



**campus MONCLOA**

la energía de la diversidad

**PROGRESS REPORT**  
nº 3 (2013)

# **CAMPUS MONCLOA**

## **CAMPUS OF INTERNATIONAL EXCELLENCE**

Universities



Complutense and Technical University  
Madrid



**PROGRESS REPORT**

Period: 2010-2013

[www.campusmoncloa.es](http://www.campusmoncloa.es)

**Project Data:** MONCLOA CAMPUS: THE POWER OF DIVERSITY (Ref.: CEI09-0019)

**Type of CIE:** Global X

**Acronym:** CEI Moncloa Campus

**Coordinating University:** Universidad Complutense de Madrid

**Partner / Promotor Universities:** COMPLUTENSE UNIVERSITY OF MADRID (UCM) and TECHNICAL UNIVERSITY OF MADRID (UPM)

**Other CIE institutional promoters:**

Agencia Estatal de Meteorología (AEMET)

Ayuntamiento de Madrid

Central Lechera Asturiana (CAPSA)

Centre for Energy, Environment and Technology Research (CIEMAT)

Madrid Autonomous Community

Spanish National Research Council (CSIC)

Fundación Juan José López Ibor

Fundación madri+d para el Conocimiento

Fundación para la Investigación Biomédica del Hospital Gregorio Marañón (FIBHGM)

Hospital Universitario 12 de Octubre (H12O)

Global Forecasters, S.L.

Hospital Clínico San Carlos (HCSC)

Indra

Instituto de Salud Carlos III (ISCIII)

Instituto del Patrimonio Cultural de España (IPCE)

Instituto Geológico y Minero de España (IGME)

Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)

Instituto Tecnológico PET

Parque Científico de Madrid (PCM)

Patrimonio Nacional (PN)

University of Colorado Denver

**Progress Report: Nº 3 (2013)**

**Period:** 2010-June 2013

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# CEI CAMPUS MONCLOA

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## **1. Brief Summary for Publication**



The **Moncloa International Campus of Excellence** (CEI Moncloa Campus) is home to the greatest concentration of talent in our country.

It represents a major merger between two of Spain's most important universities with the aim of combining their complementary strengths to forge an international point of scientific reference.

The **CEI Moncloa Campus** runs an integral, unified, sustainable and socially responsible campus, and acts as a catalyst for the cultural life of the city of Madrid.

The **CEI Moncloa Campus** is located in the city of Madrid, although it includes other campuses such as Somosaguas, and the CEI in Montegancedo.

The scientific strategy of the **CEI Moncloa Campus** is arranged in a system of **six clusters** representing different areas of specialisation; this is the critical mass for knowledge generation where there is the greatest overlap between the component actors in our campus. These knowledge areas are: **global change and new energies; materials for the future; agri-food and health; innovative medicine; cultural heritage and sustainable mobility.**



### **Program for International Talent Recruitment (PICATA)**

This represents a commitment to the future by recruiting the most talented young people for research.

It offers pre- and post-doctoral contracts in conditions that are similar to the leading international programs. These projects are co-directed by professors from both universities, which confers an added value to the results.

The content of this research explores areas with a wide-reaching impact, including Parkinson's disease, tuberculosis, food safety and ready-made products, graphenes, the development of two-dimensional magnetic materials, anti-tumour therapy and renewable energies. There is a procedure currently under way in this field to obtain a patent for construction and renewable energies, and one of our promising newcomers is currently involved in the project.

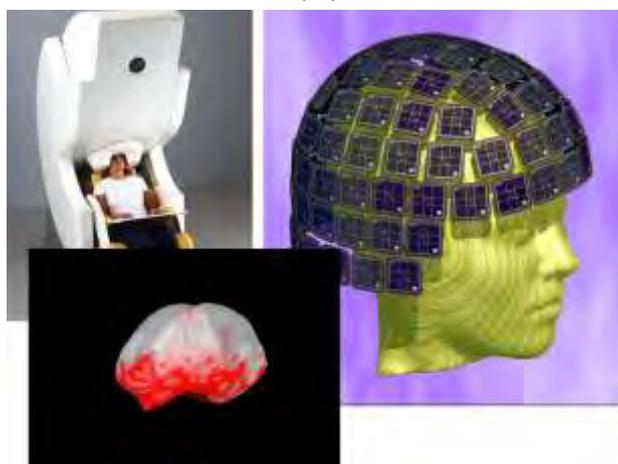
In 2012 –thanks to this program– the **CEI Moncloa Campus** had 33 graduates working towards their doctoral thesis, and 22 recent doctoral graduates divided among the six clusters.

### Science infrastructures

The **CEI Moncloa Campus** provides its researchers with internationally competitive and attractive tools and facilities.

Through the **Moncloa Campus's Call for Research Grants (CAIMON)**, nearly 4 million euros has been dedicated to acquiring equipment and infrastructures to assist the research works carried out by our scientists. Some of the most important resources are described below:

- ✓ **Singular Technical Science Facility for Advanced Electron Microscopy.** This facility has a microscope with an aberration corrector on the condenser lens and cold cathode that makes it unique in Spain. It provides direct images with atomic resolution of the structure of a material, and represents a major leap forward in the development of new materials, particularly in the area of nanomaterials. The facility collaborates with leading institutions such as Oxford, Paris VI, Stockholm, Tsukuba and Oak Ridge National Laboratory.
- ✓ **Cognitive and Computational Neuroscience Laboratory.** This is a unique facility in which a further magnetoencephalography (MEG) apparatus has been added to its electroencephalography equipment (EEG), in what is cutting-edge technology in the field of neuroscience. This equipment creates models which help to understand neurological diseases such as Alzheimer's.



- ✓ **Advanced Scientific Instrumentation Laboratory (LICA).** This laboratory includes instruments with a significant impact on astronomy such as MEGARA, the first instrument capable of observing gas emissions between galaxies.
- ✓ **Living-Lab.** This is an infrastructure for 3-D visualisation and multimodal interaction capable of recreating the evolution of the real world in a virtual environment. It has multiple applications in the fields of health (surgical training, cognitive therapies), defence (flight simulator), and architecture (accessibility assessment).
- ✓ **Veterinary Healthcare Surveillance Centre (VISAVET).** This centre studies disease-causing microorganisms with an impact on animal production and public health, and verifies that the products we consume are healthy. Its laboratories and animal

facilities are unique in Madrid, and it has a MALDI TOF/TOF mass spectrometry platform that is the only one of its kind currently installed in Spain.

- ✓ **Agri-food corridor.** Its infrastructures are unique in Madrid. This facility makes this environment one of the leading European axes of R+D+i in sustainable agricultural production, food safety, and animal health and wellbeing.

#### Academic program

- ✓ The **International Postgraduate School (EIP)** is the inter-university structure at the **CEI Moncloa Campus** that is responsible for the academic organisation of the activities that lead to the award of university Masters' degrees, its own degrees and lifelong learning. It also arranges extraordinary courses, events, meetings and a range of potential educational activities for the future. The following academic qualifications are offered:
  - ✓ **University Masters Degree in Disaster Management**, the first to be taught by the **CEI Moncloa Campus** and the only one of its kind in Spain. It will feature teaching staff from both universities and various teachers from outside the university involved with companies working in the prevention and resolution of disasters.
  - ✓ **Official Masters Degree in Animal Health and Production.**

The area for academic collaboration includes the following

- ✓ **International School of Infectious Communicable Animal Diseases (EIEAC)** provides technical and scientific training aimed at combating and eradicating infectious diseases in animals. It includes the reference laboratories for the OIE, UE and FAO for African swine fever. In this line of work a collaboration agreement has been signed with the Center for Animal Disease Modeling and Surveillance at the University of California, Davis.

#### Events.

- **Cei[innova] course.** Organised with the aim of highlighting the R+D+i capacities, solutions and services of the **CEI Moncloa Campus**, it also included companies and experts from a range of institutions who shared their current view of the challenges and technological requirements involved in their area of activity.
- **Materials Week.** Materials week featured a wide range of activities designed to highlight our social presence and the synergies between teaching staff, researchers, students and companies working or collaborating in the materials sector. The events took various formats



(lectures, debates, presentation of research lines, demonstrations, courses, visits, etc) aimed primarily at students at different stages of their academic career, companies, researchers and teachers at the **CEI Moncloa Campus** who have some type of relationship with the realm of materials.

- **Summer courses.** The **CEI Moncloa Campus** also contributes additional value in the sphere of education with courses such as the one on **21st-century astrophysics: the science of the universe** held in El Escorial, or the one entitled **The challenges of the cities of the future** that took place at the Granja de San Ildefonso
- ✓ **Researchers' night.** A European event designed to raise awareness of science among the general public. In its latest edition, arranged in the Higher Technical School of Forestry, over 1000 people enjoyed activities including concerts, the chance to compose music using mathematical concepts, and botanical routes.

### Transference.

- ✓ The **University Institute of Automobile Research (INSIA)**. This is a reference centre for the automobile industry and transport sector with a national and European scope. It is engaged in an ongoing collaboration with companies in the sector including the Spanish Automobile and Lorry Manufacturers Association (ANFAC), the Spanish Association of Automobile Equipment and Component Manufacturers (SERNAUTO), PSA PEUGEOT CITROËN, Madrid Municipal Transport Corporation (EMT), Madrid Metal Employers Association (AECIM), the Bus and Coach Chassis Company Association (ASCABUS), Association of Paraplegics and the Severely Disabled (ASPAYM), VALVERAUTO, S.A., ALSA.
- ✓ The **Electron Microscopy Centre** resolves technology-based problems for companies such as Repsol, Acerinox, Cepsa, and Lucent Technologies, among others, and works with institutions such as the Prado Museum in the study of Spain's national heritage.
- ✓ The **VISAVET** Centre advises and provides scientific support for companies and government bodies such as Merial Laboratorios S.A., Pfizer S.L.U., Lohmann Animal Health, CZ VETERINARIA S.A. Laboratorios Maymo S.A., Inmunología y Genética Aplicada (INGENASA), and the Spanish Ministry of the Environment and Rural and Marine Affairs.





## **2. Qualitative and Quantitative Description**

## INTRODUCTION

The project **Moncloa Campus: The Power of Diversity**, coordinated by the Complutense (UCM) and Technical (UPM) Universities, Madrid was designated “Campus of International Excellence (CEI)” in the resolution of the *Secretario General de Universidades* on 26 November 2009. As well as the promoting partner universities this project also includes other teaching and research institutions located in the *Ciudad Universitaria*. The institutions with which the CEI Moncloa Campus has signed collaborative agreements are as follows:

- Agencia Estatal de Meteorología (AEMET)
- Ayuntamiento de Madrid
- Central Lechera Asturiana (CAPSA)
- Centre for Energy, Environment and Technology Research (CIEMAT)
- Madrid Autonomous Community
- Spanish National Research Council (CSIC)
- Fundación Juan José López Ibor
- Fundación madri+d para el Conocimiento
- Fundación para la Investigación Biomédica del Hospital Gregorio Marañón (FIBHGM)
- Global Forecasters, S.L.
- Hospital Clínico San Carlos (HCSC)
- Hospital Universitario 12 de Octubre (H12O)
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- Instituto de Salud Carlos III (ISCIII)
- Instituto del Patrimonio Cultural de España (IPCE)
- Instituto Geológico y Minero de España (IGME)
- Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)
- Instituto Tecnológico PET
- Parque Científico de Madrid (PCM)
- Patrimonio Nacional (PN)
- University of Colorado Denver

This project, detailed in the *Strategic Plan for the Viability and Conversion of the Moncloa Campus into a Campus of International Excellence*, is the outcome of a strategic planning process, achieved through partnership and clusters of the teaching and research institutions on the Ciudad Universitaria Moncloa Campus. The project is based on a framework agreement between the coordinating partner universities and between these and the other institutions involved.

Four **strategic areas**, identified by the keywords ***Creating, Sharing, Connecting and Growth***, determine the **guidelines for simultaneous actions** taken to achieve **excellence**. These are the starting point to define the **strategic objectives** and desired outcomes to enable the future vision to be achieved. In turn, these strategic aims are embodied in **specific or operational objectives** to be accomplished through a series of general, transversal and sector-based **actions**.

The Strategic CEI Conversion Plan includes **27 general and structural actions** which form the basis of the project architecture and built up on them, heightening and enhancing the visibility of the Campus, are the five thematic clusters: *Global Change and New Energies, Materials for the Future, Agri-Food and Health, Innovative Medicine, Cultural Heritage and Sustainable Mobility* (with **33 specialized actions**).

## CEI Campus Moncloa: The power of Diversity

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As the project develops it has evolved to adapt to the changes in the Chancellor's Office in both universities, leading to closer collaboration between the two institutions and boosting the implementation of the strategic plan.

Taking this into account, the Governing Board of the Moncloa Campus decided to include the full potential of their universities, beyond the physical concept of the Ciudad Universitaria Moncloa as originally envisaged in the Strategic Plan. Both universities intend to extend their collaboration with other campus locations including Montegancedo or Somosaguas, so that strategic actions including the International Centre for Heritage Studies or the Centre for Latin American Studies will set up their central operations on these campuses.

It has proved impossible to use the building currently housing the Museum of Costume as the centre for Moncloa Campus activities, due to the difficulties encountered in finalizing the terms of the cession agreement with the Ministry of Culture. This has led to a change of strategy in the distribution of available space on the Moncloa Campus. The significant investment required to adapt this building was also a factor in the decision-making process. As a result, the services originally planned for the Museum of Costume building have now been distributed throughout the Campus, enhancing their visibility and bringing them closer to the wider university community.



