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Investment by the Generalitat of Catalonia in R&D (2001–2006): eighteen emblematic examples*

This article is a summary of the main current investments in R&D by the Generalitat (Government of Catalonia). The projects described do not comprise the totality of the Generalitat's R&D investment programme, but do represent the main economic investment, in building work and facilities, for the 2001–2006 period. The Generalitat's investment in R&D can be by way of any of a range of channels: direct investment in its own research centres or those linked to Government ministries, funding provided to the universities for improved R&D infrastructure, funding for other public and private institutions engaged in R&D work, etc.

1. General introduction

1.1 The importance of research to the development of Catalonia

In recent years, scientific and technological advances have become the most potent driving forces behind social change and economic development. University and research centre outcomes have brought enormous improvements in living conditions, wealth and development around the world, but especially in those countries which have done most to foster research and harness its results. In the 21st century, leadership will lie in the hands of those societies capable of adapting to new realities and effectively competing in the world market with the assets they have generated themselves.

Universities and research centres explore and develop new concepts and realities and extend the bases of our knowledge. New knowledge spreads through the scientific community and is passed on to graduates who, in turn, introduce it into the workplace, whether in government, private industry or the university itself. This knowledge is then developed and applied, sometimes to problems of general interest and for improved administration of public services, sometimes to development of new goods and services which foster economic development and which change and enrich the daily life of individuals and the community.

A high regional concentration of educational and R&D activity and innovative industries, alongside availability of intellectual resources and a solid entrepreneurial culture cannot fail to attract further investment which, in turn, serves to stimulate further technological innovation and economic development.

1.2 Private research Vs public research

A range of factors confirm the need for public investment in technological research and development.

As an economic activity, research is characterised by two specific features which mean that basic knowledge constitutes a typical "public asset". Firstly, unlike other assets, nobody can be excluded from its use. Its use can only be conditioned by previously acquired knowledge; the second, the collective benefits tend in general to be much greater than in the case of other assets. As a result, public investment in research is justified, desirable and indispensable.

In addition, the risks associated with certain science projects, mainly in the sphere of *big science*, which require major capital investment in equipment and infrastructure, mean that it is the public sector which is best positioned to provide support and funding, or undertake long-term programmes whose benefits will not become apparent in the short term. Further, once such public investment has begun, whether in space research or fine chemistry, the wider society immediately benefits from the knowledge indirectly derived. Thus, public investment in research not only stimulates private investment in the commercial use of new technologies and discoveries, but also opens a gateway for further research which may lead to additional knowledge.

1.3 Catalan Government investment in R&D infrastructure

For all these reasons, the Generalitat's Third Catalan Research Plan 2001–2004, provides for research infrastructure investment to a total of 90 M€ over four years and other measures in a bid to rapidly close the distance separating Catalonia from Europe's and the world's leading R&D regions.

Specifically, the Research Plan aims to "foster growth and

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improvement in science and technology by means of [...] provision and maintenance of the necessary infrastructure [...].” It establishes two programmes to achieve this objective: a “Research Centre Programme (3.5.2)” and a “Research Infrastructure Programme (3.5.3)”.

By investing in research infrastructure, the Generalitat aims to enable Catalonia to make an effective, well-planned leap, both quantitatively and qualitatively, in R&D, and in development of Catalan science and technology. The overall purpose is to equip Catalonia to respond to emerging demands and needs in an increasingly competitive and demanding world.

1.4 Main projects

The Generalitat's investment in R&D can be through any of a range of channels: direct investment in its own research centres or those of Government ministries, funding provided to the universities for improved R&D infrastructure, funding for other public and private institutions engaged in R&D work, etc. This article sets out to provide a summary of the current main R&D investments receiving direct funding from the Generalitat. It does not include all the Generalitat's R&D investment projects, only those which constitute the main economic investment, in building work and facilities, for the 2001–2006 period. Similarly, investments made before the year 2001 are not described and nor are those which have yet to be fully defined, such as the possible participation of the Generalitat in the Barcelona Biomedical Research Park (PRBB) or the establishment of the new Nanotechnology Research Centre.

The main projects, i.e., those described in this article, can be divided into those affecting already existing research centres; new research centres (established between 1999 and 2003); and finally, certain specific infrastructures.

In the first category, the work involves extension, adaptation or construction of new facilities which are necessary for improvement or maintenance of the centre's ongoing R&D work. Examples include the work on the Research Centre for International Economics (CREI), the UdL-AGRI-FOOD Centre, the Meat Technology Centre (CTC), the Trias i Pujol Health Science Research Institute, the August Pi i Sunyer Biomedical Research Institute (IDIBAPS) and the Vall d'Hebron University Hospital Research Institute. Of these research centres, the two oldest (the UdL-IRTA Centre and CTC), are Institut de Recerca i Tecnologia Agroalimentàries –*Agri-Food Research and Technology Institute* (IRTA) centres. The IRTA is a public research organism associated with the Ministry of Agriculture, Livestock and Fisheries (DARP), while the other four are independent research centres: the Trias i Pujol Health Science Research Institute and the Vall d'Hebron University Hospital Research Institute are two of the Catalan Health Institute (ICS) hospital foundations responsible for hospital research and the other two (CREI and IDIBAPS) are public consortiums, with participation by the Generalitat.

In the case of the newer centres, the work involves building or adaptation of facilities and provision of equipment. This is the case of the Animal Health Research Centre (CReSA), the Gene Regulation Centre (CRG), the Telecommunications Technology Centre of Catalonia (CTTC), the Catalan Institute for Classical Archaeology (ICAC), the Catalan Institute for Cardiovascular Sciences (ICCC), the Catalan Institute for Chemical Research (ICIQ), the Photonic Science Institute (ICFO), the Geomatics Institute (IG) and the Internet Interdisciplinary Institute (IN3). With the exception of the latter (which is part of the Open University of Catalonia), all of these are independent institutions. The majority (CReSA, CRG, CTTC, ICIQ, ICFO) are foundations, and three (ICAC, ICCC, IG) are public consortiums.

The specific infrastructures include the Barcelona Science Park (PCB) promoted by the University of Barcelona and already operational. Science Parks, generally located within the hinterland of a university or in areas with high concentrations of research activity, aim to foster generation and transfer of knowledge by means of integration of scientific, technological and entrepreneurial interests. Part of their role is to function as support instruments to local industry by facilitating links between the university and business, thus improving the competitiveness of both.

A major infrastructure, not only on Catalan but also on European scale is the Vallès Synchroton Light Laboratory: the project brings together a multiplicity of scientific and technological interests and aims to service an extensive area of south-western Europe.

Finally, the Montsec Observatory-Universe Observation Centre (OAM-COU) aims to promote astronomical observation and integrate this science into a leisure programme aimed at society in general and especially at the young. In the mountain setting of Montsec, the initiative also serves to provide a valuable economic and cultural stimulus.

1.5 Recipient disciplines and regional distribution

The recipient disciplines constitute a wide range of areas of endeavour. Life and health sciences figure prominently, both in the more basic areas (Gene Regulation Centre), and in biomedical applications (ICCC, IDIBAPS, the Hospital research foundations, and several of the CRG's research areas, veterinary science (CReSA, UdL-IRTA) and agri-food science (UdL-IRTA, CTC); Barcelona Science Park (PCB) is also active in the field of biomedicine.

Physical sciences and their technological applications are also central, including the Synchroton Light Source, the ICFO and IG on one hand, and the CTTC on the other, to which the OAM-COU could also be added in that it calls for highly specialised observation infrastructure. Social sciences are represented by the CREI and IN3, humanities by the ICAC and chemistry by ICIQ.

The investments cover the whole of Catalonia, from the Vallès Occidental to Pallars Jussà and from Baix Empordà to Tarragona, taking in nine municipalities in nine different regions. The CREI, CRG, ICCC, IDIBAPS, the two hospital foundations and the PCB are all located in the Barcelona area; the CTTC, IN3, ICFO and IG are located in the Baix Llobregat while in the Vallès Occidental we have the CReSA

and the Synchroton Light Laboratory. The ICAC and ICIQ are based in Tarragona; the UdL-IRTA is in Lleida and the CTC will have facilities in Girona and in Monells (Baix Empordà). Finally, the OAM-COU will lie between the Noguera and Pallars Jussà areas.

