT ASSOCIATIONS**

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**UABCEI PROJECT ASSOCIATIONS**

## 1. Introduction

One of the most important objectives of the UAB<sup>CEI</sup> project is the development of the associations with their settings. According to the type of relationship between the UAB and the associated organisations, this objective can be approached in different ways:

- Deeper integration of institutions which have been associated and have been collaborating with the UAB for some time, such as the R&D centres on the Bellaterra campus and the university hospitals linked to the UAB.
- The inclusion of other organisations in the UAB framework with as yet unconsolidated relationships and also those whose relationships begins precisely with the opportunity of associating themselves to the UAB<sup>CEI</sup> project. This would include technology parks (PTV), business parks (ESADECREAPOLIS) or the ALBA science park, together with technological spinoffs from UAB and those that already have some links with the UAB.
- The association of local councils with the UAB<sup>CEI</sup>, due to their geographical proximity or because they house UAB university hospitals.

The process of associating all the institutions defined as associates on the list provided later in this document is intended to be evolutive, dynamic, open and networked:

- Evolutive, because new collaborations are developed which enable closer relationships between all the members associated to the UAB<sup>CEI</sup>;
- Dynamic, because new tools must be created to bring closer together institutions, such as forums, scientific service agreements and social or cultural activities, etc. in which the UAB intends to act as a sponsor,
- Open, because the process should provide other institutions with the opportunity to become associated to the UAB<sup>CEI</sup>, providing they meet the project's objectives.
- Networked, with all members forming nodes, each with its own role, of a network rich not only in bilateral (UAB-associated organisation) connections, as is common at present.

As mentioned earlier, the long-term objective of this process is the establishment of the **UAB-30 Knowledge Cluster**, of which the UAB<sup>CEI</sup> project presented here is the first phase.

In the first place, the UAB<sup>CEI</sup> project aims to enhance the integration of the R&D centres which already have consolidated bilateral relationships with the UAB, with which there have been specific agreements for years. This integration will be approached decisively. The UAB already has documents approved by the university's governing bodies in order to foster this integration process. These documents regulate

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issues such as the connection of UAB teachers to R&D centres (see documents on the UAB<sup>CEI</sup> website).

The wealth of R&D centres on campus has not reached an optimal degree of integration and further progress is required. The UAB<sup>CEI</sup> project plays an instrumental role of enormous importance, because it aims to enhance this integration in the next 4 years of the project and consolidate mechanisms to obtain a close and multinodal relationship between all existing and new associate members.

As each organisation associated to the UAB<sup>CEI</sup> proposal currently has a different degree of integration, this is seen in the different types of documents loaded on the website in this respect:

- In the case of institutions with a long tradition of collaboration with the UAB, there are agreements which, in some cases, start with the agreement to create the centre itself, signed by the institutions found on its governing board. In these cases, as well as the respective agreements, there is an alignment declaration which aims to confirm the validity of the relationship and support for the UAB<sup>CEI</sup> proposal.
- In other cases, general framework agreements have been signed, expressing a willingness to enter into a closer relationship. Some of them are connected to occasional collaboration agreements signed in the past.
- Finally, there is another group of organisations and firms, invited to sign the aforementioned alignment declaration. In many of these cases, the relationship is in its very early stages and signing this document shows their willingness to participate in an exciting venture which begins with the opportunity to belong to a club of excellence in the form of the UAB<sup>CEI</sup> project.

The UAB is aware that signing documents, in cases where collaboration is not traditional, could be meaningless if the two parties do not collaborate in common activities in a consistent manner. The UAB therefore aims to promote and steer an interaction process between members with a view to creating an economic, social and cultural R&D hub with room for all initiatives and all organisations able and, above all, willing to be the active protagonists of an ambitious long-term project: **the UAB-30 Knowledge Cluster**.

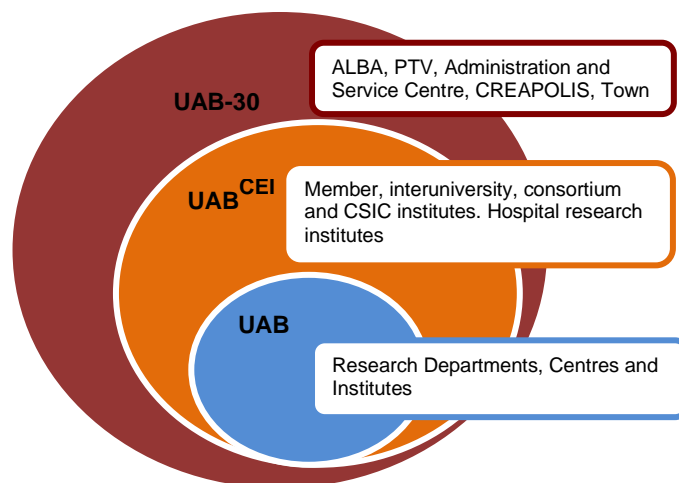


Fig. 1.- The three circles represent the target levels of integration. The current situation (UAB), the medium-term result expected with the UAB<sup>CEI</sup> project and the long-term target, the UAB-30 Knowledge Cluster.

## 2. Strategic associations with associate members

A rich selection of R&D centres, science, technology and business parks, multinational corporations, small and medium-sized high-tech companies and other social institutions such as foundations or local councils, duly articulated by the UAB<sup>CEI</sup>, will be the foundation for a future qualitative and quantitative leap in the creation of a hub based on the most dynamic knowledge in the Mediterranean.

The synergies generated in the last few years in this respect have given rise to the effective creation, in 2007 of the **UAB Research Park (PRUAB)**, a foundation materialising the strategic alliance between the UAB, the CSIC and the Catalan Regional Government's *Institut de Recerca i Tecnologia Agroalimentàries* (IRTA – Agrofood Research and Technology Institute).

The PRUAB project is supported by three important banks (Banco de Santander, La Caixa and Caixa Catalunya) which make significant contributions to its funding and are involved in its Trust.