Photo: Flagship building for the Office of the CEI Moncloa Campus (*Real Jardín Botánico Universitario Alfonso XIII*)

During the period under review, the following have been launched within the context of the transversal actions included in the Moncloa Campus Strategic Plan and already implemented:

- Adaptation of teaching infrastructure to EHEA deployment
- International Postgraduate School CEI Moncloa (EIP)
- Moncloa Campus Competitive Calls:
  - Call for Research Grants Moncloa Campus (CAIMON)
  - International Program for Talent Recruitment (PICATA)
- Drawing up of Cluster Master Plans
- Improvement of Data Network and Communications
- International Visitors Reception Centre (CIVA)
- Campus Recovery Plan: Campus Project
- General Accessibility Plan

- Actions related to the Moncloa Campus Museum Provision
- School of Governance
- International Centre for Latin American Studies (CEI-AL)

In terms of how the work and research areas developed by the clusters are structured, each one forms a program based on the thematic actions defined in their strategic plans.

At the end of November 2011, a new excellence cluster for Research into Sustainable Mobility was proposed by the Moncloa Campus Executive Committee and included, after its presentation to and acceptance by the Ministry of Education.

The Table below gives a summary of how the work of the clusters is structured, with a more detailed description to follow:

Cluster	Work areas
Global Change and New Energies	<ul style="list-style-type: none"> <li>▪ Joint UPM-UCM Centre for Environmental Research Moncloa Campus (CIMAM).</li> <li>▪ Sustainable Technologies and New Energies.</li> <li>▪ Observation of System Earth.</li> <li>▪ Biodiversity Studies and Conservation.</li> <li>▪ Socio-economic Impact of Global Change.</li> </ul>
Materials for the Future	<ul style="list-style-type: none"> <li>▪ Setting up the Advanced Electron Microscopy Centre (CMA).</li> <li>▪ Mechanical Properties Workshop: Durability and Sustainability of Materials.</li> <li>▪ Workshop Network for the Development of New Thin Film Materials.</li> <li>▪ Platform for the Design and Construction of Electromagnetic Sensors and Actuators (applied to medicine, radar and railway technology).</li> <li>▪ Workshop for the Design of Biomaterials for Bone Tissue Regeneration.</li> <li>▪ Workshop for the Design and Description of Materials for Energy.</li> <li>▪ Development of Advanced Instrumentation.</li> </ul>
Agri-food and Health	<ul style="list-style-type: none"> <li>▪ Moncloa Agri-food Corridor</li> <li>▪ Animal Production and Health: nutrition, health and well-being in animal rearing and aquaculture.</li> <li>▪ Plant Reproduction Systems: sustainable production and management, including risks in agri-food resources.</li> <li>▪ Agri-food technologies: advanced technologies for quality, safety and traceability.</li> <li>▪ Food Hygiene and Safety: production of safe and healthy foods.</li> </ul>
i-Health	<ul style="list-style-type: none"> <li>▪ Design and Synthesis of Diagnostic and Therapeutic Tools:</li> <li>▪ Pre-clinical Platform for Biomedical Imaging. Advanced Biomedical Imaging Analysis (LA2IB).</li> <li>▪ Clinical Information Platform: filing and communication system for images and clinical databases. Telemedicine Area and coordination with hospitals of reference. Personalized Care Systems.</li> <li>▪ "Living-lab" Platform.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>▪ International Centre for Advanced Heritage Studies (CIESP).</li> <li>▪ Creation of Science and Technology Laboratory Network for Heritage Conservation (RedLabPat).</li> </ul>
Sustainable Mobility	<ul style="list-style-type: none"> <li>▪ Platform for Developing Electromobility Technologies.</li> <li>▪ Mobility Observatory.</li> <li>▪ Technological Network - to support the control, management and traceability of mobility.</li> <li>▪ Technological Platform - for innovation in intermodal and multimodal transport areas.</li> </ul>



The action areas in the CEI Moncloa Campus Program where work is underway are:

1. Improvements in teaching and adaptation to the EHEA
2. Improvements in scientific and knowledge transfer areas
3. Transforming the Campus to develop an integrated social model and its interaction with the local environment.

**Table I. Description of project actions**

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>																												
<b>Action</b>	A5. CALL FOR RESEARCH GRANTS MONCLOA CAMPUS (CAIMON)																												
<b>Objectives</b>	To implement a joint call for research grants in the groups taking part in the clusters for the acquisition of scientific equipment to improve research capacity. The aim is also to boost the CEI cluster connectivity through the shared use of resources. The aims of the CAIMON Call, in line with the aims defined in the CEI Moncloa Strategic Plan, are to increase the capacities of the Campus, create the conditions for the optimal use of its scientific and technological infrastructure, create the synergies required to reinforce the Campus, optimize research results transfer to the productive sector and boost the Campus excellence in the thematic areas of the five clusters.																												
<p><b>Progress made towards Objectives</b></p> <p>As a result of the UCM-UPM joint agreement on 23 March 2011, grants were announced for the acquisition of scientific and technological equipment and infrastructure for the year 2011 within the CEI Moncloa framework.</p> <p>These grants were complementary to the actions for acquisition of strategic scientific equipment requested through the programs: <i>Campus de Excelencia Internacional Subprograma B</i> (MICINN) and INNOCAMPUS.</p> <p>For more information see: <a href="http://www.campusmoncloa.es/es/convocatorias/caimon.php">http://www.campusmoncloa.es/es/convocatorias/caimon.php</a>.</p>																													
<p><b>Description of work completed and role of participants</b></p> <p>This Moncloa Campus program has assigned funds of almost <b>4 million euros</b> for the acquisition of equipment and infrastructure for Research Groups or Research Support Centres, and for the inter-university group networks of any institutions on the Moncloa Campus. This funding was complemented by the provision of more than <b>1.5 million euros</b> from the resources of the research groups which have co-financed the equipment. The Call for Research Grants, which received 55 applications for a total value of over 10 million euros, was assessed scientifically by the ANEP and after a strategic evaluation by independent experts, was decided in December 2011.</p> <p>The infrastructure and equipment funded are for open use by the whole scientific community of the Moncloa Campus, as is made clear in the official joint statement signed by the Chancellors of the partner universities on 21 May 2013. See: <a href="http://www.campusmoncloa.es/data/pdf/gobernanza/Resolucion-Rectoral-Conjunta-20130521.pdf">http://www.campusmoncloa.es/data/pdf/gobernanza/Resolucion-Rectoral-Conjunta-20130521.pdf</a></p> <p>The availability of and access to the equipment can be consulted online on the Moncloa Campus website. The Table below shows the projects which received funding through this Call:</p>																													
	<table border="1"> <thead> <tr> <th>CLUSTER</th> <th>TITLE</th> <th>AMOUNT AWARDED</th> </tr> </thead> <tbody> <tr> <td>Innovative Medicine</td> <td>Improved Confocal Microscopy and Imaging Analysis.</td> <td>282.922 €</td> </tr> <tr> <td>Materials for the Future</td> <td>Powder Diffractometer with accessory for PDF measurement (<i>Atomic Pair distribution function</i>).</td> <td>214.760 €</td> </tr> <tr> <td>Global Change and New Energies</td> <td>Ex-situ conservation of animal and plant biodiversity on the CEI Moncloa Campus. Proposal to set up an Inter-university centre for the study of autochthonous fauna.</td> <td>121.044 €</td> </tr> <tr> <td>Global Change and New Energies</td> <td>Guadarrama Monitoring Network Initiative (GUMNET)</td> <td>318.876 €</td> </tr> <tr> <td>Agri-food and Health</td> <td>Mass spectrometry platform Maldi Tof/Tof</td> <td>595.680 €</td> </tr> <tr> <td>Innovative Medicine</td> <td>Incorporation of TAC and new ring of detectors to microPET tomograph</td> <td>165.000 €</td> </tr> <tr> <td>Heritage</td> <td>Incorporation of portable equipment for Energy –dispersive X ray fluorescence (ED XRF) in the Heritage Laboratories Network.</td> <td>54.588 €</td> </tr> <tr> <td>Heritage</td> <td>Mechanical traction multi-channel georadar system for high resolution</td> <td>118.387 €</td> </tr> </tbody> </table>	CLUSTER	TITLE	AMOUNT AWARDED	Innovative Medicine	Improved Confocal Microscopy and Imaging Analysis.	282.922 €	Materials for the Future	Powder Diffractometer with accessory for PDF measurement ( <i>Atomic Pair distribution function</i> ).	214.760 €	Global Change and New Energies	Ex-situ conservation of animal and plant biodiversity on the CEI Moncloa Campus. Proposal to set up an Inter-university centre for the study of autochthonous fauna.	121.044 €	Global Change and New Energies	Guadarrama Monitoring Network Initiative (GUMNET)	318.876 €	Agri-food and Health	Mass spectrometry platform Maldi Tof/Tof	595.680 €	Innovative Medicine	Incorporation of TAC and new ring of detectors to microPET tomograph	165.000 €	Heritage	Incorporation of portable equipment for Energy –dispersive X ray fluorescence (ED XRF) in the Heritage Laboratories Network.	54.588 €	Heritage	Mechanical traction multi-channel georadar system for high resolution	118.387 €	
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	large scale geophysical prospection.	
Global Change and New Energies	Ex situ conservation of animal and plant biodiversity on the CEI Moncloa Campus. Acquisition and installation of equipment and infrastructure for the conservation, maintenance and study of the biodiversity in the plant germplasm bank.	244.375 €
Materials for the Future	Combined Scanning Electron Microscopy-Cathodoluminescence System(SEM-CL)	250.000 €
Agri-food and Health	Providing the CAM 212-UPM service laboratory with equipment for the elemental analysis of C and N in solid and liquid samples.	113.415,00 €
Innovative Medicine	3D visualization and advanced multimodal interaction infrastructure for CEI Living Lab	296.174 €
Agri-food and Health	Creation of an interdepartmental laboratory for evaluating techniques and processes to improve the safety, healthiness and quality of foods of animal origin.	155.875,00 €
Materials for the Future	Integral platform for the micro and nano mechanical characterization of materials	120.000 €
Materials for the Future	Direct laser writing system for nanolithography	120.000 €
Materials for the Future	INGENIA: developing the solar cell of the future through new generation materials	250.000 €
Materials for the Future	Axial 500kN servo hydraulic dynamic test machine	150.000 €
Global Change and New Energies	Technique for quantitative elemental determination in solids, secondary neutron mass spectrometry (SNMS)	120.000 €
Global Change and New Energies	Capturing and application of 3D information using terrestrial laser to natural resource management, land use planning	80.163 €
<b>Global governance structures created</b>		
N/a.		
<b>Most significant results</b>		
Most of the equipment has already been acquired and is working. The description of the scientific work undertaken is given in the report in the section corresponding to the strategic areas developed by the clusters, where the scientific equipment is an essential complement to the work underway.		
<b>Use of human, material and economic resources.</b>		
The Call for the <b>Acquisition of scientific and technological equipment and infrastructure</b> with total funding <b>3.9 million Euros</b> from the CEI 2009 budget is managed by the CEI Moncloa Campus Office.		
<b>Most important progress deviations</b>		
The complexity of the equipment to be acquired and the time lapse inherent in the acquisition process has meant delays in some cases of over a year in the installation of the equipment, so that some projects were unable to start on schedule.		

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	A9. INTERNATIONAL PROGRAM FOR TALENT RECRUITMENT (PICATA)
<b>Objectives</b>	Recruiting international talent at all levels: Predoctoral grants, postdoctoral contracts and highly qualified technicians. The program is complemented by a subprogram of mobility

#### **Progress towards the objectives**

The International Program for Talent Recruitment (PICATA) is one of the strategic actions of the Moncloa Campus. Researchers may join research groups at UCM, UPM and / or Partner Entities (CSIC, CIEMAT, INIA, AEMET, etc.) in order to work together. All beneficiaries' work undergoes double supervision, with scientists from at least two institutions from the strategic group of Moncloa Campus. Accordingly, the projects undertaken under this program reinforce the joint research conducted by the CEI Campus Moncloa groups.



Photo: Group of PICATA program beneficiaries at the meeting held in March 2012

This program reinforces the collaboration and integration in the Moncloa Campus and promotes internationalization.

#### **Description of the work done and role of the participants**

In this area of scientific improvement and internationalization, from the human capital perspective, young researchers of academic and scientific excellence have joined through the International Program for Talent Recruitment (PICATA), which is undoubtedly one of the main actions of CEI Moncloa Campus.

The PICATA program has a total budget of about **6 and a half million Euros, divided into three calls for young PhDs, two grants for the completion of doctoral theses** and a last tender for highly skilled laboratory technicians is scheduled for the last quarter of 2013. This last call will be financed by the research groups and is intended for large equipment acquired through the CAIMON call.