1.6 The main projects and their funding

As already pointed out, this article does not describe the totality of investments in R&D by the Generalitat, but only the most significant projects funded within the current planning period.

The costs of R&D investment in bodies other than those set out here are not included, and neither are current investments in Generalitat bodies which are less than one million Euro.

Once again, the aim is to set out the main R&D investments by the Generalitat and not to provide a list of the main centres carrying out R&D work in Catalonia, many of which already enjoy optimum operating conditions and facilities, and whose growth and optimisation is planned on a more progressive basis.

It must also be pointed out that the level of definition in sums mentioned also varies. In most cases, the projects described have been approved, or may even be in progress, andhave been given a formal undertaking for funding. In other cases however, the figures quoted may correspond to estimates subject to modification as projects develop.

The investments described in this article for the 2001–2004 period total 191 M€. However, given than in many cases, the investment in building work and, especially in scientific equipment will continue beyond the period in question –until 2006, the overall investment required rises to 287 M€ (corresponding to roughly equal parts for construction work and scientific equipment). It must also be borne in mind that the building work on the Synchroton Light Laboratory will continue until 2008 so that the final total investment will be still higher.

The bulk of the funding listed (65% of the total) is provided by the Generalitat of Catalonia, through a variety of payment formulas. Transfers from ERDF (European Regional Development Funds) assigned by the Generalitat over the applicable period are included (total value: 34.5 M€).

The remaining funding comes mainly from the central Spanish government (including ERDF resources assigned via the Spanish Ministry of Science and Technology) and from the Catalan universities.

Table 1. Main investments in R&D infrastructure (data in million €)

	Investments either projected or executed 2001–2006 period				
Centres/Facilities	*Completed 2001–02*	*Projected 2003–04*	*Sub-total 2001–04*	*Projected 2005–06*	*TOTAL 2001–06*
Research Centre for International Economics *(CREI)*	0.00	1.86	*1.89*	0.12	1.98
UdL – Agri-Food Centre *(UdL-IRTA)*	0.07	2.34	*2.42*	1.79	4.21
Animal Health Research Centre *(CReSA)*	4.33	9.95	*14.28*	0.84	15.12
Gene Regulation Centre *(CRG)*	5.93	2.23	*8.16*	4.47	12.62
Meat Technology Centre *(CTC)*	0.59	5.35	*5.94*	2.98	8.93
Telecommunications Technology Centre of Catalonia *(CTTC)*	0.62	8.80	*9.42*	4.90	14.32
Synchroton Light Source	0.00	24.43	*24.43*	58.72	83.15
Catalan Institute for Classical Archaeology *(ICAC)*	0.06	1.69	*1.75*	1.00	2.75
Catalan Institute for Cardiovascular Sciences *(ICCC)*	1.97	7.30	*9.28*	0.66	9.94
Catalan Institute for Chemical Research *(ICIQ)*	3.78	20.54	*24.32*	3.84	28.16
Trias i Pujol Health Science Research Institute*	0.00	4.90	*4.90*	0.00	4.90
August Pi i Sunyer Biomedical Research Institute *(IDIBAPS)*	6.69	12.07	*18.76*	7.77	26.53
Photonic Science Institute *(ICFO)*	1.10	9.12	*10.22*	7.52	17.73
Geomatics Institute *(IG)*	0.53	1.91	*2.44*	0.21	2.64
Vall d'Hebron University Hospital Research Institute	2.14	2.27	*4.40*	0.00	4.40
Internet Interdisciplinary Institute (IN3)	1.73	7.48	*9.21*	1.20	10.41
Montsec Observatory-Universe Observation Centre *(OAM-COU)*	0.50	4.00	*4.50*	0.00	4.50
Barcelona Science Park *(PCB)*	31.77	2.94	*34.71*	0.00	34.71
Total investment in building work and scientific equipment	*61.82*	*129.18*	*191.00*	*96.02*	*287.01*
Subtotal investment in building work (including equipment and facilities)	36.28	77.33	*113.61*	30.41	144.02
Subtotal investment in scientific equipment	25.54	51.85	*77.39*	65.61	142.99
Total investment in building work and scientific equipment	*61.82*	*129.18*	*191.00*	*96.02*	*287.01*

* Investments allocated in 2003-2004 period correspond to years 2002-2004

2. Main investments in R&D centres and other fixed research infrastructure

The eighteen research centres and facilities described below account for the bulk of the Generalitat's R&D funding for the 2001–2006 period.

A general contextual description is provided for each, including the importance of the research activity, a listing of the scientific disciplines involved in the research and the programmes and research areas, the facilities, human and material resources, and, finally, the funding provided or scheduled for the 2001–2006 period and the source of this funding.

Research Centre for International Economics *(Centre de Recerca en Economia Internacional – CREI)*

Established by Generalitat decree in 1994 (modified in 2001), the CREI is a consortium designed to promote high quality research in international economics and macroeconomics in the widest sense. The consortium partners are the Generalitat of Catalonia, via the Presidential Department and the Ministry of Universities, Research, and the Information Society, and Universitat Pompeu Fabra.

Context

In-depth and wide-ranging knowledge of the characteristics and transformations taking place in international economics is a valuable tool in today's competitive world. The CREI came about due to a meeting of two lines of development. One, the outcome of international and particularly European economic developments, which led to a situation of new challenges and uncharted territory for dynamic regions such as Catalonia. The other, the situation deriving from recent developments in economic theory, which led to a revitalisation and intertwining of fields which had hitherto been highly segmented.

The CREI aims not only to promote research of the highest academic standard and become a leader in its areas of specialisation (international economics and macroeconomics), but also, in line with its origin, location and spirit, it sets out to emphasis the European dimension of these fields of study. In addition, the CREI takes international economics and macroeconomics in the widest sense of the terms and includes such issues as growth, monetary economics, macroeconometrics and economic geography among its areas of study.

Through its research work, the CREI aims to contribute to an improved understanding of the functioning of the economy in contemporary society, so as to improve design of policies and institutions to foster economic growth and eventually citizens' welfare.

Scientific activity

The CREI aims to become a leader in its areas of specialisation. In addition to its research functions, it also aims to serve for education purposes and dissemination of new ideas in economics. The Centre's research areas are the following:

- Monetary policy, inflation and macroeconomic stability
- International capital movement
- International trade and development

The CREI organises periodical seminars and scientific conferences of the highest level. The Centre's researchers publish in the most prestigious international journals in their respective fields.

Resources

At present (January 2003) the CREI has three fulltime researchers and a further four associated researchers. The Centre is based at the Jaume I building, in the Department of Economics and Business premises on UPF's Ciutadella Campus.

In June 2001, the Generalitat of Catalonia and UPF signed an agreement for a strategic plan including employment of 12 fulltime researchers between 2001 and 2006 and development of a new 1,300 m^2 headquarters in the Ciutadella Campus.

Total funding and funding source

Estimated investment required to cover the CREI premises in the new building amounts to 2 M€ for the 2002–2006 period. Of this figure, 1.5 M€ corresponds to building work and 0.5 M€ to scientific equipment. Funding will come from DURSI resources. It is estimated that building work will be completed by mid-2004.

The UdL-IRTA Agro-Food Research Centre *(Centre UdL-IRTA)*

The UdL-IRTA Centre was established as a mixed research institute by the University of Lleida (UdL) and the Agri-Food Research and Technology Institute (IRTA), a public research body linked to the Generalitat of Catalonia's Ministry of Agriculture, Livestock and Fisheries. In March 1999, both institutions signed an agreement updating and revising the original agreement establishing the centre in 1984.

Context

The main objectives of the UdL-IRTA Centre are to improve the competitiveness of the agri-food and connected sectors. These efforts are first and foremost concentrated in the Lleida region, where the agri-food sector is a main support pillar for all development strategies in the context of the global market and the information and communication technologies (ICT) revolution.