The mission of the PRUAB is to integrate the specific research centres and consortiums on the UAB campus, the associated hospitals and their research institutes. The activity of these centres is complementary to that of the university, and is therefore closely interrelated to the fabric of the UAB (faculties, departments, university institutes, research and service centres), so they are mutually enriching and constitute a multidisciplinary setting of unique characteristics.

This innovative activity map will be completed with the location of business R&D activities in the soon to be operational EUREKA I building. Built and managed by the Free Trade Zone Consortium on the UAB campus, the building provides 5000 m<sup>2</sup> for business activities and a business incubator. The Eureka building will be an important

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part of the integration process, as it will not only be at the service of the UAB but also of all UAB<sup>CEI</sup> members.

The ALBA Park is currently being developed in the vicinity of the UAB. It represents a total of 70 hectares to house research centres and high-tech firms as well as the ALBA synchrotron, the most important scientific infrastructure in Spain and the only one of its kind in southern Europe. It is an electron accelerator which provides high intensity and high quality synchrotron light. This great facility is particularly important for the Lines of Strategic Priority at the UAB<sup>CEI</sup>: nanoscience-nanotechnology and biotechnology-biomedicine. The ALBA synchrotron is also a great tool for many branches of science and technology, such as geology, chemistry, archaeology and physics. It is also very important for some industrial sectors such as food, the pharmaceutical and metal industries, plus fields such as the restoration and preservation of our artistic heritage.

The ALBA synchrotron, a national facility classified as a singular scientific and technological infrastructure, or ICTS, represents the greatest scientific investment made to date in Spain and it is closely linked to the university: UAB professors and investigators have been actively involved in its design for more than 15 years, and numerous postgraduate students are participating in synchrotron-related projects.

The axis of the B-30 also houses the Vallès Technology Park, with 170 technological firms and one of the UAB's spin-off business incubators: Masia Can Fatjó. In the same area there is also the Administration and Service Centre (CD – *Centro Direccional*) of Cerdanyola del Vallès, a hub for scientific and town planning development located between Sant Cugat and Cerdanyola, where the ALBA Park is installed. With the ambition of becoming a true metropolitan centre, the CD will create a series of infrastructures pertaining to the so-called quinary sector<sup>1</sup> on land adjacent to the UAB, which can be reached by a new bridge over the AP-7 motorway. The CD, accessible from anywhere in Catalonia, will have the elements required to become a crucial support for the development of the UAB. Likewise, in Sant Cugat del Vallès, we find ESADECREÁPOLIS, the ESADE park dedicated to creativity and already associated to the project, and the creation of companies linked to its new Sant Cugat del Vallès campus. All the above complement the UAB's research, training and knowledge transfer objectives.

A major role is also played in the strategic positioning of the UAB<sup>CEI</sup> project by the urban areas of Cerdanyola del Vallès, Sant Cugat del Vallès, Sabadell, Terrassa, Rubí, Badia del Vallès and Ripollet, all of which are within the area of influence of the UAB<sup>CEI</sup> and represent a population of over 697,000 inhabitants, aimed at enhancing the area's economic growth. The firms established on their industrial estates also foster innovation and technological transfer in collaboration with the PRUAB. The economic, educational, social and cultural activities of these areas are also perfectly in line with those of the UAB, providing significant added value to the group.

As well as the ALBA synchrotron, this area will, in the near future, house different singular infrastructures belonging to the Ministry of Science and Innovation's ICTS programme: the CBATEG-Mouse Clinic (Animal Biotechnology and Gene Therapy Centre), the CNM-CSIC White Room (National Microelectronics Centre) and the future Structural and Proteomic Biology Centre (collaboration between the UAB and the CSIC, in the context of the ALBA synchrotron).

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<sup>1</sup> The quinary sector includes different interrelated activities used to extend and refine human skills. Basically, they are cultural services in a broad sense (publishing, press, audiovisual, performance and plastic arts, cultural tourism) plus a series of professional, scientific and technical services; education, healthcare and social services and different forms of leisure.



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We also have the support of local companies, particularly technology-based enterprises, such as Topping Partnerships, AB-BIOTICS, DLM Solutions or Laboratoris ESTEVE and technological centres such as ASCAMM.

The following list shows the different institutions which form the aggregate of the UAB<sup>CEI</sup> project. Their willingness to be associated is confirmed in the documents found on the website.

REGIONAL GOVERNMENT	
Cataluña	Gobierno de la Generalitat de Catalunya
RESEARCH INSTITUTES AND CENTRES	
CREAF	Centre for Ecological Research and Forestry Applications
ICTA	<i>Institut de Ciència i Tecnologia Ambientals</i> (Environmental Science and Technology Institute) (UAB)
ETC-LUSI	European Topic Centre on Land Use and Spatial Information (UAB)
CED	<i>Centre d'Estudis Demogràfics</i> (Centre for Demographic Studies)
CEO	Olympic Studies Centre
IAE	<i>Institut d'Anàlisi Econòmica</i> (Institute for Economic Analysis) (CSIC)
ICPS	<i>Institut de Ciències Polítiques i Socials</i> (Institute of Political and Social Science)
IERMB	<i>Institut d'Estudis Regionals i Metropolitans de Barcelona</i> (Institute of Regional and Metropolitan Studies of Barcelona)
IGOP	Public Policies and Government Institute (UAB)
IUEE	<i>Institut Universitari d'Estudis Europeus</i> (University European Studies Institute)
IEM	<i>Institut d'Estudis Medievals</i> (Institute for Medieval Studies) (UAB)
IBEI	<i>Institut Barcelona d'Estudis Internacionals</i> (Barcelona Institute of International Studies)
IIEDG	<i>Institut d'Estudis de Dones i Gènere</i> (Institute of Research on Women and Gender)
CBATEG	<i>Centre de Biotecnologia Animal i Teràpia Gènica</i> (Animal Biotechnology and Gene Therapy Centre) (UAB)
CRAIG	<i>Centre de Recerca Agrigenòmica</i> (Agrigenomic Research Centre)
IBB	<i>Institut de Biotecnologia i Biomedicina</i> (Biotechnology and Biomedicine Institute)
INc	<i>Institut de Neurociències</i> (Neuroscience Institute) (UAB)