At the date of issuance of this report a total of 5 calls of the program have been resolved whereby 43

graduates completing their PhD theses and 22 young PhDs have joined the project, distributed in CEI clusters as follows:

	Global Change and NE	Materials	Agri-Food and Health	Innovative Medicine	Heritage
Predoc 2010	Alonso Henaar, Jorge	Guisasola Cal, Eduardo	Rivas Fernandez, Eva M <sup>a</sup>	Garcés López, M <sup>a</sup> Pilar	Martínez Garrido, M <sup>a</sup> Inmaculada
	Marino, Raffaella Anna	Rocci, Mirko	Sánchez Matamoros, Almudena	Ibáñez Escribano, Alexandra	Rodríguez Herrero, Montserrat
	Capa Morocho, Miriam	Alonso Domínguez, Daniel	Cámara García, Lourdes	Cancela González, Jorge	de la O Cabrera, Manuel Rodrigo
	Zapater Sancho, Marina			Méndez Bértolo, Constantino	Díez De Pablo, Ainhoa
	Lirola Pérez, Juan Miguel				
Predoc 2011	Amils Samalot, Ricardo Ignacio	Abuín, Manuel	Duque Rodríguez, Juan Ramón	Fonseca Berzal, Cristina	Pérez Ema, Natalia
	Arribas Fernández, Paula	González González, David	Navarro García, Yurena	Marín Ramos, Nagore Isabel	
	García Hemme, Eric	Martínez Carmona, Marina		Nidhi Sneha	
	Sedano Algarabel, Enrique	Pérez Muñoz, Ana			
Doc 2010	Alvarez Solas, Jorge	Chang, Hyung-Jun	Gañan Martínez-Ballesta, Mónica	Murphy, Niall Paul	Hernández Jiménez, Verónica
	Monasterio Martin, Camila	Gaul, Christopher	Lunadei, Loredana	Vignoletti, Fabio	Pablo Núñez, Luis
	Sacca, Maria Ludovica	Gordillo García, Nuria			

	Tadger, Marko Jak	Martinez Pedrero, Fernando			
Doc 2011	Amore, Valentina	Cortes Gil, Raquel		García Arencibia, Moises	
	Peña Rodríguez., Ovidio	Pedros Ayala, Jorge		Luengo Oroz, Miguel Angel	
	Sánchez Vicente, Yolanda	Urraca Ruiz, Javier			
Doc 2012	Domingo Martínez, Laura	Torres Pardo, Almudena	Cubillos Zapata, Carolina	Canuet Delis, Leonides	Carrasco Conde, Ana
	Williams, Richard		García Ortega, Lucía	Pradillo Justo, Jesús Miguel	Gómez Heras, Miguel
			Liandris, Emmanouil		

International Calls for Predoctoral Grants are complemented by a Mobility subprogram whereby all Predoctoral grant recipients can enjoy a Predoctoral stay at any university or research centre in any city in the world, for up to three months maximum. The purpose of these grants is to promote the international character of their training and facilitate obtaining European doctorates.

Detailed information on these calls is available through our website:

<http://www.campusmoncloa.es/es/convocatorias/picata.php>

#### **Major results**

Each year a meeting with all PICATA program beneficiaries is organized to verify the progress of their work and encourage interaction between them and their research groups. In February 2013 the 1st PICATA Workshop was conducted with the presentation of the projects developed, and regarding which a publication is available at:

<http://www.campusmoncloa.es/data/pdf/noticia/Book-of-abstracts-PICATA.pdf>

#### **Use of human, material and economic resources**

The PICATA call has been allocated about 6 million euro of the budget for CEI 2009, CEI 2010 and the 2011 Strengthening call.

To date a total of € 2,239,713 has been used in the years 2010, 2011 and 2012



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	A6. DEVELOPING THE CLUSTER MASTER PLANS.
<b>Objectives</b>	Preparation and development of cluster master plans for the purpose of ensuring the strategic objective of connectivity, internationalization and transfer.
<p><b>Progress towards the objectives</b></p> <p>In 2010 the coordination structures of the clusters were created. The process began with the appointment of Coordinators and Advisory Councils. Cluster Coordinators are part of the campus Board.</p> <p>To date more than 400 research groups belonging to strategic partners of CEI Moncloa Campus have shown interest in taking part in joint research projects.</p>	
<p><b>Description of the work done and role of the participants</b></p> <p>The Moncloa Campus defines its strategic specialization areas through six clusters: Global Change and New Energies, Materials for the Future, Agri-Food and Health, Innovative Medicine, Heritage and Sustainable Mobility.</p> <p>A noteworthy factor in this second evaluation period is the consolidation of work developed in the clusters as a force which generates collaborative work in the Moncloa Campus and enhances the power of diversity, as defined by the title of our strategic plan. Moreover, in late 2011 the Moncloa Campus Executive Committee agreed on the incorporation of a new cluster in addition to the initial five clusters. The new cluster specialized in Sustainable Mobility generates new lines of joint work and is strongly supported by the business sector.</p> <p>While in 2010, progress was made towards the consolidation of clusters, identifying the groups involved in the strategic lines of the Moncloa Campus, defining their objectives and decision making structures through the Advisory Boards of the clusters, during 2011 their work was consolidated and compiled in a document that contains the Master Plans which describe their work strategy.</p> <p>These master plans may be viewed at the Moncloa Campus website, at the following links:</p> <ul style="list-style-type: none"> <li>- Global Change and New Energy Cluster: <a href="http://www.campusmoncloa.es/data/clusters/CG/Cluster-Cambio-Global-y-Nuevas-Energias-Plan-Director.pdf">www.campusmoncloa.es/data/clusters/CG/Cluster-Cambio-Global-y-Nuevas-Energias-Plan-Director.pdf</a></li> <li>- Materials for the Future Cluster: <a href="http://www.campusmoncloa.es/data/clusters/MF/Cluster-Materiales-para-el-Futuro-Plan-Director.pdf">www.campusmoncloa.es/data/clusters/MF/Cluster-Materiales-para-el-Futuro-Plan-Director.pdf</a></li> <li>- Agri-Food and Health Cluster: <a href="http://www.campusmoncloa.es/data/clusters/AH/Cluster-Agroalimentacion-y-Salud-Plan-Director.pdf">www.campusmoncloa.es/data/clusters/AH/Cluster-Agroalimentacion-y-Salud-Plan-Director.pdf</a></li> <li>- Innovative Medicine Cluster: <a href="http://www.campusmoncloa.es/data/clusters/MI/Cluster-Medicina-Innovadora-Plan-Director.pdf">www.campusmoncloa.es/data/clusters/MI/Cluster-Medicina-Innovadora-Plan-Director.pdf</a></li> <li>- Heritage Cluster: <a href="http://www.campusmoncloa.es/data/clusters/P/Cluster-Patrimonio-Plan-Director.pdf">www.campusmoncloa.es/data/clusters/P/Cluster-Patrimonio-Plan-Director.pdf</a></li> <li>- Sustainable Mobility Cluster: <a href="http://www.campusmoncloa.es/data/clusters/MS/Cluster-Movilidad-Sostenible-Plan-Director.pdf">www.campusmoncloa.es/data/clusters/MS/Cluster-Movilidad-Sostenible-Plan-Director.pdf</a></li> </ul>	
<p><b>Governance structures created</b></p> <p>In 2010 progress was made towards the consolidation of the clusters, identifying the groups involved in the strategic areas of CEI Moncloa and defining objectives. Part of the consolidation is based on the decision-</p>	

making structures created:

- Campus Board. Formed by two internationally renowned coordinators (one proposed by each university).
- Advisory Councils of the clusters. Recognized experts from different subject areas of each cluster. They involve not only UCM and UPM researchers, but also prominent members of the Campus partner institutions. Each cluster has been involved in a considerable number of meetings of the Advisory Council to define the strategic aspects.
- Relationship between the Board- Advisory Council and Campus groups. Network structure. Input from groups: Formalizing Expressions of interest (June-July 2010, October-November 2010, April 2011).

**Major results:**

Creating structures. Appointment of Coordinators for Clusters and Advisory Councils.

More than 400 research groups from the UCM and UPM have submitted formal expressions of interest in joining the Campus clusters.

Identifying synergies between groups.

**Use of human, material and economic resources**

To prepare the Master Plan of the Innovative Medicine and Agri-Food and Health clusters, technical advice was sought from consultants who structured the information and assisted those responsible for the clusters in strategy definition.

€ 2467 of the CEI 2009 budget has been used for this action.

**Major deviations in the progress towards objectives**

The role of the Partner Institution groups in relation to the CEI Moncloa Project has changed, because a loan rather than a grant assumed only by the Coordinating Universities has been granted to implement the project.



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	<p><b>Thematic actions of the GLOBAL CHANGE AND NE cluster.</b></p> <p><b>Actions started:</b></p> <p>E8. Creating a Remote Sensing and Monitoring Laboratory.                  E9. Creating a Laboratory for Climate Change and Impacts.                  E10. Setting up the Moncloa Natural Hazards Network.                  E11. Creating the Advanced Scientific Instrumentation Laboratory (LICA).                  E12. Creating a Joint Unit (UCM-UPM) for ex situ Conservation.                  E13. Creating a program for cataloguing, conservation and dissemination of Biodiversity in the University Campus</p>
<b>Objectives</b>	<p>The cluster is structured into four strategic areas:</p> <p>a) <b>Environmental technologies and new energy.</b> For the development of new technologies for the production of clean energy and for the prevention, monitoring and mitigation of some of today's environmental problems.</p> <p>b) <b>Observation of System Earth and Space.</b> Aimed at preventing climate change and natural disasters and mitigating their impacts, taking into account that the area covering the Iberian Peninsula, ocean margins, North Africa and the Canary Islands is a particularly sensitive region. Including support for space missions and instrumental development in Astrophysics. <i>Actions: E8, E9, E10, E11</i></p> <p>c) <b>Study and conservation of biodiversity,</b> with a focus on the Mediterranean and Latin American areas, where there are currently large biodiversity reservoirs (<a href="http://www.biodiversityhotspots.org">www.biodiversityhotspots.org</a>). <i>Actions: E12, E13</i></p>
<p><b>Progress towards the objectives</b>                  Described on separate sheets.</p>	

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	E8 Remote Sensing and Monitoring Laboratory
<b>Objectives</b>	The main objective of the Remote Sensing and Monitoring Laboratory is the creation of a device capable of monitoring the Earth's surface using space and ground data. Regions of interest: Iberian Peninsula, North Africa and the Canary Islands. It includes the development of algorithms.
<p><b>Progress towards the objectives</b></p> <p>The action continues to develop with the consolidation of a CEI Moncloa Campus Remote Sensing group, based on the specialization in techniques for the study and measurement of deformations of the earth's surface and its many applications, which develops research, and is competitive, holding a leading position in the international arena. Components of the various institutions involved in the CEI Moncloa Campus (UCM, UPM, CSIC, IGME...) and international institutions are being integrated therein.</p> <p>The main objectives of the Global Change and New Energies Cluster include, among others, bringing together the wealth of the research groups working on the Moncloa Campus in issues regarding global change, the system earth, space, environment and new energy by providing a backbone and shared coordination mechanism enabling the optimization of resources and international impact.</p> <p>The Campus includes the CIEMAT, the leading Spanish scientific institution in energy and environmental studies, the CSIC, the largest Spanish research organization, IGME, whose collaboration with the two universities, UCM and UPM, and with the Moncloa Campus is in itself an essential added value and will undeniably act as a driving force for the cluster.</p> <p>Activities within the areas of system earth, space and new energy include the creation of a Remote Sensing Laboratory, connected and coordinated with a twin laboratory that UCM has already deployed on its premises.</p> <p>The activities of a Remote Sensing Laboratory generally require a very high consumption of computational resources, both for processing and storage, as they need intensive image processing applications, for both still and moving images as images that are often multichannel and having an extremely high resolution. These resources are suitably and efficiently provided through a supercomputing cluster.</p> <p>The action falls within the context of major European and international initiatives: IGOS (<i>Integrated Global Observatory Strategy for monitoring our environment from Earth and Space</i>), GEOSS (<i>Global Earth Observation System of Systems</i>), CEOS (<i>Committee on Earth Observation Satellites</i>), GEM: Global Earthquake Model, GlobVolcano of the ESA, etc.</p>	
<p><b>Description of the work done and role of the participants</b></p> <p>Based on the existing CSIC-UCM group (which includes one of the universities and an important partner entity), a considerable effort is being made to develop and strengthen cooperation in the areas of action with the UPM, other partner agencies of the CEI Moncloa Campus and private companies. Research carried out by the core group has a strong international nature which is expected to increase under the CEI. Results are being achieved regarding the promotion of scientific and technical collaborations and synergies.</p> <p>It is an absolute priority when developing the action to boost and increase where possible -based on existing or new synergies and collaborations within the CEI- the scientific quality of the research</p>	

conducted, and the impact and relevance of the results. This aspect has also begun to show results.

### **Governance structures created**

#### Participating partners of the action

UPM (ETSI: Telecommunications, Aeronautics, Mining, Agriculture, Forestry), UCM (Faculties: Chemistry, Physics, Geology, Biology, Mathematics, Pharmacy, Computer Science, Geography and History), CSIC (IGEO Joint Centre UCM-CSIC), AEMET, IGN, IGME, INIA.

Supervising groups at each University. UPM: ETSI Aeronautics, UPM-UCM: Joint Institute of Geoscience IGEO, Department of Earth Observation.

Overall supervisor of the action: UPM

Scientific supervisors: Dr. José Fernandez Torres (CSIC-UCM) and Prof. Francisco Javier Elorza (UPM).

The supercomputing system has been acquired and is currently being installed and commissioned.

At an early stage the operating software for image processing and 3D visualization has been defined, and the calls requesting projects for the scientific and technical operation of the infrastructure are being defined.

### **Major results**

A numerical summary diffusion of the results obtained as well as relevant training aspects are given below. Details are available in Appendix I.

The following codes are used in all UCM-CSIC cooperation actions as well as for other collaborations: **I**=international participation; **U**=Cooperation with UPM; **A**=Cooperation with other partner entities other than CSIC; **E**=Cooperation with companies: Publications in journals included in the SCI: 2010: 2 (**I**); 2011: 7 (**I**); 2012: 4 (**I**), 1 special edited volume (**I**); 2013: 4 (**I, A**) (2 in the press). Major results: 1 paper in *Geology* (2011) on the subsidence in the vicinity of the city of Lorca, 1 paper in *Nature Geoscience* (2012) on the Lorca earthquake, 1 paper published in the Journal of Geophysical Research-Solid Earth (2013) on the eruption of El Hierro.