Two of the Centre's research units study the main crops grown in the region surrounding the University of Lleida: dry crop cereals and fruit. However, this local focus has not prevented the Cereal Genetics Group from becoming the leading Spanish group in this field with numerous links and contracts with the Spanish seed industry, while the Fruit Production Group also has many international links, and in conjunction with Californian and Australian specialists, constitutes the only international working group on efficient water use in cultivation of ligneous crops in Mediterranean type conditions.

In addition, the Centre's Animal Genetics Group, in keeping with the importance of Catalan pig farming –especially in the province of Lleida, is one of the two most prestigious groups in Spain in the field of pig genetics and directs and manages the Spanish Pig Farming Database for the Spanish Ministry of Agriculture, Fisheries and Food.

Scientific activity

The Centre's research work is carried out by five specialised units –comprising UdL teaching staff and IRTA researchers. The areas of study are as follows: intensive cropping, fruit farming, postharvest, crop protection and animal genetics.

In the area of intensive cropping, the main focus is on selection and genetic improvement of cereals (wheat, barely and triticale or rye). In fruit cultivation, the main work is in the area of development and application of systems for efficient water use in Mediterranean climatic conditions (summer drought). The postharvest unit studies cold storage of fruit and vegetables and biological control of storage epidemics. The crop protection unit also studies integrated biological control of disease in cereals and fruit trees.

Finally, the work of the animal genetics group is especially addressed to genetic selection and improvement in pigs.

Resources

Total staff at the UdL-IRTA Centre numbers one hundred: 61 researchers, 31 support staff and eight students and scholarship holders.

The Centre occupies two buildings (total surface area: 2,000 m^2) in close proximity to UdL's School of Agricultural Engineering and Technology Transfer Centre. The Centre also has 235 m^2 of greenhouses, and test fields located throughout Catalonia. Its computer staff are highly qualified and well equipped.

At present, the UdL-IRTA Centre is extending and improving its already existing laboratories and plans to build new premises for mixed research units comprising Centre staff and external companies, especially in the fields of food safety and animal production.

Total funding and funding source

The total cost of this investment is 4.2 M€ for the 2001–2006 period, half of which corresponds to building work and half to equipment. DURSI will provide 100% of the funding. Of this, 2.1 M€ is from European funds (ERDF). Building work started in 2002. The first phase should be completed before the end of 2003, and the remainder by the end of 2004.

Animal Health Research Centre *(Centre de Recerca en Sanitat Animal – CReSA)*

Established in December 1999, by Universitat Autònoma de Barcelona (UAB) and the Agri-Food Research and Technology Institute (IRTA), the Animal Health Research Centre is a foundation which carries out its own publicly-funded R&D programmes in the area of animal health, and also R&D&I programmes for other companies and government bodies, adhering to the highest standards of quality control, laboratory practice and confidentiality.

Context

Technology transfer and practical application of research results in a centre such as the CReSA requires continuous interaction with the relevant sectors. For this purpose, an advisory council was established comprising sector and producer representatives willing to undertake this role for a five-year period. At present, a total of seven companies are represented on the board, along with two foundations and five producers' groups.

The CReSA has also signed a cooperation agreement with the Valdeolmos Animal Health Research Centre (CISA) (Madrid), a biosafety laboratory which is part of the National Agricultural Research Institute (INIA). The CISA has played an active role in discussions concerning the new CReSA facilities and both centres share a number of research projects.

Scientific activity

The CreSA's research work ranges from epidemiology of zoonosis to the molecular biology of infectious agents, including pathogenic studies, immunology, population risk factors, development of new diagnostic techniques, new products for immunological control of infections (vaccines), establishment of experimental infection models, drug tests and infection control through modification of production systems. The CreSA also runs training courses, programmes and seminars.

Resources

Since 2002, CReSA staff has numbered 43: 25 researchers and six PhD students, two technical staff and two administrative support staff.

The CReSA is provisionally based at Building V (Veterinary Science Faculty) at the UAB Bellaterra campus until building work on its new headquarters is complete. The UAB Veterinary Faculty's Microbiology Unit also works in cooperation with the CReSA. The IRTA's Animal Health Unit, which has also been integrated into the CReSA, is provisionally located at the Ministry of Agriculture, Livestock and Fisheries (DARP) laboratory in Barcelona's Zona Franca.

The new building is complex, and has been designed to contain microorganisms to a high standard of biosafety (level 3). This enables the Centre to work with microorganisms which represent a serious risk of infection both for other animals and humans, without the risk of these microorganisms spreading outside the building. Such work could not take place in Catalonia to date, due to a lack of adequate facilities. The CReSA will now be in a position to safely carry out research into the virulent pathogens responsible for serious animal disease.

The new facilities will also have a dynamic effect on animal health research in general, by drawing together the groups which are currently dispersed throughout Catalonia. Application of good laboratory and clinical practices will

also enable collaborative work with animal health drug producers.

Total funding and funding source

Estimated total investment required for construction of the new CreSA totals 15.1 M€ for the 2002–2006 period. Of this total, 7.8 M€ corresponds to building work and 7.3 M€ to the cost of technical equipment.

The funding will be drawn from a range of sources: DURSI will contribute approximately 72% of the total, the remainder coming from state funds (ERDF), UAB and the IRTA. Building work started in 2001, and is planned to reach completion in 2003.

Gene Regulation Centre *(Centre de Regulació Genòmica – CRG)*

Established in July 2000 by the Generalitat of Catalonia through the Ministry of Universities, Research and the Information Society, the Ministry of Health and Social Security, and Universitat Pompeu Fabra, the Gene Regulation Centre (CRG) is a foundation which aims to become an international leader in basic and applied biomedical research in gene regulation and proteomics.

Context

Genomics has made advances in recent years which until now would have been unthinkable. It has become one of the leading edge academic disciplines, and is expected to make major contributions in a range of applications, from prevention and curing of illness to food production. The EU VI Framework Programme for Technological Research and Development sees genomics and biotechnology as among its priorities and the number of research centres in these fields is rising rapidly in all developed countries.

The CRG will become a knowledge production centre of the highest calibre. Along with the other scientific, health and teaching institutions located at the future PRBB, it will enrich our knowledge of biomedicine and contribute to concentration of research in these fields along Barcelona's coastal zone.

Scientific activity

The CRG's activities are organised in the form of research programmes. Four of these programmes are already in operation (gene regulation, bioinformatics and genomics, cell differentiation and cancer, and genes and illness); a fifth (cell biology and development) is presently at the planning phase.

The first programme is concerned with the most basic and mechanical aspects of gene expression. The second concerns study of the specific needs in terms of acquisition, storage, analysis and integration of the data generated by genomic research; three researchers are currently working in this area. The third programme involves study of adult mother cell differentiation and its relation with cancer. The fourth, previously worked on at the Institute of Oncological Research (IRO), focuses on human molecular genetics. The fifth programme will study developmental biology employing advanced microscopy and photonic techniques which permit observation of macromolecular interactions in living cells.

Resources

The gene regulation programme presently employs 32 researchers (including the Centre Director), divided into six working groups. The bioinformatics and genomics programme has a staff of five researchers. The genes and illness programme, already active at the Oncological Research Institute (IRO), has a staff of 30 researchers, organised into five research groups. The cell differentiation and cancer programme has now started and is staffed by a coordinator and three group leaders; one of these groups, comprising eight researchers, is already fully operational. Total staff amounts to almost 80 researchers.

The CRG first started work in 2001 in provisional premises provided by UPF and, since June 2002, has occupied a rented premises on the first floor of the Mediterranean Marine and Environmental Research Centre (CMIMA) building on Barcelona's Passeig Marítim. Beside this building, the Barcelona Biomedical Research Park (PRBB) is being built, where it is planned to locate the CRG in 2004, along with the Municipal Institute of Medical Research (IMIM) and UPF's Department of Health and Life Sciences. This will facilitate concentration of high-level research work enabling optimum utilisation of resources, coordination of scientific programmes and development of potent synergies.