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LP CSIC-UAB	<i>Laboratori de Proteòmica CSIC-UAB</i> (CSIC-UAB Proteomics Laboratory)
BST	<i>Banc de Sang i Teixits</i> (Blood and Tissue Bank)
Hospital del Mar	Hospital del Mar
I. Barraquer	Barraquer Institute
I. Guttmann	Guttmann Institute
F. Puigvert	Puigvert Foundation
I.U.Dexeus	Dexeus University Institute
ICCC	<i>Institut Català de Ciències Cardiovasculars</i> (Catalan Cardiovascular Research Centre)
ICF	<i>Institut Català de Farmacologia</i> (Pharmacology Institute of Catalonia)
IDIAP Jordi Gol	<i>Institut d'Investigació en Atenció Primària "Jordi Gol"</i> ("Jordi Gol" Primary Care Research Centre)
IICS GTP	<i>Institut d'Investigació en Ciències de la Salut Germans Trias i Pujol</i> (Germans Trias i Pujol Health Science Research Centre)
IMPPC	<i>Institut de Medicina Predictiva i Personalitzada del Càncer</i> (Predictive and Personalised Medicine for Cancer Centre)
IQUASC-FAD	Avedis Donabedian Foundation
IRHSCSP	Hospital Santa Creu i Sant Pau Research Centre
IRHUVH	Hospital Universitari Vall d'Hebron Research Centre
IUFPT	Parc Taulí University Institute
CRSA	<i>Centre de Recerca en Sanitat Animal</i> (Animal Health Research Centre)
Torre Marimon	IRTA. Rabbit Breeding, Livestock Breeding and Forestry Units
CELLS	Consortium for the Construction, Equipment and Exploitation of the Synchrotron Light Laboratory
IMB-CNM	<i>Centre Nacional de Microelectrònica</i> (National Microelectronics Centre) (CSIC)
CRM	<i>Centre de Recerca Matemàtica</i> (Mathematics Research Centre)
CVC	Computer Vision Centre
ICMAB	<i>Institut de Ciència de Materials de Barcelona</i> (Barcelona Material Science Institute) (CSIC)
ICN (CIN2)	<i>Institut Català de Nanotecnologia</i> (CIN2) (Catalan Nanotechnology Institute)
ICP	<i>Institut Català de Paleontologia</i> (Catalan Palaeontology Institute)
ICE-CSIC (IEEC)	<i>Institut de Ciències de l'Espai (CSIC) - Institut d'Estudis Espacials de Catalunya</i> (Spanish Institute of Science – Centre for Space Studies of Catalonia)

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IFAE	Institute for High Energy Physics
IIIA	Artificial Intelligence Research Institute (CSIC)
LLS	<i>Laboratori de Llum de Sincrotró</i> (Synchrotron Light Laboratory)
MATGAS	Materials and Gases
PIC	<i>Port d'Informació Científica</i> (Scientific Information Centre)
IEA	Institut d'Análisis Económic - CSIC
CIN2	Centro de Investigación en Nanociencia y Nanotecnología
Envelliment	Institut Catalá de l'Envelliment
F.Puigvert	Fundació Puigvert
<b>COMPANIES AND BUSINESS PARKS</b>	
PTV	Vallés Technology Park
Activery	Activery Biotech
AITECH	AITECH
AB-Biotics	AB-Biotics
Davantis	Davantis
DLM	DLM Solutions SL
D+T Microelectr.	D+T Microelectrónica, A.I.E.
Ecomunicat Electronics	Ecomunicat Electronics
Hexascreen	Hexascreen Culture Technologies
Inspecta	Inspecta
Topping	Topping
X-Ray Imatek	X-Ray Imatek
Ascamm	Ascamm
Esteve	Laboratoris Esteve
Univet S.L.	Univet S.L.
Fit Sport	Fit Sport Consulting S.L
Reprogenetics	Reprogenetics Spain S.A.
Spora	Spora Sinergies
ICAR VISION	ICAR VISION
Applus	Applus

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R+D PUBLIC ORGANISATIONS	
CSIC	Spanish National Research Council
IRTA	<i>Institut de Recerca i Tecnologia Agroalimentàries</i> (Catalan regional government) (Institute for Agrofood Research and Technology)
LOCAL COUNCILS	
Barcelona	Ayuntamiento de Barcelona (City Council)
Cerdanyola	Ayuntamiento de Cerdanyola del Vallès (City Council)
Rubí	Ayuntamiento de Rubí (City Council)
Sabadell	Ayuntamiento de Sabadell (City Council)
Badalona	Ayuntamiento de Badalona (City Council)
Sant Cugat	Ayuntamiento de Sant Cugat del Vallès (City Council)
Terrassa	Ayuntamiento de Terrassa (City Council)
Ripollet	Ayuntamiento de Ripollet (City Council)
Badia	Ayuntamiento de Badia (City Council)

### 3. Level of scientific excellence of associates

The UAB has become one of the leading Spanish universities both in R&D and teaching activities, promoting multidisciplinary research and the transfer of the resulting knowledge.

The UAB is one of the top Spanish universities in terms of absolute production: the number of scientific papers published in 2008 was 1,616, 60% of which are in the first quartile with regards to impact factor. In other words, they were published in journals of the greatest international renown. It is the first public university in weighted scientific productivity<sup>2</sup>, QS-Times/Shanghai ranking results, and is first in the ranking of Spanish universities published by the El Mundo newspaper<sup>3</sup>.

These indicators increase considerably if we consider all the organisations associated to the UAB<sup>CEI</sup>. In 2008, for example, more than 3,200 papers were published, making it the most important research core in Spain. This figure would already make the area a leading research enterprise on an international scale.