Publications submitted and under revision: 1

Publications in other journals: 2011: 1 (**I**); 2012: 2 (**I, A**).

Books, monographs and collective volumes: 2011: 1; 2012: 5 (**I, U**), 1 book edited (**I**); 2013: 3 (**I, A**)

Research Projects: VII Framework Program of the EU: 2 (**I**); Space Agencies: 7 (**I, E**); National Plan R+D+i: 2 (**I, U, A, E**).

Communications and presentations at conferences: Conferences Invited to: 10 (**I, U, A**); Total number of Communications presented: 40 (**I, U, A**).

Courses taught: 2 (**I, U, A, E**).

Doctoral theses in progress: 2 (**I, U, A, E**).

**Use of human, material and economic resources**

Investment made to acquire the computational cluster entitled VIENTO: 286,692 Euros (246,691.64 UPM, 40,000 UCM) under the INNOCAMPUS program.

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	E9 Creation of the Laboratory for Climate Change and Impacts
<b>Objectives</b>	<p>The main goal is the analysis and modelling of the climate system (atmosphere, oceans, cryosphere, biosphere and its interactions) and the impacts of climate change. The simulation will address different spatial and temporal scales, covering from geological periods to the end of the century. The laboratory consists of: A computing cluster, an isotope laboratory focused on obtaining paleoclimatic proxies (stable isotope laboratory and Thermal Ionization Mass Spectrometer)</p>
<p>Progress towards the objectives</p> <p><b>EOLO Computing Cluster:</b> The EOLO Cluster is installed and operating in the Data Processing Centre (CPD) of the UCM on the Moncloa Campus. In August 2013 it reached a level of use over 90%, most of this time spent on climate simulations with the model CESM1.2 (Community Earth System Model) and the Whole Atmosphere Community Climate Model (WACCM). On this date EOLO accounts for 35 researchers from 14 research CEI Moncloa groups were opened.</p> <p>Photo: EOLO Control Screen</p>  <p><b>Laboratory for obtaining paleoclimatic proxies.</b> Initiation of the processing of purchases of laboratory equipment for the stable isotopes laboratory: Automatic carbonates system, O, N, C, H). Location: Faculty of Geological Sciences at the UCM.</p> <p>Acquisition of the Thermal Ionization Mass Spectrometer-TIMS. Location: CAI Geochronology at the UCM.</p>	
<p><b>Description of the work done and role of the participants</b></p> <p><b>1. EOLO Computing Cluster:</b></p> <p>EOLO is a high capacity computing system with distributed memory, consisting of 40 compute nodes and an advanced NAS-type storage subsystem for the Cluster File System. The interconnection network of the computing cluster is InfiniBand, and the storage connection network is based on 4 links of 10 Gigabit Ethernet links that give a bandwidth of 40 Gbps. 1.9 TB of RAM and 480 actual calculation cores. The hard drive capacity is close to 300 TB.</p> <p>EOLO is acquired to meet the needs of meteorology, climate and climate change research groups. In these areas, HPC resources are essential for performing simulations with meteorological or climatic models on a</p>	

regional and global scale. These groups will benefit both from the increase in computing resources and the availability of a high storage capacity, thereby meeting the two typical requirements for climate / meteorological simulation in which experiments generate a large volume of outputs to be stored over long periods.

A management committee for the EOLO cluster has been created with members from UCM and UPM. Since computing resources involve not only the research vice-chancellors but also those responsible for computing resources, such management committee also includes representatives from CEI Moncloa for UCM and UPM, a representative from IGEO, a representative from UCM and another from UPM of the vice-chancellors responsible for the computing resources and a user representative from UCM. This committee will regulate access to EOLO and coordinate the distribution of intensive scientific computing applications among the resources available in the CEI and partner institutions. The management committee has convened several times since October 2012. During the implementation period, an executive committee has acted formed by José Manuel Udías (Faculty of Physical Sciences UCM), Jorge Balsa (IGEO computer technician) and Jesús Palero (technician assigned by the UCM CPD as contact for EOLO).

In the implementation period Prof. José Manuel Udías takes over from Prof. Fidel González Rouco who was head researcher in EOLO during the purchase process.

#### Participating partners of the action

UPM (ETSI: Agriculture, Forestry, CEIGRAM), UCM (Faculties: Physics, Geology, Mathematics, Chemistry, Biology, Pharmacy, Computer Science, Geography and History), CIEMAT, CSIC (IGEO Joint Centre UCM-CSIC), AEMET, INIA.

Supervising groups of each university. UPM-UCM: Joint Institute of Geoscience IGEO, Department of Climate Change), UCM: Faculty of Physical Science, UPM: ETSI Agriculture.

Overall supervisor of the action: UCM

#### **2. Laboratory for obtaining paleoclimatic proxies:**

Stable Isotope Laboratory: Prof. Javier Martin Chivelet (Faculty of Geological Sciences, UCM)

Thermal Ionization Mass Spectrometer: Prof. Carmen Galindo (CAI Geochronology, UCM)

The CAI Isotope Geochronology and Geochemistry, has served numerous research projects obtaining results. This service has been made possible largely due to the acquisition of new mass spectrometer Phoenix HCT040 and the development and commissioning of the new Clean Room in the laboratory, both purchased with CEI funds. All this has contributed to the improved performance in terms of precision, accuracy, timely delivery of results and specific technical troubleshooting.

Notably, this year 2013 the systematic of common lead in the new spectrometer has been introduced, which soon will service users who so request.

Similarly, the CAI (CEI) continues with its academic work, allowing graduate students to access the laboratory for learning, expanding knowledge on the techniques developed, and subsequent analysis of the samples of interest for scientific work.

Hereunder is a list of the work and contributions to conferences (these communications are provided by the users themselves, so the number of jobs is much higher than shown here) which shows results

obtained in the CAI (CEI) as well as a list of projects routinely serviced by the CAI (CEI):

### 1. Papers published with results from CAI (CEI) equipment

1.1. ALASINO, P.H., DAHLQUIST, J.A., PANKHURST, R.J., GALINDO, C., CASQUET, C., RAPELA, C.W., LARROVERE, M.A., FANNING, C.M., 2012. Early Carboniferous sub- to mid-alkaline magmatism in the Eastern Sierras Pampeanas, NW Argentina: a record of crustal growth by the incorporation of mantle-derived material in an extensional setting. **Gondwana Research**, 22: 992-1008

1.2. AULINAS, M.; GASPERINI, D.; GIMENO, D.; MACERA, P.; FERNANDEZTURIEL, J.L. y CIMARELLI, C.. Coexistence of calc-alkaline and ultrapotassic alkaline magmas at Mounts Cimini: evidence for transition from the Tuscan to the Roman Magmatic Provinces (central Italy). **Geologica Acta**, 9(1), 103-125.

1.3. BAQUÉS, V.; TRAVÉ, A.; ROCA, E., MARÍN, M., CANTARERO, I.(2012). Geofluid behaviour in successive extensional and compressional events: a case study from the southwestern end of the Vallès-Penedès Fault (Catalan Coastal Ranges, NE Spain). **Petroleum Geoscience**, 18, 17-31. ISSN: 1354-0793

1.4. CASQUET, C.; RAPELA, C.W.; PANKHURST, R.J.; BALDO, E.G.; GALINDO, C.; FANNING, C.M & DAHLQUIST, J.A. (2012) Fast sediment underplating and coeval juvenile magmatism in the Ordovician continental margin of Gondwana, Western Sierras Pampeanas, Argentina. **Gondwana Research**, 22, 664-673

1.5. FUENLABRADA, J.M., ARENAS, R., DÍEZ FERNÁNDEZ, R., SÁNCHEZ MARTÍNEZ, S., ABATI, J. & LÓPEZ CARMONA, A. (2012) Sm-Nd isotope geochemistry and tectonic setting of the metasedimentary rocks from the basal allochthonous units of NW Iberia (Variscan suture, Galicia). **Lithos**, v 148, p. 196-208 (2012)

1.6. DE IGNACIO, C., MUÑOZ, M., SAGREDO, J. Carbonatites and associated nephelinites from São Vicente, Cape Verde Islands (in press) **Mineralogical Magazine** ISSN:DOI: 10.1180/minmag.2012.076.2.05. Volume: 76(2) (Pages, initial: 311 final: 355) Date: 2012

1.7. MARTÍN-MARTÍN, J.D.; GOMEZ-RIVAS, E.; TRAVÉ, A.; SALAS, R.; VERGÉS, J.(2012). Dolomías controladas por fracturas en carbonatos aptienses de la zona de Benicàssim (SE Cuenca del Maestrat): distribución y características petrográficas. **Geogaceta**, 51, 19-22. ISSN: 0213-683X

1.8. RODRÍGUEZ-MORILLAS, N.; PLAYÀ, E.; TRAVÉ, A.; MARTÍN-MARTÍN, J.D.; GUERRERO, A.(in press). Casablanca oil field, Valencia Trough, offshore Spain: Diagenetic processes in a carbonate reservoir. **Geologica Acta**., DOI: 10.1344/0.000001833 ISSN: 1695-6133

1.9. THORNDYCRAFT, V., BENITO, G., SÁNCHEZ-MOYA, Y., SOPEÑA, A. (2012): Bayesian age modelling applied to palaeoflood geochronologies and the investigation of Holocene flood magnitude and frequency. **The Holocene**, 22(1), 13-22

1.10. ARMENDÁRIZ, M., ROSALES, I., BÁDENAS, B., AURELL, M., GARCÍARAMOS, J.C. & PIÑUELA, L. (2012). High-resolution chemostratigraphic records from Lower Pliensbachian belemnites: Palaeoclimatic perturbations, organic facies and water mass exchange (Asturian basin, northern Spain). **Palaeogeography, Palaeoclimatology, Palaeoecology**, v. 333-334, pp. 178–191. Doi:

10.1016/j.palaeo.2012.03.029

1.11. DALHQVIST, J.A.; PANKHURST, R.J.; GASCHNIG, R.M.; RAPELA, C.W.; CASQUET, C.; ALASINO, P.H.; GALINDO, C. & BALDO, E.G. (2012). Hf and Nd isotopes in Early Ordovician to Early Carboniferous granites as monitors of crustal growth in the Proto-Andean margin of Gondwana. *Gondwana Research* (doi: 10.1016/j.gr.2012.08.013)

1.12. IANNIZZOTTO, N.F.; RAPELA, C.W.; BALDO, E.G.; GALINDO, C. & FANNING, C.M. (2012) The Sierra Norte-Ambargasta Batholith: Late Ediacaran-Early Cambrian magmatism associated with Pampean Transpressional Tectonics. *Journal of South American Earth Sciences* (10.1016/j.jsames.2012.07.009)

## 2. Research projects serviced by CAI (CEI)

2.1. Group Data: 910429. Group code and title: ANALYSIS OF SEDIMENTARY BASINS. Director/Head Researcher: José Ramón Mas Mayoral. Level: Excellence (Cluster "Global Change and NE" of the Project CEI Campus Moncloa). Year of establishment: 2005. State if it is currently in force: Yes

2.2. Group Data: Paleoclimatology and Global Change. Director/Head Researcher: Cristino Dabrio González and Javier Martín Chivelet. Level: Complutense group linked to the Moncloa Campus of International Excellence (UCM & UPM) in the Cluster "Global Change and NE". Year of establishment: 2005. State if it is currently in force: Yes

2.3. Group Data: 910129. Group code and title: Group EUROVARISCO: "Dynamics and evolution of the European Variscan Belt". Complutense group linked to the Moncloa Campus of International Excellence (UCM & UPM). Director/Head Researcher: Ricardo Arenas Martín and Jacobo Abati Gómez. Year of establishment: Created in 2005 and with ongoing activity to date.

2.4. Group Data 910469. Group code and title: Volcanism. Director/Head Researcher: Eumenio Ancochea Soto. Level: UCM Group included in the Cluster "Global Change and NE" of the Project CEI Campus Moncloa. Year of establishment: 2005 and with ongoing activity to date.

2.5. Group Data 910495. Group code and title: PAMPRE from "Pampeanas to Andean foothills" Argentina. Director/Head Researcher: Cesar Casquet Martín and Carmen Galindo Francisco. Level: UCM group included in the Cluster "Global Change and NE" of the Project CEI Campus Moncloa, and Research group No. 642840 of IGEO (UCM-CSIC). Year of establishment: 2005 and with ongoing activity to date.

2.6. Group Data 910404. Group code and title: Petrology applied to basin analysis and conservation of Geological Heritage

Director/Head Researcher: Ana M<sup>a</sup> Alonso Zarza and Rafaela Marfil Pérez. Level: UCM group included in the Cluster "Heritage" of the Project CEI Campus Moncloa. Year of establishment: 2005 and with ongoing activity to date.

2.7. Group Data 910492. Group code and title: Magmatism and mineralization in the Hercynian Central-Iberian region

Director/Head Researcher: Carlos Villaseca González. Level: UCM group included in the Cluster "Global Change and NE" of the Project CEI Campus Moncloa and Research group No. 642840 from IGEO (UCM-CSIC). Year of establishment: 2005 and with ongoing activity to date.