Total funding and funding source

The cost of renovation and adaptation work on the various premises occupied by the CRG since its establishment and the equipment which will be necessary in the future amounts to 12.6 M€ for the 2001–2006 period. Of this, 3.2 M€ corresponds to building work, and the remainder –9.4 M€– to the cost of scientific equipment.

The funding is provided by DURSI and the Catalan Ministry of Health and Social Security and also, to a lesser extent, other competitive capital funds. Renovation work on the CRG's provisional premises took place in 2001 and 2002.

Meat Technology Centre *(Centre de Tecnologia de la Carn – CTC)*

The Meat Technology Centre is part of the Agri-Food Research and Technology Institute (IRTA) and is based at the Camps i Armet farm, spread over the municipal areas of Cruïlles, Monells and Sant Sadurní de l'Heura. The farm itself has been owned by Girona Provincial Council since 1939 thanks to the legacy of Carles Camps i Armet (1857–1939) and had been the location since 1970 for the Carles Camps Farm-School, today the Escola de Capacitació Agrària de l'Empordà. The Catalan Ministry of Agriculture, Livestock and Fisheries established the Catalan Meat Institute in 1979, which became part of the IRTA on the latter's foundation in September 1985. In January 1986, it was renamed the *Centre de Tecnologia de la Carn* (Meat Technology Centre).

Context

The CTC is part of the Food Technology Reference Centre (CeRTA) network, and its director is the CeRTA coordinator. The network includes IRTA centres and a range of Catalan universities (UB, UAB, UdG, UdL and URV). For some months now, the network is also responsible for coordination of the Centre for Scientific and Technological Competence in Meat Processing (CECOT-PTC) which is the state-wide equivalent of CeRTA.

The meat industry is Catalonia's second most important food industry in terms of added value (second to bread, pastries, sugar and cacao). Companies in the meat sector are aware that innovation is the key to competitiveness and this demands research, creation of new products, and solid scientific and technological services capable of carrying out contract research, testing, quality control and providing technical advice.

In addition, the *Campus Agroalimentari de Girona* (Girona Agri-Food Campus), in which it is planned to integrate the CTC, will be equipped with the most advanced technologies in the field. With implementation of the EU's VI Framework Programme for Technological Research and Development it is also important to avail of advanced infrastructure if we are to develop centres of excellence at European scale.

Scientific activity

The CTC aims to develop research which will provide a technological basis for the meat industry and associated sectors in such areas as quality assurance, meat production technology, machinery and equipment, biochemistry, microbiology and analytical technology, sensorial analysis and total quality management. The Centre's work is organised into four R&D units: carcass and meat quality, food industry chemistry, food processing technology and food industry biotechnology.

Resources

At present, the Meat Technology Centre employs a staff of 40: 20 researchers, 18 support staff, and 5-6 postgraduate scholarship students.

The Centre occupies a building with a surface area of 2,600 m^2. Of this, 650 m^2 are laboratories, 850 m^2 are given over to a pilot plant for meat production and the remaining 1,100 m^2 are occupied by offices, a library, administrative and auxiliary areas.

Current investment projects include construction of a new, cutting edge experimental meat production pilot plant and development of equipment and machinery for the meat industry to be located at Monells, alongside the present facilities. In addition, it is also planned to establish a unit for new meat processing technologies under control of the University of Girona and based at the Girona Agri-Food Campus, both in Monells and in Montilivi, in Girona city.

Total funding and funding source

It is estimated that the total cost will amount to 8.9 M€ for the 2001–2006 period. Building work will account for 3.7 M€ of this, while scientific equipment will cost 5.2 M€.

Funding will be drawn from DURSI funds (26%, basically from ERDF resources) the University of Girona, and the Spanish Ministry of Science and Technology (50%) in keeping with the terms of an agreement signed to this effect. The Centre is to be built over the 2001–2005 period.

Telecommunications Technology Centre of Catalonia *(Centre Tecnològic de Telecomunicacions de Catalunya – CTTC)*

The Telecommunications Technology Centre of Catalonia (CTTC) is a research foundation established in June 2001 by the Generalitat of Catalonia's Ministry of Universities, Research and the Information Society, in collaboration with the Technical University of Catalonia (UPC) and Universitat Ramon Llull (URL). The aim was to establish a leading research centre in the field of telecommunications technology.

Context

Telecommunications technology research is expanding rapidly worldwide, both in the public and private sector, and the field will play a central role in socioeconomic transformations over coming years just as it has for the last 20 years, which were a veritable golden age for telecommunications.

Catalonia was to the forefront of the electronic instrument industry in Spain in the 1970s; however, the advent of the microprocessor at the close of that decade and an unwillingness to invest in technological development led to the practical disappearance of the sector.

Even today, the number of Catalan companies producing telecommunications equipment is low. Therefore, the conditions must be created which will permit emergence and consolidation of an information and communication technology (ICT) sector which could become one of the driving forces of the Catalan economy and a benchmark for quality and prestige in the information and knowledge society. This is the aim of the CTTC through a combination of scientific coordination, technological perspective and development engineering.

Scientific activity

The CTTC aims to become an international benchmark for conception, design and execution of innovative R&D projects both in scientific terms and in terms of engineering, mainly in the area of communication subsystems, radio communications, access technologies, optical networks and IP technologies. In collaboration with other European centres, work has begun on a number of research projects in the field of radio communications and fibre-optic networks, including communication subsystems.

The establishment of the CTTC will provide a setting for doctoral or post-doctoral training in R&D and will contribute to eliminating the gap between doctoral level studies and industry. This would also constitute an injection of energy for the revival and growth of Catalan industrial fabric in the telecommunications sector. It will also serve to contribute to anchor the R&D work of the large transnational corporations in Catalonia, by providing a guarantee that through proximity to the Centre they would have a reliable partner for R&D

work and a source of research staff for their own development work.

Resources

At present, CTTC scientific staff includes 20 researchers. Since September 2001, the CTTC has been provisionally based at a 450 m^2 premises on the second floor of the Nexus 1 building on UPC's North Campus. The building includes laboratories, meeting rooms, a multi-use room and offices. The Centre's scientific equipment is still limited. Growth will take place in stages, in keeping with the availability of research teams and space. In addition, scientific and technical services are shared with neighbouring institutions, mainly UPC and URL. A new building with a total surface area of 3,500 m^2 is planned for the Mediterranean Technology Park at Castelldefels.

Total funding and funding source

The costs of the new building and the equipment needed for its functioning (since the start of its activity) total some 14.3 M€. Of this, 5.2 M€ corresponds to building work, and 9.1 M€ to equipment. Funding will be from DURSI. A total of 4.9 M€ will be drawn from ERDF funds. It is planned that building work will start in 2003 and be completed in 2005.

Synchrotron Light Source *(Font de Llum de Sincrotró)*

In March 2002, the Generalitat of Catalonia and the Spanish Ministry of Science and Technology signed a protocol for construction, equipping, and operation of a synchrotron light source. Funding will be in equal shares between both governments. One year later, on 14 March 2003, an agreement was signed to establish a new consortium with participation by both the Spanish and Catalan governments for construction, equipping and operation of a Synchrotron Light Source on a site at the Cerdanyola del Vallès Strategic Centre.

Context

Use of Synchrotron Light Sources has risen dramatically over recent years. From insignificant numbers some 30 years ago, there are now thousands of users, and this upward trend shows no sign of abating.

Until now, neither Catalonia nor Spain had undertaken development of a Synchrotron Light Source, although Spain does have a 4% share in the European Synchrotron Radiation Facility (ESRF) at Grenoble and has its own beam-line thanks to an agreement between CICYT and CIRIT. The capacity of this line is not sufficient however, to cover the needs of all potential present Spanish users, not to mention future users.

Through acceleration of electrons in a large ring at speeds nearing the speed of light, electromagnetic waves are generated known as *synchrotron light*, which have numerous applications in non-destructive structural and property analysis of any material, making the Synchrotron Light Source a highly useful instrument both in fundamental and applied research.

As a result of a 1992 viability study, in 1993 the Generalitat of Catalonia incorporated construction of a Synchrotron Light Source into its research planning. The source would service the numerous and ever-growing body of users in south-western Europe and, especially, Spain. In 1993, the Synchrotron Laboratory Promotional Committee was established. The Committee reported in December 1997.