The quantitative increase in quality indices also involves a larger number of consolidated research groups recognised by the Catalan Regional Government, from 155 to 218 in the last 4 years, the greatest percentage increase of all Catalan universities. This indicator, which refers to all public and private universities and research centres, including the CSIC, shows a total of 341 groups, equivalent to 23%

<sup>2</sup>Number of publications per full-time investigator, according to the ranking estimated by the SCIMAGO research group, *Universidad Carlos III de Madrid*.

<sup>3</sup>Published in May 2009. The focus of this ranking is teaching quality.

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of all the consolidated groups in Catalonia. Of these 218 groups, 34 are classified as emerging (for groups with some projection which are becoming consolidated), involving young investigators who, in the next 4 years, can be expected to ultimately consolidate their research units.

The UAB currently has a technological portfolio with over 100 priority patents and international extensions, 50% of which are related to nanoscience-nanotechnology and biotechnology-biomedicine. In this respect, the UAB has highlighted knowledge transfer as a fundamental tool for increasing research quality and its impact on society.

Below is a list of some of the most important centres associated to the project, with a description of their principal characteristics, provided by the organisations themselves.

Some of the institutions associated to the UABCEI proposal
<p><b>Centre d'Investigació en Nanociència i Nanotecnologia (CIN2)</b></p> <p>The Nanoscience and Nanotechnology Research Centre (CIN2) is of key importance for the development of nanoscience and nanotechnology in Catalonia and Spain, and aims to become an international point of reference of scientific excellence. CIN2 is a mixed centre formed by the Spanish National Research Council (CSIC) and the Catalan Nanotechnology Centre (ICN). This joint venture involved everything from basic nanoscience research to nanotechnology applications, interrelated with the industrial environment. It fosters local and international collaborations, and our research covers specific lines and transversal activities. Excellence and dedication are at the forefront of this research centre's activities.</p> <p>CIN2 aims to be recognised as an international leader, supporting and coordinating research and development in nanoscience and nanotechnology in Catalonia and Spain. Below are some of our goals:</p> <ul style="list-style-type: none"><li>- To transmit fundamental lines and applied research in nanoscience and explore potential nanotechnology applications.</li><li>- To interrelate with the industrial community for the use of the results of our research.</li><li>- To foster networking and the creation of alliances with organisations and regions on a worldwide scale.</li><li>- To consolidate our collaboration with private enterprise, establishing agreements to transfer our know-how and the results of our research.</li><li>- To foster our research by means of excellence and dedication, selecting the best investigators.</li></ul> <p>As of December 2008, the CSIC part of CIN2 comprises 25 PhD researchers and is involved in 14 European Union and another 3 international projects, plus 14 National Plan and another 18 Spanish projects. It has had 2 patents granted and another 3 have been applied for. We have embarked upon several JTI projects and several agreements with private companies. The R&amp;D budget totals 4,676,000 euros.</p>
<p><b>Institut Català de Nanotecnologia (ICN)</b></p> <p>The Catalan Nanotechnology Centre (ICN) was established on 11 July 2003 in order to develop scientific research in the nanoscience and nanotechnology (NiN) fields and become an international point of reference on the subject. The specific objectives that were initially defined are:</p> <p>research into new properties of matter derived from its aggregation status on a nanometric scale, development of methods of nanomanufacture, synthesis, analysis and handling of aggregates and structures or nanometric dimensions,</p>

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development of techniques for the characterisation and manipulation of nanostructures, collaboration of scientists specialising in different areas (physics, chemistry, biology, engineering) in order to integrate their know-how in the new research area, research training in the nanotechnology field, any other purpose related to NiN research.

It is important to emphasise that, as the centre was created by the Catalan Regional Government, its beneficiaries are universities, research centres, the scientific community in general, technological centres and the business sector related to NiN research, and society as a whole. The foundation is governed by a trust comprising the DIUE (Department of Innovation, Universities and Business) and the UAB.

One of the primary objectives of the Catalan Nanotechnology Centre is to consolidate sustained growth of existing lines of research, which are grouped into departments, increasing the critical mass of investigators involved with given subjects and defining a few topics that will identify it as a worldwide centre of reference. On the nanotechnology side, the primary objectives focus on design functionalised nanoparticles and/or substance carriers and the manufacture of devices, basically lab-on-a-chip like sensors, directly applicable to social needs, particularly in the biomedicine field.

2008 figures:

- No. of investigators (PhD): 34
- No. of European projects in which the ICN (SV) is involved: 11
- No. of national R&D projects in which the ICN (SV) is involved: 14
- Participation in JTI (Joint Technology Initiatives) (SV): 1
- No. of agreements with private and/or public enterprise: 23
- No. of patents: 6
- R&D budget: 4,027,455 €

### Centre Nacional de Microelectrónica (CNM)

The National Microelectronics Centre (CNM) is a Spanish National Research Council (CSIC) research unit. It was established in 1985 and currently offers a surface area of over 8,000 m<sup>2</sup>, including a 1,500 m<sup>2</sup> microelectronics white room which is recognised by the Ministry as an ICTS.

The CNM-IMB employs 172 people, not counting the Administration and Services units, in a Micro-Nanosystem Department, a Systems Integration Department and the "Integrated Micro and Nano manufacture white room" ICTS. Besides the work performed in the latter, which is open to the national and European scientific community, the departments focus their R&D on the micro- and nanosystem concepts, divided into the following groups:

- -Radiation detectors
- -Bio-microsystems
- -Gas sensors and fuel cells
- -Nanomanufacture and functional properties of nanostructures
- -Reverse engineering in microelectronic devices
- -Silicon photonics
- -Integration of power devices and systems
- Electrochemical transducers
- Integrated circuits and systems
- Biomedical applications
- Micro and nano tools

Global 2008 figures:

- Total competitive project financing: 3,346732€
- Total papers in scientific journals in SCI database:115
- Total papers in non-ISI journals: 6
- No. of books/book chapters: 2

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- National congresses: 11
- International congresses: 150
- Patent applications: 14
- Revenue from R&D contracts (with private sector, D+T): 815,241 Euros
- Revenue from contracts/advisory services (with public sector, CENIT): 780,605 Euros
- Total doctoral theses presented: 8

### Computer Vision Centre (CVC)

The Computer Vision Centre (CVC) is a non-profit organisation established in 1994 as a consortium by the Catalan Regional Government, through the Department of Industry and the CIRIT and UAB.