2.8. Group Data Group code and title: Grup Consolidat de Recerca Geologia Sedimentaria" 2009SGR-1451. Director/Head Researcher: Anna Travé. Group level: Generalitat de Catalunya. Year of establishment: 2009 (In force).

2.9. KHORRA (CSIC Project). (Spain). Jaume Vergés Masip / Juan Diego Martín. Institut de Ciències de la

Terra Jaume Almera (CSIC)

2.10. DARIUS (Spain). Jaume Vergés. Instituto de Ciencias de la Tierra 'Jaume Almera' CSIC.

2.11. CANOA 53.2.00.12.00 (Spain). Idoia Rosales. Instituto Geológico y Minero de España

2.12. MINCYT Córdoba Res. Nº 000121 (Argentina). Juan A. Dahlquist. CONICETUNC (Argentina).

2.13. CANOA 72.5.00.16.00 (Spain). Fernando Tornos. Instituto Geológico y Minero de España

2.14. PROCESOS DE INTERACCIÓN ROCA-FLUIDO EN SISTEMAS PETROLEROS SILICICLÁSTICOS Y CARBONÁTICOS. (SPAIN) Juan José Pueyo. Universidad de Barcelona

2.15. (Iran). Hadi Schafaii Moghadam Damghan University.

2.16. CGL2010-21298 (Spain) Montserrat Liesa Torre-Marín / Marina Navidad. Universidad de Barcelona

2.17. CGL2011-28022 (Spain) Domingo Gimeno Torrente. Universidad de Barcelona

2.18. Oferta número: 9000035842. (Spain). Miguel Angel Caja. Centro Tecnológico REPSOL

### **3. Congresos donde se presentaron resultados del CAI (CEI)**

3.1. BAQUÉS, V.; TRAVÉ, A.; BENEDICTO, A.; CANTARERO, I. (2012). The meteoric fluids circulation during the Miocene rifting of the Penedès Halfgraben, NE Iberian Peninsula. Presentation of communication, VIII Congreso Español de Geología. Geo-Temas, Oviedo, SPAIN.

3.2. BAQUÉS, V.; TRAVÉ, A.; CANTARERO, I.; BENEDICTO, A.; LABAUME, P. (2012). Pre-, syn- and post-rift karstic features in a single normal fault: Penedès Half-graben, NE Iberia. Presentation of communication, VII Geofluids conference, París, FRANCE.

3.3. CANTARERO, I.; TRAVÉ, A.; ALÍAS, G.; BAQUÉS, V. (2012). Evolution of fluids and deformation along a multiphasic segmented fault system, Barcelona Plain (NE Spain). Poster, VII Geofluids conference, París, FRANCE.

3.4. CAPRANO, J., COLOMBO, F., BALDO, E., Y WEMMER, K. (2012) Basic magmatism in Eastern Sierras Pampeanas (Córdoba, Argentina): the magmatic record of Late Carboniferous extension. VIII Congreso Geológico Español. Universidad de Oviedo

3.5. GUERRERO, A.; PLAYÀ, E.; TRAVÉ, A.; RODRÍGUEZ, N. (2012). Evolución diagenética de los Campos petrolíferos de la Cuenca de Tarragona (Surco de Valencia, NE España). Poster, VIII Congreso de Geología de España, Oviedo, SPAIN.

3.6. GUERRERO, A.; RODRÍGUEZ, N.; PLAYÀ, E.; TRAVÉ, A. (2012). Dolomitization processes in extensional context: tarragona basin oil fields (valencia trough, ne spain). Poster, PROCEEDINGS, GEOFLUIDS VII – International Conference, Paris, FRANCE.

3.7. LÓPEZ-CILLA, I. & ROSALES, I. (2012). Diagénesis en las plataformas carbonatadas del Cretácico inferior del noroeste de Cantabria: un ejemplo de dolomitización y cementación calcítica multifase. V *Jornadas de Investigadores en Formación en Ciencias de la Tierra del IGME*, Salon de Actos de la E.T.S. de

Ingenieros de Minas, Madrid. *Libro programa y resúmenes, IGME*, pp. 13-14.

3.8. LÓPEZ-CILLA, I., ROSALES, I. & NAJARRO, M. (2012). Diagenesis in Lower Cretaceous platform carbonates of northern Spain (NW Cantabria): An example of multistage dolomitization and calcite cementation. *GEOFLUIDS VII-International Conference*, 6-8 Junio, Proceedings of Geofluids VII, IFP Energies Nouvelles, Rueil-Malmaison (Francia). Extended abstracts book, pp. 205-208.

3.9. MARTÍN-MARTÍN, J.D.; AMENEIRO, R.; GOMEZ-GRAS, D.; TRAVÉ, A. (2012). Macroporosity distribution in fault controlled dolostones from the SE Maestrat Basin (Spain). Presentation of communication, VII Geofluids conference, París, FRANCE.

### **Major results**

The cluster is in its first months of use by researchers, but has already had an impact on the achievement by some CEI Moncloa groups of European projects to be implemented with the help of EOLO. These include:

MULCLIVAR Project (CGL-2012-38923-C02-01), with national funding coordinated by María Belén Rodríguez Fonseca at UCM and M. Ines Minguez Tudela at UPM. PREFACE European project (Enhancing PRediction of Tropical Atlantic ClimatE & its impact )

EU Framework 7 cooperative project (ENV 2013), coordinated at UCM by María Belén Rodríguez Fonseca. Also, Simulation and analysis of key Periods in the Quaternary: Towards advancing understanding of proxy Reconstructions and model Simulations, CGL2011-29672-C02-01(MINECO). Head researcher: Volker Rath (UCM). Mechanisms and variability of the troposphere-stratosphere coupling (CGL2012-34221, MINECO) coordinated by David Barriopedro Cepero (UCM). "Interaction between atmospheric boundary layer processes and fog in stable environments: An observational study and numerical simulations" (CGL2012-37416-C04-02).

### **Use of human, material and economic resources**

The IGEO funds Jorge Balsa's contract; technician assisting EOLO management.

### **Major deviations in the progress towards objectives**

The need to relocate some equipment and delayed purchase of equipment.

### **Corrective measures proposed**

EOLO Computing Cluster: relocation to the UCM Computation Centre.

Stable isotope laboratory: provisional relocation: Faculty of Geological Science of UCM



<b>Scope</b>	Teaching improvement / Scientific improvement / Transfer / Comprehensive Social Campus
<b>Action</b>	E10: Moncloa Natural Hazards Network
<b>Objectives</b>	For the development and innovation of new technologies for the study of the processes that cause natural disasters. Modelling studies will be enhanced and early warning systems of natural disasters will be developed.
<p><b>Progress towards objectives</b></p> <p>Improved Western Mediterranean seismic network (WM, ROA / UCM) by acquiring four broadband seismic stations, equipped with speed and acceleration registration and 3 seafloor seismometers (Ocean Bottom System, OBS).</p>	
<p><b>Description of the work done and role of the participants</b></p> <p>Characteristics of the instrumentation on the market has been studied, its adaptation to the objectives of the WM network and particularly maintenance of network homogeneity. This is of vital importance for the integration of observations from the new equipment in the existing database. The maintenance and control of the new equipment must also be ensured. This work was done in collaboration with the Royal Institute and Observatory of the Navy (ROA).</p> <p><b>Governance structures created</b></p> <p><u>Participating partners of the action</u></p> <p>(ETSI Telecommunication, Mining, Forestry, Agriculture, Forestry, Civil Engineering), UCM (Faculties: Physics, Geology, Mathematics), CIEMAT, CSIC (IGEO Joint Centre UCM-CSIC), IGN, IGME, INIA, AEMET.</p> <p><u>Supervising groups in each university.</u> UPM-UCM: Joint Institute of Geoscience IGEO, Department of Earth observation), UCM: Fac. Physical science, UPM: ETSI Mines.</p> <p><u>Overall supervisor of the action:</u> UCM</p> <p><u>Scientific supervisor:</u> Elisa Buforn (Fac. Physical science, UCM).</p>	
<p><b>Major results</b></p> <p>The action is underway. The procedure for the acquisition of 4 broadband speed sensors has initiated. Reports are being prepared for the acquisition of the acceleration sensors, data acquisition system and digitizer. Reports for the acquisition of OBS are also being developed.</p>	
<p><b>Use of human, material and economic resources</b></p>	

The purchase of equipment needed for scientific improvement of the network is underway.

**Major deviations in the progress towards objectives**

No deviations; action development as planned

**Corrective measures proposed**

Not applicable



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	<b>E11. Advanced Scientific Instrumentation Laboratory (LICA).</b>
<b>Objectives</b>	To create and maintain a laboratory dedicated to the design, development and integration of all types of astronomical instruments for large land-based installations, as well as space missions. Optimisation in the areas of high energy, optics and near infrared (cryogenics).
<p><b>Progress towards the objectives</b></p> <p>The Astronomical Instrumentation group at Moncloa Campus (<a href="http://guaix.fis.ucm.es/">http://guaix.fis.ucm.es/</a>) leads the design, development and construction of the MEGARA instrument for the 10m Giant Telescope in the Canary Islands: An optical multi-object spectrograph with integral field of fibres and high spectral resolution. Budget of ~6 million Euros.</p> <p>Development and optimization of algorithms for the simulation, processing and analysis of astronomical and spatial data. Development of software associated with instrument control. Development of tools for working with the Spanish and European Virtual Observatories, as well as the forthcoming Astrophysical Software Laboratory. The group is responsible for the data reduction chain of the EMIR and FRIDA instruments of the GTC.</p>	
<p><b>Description of the work done and role of the participants</b></p> <p>The study of the impact of global changes and natural hazards require the use of networks of measurement for different parameters (ground humidity, temperature, etc.) which are easy to install and are energy-efficient. Only with the correct monitoring is it possible to create evolution models and develop early-warning systems for natural disasters. On the other hand, there is an ever-increasing demand for advanced instrumentation designed specifically for use in satellites and aircraft, such as that aimed at measuring light contamination, either directly or from its effects on the brightening of the night sky.</p> <p>Astrophysics is an area of huge scientific and experimental development, with a high degree of involvement of companies, with a great capacity for resource uptake and providing great returns to society. Big Science projects in Astrophysics are linked to cutting edge developments in instrumentation (with budgets of several M€) associated as much with large astronomical installations on land as those in space. Given the huge potential for the international market in this field (new instruments for the GTC, ESO, space missions, giant European E-ELT telescope), the centres which, until now have been developing astronomical instrumentation in Spain (IAC, INTA) are no longer enough. Taking advantage of this new niche in R&amp;D, Astrophysics at the Moncloa Campus is experiencing spectacular progress, taking on a very important role (and in some cases a leadership role) in large R&amp;D projects for the development of astronomical instrumentation for large scientific projects. These developments in instrumentation have created the need to design, test, integrate and verify different optical, mechanical e engineering modules. It is therefore essential to have the material and human resources necessary to undertake this type of work with confidence.</p> <p>The interaction between physicists, engineers, mathematicians and IT specialists constitutes significant progress in the development of this laboratory.</p>	

## Major results

The research teams of the partner entities currently participate in R&D+i projects financed by international programs: European Framework Program (FP7), GMES, European Space Agency (ESA), European Southern Observatory (ESO), etc.

This laboratory facilitates the involvement of the relevant groups in new instrumental development projects at an international level. They have taken on projects of great consequence, whose objective is to provide instrumentation to installations such as the Giant Telescope in the Canary Islands, the European Southern Observatory telescopes, the 39m giant European E-ELT telescope and future space missions.

### **Publications which have directly resulted from LICA's instrumental activities:**

*"Night Sky Brightness and Light Pollution in the Madrid Autonomous Community"* [Poster in PDF](#)

J. Zamorano, A. Sánchez de Miguel, J. Gómez-Castaño, F. Ocaña, J. Gallego, B. Pila, M. Nievas, C. Tapia, A. Fernández and S. Pascual. Light Pollution: Theory, Modelling, and Measurements [LPMMT2013](#) April 15-18 2013, Smolenice, Slovak Republic

*"Evolution of the energy consumed by street lighting in Spain estimated with DMSP-OLS data"*

A. Sánchez de Miguel, J. Zamorano, J. Gómez Castaño and S. Pascual

Light Pollution: Theory, Modelling, and Measurements [LPMMT2013](#) April 15-18 2013, Smolenice, Slovak Republic. Journal of Quantitative Spectroscopy and Radiative Transfer (2013, in press)

*"First scientific results of the Fireball Detection Station at UCM Observatory"*

F. Ocaña, J. Zamorano, A. Sánchez de Miguel, J. Izquierdo, M.F. Palos, G. Rodríguez-Coira, R. García, C. Vázquez, B. Muñoz-Ibáñez, A. Santamaría, J. Gallego, J.M. Trigo-Rodríguez and J.M. Madiedo. Proceedings of the Int Meteor Conference, La Palma Island, Spain, 20-23 Sept, 2012

*"ISS nocturnal images as a scientific tool against Light Pollution: Flux calibration and colors"*

A. Sánchez de Miguel, J. Zamorano, S. Pascual, M. López Cayuela, F. Ocaña, P. Challupner, J. Gómez Castaño, A. Fernández-Renau, J.A. Gómez, and E. de Miguel. Highlights of Spanish Astrophysics VII. Proceedings of the X Scientific Meeting of the Spanish Astronomical Society (SEA) held in Valencia, July 9-13, 2012

*"NIXNOX project: Enjoy the dark skies of Spain"*

J. Zamorano, A. Sánchez de Miguel, E. Alfaro, D. Martínez-Delgado, F. Ocaña<sup>1</sup>, M. Nievas, and J. Gómez Castaño. Highlights of Spanish Astrophysics VII. Proceedings of the X Scientific Meeting of the Spanish Astronomical Society (SEA) held in Valencia, July 9-13, 2012

*"Narrow-band photometry of meteors"*

F. Ocaña, J. Zamorano Proceedings of the International Meteor Conference. Sibiu, Romania, 15-18 September 2011.

*"Setting-Up a Fireball Detection Station at UCM Observatory"*

F. Ocaña, J. Zamorano, A. Sánchez de Miguel, J. Izquierdo, E. Manjavacas, P. Ramírez-Moreta, R. Ponce. Proceedings of the International Meteor Conference. Armagh, Northern Ireland(UK), 16-19 September 2010.