At the same time, the Generalitat, through DURSI, and Universitat Autònoma de Barcelona established the Synchrotron Light Laboratory Consortium in July 2000, provisionally based at the High Energy Physics Institute on the UAB campus. The objective of the consortium was to collaborate in ESRF (Grenoble) projects; measurement of their own and other laboratories and research centres' magnetic components; fostering the use of synchrotron light (SL) provided by other countries and establishing research lines related to synchrotron light.

Scientific activity

The project provides for funding for five independent beam-lines, even though the characteristics of the facility would permit up to thirty lines. The facility's capacity will be increasingly harnessed over the course of its life cycle in order to cater for needs in Catalonia, Spain and a large area of south-western Europe. The five initial lines will be used for research purposes in biology, biotechnology, chemistry, physics, materials science and industry.

Resources

It is planned to construct an electron accelerator with conventional magnets, forming a ring of 250 m circumference which will be lodged in a circular building with external radius of 65 m and 6 m high. This building will also house the beam-lines and their associated experimentation stations. It will be equipped with all conventional services (water, gas, electricity, telephone, digital networks, air-conditioning) and other services necessary for specific uses (dry nitrogen, inert gases, cryogenic gases, compressed air, etc.). Temperature and humidity control will have to be particularly strict. The scientific and administrative activity will required a total surface are of some 3,200 m^2, while technical services will occupy an additional 1,500. The electric substation and the refrigeration tower will require a further 1,000 m^2. When in full operation, the facility will require a total staff of approximately 125 persons.

Total funding and funding source

Estimated investment for construction of the Synchrotron Light Source is 163.9 M€ and the work will take place over the 2003-2008 period. Work taking place up until 2006 will cost 83.1 M€. Total funding will be provided equally by DURSI and the Spanish government.

Catalan Institute for Classical Archaeology *(Institut Català d'Arqueologia Clàssica – ICAC)*

Established in May 2000, the Catalan Institute for Classical Archaeology (ICAC) is a consortium comprising the Generalitat of Catalonia, via the Department of Universities, Re-

search and the Information Society, and Universitat Rovira i Virgili (URV). The Institute's aim is to promote research, advanced training and dissemination of Classical culture and civilisation through collaboration and development of synergies with the universities and Catalan research institutions in this field, with a view to becoming an international benchmark.

Context

Classical archaeology has a long tradition in Catalonia and the 20th century has seen major researchers in the field. In addition, the discipline has advanced greatly in recent years with the application of new legislation governing our archaeological heritage, which has enabled and indeed made necessary scientific study of numerous sites.

The ICAC is based in the historic centre of Tarragona, in the ancient forum marketplace – a building provided by URV. The importance and great scale of Tarragona's archaeological heritage, it being the site of the ancient Tarraco, provincial capital of the Roman empire, has led to the establishment of an important Archaeology Museum, and more recently to the city's being declared a UNESCO world heritage site.

The central location of the ICAC headquarters, near the Archaeology Museum and the majority of the city's main Roman monuments, make the Institute an important feature for the city's residents as well as for professional archaeologists.

Scientific activity

The ICAC's research work is not limited to the ancient Tarraco however; their mission covers classical civilisation in general. It is planned to send researchers to other international centres and to participate in joint projects. In particular, it is planned to study not only Roman but also Greek archaeology and to establish cross-sectional projects harnessing the latest technologies in archaeological science.

Resources

Work completed so far has included supervision of the adaptation and refurbishment of the Institute's headquarters and preliminary organisation of staff. The Institute now has the minimum necessary administrative structure. It is planned that research staff will include contracted and associate researchers and scholarship holders and that the prestigious international scholars will be contracted as visiting fellows. The Institute will also be in a position to contract support staff as determined in the guidelines established by the Management Council.

Total funding and funding source

The cost of refurbishment and adaptation of the Institute's headquarters and the necessary scientific equipment will total approximately 2.7 M€ for the 2001–2006 period. Of this, 1.1 M€ will correspond to building work and 1.6 M€ to the cost of scientific equipment. Funding will be provided exclusively by DURSI.

Catalan Institute for Cardiovascular Sciences *(Institut Català de Ciències Cardiovasculars – ICCC)*

The Catalan Institute for Cardiovascular Sciences (ICCC) is a consortium comprising the Generalitat of Catalonia, via the Ministries of Health and Social Welfare, Universities, Research and the Information Society, Universitat Autònoma de Barcelona and the Santa Creu i Sant Pau Hospital Health Management Foundation. Established in July 2000, the aim is that the Consortium will help to place cardiovascular research in Catalonia on the international stage and also to facilitate transfer of fundamental research outcomes to diagnostic and therapeutic developments, with the consequent improvement of health practice.

Context

Cardiovascular and cerebrovascular disease is the main cause of mortality in developed countries. They are also the main cause of mortality in the developing countries. Therefore, study of the cardiovascular system and its dysfunctions is one of the fastest growing fields of biomedical research worldwide in recent years. Thanks to new technologies permitting gene and molecule regulation, there is now great potential for innovation in this field.

However, application of the results of fundamental research to clinical research, health care practice and development of new drugs is extremely slow or even non-existent. Meanwhile, cardiovascular and cerebrovascular morbidity rates (incidence and prevalence) continue to rise with a consequent increase in costs for national health systems throughout the developed world.

Catalonia has a long-standing tradition in this field, with consolidated research groups both in basic and clinical research, with high-quality teaching hospitals and a high concentration of pharmaceutical companies. A centre such as the ICCC, open to participation by other public bodies (for example, CSIC) and aiming to coordinate and link its activities with the health industry, represents a major contribution to improved application of research results to clinical practice. Already, a number of companies have expressed interest in the ICCC's research work and have offered significant support for their initial work.

Scientific activity

DURSI and the CSIC have recently signed an agreement establishing the ICCC as a mixed research centre. This mixed centre will work on basic research, such as the identification of genes regulating vascular and cardiac cell functions, gene therapy (gene regulation and cell function), cell recognition, cell interaction, genetic anormalities in cardiovascular pathology, bioinformatics and cardiovascular genomics and proteomics. ICCC work in applied research will essentially be in the area of new therapeutic targets, design of drugs to provide cardiovascular protection, preclinical and clinical testing of drugs against therapeutic targets, new indications and preclinical and clinical research in prognostic and diagnostic disease markers.

Resources

The mixed Centre (ICCC) will be based at the old monastery of the Hospital de la Santa Creu i Sant Pau, premises given to the Consortium in August 2001. Refurbishment work commenced in November 2001. Since the building is catalogued as of architectural interest and is part of a UNESCO world heritage site, the work has to be carried out with great care. Thus progress is slow.

On completion of the work in 2003, the Centre headquarters will have a total available surface area of 3,889 m^2, 2,454 of which will correspond to laboratories. It is projected that staff will total 100, comprising 33 researchers, 14 post-doctoral research staff, 21 doctoral students and 25 members of technical, administrative and support staff.

Total funding and funding source

The cost of the work and the necessary scientific equipment is estimated at almost 10 M€, for the 2001–2006 period. Of this total, approximately 6.6 M€ corresponds to building work, while the cost of equipment totals 3.4 M€. Practically all funding will be provided by DURSI. The balance will be met by project income.

The Catalan Institute for Chemical Research *(Institut Català d'Investigació Química – ICIQ)*

The Catalan Institute for Chemical Research (ICIQ) is a foundation, established by Generalitat of Catalonia, through the Ministry of Universities, Research and the Information Society. Universitat Rovira i Virgili is represented on the Board of Trustees and support is provided by chemical and pharmaceutical sector companies participating in its Business Council, such as the Bayer and Repsol-YPF groups. The aim of the Business Council is to provide support to the Board of Trustees regarding transfer of research results to industry.

Formally established in July 2000, the ICIQ aims to acquire the knowledge needed to develop new products and technological processes in chemistry to the highest standards of excellence, and also to strengthen, by means of innovation and technological improvement, the competitiveness of Catalonia's chemical and pharmaceutical sector.