The primary function of the CVC consists of the following: high quality research with an international impact, transfer of knowledge to businesses and society in general, training first class scientists and professionals in competencies on a European level. CVC personnel includes university teaching staff, pre- and post-doctoral investigators and third cycle students, engineers and technical and administrative support staff.

Global 2008 figures:

- Research personnel: 1
- R&D technicians: 12
- Associated researchers and technicians: 14
- Competitive researchers (ICREA, Ramon y Cajal, Juan de la Cierva, Beatriu de Pinós, MEC Movilidad: 22
- PhD students: 53
- Management, Administration and Marketing: 7
- Total people devoted to research: 109
- Published articles with impact index: 48
- Other publications (journals with no impact index, books, international and national congresses, LNCS: 122
- Competitive projects awarded: 11
- Patents and licenses: 5
- International doctorate and postgraduate activities (participation in Master's degree in Computer Vision and Artificial Intelligence, MVCIA): 1

### Institut d'Anàlisi Econòmica (IAE)

The Institute for Economic Analysis (IAE) belongs to the Spanish National Research Council (CSIC). It is located on the UAB campus and is closely related to its Economics Department. The Institute was established in 1985 in order to promote economic research. Our team of investigators is highly productive and committed to scientific excellence in research and postgraduate education.

The Institute's research activities include both theoretical and empirical research in different areas, including industrial organisation, finance, regional economics, economic policy, macroeconomics, growth, public economics, game theory and experimental economics. Scientific production rankings identify the IAE-CSIC as one of the best institutions in Europe. The numerous studies conducted by our investigators lead to constant production of important papers in international scientific journals.

Our traditional post-doctoral programme, which is currently being extended, represents an excellent starting point for brilliant careers in the economic research field. Likewise, the IAE participates in the UAB's IDEA doctorate programme.

The IAE is also a founder member of Barcelona Graduate School of Economics GSE, a new initiative offering first class postgraduate programmes.

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Global 2008 figures:  
Number of investigators (with PhD): 32  
Number of European projects: 2  
National R&D projects: 8  
Catalan Regional Government research groups: 5

### **Institut de Ciència de Materials de Barcelona (ICMAB)**

Barcelona Material Science Institute (ICMAB) <http://www.icmab.es>, is a research unit belonging to the Spanish National Research Council (CSIC) and governed by a trust. Located on the UAB campus, it was established in 1987 and its laboratories were opened in April 1991. A new floor was added in 1998.

It is involved in research aimed at obtaining and characterising materials of industrial interest. Its activities focus on the synthesis, preparation, crystallisation and characterisation of high-performance functional materials and nanomaterials, and often involve the construction of device prototypes based on such materials.

In relation to research projects and contracts, studies are being carried out to improve conventional materials and research into new molecular, supramolecular, magnetic, superconductor and porous materials, etc.

The staff currently comprises a total of 232 people, including investigators and support staff. Of these, 76 are PhDs classified in different categories: 22 scientists, 17 scientific investigators, 15 research lecturers, 2 ICREA investigators, 14 tenured lecturers and 8 associate lecturers. They are all divided into eight departments, a general services unit and a scientific-technical services unit.

In 2006-2008, the ICMAB published 610 papers included in the SCI database. Each permanent investigator publishes around 5 papers per year in journals with a very high impact index (7 of our scientists have reached an "h index" of over 20, and 50% of our personnel has an "h index" of over 20).

In this two-year period, the institute undertook 9 European projects and 56 national R&D projects. The centre's JTI participation comprised 6 projects. Likewise, 35 patents were registered and the number of collaboration agreements with public and private institutions was 19.

The financing obtained by the centre's investigators represents around 50% of the total ICMAB budget. The annual R&D budget is estimated at 3,600,000 euros, confirming that the ICMAB is the most active material science centre in Spain.

### **Institut de Ciències Polítiques i Socials (ICPS)**

The Institute of Political and Social Sciences (ICPS) was established on 8 November 1988 by the Diputació de Barcelona regional council and the UAB in the legal form of a university consortium. The ICPS is an UAB institute.

The purpose of the ICPS is to foster research in political science and social sciences in general in Catalonia, paying special attention to training young investigators and promoting relations between Catalan and other worldwide politologists, organising stays by Catalan investigators and teachers in foreign centres and universities and vice versa.

The ICPS provides the scientific community with different lines of action and the means to publish different projects: workshops, symposiums, seminars, courses and polls. It promotes research, among other things, into Catalan political parties, election result analysis, local and regional politics, relationships between citizens and governments and the evolution of international politics, particularly in Latin America.

R&D figures:



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- No. of investigators (with PhD): 4
- No. of national R&D projects: 1
- No. of agreements with public institutions and/or agencies: 5
- R&D budget: 635,000 Euros

### **Institut de Ciència i Tecnologia Ambientals (ICTA)**

The Environmental Science and Technology Institute (ICTA) is a research centre belonging to the UAB, whose objective is to foster research and interdisciplinary training in the field of environmental science and technology. It was established on 17 April 2003 (DURSI Order, UNI/167/2003, DOGC) as a result of the transformation of the previous Environmental Studies Centre (1996). It is currently managed by Dr Louis Lemkow.

The ICTA has an interdisciplinary team of 155 specialists in natural and social sciences (17 professors and senior investigators and 84 pre-doctoral students) plus 15 technical and administrative staff members. The centre's investigators are from 20 different university departments, clearly demonstrating the organisation's multidisciplinary nature.

The Institute's mission is to promote and conduct research and to train investigators in order to better understand the environment and face the challenges arising from its interaction with society.