*"ISS nocturnal images as a scientific tool against Light Pollution"*

J. Zamorano, A. Sánchez de Miguel, S. Pascual, J. Gómez Castaño, P. Ramírez Moreta, P. Challupner (2011)

LICA report <http://eprints.ucm.es/12729/> submitted to NASA.

"Calibration of SQM-L photometers for the NixNox project"

J. Zamorano and V.M. Muñoz Marín (2010) LICA report <http://eprints.ucm.es/12262/>

"Sky Quality Meter cross-calibration for the NixNox project"

J. Zamorano and R. Ruiz Carmona (2013) LICA report <http://eprints.ucm.es/18015/>

**Scientific publications resulting from a doctoral thesis scholarship (Rafaella A. Marino) granted by the PICATA program and co-directed by Professors A. Gil de Paz (UCM) and F. Sánchez (UPM):**

"Mass-metallicity relation explored with CALIFA. I. Is there a dependence on the star-formation rate?  
Sánchez et al. (2013) *Astronomy & Astrophysics* 554, 58

"Aperture corrections for disk galaxy properties derived from the CALIFA survey. Balmer emission lines in spiral galaxies "  
Iglesias-Páramo et al. (2013) *Astronomy & Astrophysics* 553, 7

"CALIFA, the Calar Alto Legacy Integral Field Area survey. II. First public data release"

Husemann et al. (2013) *Astronomy & Astrophysics* 549, 87

"Integral field spectroscopy of a sample of nearby galaxies. II. Properties of the H II regions"

Sánchez et al. (2012) *Astronomy & Astrophysics* 546, 2

"Integral Field Spectroscopy and Multi-wavelength Imaging of the nearby Spiral Galaxy NGC 5668: An Unusual Flattening in Metallicity Gradient"

Marino et al. (2013) *Astrophysical Journal* 754, 61

"The ionized gas in the CALIFA early-type galaxies. I. Mapping two representative cases: NGC 6762 and NGC 5966"

Kehrig et al (2012) *Astronomy & Astrophysics* 540, 11

"Spatially resolved properties of the grand-design spiral galaxy UGC 9837: a case for high-redshift 2-D observations"

Viironen et al (2013) *Astronomy & Astrophysics* 538, 144

"CALIFA, the Calar Alto Legacy Integral Field Area survey. I. Survey presentation"

Sánchez et al. (2012) *Astronomy & Astrophysics* 538, 8

"Integral field spectroscopy of a sample of nearby galaxies. I. Sample, observations, and data reduction"

Márol-Queraltó (2011) *Astronomy & Astrophysics* 534, 8

**Use of human, material and financial resources**

The investment made in this infrastructure is €187,129 from the funds granted as part of the CEI2009 program.

The participating entities are as follows: Spatial (Aeronautical) Instrumentation Laboratory, Electronics Laboratory (ETSI Telecommunications), the Cyclops group Laboratory at UPM.

Calar Alto Astronomical Centre, Roque de los Muchachos Observatory, Teide Observatory, Giant Telescope in the Canary Islands, CAB, INTA, CSIC, LAEFF, IAC, UNED, GMV, FRACTAL, LIDAX.

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	E12 Creation of a Joint Unit (UCM-UPM) for ex situ Conservation.
<b>Objectives</b>	Ex situ conservation is an essential activity against the loss of biodiversity in natural habitats. The aim is to encourage the development of cutting-edge research in the Moncloa Campus taking advantage of existing UCM-UPM-INIA groups already working collaboratively on this topic.

**Progress towards the objectives**

**Ex situ breeding centre for native fauna:** construction of the insectary (pending). This structure is aimed to the study and conservation of indigenous animal species and their host plants. The equipment will be adapted to different spaces that allow the breeding of small animals and their food plants, with their different ecological requirements (irrigated and rainfed vegetation zones, water ponds, etc.). The goal is to be used as a study or experiment area for these species. The facility will be available to research teams who will contribute to its maintenance with projects that are in progress. It is also intended that the facility should focus on general dissemination of the biodiversity present at CEI-Moncloa, with special emphasis on native species or threatened species, and with an emphasis on plant-animal interactions. Accordingly, the facility will also be designed so it can be visited occasionally, especially on open days, science weeks and other outreach events.

**Plant Germplasm Bank:** The equipment allows the conservation and maintenance of the plant material, making possible the study and monitoring of seed viability in the medium and long term, insect-plant interactions and possible supply of seeds or plants to the research group responsible, the determination of appropriate conservation conditions and the possibility of providing research material based on availability.

Scientific Objectives: The scientific objectives are framed within the context of the Global Change and New Energies Cluster and directly correspond with the E12 Actions "Creating a Joint Unit (UCM-UPM) for ex situ Conservation " and E13 "Creating a program for cataloguing, conservation and dissemination of Biodiversity in the University Campus" contained in the Moncloa Campus document, which were supported by UCM and UPM groups who initially expressed interest in joining the CEI Moncloa.

**Installing a research greenhouse** at the Royal Botanic Gardens Alfonso XIII.

**Description of the work done and role of the participants**

The Greenhouse has been installed in the Royal Botanic Gardens Alfonso XIII and will activate the research area of Study and Conservation of Biodiversity.

The installation allows planting in soil or benches for ex situ conservation and for experimentation. It is further provided with an isolated compartment for transgenic plants and programmable automatic irrigation and temperature and light control as well as artificial light to vary the photoperiod.

The infrastructure will allow ex-situ conservation of animal and plant species under conditions suitable for their growth and survival, enabling research on the monitoring and recovery of threatened species. The ultimate goal is to create a research centre specializing in recovery of species of plants and animals using endangered plant species from the Plant Germplasm Bank - UPM. The medium-term objective is to use this laboratory for the restoration of biodiversity firstly in the University Campus, and then in the city of Madrid. It is important to emphasize here the importance of the role of biodiversity conservation in urban environments through organic gardening and sustainable urbanism, as recommended in the 10th Meeting



of the Parties to the Convention on Biological Diversity, held in Nagoya, Japan (URBIO 2010; see Agenda 21).

The growing interest in environmental issues and greater sensitivity to the conservation of the species have been reflected in both the Convention on Biological Diversity (UN, 1992), and the Law on Natural Heritage and Biodiversity (BOE 42 / 2007) that, in particular, promote the establishment of facilities for the study and ex - situ conservation of species, preferably in the country of origin. The Inter-University Centre for the Study of Native Fauna is needed to progress in biodiversity reconstruction from the Plant Germplasm Bank of the UPM, and allows breeding and ex-situ conservation of these species. This centre will be a groundbreaking facility developing activities that contribute to the conservation of wild species present in the CEI - Moncloa in Madrid, which also promotes awareness of the value of the biodiversity we live within this urban or semi-urban environment. The creation of this infrastructure will allow the groups involved, and those interested, to develop research in a very controlled environment where, as in a greenhouse, it is possible to regulate many of the factors that affect animals and plants with which they interact. This type of site where the environmental conditions and the structure of communities of organisms can be manipulated has been requested repeatedly in various scientific forums in order to promote manipulative experiments, almost impossible to tackle in natural conditions. Therefore, we believe it to be a necessary laboratory which, in addition to its return applied in the field of restoration, may help establish ongoing projects and initiate new lines of work in a field of scientific study of biodiversity that still has few facilities of this kind.

Regarding the Germplasm Bank, equipment and infrastructure comprises long-term seed conservation Chambers including the Plant Germplasm Bank of the UPM, which conserve endemic and threatened species, as well as species from the Cruciferae family. Such conservation cameras have a supplementary generator, security systems and an annexed mini-laboratory to prepare samples for storage.

These facilities are available to research teams according to their possibilities and may also be visited on open days, science weeks and other specialized outreach events.

Plant material (food plants) will be provided as far as possible for the joint applicant's project for the "ex situ" conservation project for animal biodiversity.

## Major results

We have also participated in the action: Terrestrial laser 3D data capture (LIDAR)

The researcher hired by the PICATA program (Richard Williams) is developing a new line of research on geographic distribution on a small spatial scale (landscape) of the risk of infection by parasites in wild birds. The project combines parasitological diagnosis techniques developed by the UCM team with techniques for mapping natural processes developed by the UPM group, and will use the infrastructure (terrestrial laser) granted in research that will combine the specialties of the groups involved with development of niche models (R. Williams' specialty) for the prediction of the distribution of the risk of infection. This line of research will be impressive in the different fields of knowledge (disease ecology and physical geography) due to its resolution capacity (never before has there been a study of these characteristics in bird populations) and its potential contribution to better understand the dynamics of disease transmission in wild populations.

Activities related to the CEI of both UCM research groups that support the project.

## Biology and Vertebrates Conservation Group (Research Group UCM 910577)

<http://www.ucm.es/info/zoo/bcv/inicio.html>

**Activities related to the CEI Moncloa:** <http://www.ucm.es/info/seguimientofauna/> Currently this page is being relocated to the new servers provided by the new website environment of the Complutense University.

The overall objective of these activities continues to be the study of the biology of bird populations within the framework of standardized programs of long-term studies. Once again, this program has been very successful.

The three bird long term monitoring programs remain in operation. Both scientific bird tagging station in the Royal Botanic Gardens Alfonso XIII of UCM, and the population of passerine bird nest boxes around the entire campus and four batteries of nesting boxes for swifts on the 9th floor of the main building of the Biology Faculty have operated throughout the academic year 2012-2013. The banding station has operated continuously on a biweekly basis. Nest boxes have also been checked and the results published. There have been a total of 47 field days. Since the start of the project a total of 100 different people belonging to all levels of the university community have been involved in some phase of the project and distributed as follows: 67 4-year degree students, 12 bachelor's degree undergraduates, 10 master students, 6 graduates and other 5 members of the educational community. The degree of involvement in the activities has been higher than in the previous season each participating in an average of 6 conferences.

Regarding the scientific tagging in the Royal Botanic Gardens Alfonso XIII station a total of 946 birds have been captured up to the end of June 2013 (608 tags and 168 recoveries) of 48 species. A total of 177 nest boxes for passerines and 43 for swifts have been controlled. 295 eggs have been laid and the birth of 204 chicks has been confirmed, of which 167 have been tagged.

The website which was launched during the 2011-2012 academic year is currently being migrated to the new servers at the UCM ([www.ucm.es/info/seguimientofauna/](http://www.ucm.es/info/seguimientofauna/)). It reports on activities, calendars, the actual results of each of the programs and the integration of the activities within the Wildlife Monitoring Program of the UCM Moncloa campus. It has not been possible to determine the number of visits but the university community has been aware of its existence and the Research Vice-Chancellor has shown interest in the program and has suggested its dissemination through the website of the Campus of International



Excellence CEI.

Furthering the Project on Innovation and Improvement of the Educational Quality: Monitoring bird populations on the Moncloa campus -UCM developed during the 2011-2012 academic year. A new project has been launched entitled Virtual catalogue of Wildlife of the CEI-Moncloa Campus of the UCM. It was granted 700 Euros and its main objective is to promote the knowledge and study of wildlife in the CEI - Moncloa Campus of the UCM within the framework of the implementation of a virtual wildlife catalogue following standardized methodologies. There will be specific tabs for the most representative species to be incorporated into the website to be used by the entire university community.

Scientific results have led to two master's dissertations carried out partly thanks to the data obtained in this project and three communications to the next Iberian Ornithological Congress to be held in Vitoria next December.

**Publications;** in bold letters **C. Monasterio** and **R.A.J. Williams, recruited PICATA**):

\*Cano, L.S. y Tellería, J.L. 2013. Migration and winter distribution of Iberian and central European black storks *Ciconia nigra* moving to Africa across the Strait of Gibraltar: a comparative study. *Journal of Avian Biology* 43: 001-009.

\*Cano, L.S. y Tellería, J.L., 2013. Breeding productivity in relation to nesting substrate and restricted access in the black stork *Ciconia nigra*. *Ardeola* 00: 000-000.

\*Cano, L.S., Franco, C., Doval, G., Torés, A., Carbonell, I. y Tellería J.L. 2013. Conservation of Iberian black storks *Ciconia nigra* outside of breeding areas: distribution, movements and mortality. *Bird Conservation International* 00: 000-000..

\*Cano, L.S., Franco, C., Doval, G., Torés, A., Carbonell, I. y Tellería J.L. 2013. Post breeding movements of Iberian black storks *Ciconia nigra* as revealed by satellite tracking. *Ardeola* 60: 133-142.

Cano, L.S. y Tellería, J.L. 2011. Dix ans de suivi satellitaire de la Cigogne noire *Ciconia nigra* en Espagne. Des défis sans frontière pour la conservation de l'espèce. *Nature Nièvre* 19: 22-32.