Context

The ICIQ will benefit from the presence of high-quality chemistry in Catalonia and especially in the Tarragona region, where its headquarters is to be located. Catalonia, and again Tarragona especially, is one of Southern Europe's main chemical areas. In fine chemistry, for example, Catalan production accounts for between 4.5 and 5 % of world production in economic terms.

The Tarragona region has attracted a major concentration of chemical companies and has a university (URV), with strong chemistry and chemical engineering schools. The location of the ICIQ in Tarragona will serve to complete this rich industrial fabric and to generate synergies with Universitat Rovira i Virgili. The Institute will strive to establish links with chemical sector companies in the region, through their participation on the Business Council, an advisory organ for representation of industrial interests at ICIQ management level.

Scientific activity

The ICIQ's main research work will lie in two fields: catalysis of chemical processes and supramolecular chemistry.

In catalysis, the aim is to create industrially useful processes and products making efficient use of resources (both material and energy) with low or non-existent levels of waste products. Sustainability will underpin design of the chemical process.

In macromolecular chemistry, work will be on pre-fixed molecule receptors for detection or catalysis purposes, design and synthesis of molecules with self-replication capacities and discrete chemical entities capable of exercising functions (sensors, elementary logics, electronic) which were previously reserved to materials, thus making a contribution to the development of molecular nanotechnology.

Resources

In the autumn of 2001, building work began on the ICIQ headquarters on a 13,000 m^2 site at the URV Sant Pere Science Campus in Tarragona. The building will have a total useful surface area of 5,000 m^2, of which 1,685 m^2 will correspond to laboratories, 1,610 to facilities, 1,115 to services, 380 to research offices and 260 to administrative offices.

When fully operational, it is estimated that the Centre will employ more than 200 staff, including researchers (approximately 120, working on 20 different research topics), technical staff (approximately 50) and administrative and support staff (approximately 30).

Total funding and funding source

The cost of the building work and the scientific equipment needed for the new headquarters is estimated at 28.2 M€ for the 2001–2006 period, corresponding in almost parts to building work and scientific equipment. Funding will come from DURSI. A total of 11.7 M€ of this funding will be from European funds (ERDF). The building work began in 2001, and is planned to reach completion in 2003.

Trias i Pujol Health Science Research Institute *(Institut d'Investigació en Ciències de la Salut Germans Trias i Pujol)*

The Trias i Pujol Health Science Research Institute is a foundation comprising the ICS Hospital Germans Trias i Pujol, Universitat Autònoma de Barcelona and the ICS Transfusion Centre and Tissue Bank –a public company. Established in 1995, the foundation promotes biomedical research in the Hospital Germans Trias i Pujol at Badalona.

Context

The Hospital Universitari Germans Trias i Pujol was inaugurated in April 1983 and is the reference hospital for the Barcelonès Nord i Maresme health region. In addition to its health care services, the hospital undertakes a range of training (undergraduate, postgraduate, and continuing training)

and research work. Since 1995, the research work has been coordinated through the Germans Trias i Pujol Biomedical Research Foundation, which now constitutes the nucleus of the Germans Trias i Pujol Health Science Research Institute.

Scientific activity

Research work concentrates on seven main areas: immunology and AIDS; disorders of the digestive system; eating disorders and obesity; oncohematology; microbiology and infectious disease; respiratory and cardiovascular disease and diagnostic methodology and clinical practice.

The Institute published a total of 218 articles in 2001. Of these, 127 were original articles published in international journals and 68 in Spanish journals. The most productive research areas are, in order, AIDS, genomics-oncology-hematology, respiratory and cardiovascular disease, immunology and transplants, and the digestive system and hepatology.

Resources

The Institute has a staff of 140 researchers and 109 scholarship holders. To date, the research work has been carried out in different, physically separate, facilities and premises, with a total surface area of 3,553 m^2. Of this, 1,000 m^2 are the Institute's, 1,000 m^2 are premises shared with the care and teaching services, and the remainder are exclusively research premises including specialised laboratories and animal experiment centres.

The "Escoles" project aims to equip the Institute with a 6,000 m^2 headquarters. A further 3,000 m^2 will be added in the second phase.

Total funding and funding source

The total cost of this work will be 4.9 M€ and it should be completed over the 2002–2004 period. A number of institutions will provide funding for the project (Universitat Autònoma de Barcelona, Badalona Municipal Council and the ICS, among others).

August Pi i Sunyer Institute of Biomedical Research *(Institut d'Investigacions Biomèdiques August Pi i Sunyer – IDIBAPS)*

The August Pi i Sunyer Institute of Biomedical Research (IDIBAPS) is a consortium established in July 1996 by the Generalitat of Catalonia, which is presently represented by the Ministry of Universities, Research and the Information Society, the University of Barcelona and Hospital Clínic i Provincial de Barcelona. From its foundation, the CSIC's Barcelona Biomedical Institute (IIBB) also participated by virtue of an association agreement. The consortium aims to facilitate integration of high quality clinical and basic research so as to enable improved and swifter transfer of outcomes for prevention and treatment of the main health problems facing our society.

Context

Continued efforts in the field of biomedical research over recent years have led to improved life expectancy and general health, and a reduction in the effects of most illnesses in the developed world.

In biomedicine, an interactive chain links basic research with everyday medical practice, via clinical research. Clinical practice is a constant source of ideas and challenges, both for clinical and basic research; the more integrated these fields, the faster and better the application of advances in prevention and treatment of health problems.

Biomedical research enjoys a long tradition of high quality in Catalonia. In the 20th century alone, we could mention the foundation of the Barcelona Biology Society in 1912 (today known as the Catalan Biology Society), the first associated body of the Institut d'Estudis Catalans. August Pi i Sunyer was the first president of the Barcelona Biology Society which, until, 1938, organised the *Catalan Biology School*, first under the leadership of Ramon Turró and later August Pi i Sunyer himself. Even today, for example, Hospital Clínic de Barcelona is one of the ten most scientifically productive hospitals in the European Union. Of this production, IDIBAPS researchers account for almost 400 articles per year, more than 50% of which are published in journals featuring in the highest impact quartile for their field according to the *Science Citation Index*.

Scientific activity

IDIBAPS work is focused on five research areas: biological aggression and response mechanisms; biopathology and respiratory, cardiovascular and renal bioengineering; liver, digestive system and metabolism; clinical and experimental neurosciences, and oncology and hematology.

Resources

IDIBAPS presently comprises 291 researchers and a large number of graduates and scholarship holders at different levels working in 58 groups in the above-mentioned five research areas. The Institute takes up 2,400 m^2 of the new outpatient building at Hospital Clínic and 400 m^2 of the Fundació Clínic and UB Medical Faculty research laboratories. In April 2001, the first stone was laid for refurbishment work of one part of the south wing of the old Faculty of Medicine – a total of 8,300 m^2 – which has been given over to IDIBAPS. More than half of this renovated space (4,700 m^2), given over to laboratories, was opened in the summer of 2003, and it is anticipated that the remainder will be ready by spring 2004. A second phase is also planned (2004–2006) for refurbishment of further areas in the same building which will add another 5,000 m? to the surface space available to IDIBAPS.

Total funding and funding source

The cost of the renovation work on the new IDIBAPS premises (phases I and II), and the necessary scientific equipment totals 26.5 M€ for the 2001–2006 period. Construction work accounts for 22.5 M€ of this, while the cost of scientific equipment is estimated at approximately 4 M€. Practically all funding will be drawn from DURSI (26.2 M€, including 1.6 M€ from ERDF).

The work will be carried out over the 2002–2006 period (phase I: 2002–2003; phase II: 2004–2006).

Photonic Science Institute *(Institut de Ciències Fotòniques – ICFO)*

The Photonic Science Institute (ICFO) is a foundation established in March 2002, by the Generalitat of Catalonia, through the Ministry of Universities, Research and the Information Society, and the Technical University of Catalonia (UPC). The Institute's work lies in research, education, innovation and development of photonic science and technology at the highest international level.

Context

This new centre aims to become a European benchmark in its field, to establish alliances with other centres in related disciplines and to play an international role in photonic science.