Its objectives are:

- To be a focal point for discussion and debate among investigators from different disciplines.
- To foster and promote interdisciplinary research in environmental sciences together with the different departments and research groups involved.
- To promote research programmes related to different aspects of the environment and related issues.
- To provide training in environmental sciences, coordinating Master's degrees and doctoral studies, plus continuing education in the field.
- To create a bridge between the university and society to encourage and promote social dialogue and consideration of the environment and territory.
- To provide a research structure, scientific and technical advisory services and socio-environmental management methodological tools.

The Institute's R&D activities:

- No. of investigators (with PhD): 61
- No. of current European projects: 28 (5 coordinated)
- No. of current national projects: 18
- No. of agreements with private and/or public enterprise: 49
- No. of patents: 1
- R&D budget: 3,852,000 Euros (2009)

### **Institut d'Estudis Espacials de Catalunya (IEEC)**

The IEEC (Centre for Space Studies) was established in 1996 in order to foster space R&D activities in Catalonia. The IEEC has focused on satellite applications, particularly in activities related to the scientific and volunteer programmes of the European Space Agency: Astronomy, Exploration of the Solar System and Fundamental Physics, on the one hand, and Observation of the Earth, Microgravity and Astrodynamics, on the other.

Under the 2006 by-laws, the IEEC comprises four institutes, ICC (UB), CERES (UAB), CRAE (UPC) and ICE (CSIC), some of which were created or consolidated in 2006 and started to work together in 2007.

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Activities on the UAB campus in 2008:

- SCI papers: 118
- Non-SCI publications: 66
- Theses presented: 3
- Guest investigators: 60 (short stays)
- Projects completed in 2008 (covering different years): 696,133 Euros
- Pending projects (covering different years): 3,070,820 Euros

### **Institut de Neurociències (INc)**

The UAB Neuroscience Institute (INc) is a research centre engaged in the study of the normal and pathological performance of the nervous system. It comprises cell biologists, physiologists, biochemists, pharmacologists, histologists, psychobiologists, psychologists, pathologists, linguists and experts in computational biology, providing a multidisciplinary setting that is the only one of its kind in Spain.

Research in the INc focuses on 3 major scientific programmes:

- Cell and molecular aspects of neurodegenerative processes
- Emotion, memory and mental disorders
- Regenerative and reparative neuroscience

The INc currently houses 83 investigators, is participating in 6 European projects, 51 national projects and 9 agreements with private businesses and has an R&D budget of 20,603,323 Euros (2006-2012).

### **Laboratorio de Proteómica CSIC/UAB (LP CSIC/UAB)**

The CSIC/UAB proteomics laboratory (LP CSIC/UAB, <http://proteomica.uab.cat>) is a PRUAB laboratory engaged in research related to protein expression in humans and other organisms, while providing a proteomics service to the scientific community and private enterprise.

The LP CSIC/UAB arose from the "Biological and Proteomic Mass Spectrometry (EMBP)" line of research at Instituto de Investigaciones Biomédicas de Barcelona (IIBB – Barcelona Institute of Biomedical Research) through an agreement between the National Spanish Research Council (CSIC) and Universitat Autònoma de Barcelona (UAB) for the creation of a shared laboratory in the UAB Research Park (PRUAB).

Since 1992, the EMBP (then known as the Structural and Biological Mass Spectrometry Unit), as well as its research activities, has provided support and special analytical services to both public and private institutions. These activities were then channelled through a Proteomics Service, which was officially established in 2005. This research group has been a pioneer in Spain in the application of combined liquid chromatography-mass spectrometry techniques for the analysis of biomolecules with Termospray (1985), Electrospray (1992) or Nanoelectrospray (1997) interfaces.

The LP CSIC/UAB is a member of Instituto Nacional de Proteómica (ProteoRed, <http://www.proteored.org> – National Proteomics Network) and is the coordinator of the Catalan node. The LP CSIC/UAB provides a range of technologies which cover practically all the problems related to the protein analysis and identification and is one of the most important Spanish proteomics laboratories. Work is currently being carried out on national R&D projects and agreements with public and/or private enterprise.

The LP CSIC/UAB personnel is mixed, with investigators and technicians hired through either the CSIC or the PRUAB. The LP CSIC/UAB currently has 90 m<sup>2</sup> of laboratory space in the School of Medicine and instruments valued at close to 2 million Euros.

### **Institut Barraquer**

The Barraquer Institute is a private scientific association established in 1947, which is engaged in research, the exchange of ideas and discoveries and, in general, fostering research in

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ophthalmology. It was awarded the “Creu de Sant Jordi” in 1986, the most important award granted by the Catalan Government to scientific and cultural organisations.

The Institute’s Professional Ophthalmology School, which depends on the UAB and is part of its School of Medicine, was officially opened in 1972. Every year, Instituto Universitari Barraquer programmes postgraduate training courses in ophthalmology, validated as UAB university credits. The Master’s degree and intensive courses are evidence of this. It also provides third cycle teaching as part of the doctorate programme.

An agreement was signed by the Institute and the UAB in 2000, creating the “Joaquim Barraquer” Research Chair in Ophthalmology. It aims to support ophthalmology research and teaching activities with guest investigators and lecturers, meetings coordination, publications and other activities.

### **Institut de Medicina Predictiva i Personalitzada del Cancer (IMPPC)**

The IMPPC, which opened on 25 June 2009, is one of the new research centres created as part of the Catalan government’s strategic plan to invest in research and construct a concentration of centres of excellence in Catalonia, in northern Spain. The Institute will be complemented by other centres involved in biomedical research in Spain, making a unique contribution. The IMPPC will investigate the genetics and epigenetics of cancer in order to discover the disease’s mechanisms. The goal is to provide information enabling predictive medicine and personalised therapy, for colorectal cancer initially and for other types of cancer in the future. Founded by: Regional Government of Catalonia, Regional Ministry of Health, Department of Innovation, Universities and Business. Collaborating agencies: Spanish National Research Council (CSIC), UAB, Badalona City Council, Catalan Health Institute (EQUIS), Hospital Universitario Hermanos Trias y Pujol (HUGTiP) and the Fundación Instituto de Investigaciones en Ciencias de la Salud Hermanos Trias y Pujol (FIICSGTiP).