Cano, L.S. y Tellería, J.L., 2013. Local ecological knowledge as a tool for assessing the status of endangered vertebrates: a case study in Vietnam. *Oryx* 47:177-183

Carrascal, L.M., T. Santos y J.L.Tellería 2012. Does day length affect winter bird distribution? Testing the role of an elusive variable. *PlosOne* 7(2): e232733. doi:10.1371/journal.pone.0032733

Collins, S.A., De Kort, S., Pérez-Tris, J. & Tellería, J.L. 2011. Divergent sexual selection on birdsong: a reply to Byers. *Animal Behaviour* 82: e4-e7. doi: 10.1016/j.anbehav.2011.08.015.

De la Hera, I., Pérez-Tris, J. & Tellería, J.L. 2012. Habitat distribution of migratory and sedentary blackcaps wintering in southern Iberia: a morphological and biogeochemical approach. *Journal of Avian Biology* 43: 333-340.

De la Hera, I., Schaper, S. V., Díaz, J. A., Pérez-Tris, J., Bensch, S. & Tellería, J. L. 2011. How much variation in the molt duration of passerines can be explained by the growth rate of tail feathers? *The Auk* 128:

321-329.

- \*Ewen, J.G., Bensch, S., Blackburn, T.M., Bonneaud, C., Brown, R., Cassey, P., Clarke, R. & Pérez-Tris, J. 2012. Establishment of exotic parasites: the origins and characteristics of an avian malaria community in an isolated island avifauna. *Ecology Letters* 15: 1112-1119.
- Fandos, G., J. Fernández y J.L.Tellería 2012. Incursion of domestic carnivores around urban areas: a test in Central Spain. *Mammalia* 76:223-225
- \*Fernández-González, S., De la Hera, I., Pérez-Rodríguez, A. & Pérez-Tris, J. 2013. Divergent host phenotypes create opportunities and constraints on the distribution of two wing-dwelling feather mites. *Oikos*, en prensa
- \*Fuller, T., Bensch, S., Müller, I., Novembre, J., Pérez-Tris, J., Ricklefs, R.E., Smith, T.B. & Waldenström, J. 2012. The ecology of emerging infectious diseases in migratory birds: an assessment of the role of climate change and priorities for future research. *EcoHealth*, 9: 80-88.
- Garrote, G., Gil-Sánchez, J.M., McCain, E.B., de Lillo, S., Tellería, J.L. y Simón, M.A. 2012. The effect of attractant lures in camera trapping: a case study of population estimates for the Iberian lynx (*Lynx pardinus*). *Eur J Wildl Res* DOI 10.1007/s10344-012-0658
- \*Iraeta, P., C., Salvador, A. & Díaz, J. 2012. A.Effects of Caudal Autotomy on Postnatal Growth Rates of Hatchling *Psammotriton auratus*. *Journal of Herpetology*, Vol. 46, No. 3, 342–345, 2012
- \*Iraeta, P., C., Salvador, A. & Díaz, J.A. 2013. Life-history traits of two Mediterranean lizard populations: a possible example of countergradient covariation. *Oecologia* (2013) 172:167–176
- \*Iraeta, P., **Monasterio, C.**, Salvador, A. & Díaz, J. A. 2011. Sexual dimorphism and interpopulation differences in lizard hind limb length: locomotor performance or chemical signalling? *Biological Journal of the Linnean Society* 104: 318-329.
- Marzal, A., Ricklefs, R. E., Valkiūnas, G., Albayrak, T., Arriero, E., Bonneaud, C., Czirájk, G. A., Ewen, J., Hellgren, O., Horakova, D., Iezhova, T. A., Jensen, H., Križanauskienė, A., Lima, M. R., De Lope, F., Magnussen, E., Martin, L. B., Møller, A. P., Palinauskas, V., Pap, P. L., Pérez-Tris, J., Sehgal, R. N. M, Soler, M., Szöllősi, E., Westerdahl, H., Zetindjiev, P. & Bensch, S. 2011. Diversity, loss, and gain of malaria parasites in a globally invasive bird. *PLoS ONE*, 6: e21905. doi:10.1371/journal.pone.0021905
- \*Mendes, L., Pardal, S., Morais, J., Antunes, S., Ramos, J.A., Pérez-Tris, J. & Piersma, T. 2013. Hidden haemosporidian infections in Ruffs (*Philomachus pugnax*) staging in Northwest Europe en route from Africa to Arctic Europe. *Parasitology Research* 112: 2037-2043.
- \***Monasterio, C.**, Shoo, L.P, Salvador, A., Iraeta, P., Díaz, J. High temperature constrains reproductive success in a temperate lizard: implications for distribution range limits and the impacts of climate change. *Journal of Zoology* 00:000-000.
- Morganti, M., Aguirre, J.I., Onrubia, A. y Pulido, F. 2013. Complete post-juvenile moult in first-year blackcaps: proximate causes and adaptive implications. *Ardeola* 60(1): xxx-xxx.
- Muñoz-Arnanz, J., Roscales, J.L. Vicente, A., Aguirre, J.I., y Jiménez, B. 2012. Dechlorane Plus in eggs of two gull species (*Larus michahellis* and *Larus audouinii*) from the south-western Mediterranean Sea. *Analytical and Bioanalytical Chemistry*. 404(9): 2765-73. doi: 10.1007/s00216-012-6326-7.
- Muñoz-Arnanz, J., Sáez, M., Aguirre, J.I., Hiraldo, F., Baos, R. Pacepavicius, G., Alae, M. y Jiménez, B. 2011. Predominance of BDE-209 and Other Higher Brominated Diphenyl Ethers in White Stork (*Ciconia ciconia*) colonies from Spain. *Environment International*: 37 (3): 572-576.

- Onrubia, A. y J.L.Tellería, 2012. Has the number of birds wintering in the Maghreb decreased? A test in the Gibraltar Strait. *Ardeola* 59:123-129.
- Onrubia, A. y Tellería, J.L. 2013. Fenología migratoria del mosquitero Ibérico *Phylloscopus ibericus* en la Península Ibérica: una comparación con los mosquiteros común *P. collybita* y musical *P. trochilus*. pp: 87-91 de Rodríguez, N., García, J. y Copete, J.L. eds.): *El mosquitero ibérico*. Grupo Ibérico de Anillamiento, León.
- Onrubia, A., Gómez, J., Andrés, T. Zufiaur, F., Unanue, A. y Tellería, J.L. 2013. Migración, reproducción y muda del mosquitero ibérico *Phylloscopus ibericus* en el Norte de la Península Ibérica. pp: 77-84 de Rodríguez, N., García, J. y Copete, J.L. (eds.): *El mosquitero ibérico*. Grupo Ibérico de Anillamiento, León.
- \*Pérez-Rodríguez, A., De la Puente, J., Onrubia, A. & Pérez-Tris, J. 2013. Molecular characterization of haemosporidian parasites from kites of the genus *Milvus* (Aves: Accipitridae). *International Journal for Parasitology* 43: 381-387.
- \*Pérez-Rodríguez, A., Fernández-González, S., De la Hera, I., & Pérez-Tris, J. 2013. Finding the appropriate variables to model the distribution of vector-borne parasites with different environmental preferences: climate is not enough. *Global Change Biology*, en prensa.
- \*Pérez-Rodríguez, A., Ramírez, A., Richardson, D.S. & Pérez-Tris, J. 2013. Evolution of parasite island syndromes without long-term host population isolation: parasite dynamics in Macaronesian blackcaps *Sylvia atricapilla*. *Global Ecology and Biogeography*, en prensa.
- Pérez-Tris, J., **Williams, R. A. J.**, Abel-Fernández, E., Barreiro, J., Conesa, J. J., Figuerola, J., Martínez-Martínez, M., Ramírez, A. & Benitez, L. 2011. A multiplex PCR for detection of Papillomavirus and Poxvirus in cutaneous warts from live birds and museum skins. *Avian Diseases*, 55: 545-553.
- Remacha, C., Pérez-Tris, J. & Delgado, J. A. 2011. Reducing visitors' group size increases the number of birds during educational activities: implications for management of nature-based recreation. *Journal of Environmental Management* 92: 1564-1568.
- Santos, T., Carbonell, R., Galarza, A., Pérez-Tris, J., Ramírez, A. & Tellería, J.L. 2013. The importance of northern Spanish farmland for wintering migratory passerines: a quantitative assessment. *Bird Conservation International*, en prensa.
- \*Tellería, J.L., 2013. Pérdida de biodiversidad. Causas y consecuencias de la desaparición de las especies. *Boletín de la Real Sociedad Española de Historia Natural* 00:000-000.
- \*Tellería, J.L., Blázquez, M., De la Hera, I. y Pérez-Tris, J. 2013. Migratory and resident Blackcaps *Sylvia atricapilla* wintering in southern Spain show no resource partitioning. *Ibis* 00:000-000.
- \*Tellería, J.L., Carrascal, L.M. y T. Santos. Geographical patterns of an ecological process: factors affecting seed dispersal by birds in juniper woodlands. Enviado y en revisión.
- \*Tellería, J.L., De la Hera, I. y Pérez-Tris, J. in press. Morphological variation as a tool for monitoring bird populations: a review. *Ardeola* 00:000-000
- Tellería, J.L., Díaz, J.A., Pérez-Tris, J., De Juana, E., De la Hera, I., Iraeta, P., Salvador, A. & Santos, T. 2011.

Barrier effects on vertebrate distribution caused by a motorway crossing through fragmented forest landscape. *Animal Biodiversity and Conservation* 34: 331-340.

\*Tellería, J.L., T. Santos y L.M.Carrascal. Large-scale resource matching by frugivorous birds: does the migratory status affect the pattern? Enviado y en revisión.

\* Tellería, J.L., G. Fandos, J. Fernández-López, A. Onrubia, P. Refoyo y T. Santos. Winter bird richness distribution in the Maghreb: a conservation assessment. Enviado y en revisión.

Tellería J.L. 2012. *Introducción a la conservación de las especies*. [Tundra Ediciones](#), Valencia, ISBN 978-84-939890-7-1, 318 páginas.

Tellería, J.L. 2011. Cambios de ocupación del suelo y biodiversidad: el caso de los parques eólicos. pp.:164-167 de L.M.Jiménez (ed). *Biodiversidad en España. Base de la sostenibilidad ante el cambio global*. Observatorio de la Sostenibilidad-MMARM-FB-Universidad de Alcalá- ISBN 978-84-8476-433-5. en <http://www.sostenibilidad-es.org/>

Tellería, J.L., Díaz, J.A., Pérez-Tris, J. y Santos, T. 2011. Fragmentación de hábitat y biodiversidad en las mesetas ibéricas: una perspectiva a largo plazo. *Ecosistemas* 20:79-90.

Tellería, J.L., I. de la Hera, A. Ramírez, T. Santos 2011. Conservation opportunities in Spanish juniper *Juniperus thurifera* woodlands: the case of migratory thrushes *Turdus* spp. *Ardeola* 58: 57-60.

Tellería, J.L., T. Santos, P. Refoyo y J. Muñoz 2012. Use of ring recoveries to predict habitat suitability in small passerines. *Diversity and Distribution* DOI: 10.1111/j.1472-4642.2012.00900.x

Ventim, R. Morais, J., Pardal, S., Mendes, L., Ramos, J. A. & Pérez-Tris, J. 2012. Host-parasite associations and host-specificity in haemoparasites of reed bed passerines. *Parasitology*, 139: 310-316.

Ventim, R., Mendes, L., Ramos, J.A., Cardoso, H. & Pérez-Tris, J. 2012. Local haemoparasites in introduced wetland passerines. *Journal of Ornithology* 153: 1253-1259.

Ventim, R., Ramos, J.A., Osório, H., Lopes, R., Pérez-Tris, J. & Mendes, L. 2012. Avian malaria infections in western European mosquitoes. *Parasitology Research* 111: 637-645.

Ventim, R., Tenreiro, P., Grade, N., Encarnação, P., Araújo, M., Mendes, L., Pérez-Tris, J. & Ramos, J.A. 2012. Characterization of Haemosporidian infections in warblers and sparrows at south-western European reed beds. *Journal of Ornithology*, 153: 505-512.

\***Williams, R.A.J**, Pérez-Tris, J. & Benítez, L. PCR detection of Avipox and avian Papillomavirus in naturally infected wild birds: comparisons of blood, swab and tissue samples. *Avian Pathology*, enviado y en segunda revisión.

\***Williams, R.A.J.**, Segovia-Hinostroza, K., Ghersi, B., Gonzaga, V., Peterson, A. T. & Montgomery, J. Avian influenza infections in land birds, Peru. *Journal of Wildlife Diseases*. En prensa.

**Williams, R.A.J.**, Vázquez, A., Asante, I., Bonney, K., Odoom, S., Pupilampu, N., Ampofo, W., Sánchez-Seco, M.P., Tenorio, A., & Peterson, A.T. 2012. Yaoundé-like virus in resident wild bird, Ghana. *African Journal of Microbiology Research* 6: 1966-1969.

Congresos:

Arriero, E., Pérez-Tris, J., Remacha, C. & Ramírez, A. 2013. Experimental reduction in parasite intensity in the context of disease tolerance. International Conference on Malaria and Related Haemosporidian Parasites of Wildlife. NSF Malaria Research Coordination Network. Vilna, Lituania. 7-12 Agosto 2013. Comunicación oral.