Models which have functioned successfully in other countries cannot simply be imported and applied in Catalonia, without careful consideration of local conditions. Therefore, design of the ICFO has opted for a midway position between pure basic research and applied research: it will be concerned both with research and teaching; academically, it will be multidisciplinary, covering both basic research and its applications, and it will be proactive in its approach to technology and knowledge transfer.

Scientific activity

The Institute's research priorities will lie in the fields of information and communication technologies, optoelectronics, remote sensing and perception sensors, industrial photonics, lasers and laser systems, quantum information and biophotonics.

The creation of ICFO represents a response at international scale to industrial photonics applications and the promotion of spin-off companies by researchers. The Institute will also be in a position to cooperate with local and international risk capital providers and to participate in business incubators, and in organisation of national and international scientific meetings.

Resources

The ICFO began to operate in spring 2002, provisionally housed in premises in the Nexus II building on UPC's North Campus, while building work started on its definitive headquarters –a 7,000 m^2 building– the first phase of which is due to be completed before summer 2004.

Once fully operational, the Centre will include 25 research groups, each led by a fulltime ICFO staff member, and including two postdoctoral and four doctoral students. There will also be approximately ten additional technical staff and 15 administrative and support staff.

Total funding and funding source

Construction work on the new building at the Castelldefels Campus and the scientific equipment included in the first phase will have a total cost of 17.7 M€ for the 2001–2006 period. Of this total, 11 M€ corresponds to building work and 6.7 M€ to the cost of equipment. Total funding is provided by DURSI, including 4.9 M€ from ERDF funds.

Building work started in October 2002. It is estimated that the first phase will reach completion by mid-2004, and the second before the end of 2006.

The Geomatics Institute *(Institut de Geomàtica – IG)*

The Geomatics Institute (IG) is a consortium established in September 1997 by the Technical University of Catalonia and the Generalitat of Catalonia. The Institute aims to foster and promote geomatics through applied research and teaching, for the general benefit of society. At present, the Generalitat is represented by the Ministries of Town and Country Planning and Public Works, and Universities, Research and the Information Society.

Context

Geomatics is a multidisciplinary grouping of sciences and technologies which concerns acquisition, management and operation of geo-referenced spatial information. The field includes innovative areas such as remote sensing, information technologies, positioning systems and communications.

Geomatics is currently growing at a rapid pace in all its dimensions. It is estimated, for example, that within a few short years satellite navigation and positioning systems will be present in practically all aspects of our lives, in applications ranging from determining the best land or air travel routes, transport fleet control, vehicle or person location for safety purposes, to minimisation of pesticide and fertiliser use in agriculture. The research will also focus on development of new, cheaper and more precise GPSs, sensor and data fusion technologies, easy access systems for aerial and spatial images, and information management systems such as GIS.

Scientific activity

The Geomatics Institute will carry out high-quality scientific and technological research and provide education in all the constituent disciplines (geodesics, modelling, navigation and aspects of cartographic representation such as telematics, remote sensing, and photogrammetry) and will work to strengthen their industrial applications.

Resources

The Geomatics Institute is located at the new Mediterranean Technology Campus at Castelldefels, in a 3,550 m^2 building comprising three floors and a basement.

Total funding and funding source

The cost of the first phase of the building work and the necessary scientific equipment will total 2.6 M€.

It is estimated that building work will be completed before the end of 2003. Seventy-nine per cent of total funding will be provided by the Generalitat, the remainder coming from other institutions (Technical University of Catalonia, and the Spanish government through the ERDF funds).

Hospital Universitari Vall d'Hebron Research Institute *(Institut de Recerca Hospital Universitari Vall d'Hebron)*

The Hospital Universitari Vall d'Hebron Research Institute is one of the eight ICS hospital foundations for management of

research. The Institute was established in 1994 to promote scientific research in the Vall d'Hebron university hospital complex.

Context

The ICS is Catalonia's largest health service provider, with eight hospitals, more than 450 primary care units and more than 32,000 health professionals. Research, along with provision of care and teaching, is one of the three basic concerns of the ICS.

The Hospital Universitari de la Vall d'Hebron (opened in 1952 as a general hospital) is Catalonia's largest health service provision location and includes three hospitals (the General Hospital, the Orthopaedic and Rehabilitation Hospital, and the Mother and Child Hospital) and an Outpatient Surgery Unit (Clínica Quirúrgica Adrià). The hospital complex is a national and international benchmark, especially for complex cases (burns and major transplants) and also in research. The Research Institute is responsible for promoting, managing and coordinating the complex's research work.

Scientific activity

According to data from the recently published Bibliometric Research Map for Spanish biomedical and health science research for the 1994-2000 period, the Hospital Universitari de la Vall d'Hebron is the second most productive hospital, and occupies ninth position among all the State's biomedical and health science research centres. In 2001, this research work led to many publications: 231 articles in international journals and 57 in Spanish journals. The Foundation also carries out numerous research projects, including 70 with funding from the Health Research Fund (Spanish Ministry of Health and Consumption) and the Spanish Ministry of Science and Technology, and five more with EU funding. In 2002, the total number of research projects was 117.

The Research Institute was the second main recipient in Catalonia of funding from the *Instituto Carlos III* fund for development of cooperative thematic networks in December 2002. It is an active participant in eight research centre networks (in one of which it is the network coordinator) and its research groups participate in a total of 14 group networks (in two of which they are network coordinators).

Resources

At present the Hospital Universitari Vall d'Hebron Research Institute is applying its 1999–2004 strategic plan, which entails adaptation, reorganisation and transfer of several units and laboratories to a single building, in addition to creation of a new laboratory animal facility, opened in December 2002.

The Biomedical Research Institute has a staff of 132 researchers and 102 scholarship holders. At present, it occupies a total surface area of 2,242 m^2, 1,905 of which correspond to laboratories.

Total funding and funding source

Conversion and renovation of the general storage building which started in 1997 so as to concentrate the majority of the research groups in a single building of 3,900 m^2 will have a cost of almost 5 M€ from 1997 on. Of this, 4.4 M€ corresponds to the 2001–2006 period. The work comprises renovation of several floors (laboratories and special services) and construction of a new animal facility of 760 m?.

It is estimated that the renovation project will be completed before the end of 2004. Funding is provided by the Generalitat (through the Ministry of Health and Social Security). Minor contributions will come from the Spanish government (a loan from the Ministry of Science and Technology) and other sources.

Internet Interdisciplinary Institute (IN3)

The Internet Interdisciplinary Institute (IN3) is an Open University of Catalonia (UOC) research centre, created in 1999 with the objective of becoming a world benchmark for study, research and development concerning application and impact of information and communication technologies (ICT) in society and the consequent emergence of new practices. The Institute is not a legally independent body, although it does have its own governing organs and a separate organisational structure from the Open University: its own director, and management, scientific and advisory committees.

Context

The IN3's research concerns a recently emerging phenomenon which has not yet been approached as a serious object of study by many bodies: the information and knowledge society. Analysis of the changes and phenomena characterising the information and knowledge society however, requires moving outside the traditional disciplinary boundaries, given that one of its main traits is interconnection of the different social, technical and scientific, economic, political and cultural systems.

The IN3 does not wish to merely observe the development and spread of ICTs in different sectors and dimensions of society, or to analyse phenomena related to the use of these technologies and the changes taking place as society moves from the industrial era to the knowledge era. Rather, it aims to make proposals to companies, institutions and government bodies regarding actions and initiatives to enable them to develop the necessary skills, knowledge and instruments to adapt to the emerging needs of society.

Scientific activity

The IN3's research activity lies in six areas: education and psychology; humanities and linguistics; information and documentation; informatics and multimedia; law, and finally, economics and business.

The research undertaken is characterised by a markedly multidisciplinary approach, integrating different theoretical perspectives and methodologies and setting out to analyse such cross-sectional phenomena as e-learning, socio-economic trends, virtual communities and communication, e-business, law and ICTs, governability, knowledge management, digital arts and creativity.