Strategic research lines: Model systems in the genetics and epigenetics of cancer; tumour development and evolution mechanisms and genetic instability; experimental approaches to computational biology and genetic research; molecular epidemiology and genotyping in the population; molecular pathology and diagnosis and analytical tools in molecular oncology; genetic and epigenetic cancer risk modifiers; diagnosis of hereditary cancer. Technological platforms under construction: Genomics Unit, Computational Biology Unit, DNA Bank.

#### R&D figures

- Research groups: 8
- Research projects: 19
- Investigators (with PhD): 20
- Agreements with private and public enterprise: 6
- 2009 budget: 3 million euros

## **4. Justification of associations**

In this section, we provide the rationale for the membership of our associates, with special emphasis on the R&D centres, which form a singular aspect of the UAB and, therefore, of the UAB<sup>CEI</sup> project.

When explaining the complementary nature of the R&D centres operating in the UAB, we have to consider the reasons why they were created. In most cases, they were promoted by investigators working for the university itself in a bottom-up process.

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The process was similar in many cases: the most dynamic research groups at the UAB grew until they reached such a size that they needed room to expand and freedom of action in order to be more flexible and effective. They therefore suggested the creation of a centre, in line with the UAB's own philosophy. In some cases, alliances were sought with national research agencies such as the CSIC or specific agencies in a given area, such as the IRTA. In other cases, consortiums were created with the Catalan Government to seek the institutional and financial support required for these centres to grow and eventually become consolidated.

The complementarity and integration of these centres in the UAB is a natural consequence of their origin. They all have teaching and research staff from different UAB departments, and many of their directors or managers are also from the university's teaching staff. This is the case of the CNM, pertaining to the CSIC, promoted by UAB lecturers, where all its directors have been UAB professors. Likewise, in the case of the ALBA synchrotron, lecturers in the Physics Department were responsible for this initiative and they are now responsible for the project.

The creation of these centres has enabled us to enhance both research and teaching on the Bellaterra campus. In the research field, for instance, they have significant ability to attract talent, as they can hire foreign investigators using their own funds and making the most of their flexibility, as most of them are independent agencies. In other cases, talent is attracted by their international renown using public calls for investigators (Ramón y Cajal, ICREA or Marie Curie). Both the UAB and the centres benefit from this win-win situation which leads to collaborations derived from the synergies they create.

With regard to teaching, the initial results are already being seen in different subjects, such as astrophysics and astronomy, taught at the Institute for Space Studies. One of our most promising collaborations, however, is the creation of joint Master's degrees taught in English, such as the degree in Computer Vision and Artificial Intelligence taught by the Computer Science Department, the Computer Vision Centre and the CSIC Institute for Research on Artificial Intelligence.

Most of these centres have a long history of institutional collaboration with the UAB, starting with the initiative which led to teaching staff suggesting that they be created. This strategy has been maintained with their subsequent presence on their governing bodies and in their trusts. All these documented agreements are available for consultation on the UAB<sup>CEI</sup> website.

The geographical and organisational proximity of all the members of the UAB<sup>CEI</sup> has led the UAB to strategically consider its own role. As its neighbours include other more business-oriented infrastructures, with more space, such as the Vallès Technology Park (PTV) or the different industrial estates on the "B-30 corridor", it is evidently both advisable and logical to aim at specialising in first-class research activities, beginning by building what will eventually become a value chain, with special emphasis on the practical application and marketing of research outcomes. This orientation, and the possibility of reaching agreements with different agents in its area of influence (Vallès Technology Park, Administration and Service Centre in Cerdanyola, ALBA Park), makes it advisable for the UAB<sup>CEI</sup> project to have a clearly defined singular identity, oriented towards adding value to basic science, which should lead to an important contribution to territorial development.

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All this has created the opportunity for the UAB to define two priority strategic lines. Nearly all its fields of research, particularly strategic lines, are in line with those of the National R&D Plan, aimed at strengthening the sectors which, given their capabilities (based on an analysis of the impact of publications and citations) and opportunity (characteristics, segmentation of the business fabric and complementarity with the strategic objectives of the National R&D Plan and 7<sup>th</sup> European Framework Programme), will enable them to obtain the best possible results in R&D.

Below is a description of the most important collaborations between the UAB and the centres, starting with the priority strategic lines (nanoscience-nanotechnology, biotechnology-bioscience). We also describe our collaboration in other non-priority strategic lines.

### Priority strategic line 1: NANOSCIENCE AND NANOTECHNOLOGY

Research in this field is based on the UAB's solid tradition in Physics, Chemistry and Energy, with international recognition in high-energy physics, nanostructured materials, catalysis, nanoelectronics and theoretical physics. The associated centres play a very important role in this area, providing collaborative research and acting as contacts with industrial sectors.

In the next few years, this will probably be the most significant field for which the UAB and its area of influence is known, and could be definitive for its scientific-technological focus. The collaborative association with the UAB of the new nanoscience and nanotechnology centre, ICN-CIN2 (CSIC, UAB, Government of Catalonia), of the ALBA synchrotron, the ICMAB (CSIC) and CNM (CSIC), etc., will form a leading hub of activity in this field.

Principal lines of research:

- Nanostructured materials, nanoelectronics and superconductors
- Nanoparticles, catalysis, chemical functionality and reaction modelling
- Particle and high-energy physics

Centres: CNM, ICMAB, ICN-CIN2, IFAE, ALBA (CELLS), LLS, MATGAS, CRM<sup>4</sup>

Departments: Physics, Chemistry, Geology, Mathematics, Microelectronics and Electronic Systems, Electronic Engineering, Chemical Engineering, Telecommunications and Systems Engineering.

### Priority strategic line 2: BIOTECHNOLOGY AND BIOMEDICINE

The UAB provides a highly competitive environment for the development of translational research, thanks to its excellent basic and applied research groups, plus the clinical experience of the groups working in its associated hospitals and research centres.