One of the main programmes is *Projecte Internet Catalun-*

ya (PIC), led by Dr. Manuel Castells, an interdisciplinary programme focused on the information society in Catalonia, which includes projects on the network society, ICTs and transformation of Catalan companies, school in the information society, use of the Internet in the Generalitat of Catalonia, use of the Internet in Barcelona City Hall, the Internet and the Catalan university network and the use of the new technologies in the Catalan health services.

Resources

The IN3 is provisionally located at the UOC premises on *avinguda del Tibidabo*, in Barcelona, and has access to UOC infrastructure and equipment. February 2002 however, saw the laying of the first brick of a new four-storey building with 3,685 m^2 of surface area. The new building, in the Mediterranean Technology Part, in Castelldefels should be ready by mid-2003.

At present, the IN3 comprises a total of 17 research groups, both its own (i.e., made up exclusively of UOC researchers), associated groups (made up of UOC researchers and others), and linked groups (made up of non-UOC researchers). Among them, these groups carry out basic and applied research, innovation, technology and know-how transfer and provide observatories on phenomena concerning the research areas indicated above.

In conjunction with the London School of Economics and Political Science, the IN3 is preparing a digital journal "Internet & Society Journal" on the impact of the Internet on society.

Total funding and funding source

The total cost of building work on the new building at the Castelldefels Campus plus the necessary scientific equipment is estimated at 10.4 M€ for the 2001–2006 period. Of this, 6.8 M€ corresponds to the construction work and the remainder, 3.6 M€, to scientific equipment. Funding for the project is mainly from DURSI (6.8 M€) and the central Spanish government, via ERDF (2.4 M€).

Work on the new IN3 headquarters began in 2002 and is planned to reach completion before the end of 2003.

Montsec Astronomic Observatory – Universe Observation Centre *(Observatori Astronòmic del Montsec – Centre d'Observació de l'Univers – OAM-COU)*

The Montsec Astronomic Observatory – Universe Observation Centre (OAM-COU) are two observation centres promoted by the Montsec Consortium, set up in 2001 and comprising the Generalitat of Catalonia, via the Presidential Department and other ministries, the county councils of Noguera and Pallars Jussà, the municipal councils of the Montsec area and other bodies.

Construction work on the observatory itself began in October 2002 on the highest slopes of the Montsec d'Ares mountain range (1,570 m) in the municipal area of Sant Esteve de la Sarga (Pallars Jussà). Work has also started on the remainder of the project, a theme park based on observation of the night sky via different means and education on astronomy and cosmology. The park is situated 3.5 km from the village of Àger (Noguera), alongside the road leading to the Ares.

Context

Astronomical observation is impeded in highly populated areas by ever-increasing light pollution. Therefore, isolated, high mountain areas with dry windy climates are the best locations for observatories. This is the case of Montsec, a mountainous area lying between Noguera and Pallars Jussà, with low levels of light pollution and high levels of visibility for most part of the year. The Consortium's aim is to promote overall development of the region, as part of the "*Montsec sostenible*" project.

Scientific activity

The OAM will be a completely automatic, robotised observatory, distance-controlled via the Internet's *Anella Científica*. Since astronomical observation can only take place at night, it is not uncommon for observatories located at different longitudes to work in cooperation so that when dawn breaks for one observatory, the other continues to observe under night conditions. This, in combination with the fact that many telescope operations can be carried out automatically or through remote control, is favouring the development of telescope installations on mountain sites around the world.

The COU on the other hand, is designed as a leisure-education site allowing visitors to interact with nature and learn about the cosmos. There will also be a permanent exhibition on the region's astronomy and geology and research-related activities will be organised

Resources

The OAM will have an automatic dome of diameter 6.15 m which will house a completely automatic and robotised 80 cm diameter telescope. This work is planned to reach completion by May 2003, although for full remote control a management group will need to be established. The telescope will be supplemented by large-format infrared cameras, photometers and spectrographs. The only permanent staff will be one person responsible for maintenance and security.

The COU will have two observation domes of 4.2 and 3.2 m, respectively, equipped with three telescopes (one of 41 cm, a 15.5 cm reflector and a celostat for observation of the sun), and approximately 20 portable telescopes. There will also be a combination of items to be known as "*Ull del Montsec*" (the Eye of Montsec), comprising an audiovisual facility, a digital, multimedia planetarium and an observation platform.

Total funding and funding source

The building work and the scientific equipment will have a total estimated cost of 4.5 M€, of which 1.7 M€ corresponds to building work and 2.8 M€ to equipment.

Funding is from DURSI (1.5 M€) and the Ministry of Home Affairs and Institutional Relations, with partial funding from local ERDF funds (3 M€).

Work started in 2002 and is planned to be completed in the second half of 2003.

Barcelona Science Park *(Parc Científic de Barcelona – PCB)*

Barcelona Science Park (PCB) was created by the University of Barcelona as part of its innovation strategy. The Park includes publicly-funded research groups and private sector companies in a setting with a rich range of technological services. The combination of university, institutional and private sector research centres makes the PCB a pioneering instrument in fostering knowledge and technology transfer, which also facilitates the creation of new technologically based companies.

Context

Research is a key factor among the social and technological advances which give rise to new products and knowledge, leading in turn to improved quality of life. For the knowledge emerging from research to lead to development of new products and processes, we must design and built infrastructures to facilitate this transfer.

The main objective of the Barcelona Science Park is to create an appropriate setting to stimulate and harness synergies between public research groups and private R&D&I units so as to promote technological innovation via basic research. Within R&D plans, research is also one of the main factors underpinning technological innovation in the private sector. The need for innovation is becoming increasingly clear in that it is essential for economic competitiveness and therefore, for the economic growth of the country as a whole.

Scientific activity

Among the areas being worked on at PCB, the following are especially noteworthy: biomedical research, taking place at the Barcelona Institute of Biomedical Research (IRBB-PCB), at the Nano-bio-engineering Research Laboratory and in companies and spin-offs in the biotechnology, pharmaceuticals and fine chemistry sectors at PCB.

These companies and spin-offs, linked to the mainstream of PCB research, benefit from the concentration of high quality research work and from the network of modern support services. The concentration at PCB of public and private research centres gives rise to a range of synergies which frequently lead to creation of mixed research units.

The PCB also promotes research and development work in a range of multidisciplinary fields. This is carried out by groups and companies from different walks of experimental, human and social sciences who are working on new veins of knowledge. This strategy enables the PCB to stay at the technological forefront of a wide range of fields and to successfully face the new pattern of emerging economic cycles. These groups explore such areas as globalisation, bioethics, meteorology and climate, public law, language and computation, food, etc.

Resources

The PCB occupies a surface area of 60,000 m2 in UB's Diagonal Campus. It presently houses 20 companies, three research centres and a tech company bio-incubator, all of which work in emerging areas in chemicals, pharmaceuticals, biotechnology and nano-bio-engineering. This activity takes place in a modular laboratory building of 20,000 m2 which is equipped with a potent range of research support services.

The Park is also home to the Fundació Bosch i Gimpera (FBG) Innovation Centre. In conjunction with UB's Patent Centre, the Innovation Centre is responsible for commercialisation of patents generated by UB's research groups.

Finally, in another building of 5,000m2, Barcelona Science Park includes a wide range of technologies and infrastructures providing research support services. These services are available both to UB researchers and other institutions and companies. Provided in coordination with UB's other scientific and technical services, the services include biotechnological platforms in such cutting edge fields as genomics, transcriptomics and proteomics, a 800 MHz nuclear magnetic resonance spectrometer, among many others.

Total funding and funding source

The first phase of PCB comprises a surface area of 26,000 m? and will require a total investment of close to 60 M€. Of this, 42 M€ corresponds to building work and installations, and 18 M€ to scientific equipment. Of the total 60 M€, 34.7 M€ correspond to the 2001–2006 period.

DURSI has contributed 17.1 M€ to the first phase of the Park's development (9.2 M€ in the 2001–2006 period). These funds were drawn from ERDF. The University of Barcelona itself has also contributed and the Spanish government provides interest-free credit for the building of science parks and has also assigned part of the ERDF funds managed by the Ministry of Science and Technology.