Principal lines of research:

- Genomics, proteomics, computational biology
- Structural biology
- Gene therapy
- Oncology
- Neurodegeneration

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<sup>4</sup> The full names for these acronyms are found in the table with the associated centers list on page 9

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- Human reproduction
- Animal and human physiology

Related centres: CBATEG, CRAG, IBB, INc, LP (CSIC-UAB), BST, Hospital del Mar, I. Barraquer, I. Guttman, F. Puigvert, I.U. Dexeus, ICCG, ICF, IDIAP, IICS GTP, IMPPC, IQUASC-FAD, IRHSCSP, IRHUVH, IUFP.

Related departments: Cell biology, Physiology and Immunology, Biochemistry and Molecular Biology; Morphological Science; Surgery; Pharmacology, Therapeutics and Toxicology; Genetics and Microbiology; Medicine; Paediatrics, Obstetrics, Gynaecology and Preventive Medicine; Psychobiology; Psychiatry.

### INFORMATION AND COMMUNICATION TECHNOLOGIES strategic line

Research in information and communication technologies takes place in the UAB School of Engineering, with the collaboration of the department of Computer and Operative System Architecture, Information and Communication Engineering and Electronic Engineering, plus the departments of Journalism and Communication Science and Audiovisual Communication and Advertising and associated centres. The research groups are very active in international research projects and contracts with the business sector in a framework which fosters knowledge transfer.

Principal lines of research:

- Nanoelectronics, microelectronics and SW/HW platforms
- Computer architecture, parallel and distributed computing
- Data encoding and compression
- Standard communications and future networks
- Printed electronics
- Artificial intelligence and computer vision

Related centres: CVC, IIIA, PIC, CNM

Related departments: Computer and Operative System Architecture; Computer Science; Audiovisual Communication and Advertising; Information and Communication Engineering; Electronic Engineering; Microelectronics and Electronic Systems.

### ANIMAL HEALTH AND FOOD TECHNOLOGY strategic line

The long tradition of veterinary studies at the UAB has led animal and food science to become one of the university's primary strategic research assets, with exceptional capabilities for the development of projects in the field.

Principal lines of research:

- Functional foodstuffs and food technology
- Animal health and food safety
- Animal production and welfare
- Agrigenomics

Related centres: CRAG, CReSA, Torre Marimón.

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Related departments: Animal and Food Science; Animal Medicine and Surgery, Animal Health and Anatomy; Chemistry.

### ENVIRONMENT AND CLIMATE CHANGE strategic line

Environmental research at the UAB is clearly multidisciplinary and international. The UAB has helped to increase understanding of environmental processes, sharing the challenges facing society in a context of sustainability based on social responsibility.

Principal lines of research:

- Ecology, biodiversity and forestry applications
- Global and climate change, marine geoscience and oceanography
- Economics, sociology, public policies and responsibility
- Water and waste management
- GMES, use of land and territory and environmental information

Related centres: CREAM, ICTA, ETC-LUSI, CED, IAE

Related departments: Geography, Physics, Chemistry, Geology, Sociology and Law.

### SOCIAL SCIENCES AND HUMANITIES strategic line

The UAB was the Spanish university with the greatest involvement in the 6<sup>th</sup> European Framework Programme's social sciences and humanities plan, with its internationally recognised research groups.

Research in these fields has been primarily focused on the preservation of our artistic and cultural heritage, the development of social cohesion, better education and challenges for growth, competitiveness and the creation of employment, with special emphasis on applying knowledge to develop new technologies and methods for application in the area.

Principal lines of research:

- Social inclusion, cultural diversity and migrations
- Valuation of historic and cultural heritage
- Archaeology and palaeontology
- Economic and employment transformation
- Law and judicial technology: artificial intelligence and semantic web applications, information technology governance
- Educational policies and teaching and learning innovation

Related centres: CED, CEO, IAE, ICPS, IERMB, IGOP, IUEE, IEM, IBEI, IEDG.

Related departments: Social Sciences and Humanities departments.

The rationale behind the association of local councils with the UABCEI are generic and common to all universities' Campus of Excellence proposals.

As a campus university, however, the UAB has its own characteristics, such as:

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- It is integrated in the region and its impact is much greater than that of an urban university.
- It has to work together with local councils in relation to mobility issues.
- It has sports and cultural facilities which can be used by the local population when they are not being used by students and university staff.
- It has 200 hectares of green areas, woodland and gardens, for the enjoyment of local citizens.
- It offers many other facilities, such as libraries, cinemas, theatres and meeting places.

These complementary activities with local councils are in line with our interest in improving the quality of life of the population, as the UAB has a population that not only works on campus, but also lives there. Many of the facilities required by our local councils are available on campus, and viceversa, so they could all be used by both.

Other means of collaboration with local boroughs are the use of public transport (the UAB has two short-distance railway stations –RENFE and Ferrocarrils de la Generalitat de Catalunya– which are also used by the local population of Cerdanyola); support for the creation of new technology-based firms in the local areas (in which UAB has considerable experience), and collaboration in searching for jobs for our graduates, together with practical experience in companies from the surrounding municipalities.

UAB has a close relationship with private businesses in the area: a great deal of technology is concentrated on the B-30 corridor, known as the most dynamic in Catalonia. We are therefore able to establish relationships of great quality and diversity in terms of training, practical experience, research, patent licenses, the use of scientific-technical services and the conduct of different studies. In 2005-2007, for instance, the UAB established collaboration agreements and research contracts with 273 different companies, many of them established locally. At the same time, it established research agreements and contracts with 336 public agencies; many of them were also local. The UAB therefore makes a clear contribution to the region's business and territorial development.

The above companies and agencies are too numerous to list them all, but some of the agreements and contracts are included in the documentation provided.<sup>5</sup>

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<sup>5</sup> In light of the considerable number of companies and organisations concerned, these have not been specifically listed; however, certain agreements and contracts are detailed in the submitted documentation.