Fandos, G., J.Fernández-López, L. S. Cano, F. J. García, E. García y J. L. Tellería "Estudio mediante fototrampeo de la abundancia y distribución de carnívoros y su relación con la ab

- undancia de conejos en el Centro de la Península Ibérica (Valle del Tiétar)". XIV X Congreso de la Sociedad Española para la Conservación y el Estudio de los Mamíferos, Fuengirola, España 3-6 Noviembre 2011
- Fernández-López, J., G. Fandos, L. S. Cano J. L. Tellería "Incurción de carnívoros domésticos en hábitats periurbanos". X Congreso de la Sociedad Española para la Conservación y el Estudio de los Mamíferos, Fuengirola, España 3-6 Noviembre 2011
- Fernández-López, J., G. Fandos, L. S. Cano, F. J. García y J. L. Tellería "Las cámaras trampa en el estudio del comportamiento de los carnívoros". XIV Congreso Nacional y XI Iberoamericano de la Sociedad Española de Etología, Sevilla, España, 11-15 Septiembre 2012
- Herrera, A., Pineda, J., Aguirre, J.I., Antonio, M.T. 2012. El estrés y el sistema inmológico del gorrión común (*Passer domesticus*) como indicadores ambientales en un gradiente urbano del centro de la península. XXI Congreso Español y V Ibérico de Ornitología. Vitoria, España.
- Herrera, A., Pineda, J., Aguirre, J.I., Antonio, M.T. 2012. La "oxidación" de los gorriones urbanos: somos lo que comemos. XXI Congreso Español y V Ibérico de Ornitología. Vitoria, España.
- Martínez, B., Banda, E., Gardiazábal, A., Ferreiro, E. y Aguirre, J.I. 2012. Caracterización del territorio en individuos reproductores de águila perdicera (*Aquila fasciatus*) en Aragón. XXI Congreso Español y V Ibérico de Ornitología. Vitoria, España.
- Moens, M. A. J. & Pérez-Tris, J. 2013. Evolution of generalist blood parasites in a megadiverse bird community. International Conference on Malaria and Related Haemosporidian Parasites of Wildlife. NSF Malaria Research Coordination Network. Vilna, Lituania. 7-12 Agosto 2013. Comunicación oral.
- Mortanti, M., Assandri, G., Van Heusden, J., Ramírez, A., Aguirre, J.I., Bulaic, M. and Pulido, F. 2012. Partial migration and within-season movements in an Iberian Blackcap population. XXI Congreso Español y V Ibérico de Ornitología. Vitoria, España
- Pérez-Rodríguez, A., De la Hera, I., Bensch, S & Pérez-Tris, J. 2013. Evolution of patterns of seasonal transmission in avian blood parasites. International Conference on Malaria and Related Haemosporidian Parasites of Wildlife. NSF Malaria Research Coordination Network. Vilna, Lituania. 7-12 Agosto 2013. Comunicación oral.
- Pérez-Rodríguez, A., Ramírez, A., Richardson, D.S. & Pérez-Tris, J. 2013. Evolution of parasite island syndromes without long-term host population isolation: parasite dynamics in Macaronesian blackcaps *Sylvia atricapilla*. International Conference on Malaria and Related Haemosporidian Parasites of Wildlife. NSF Malaria Research Coordination Network. Vilna, Lituania. 7-12 Agosto 2013. Comunicación oral.
- Pérez-Tris, J., Díaz, J. A., Bloor, P., Carbonell, R., Tellería, J. L. & Santos, T. 2011. TITLE: Pérdida de eficacia biológica asociada al deterioro genético en una población fragmentada de lagartijas. Congreso de la Sociedad Española de Biología Evolutiva. Lugar celebración: Madrid, España Fecha: 21-25/11/2011
- Remacha, C., Arriero, E., Ramírez, A. & Pérez-Tris, J. 2013. Exploratory behaviour and avian malaria infection in juvenile blackcaps (*Sylvia atricapilla*). International Conference on Malaria and Related

Haemosporidian Parasites of Wildlife. NSF Malaria Research Coordination Network. Vilna, Lituania. 7-12 Agosto 2013. Comunicación oral.

Tellería J,L. 2011. Pérdida de biodiversidad. Causas y consecuencias de la pérdida de especies. 10º Congreso Nacional de Medio Ambiente (CONAMA-10). Madrid

Ventim, R., Pérez-Tris, J., Mendes, L. & Ramos, J. A. TITLE: Haemosporidian infections in passerines from south-western European reed beds Tipo de participación: Póster. Congreso: 12th European Ecological Federation Congress Lugar celebración: Ávila, España Fecha: 25-29/09/2011

**Williams, R.A.J.**, Escudero-Duch, C., Timm, R.M., Barreiro, J., Pérez-Tris, J. & Benítez, L. Museum specimens as an Ark of symbiont biodiversity: viral DNA amplified from avian and lagomorph specimens. XX Biental de la Real Sociedad Española de Historia Natural. Madrid, 4-7 de Septiembre de 2013.

#### **STAFF RECRUITMENT:**

Postdoctoral Grants of the International Program for Talent Recruitment (PICATA-CEI Moncloa).

2012 Call. Person hired: Dr. Richard A. J. Williams

Supervisors: Javier Pérez Tris (UCM) and Susana Martín Fernández (UPM)

#### **PROJECTS (UNDER CEI):**

PROJECT TITLE: Conservación "Ex Situ" de la Biodiversidad animal y vegetal en el CEI-Moncloa. Propuesta para la instalación de un Centro Inter-Universitario para el Estudio de la Fauna Autóctona. FUNDED BY: UCM IN-A14/11

DURATION: 17/11/2011- 31/12/2012 GRANT AWARDED: 121.044 €

MAIN RESEARCHER: José Luis Tellería Jorge NUMBER OF RESEARCHERS: 13

PROJECT TITLE: Captura y aplicación de información 3D mediante láser terrestre a la gestión de recursos naturales y ordenación del territorio. FUNDED BY: UCM IN-A14/11. DURATION: 17/11/2011- 31/12/2012 GRANT AWARDED: 80.163 €

MAIN RESEARCHER: Susana Martín Fernández NUMBER OF RESEARCHERS: 13

#### **PROJECTS SUPPORTED BY CEI-MONCLOA:**

PROJECT TITLE: Variación en la abundancia y condición física del gorrión común *Passer domesticus* en relación con el desarrollo urbanístico en el centro de España

FUNDED BY: GR35/10-A, BSCH-UCM

DURATION: 1/01/2011- 31/12/2011 GRANT AWARDED: 7.266 €

MAIN RESEARCHER: José I. Aguirre de Miguel NUMBER OF RESEARCHERS: 14

PROJECT TITLE: Ecología e implicaciones evolutivas de la coexistencia de simbioses en los mismos individuos hospedadores

FUNDED BY: CGL2010-15734/BOS, MINISTERIO DE CIENCIA E INNOVACIÓN

DURATION: 1/01/2011- 31/12/2013 GRANT AWARDED: 139.150 €



MAIN RESEARCHER: Javier Pérez Tris

NUMBER OF RESEARCHERS: 6

PROJECT TITLE: Conservación de la avifauna migratoria en la Península y el Magreb: Patrones actuales y perspectivas de cambio

FUNDED BY: CGL2011-22953/BOS, MINISTERIO DE CIENCIA E INNOVACIÓN

DURATION: 1/01/2012- 31/12/2014 GRANT AWARDED: 70.000 €

MAIN RESEARCHER: José Luis Tellería NUMBER OF RESEARCHERS: 3

PROJECT TITLE: Proyecto de innovación docente en zoología: seguimiento de poblaciones de aves en el campus de Moncloa-UCM.

FUNDED BY: 88, UNIVERSIDAD COMPLUTENSE DE MADRID.

DURATION: 1/01/2012- 31/12/2014 GRANT AWARDED: 3.000 €

MAIN RESEARCHER: José I. Aguirre NUMBER OF RESEARCHERS: 9

PROJECT TITLE: Catálogo virtual de fauna del CEI-Campus Moncloa de la UCM. FUNDED BY: 288, UNIVERSIDAD COMPLUTENSE DE MADRID.

DURATION: 1/01/2012- 31/12/2014 GRANT AWARDED: 700 €

MAIN RESEARCHER: José I. Aguirre NUMBER OF RESEARCHERS: 18

-“Acciones Permanentes del Banco de Germoplasma Vegetal de la UPM”. Financiación: INIA. Concesión: 01/12/2009.

-“Aproximación Teórico-Práctica a la Conservación a Largo Plazo de Semillas de Especies Silvestres”. Financiación: MEC. Plan Nacional de I+D+i. Concesión: 01/11/2010.

-“Desarrollo de Evaluación de Estrategias de Conservación de Diversidad Genética en Bancos de Germoplasma”. Financiación: Ministerio de Medio Ambiente. Concesión: 31/12/2008.

-“Establecimiento de un Sistema de Información Ecogeográfico para los Recursos Fitogenéticos Españoles (Sierfe)”. Financiación: INIA. Concesión: 01/12/2009.

**DOCTORAL THESES SUPERVISED:**

TITLE: Leisure Ecology: effects of recreational use of natural areas for breeding birds

PHD STUDENT: Carolina Remacha Sebastián

UNIVERSITY: Universidad Complutense de Madrid

FACULTY: Faculty of Biology

DIRECTOR(S): Juan Antonio Delgado and Javier Pérez Tris

YEAR: 2011      MARK: Excellent Cum Laude

TITLE: Haemosporidian parasites in communities of southwestern European reedbeds: their passerine hosts and their vectors

PHD STUDENT: Rita Ventim Neves

UNIVERSITY: Universidad de Coimbra, Portugal

FACULTY: Faculty of Biology

DIRECTOR(S): Luisa Mendes, Jaime Ramos and Javier Pérez Tris

YEAR: 2012      MARK: Excellent with honours

TITLE: Biogeography of blood parasites in a model avian host with diverse migratory strategies: the blackcap *Sylvia atricapilla*.

PHD STUDENT: Antón David Pérez Rodríguez

UNIVERSITY: Universidad Complutense de Madrid

FACULTY: Faculty of Biology

DIRECTOR(S): Javier Pérez Tris

Declared admitted, to be defended in July 2013

TITLE: Biology and conservation of the *Ciconia nigra* Black Stork in the Iberian Peninsula.

PHD STUDENT: Luis Santiago Cano

UNIVERSITY: Universidad Complutense de Madrid

FACULTY: Faculty of Biology

DIRECTOR(S): José Luis Tellería

YEAR: 2013      MARK: Excellent Cum Laude

TITLE: Biology Conservation and management of the breeding habitat of the black vulture *Aegypius monachus*

PHD STUDENT: Rubén Moreno-Opo

UNIVERSITY: Universidad Complutense de Madrid

FACULTY: Faculty of Biology

DIRECTOR(S): Antoni Margalida and José Luis Tellería

YEAR: 2013      MARK: Excellent Cum Laude

**SUPERVISED END-OF-MASTER DISSERTATIONS IN CEI-MONCLOA PROGRAMS:**

TITLE: The influence of phenotypic traits on reproductive characteristics and nesting patterns of two species



of agricultural field-nesting birds, Bobolinks (*Dolichonyx oryzivorus*) and Savannah Sparrows (*Passerculus sandwichensis*)

STUDENT: Zachary F. Rowe

DIRECTOR: Javier Pérez-Tris      YEAR: 2011

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Abundance, distribution and meteorological influences on the vector Culicoides in the area of La Herrería

STUDENT: María José García Castaño

DIRECTOR: Javier Pérez-Tris      YEAR: 2011

PROGRAM: Official UCM Master's in Evolutive Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Why are migratory blackcaps so bright?

STUDENT: Carmen Bonet Carrasquilla

DIRECTOR: Javier Pérez-Tris      YEAR: 2011

PROGRAM: Official UCM Master's in Evolutive Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: The utility of yellowing of *Cyanistes caeruleus* tit chicks as an indicator of environmental quality

STUDENT: Ignacio de Diego López

DIRECTORS: Javier Pérez-Tris and Carolina Remacha      YEAR: 2012

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Geographic, environmental and cultural effects on the conservation of primates (O. Primates): A comparison between Africa and South America.

STUDENT: Mezcua Martín, Álvaro.

DIRECTORS: Jose Luis Tellería      YEAR: 2011

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Using supplementary feeding points and landfills by juvenile black vultures (*Aegypius monachus*) in the Iberian Peninsula. Implications for conservation

STUDENT: Ana Grau.

DIRECTORS: Jose Luis Tellería YEAR: 2011

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Factors affecting the presence of wild and domestic carnivores in and around urban centres.

STUDENT: Guillermo Fandos

DIRECTORES: Jose Luis Tellería YEAR: 2012

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Effect of the type of habitat management on the carnivore community

STUDENT: Fernández López, Javier.

DIRECTORS: Jose Luis Tellería YEAR: 2012

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Oxidative stress in the house sparrow (*Passer domesticus*) as an environmental indicator in an urban gradient in the centre of the Iberian Peninsula

STUDENT: Herrera Dueñas, Amparo.

DIRECTORS: José I. Aguirre YEAR: 2012

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Stress and the immune system of the house sparrow (*Passer domesticus*) as environmental indicators in an urban gradient in the centre of the peninsula.

STUDENT: Pineda Pampliega, Javier.

DIRECTORS: José I. Aguirre YEAR: 2012

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

TITLE: Characterization of the territory of Bonelli's Eagle in Aragon

STUDENT: Martínez Miranzo, Beatriz.



DIRECTORS: José I. Aguirre      YEAR: 2012

PROGRAM: Official UCM Master's in Conservation Biology

UNIVERSITY: Universidad Complutense de Madrid

**OTHER EDUCATIONAL ACTIVITIES:**

Richard A. J. Williams. 2013. Teaching at Saint Louis University Madrid Campus - Principles of Biology II Laboratory. Activity authorized by the UCM as being compatible with the development of his PICATA contract.

**Biological and Biodiversity of Arthropods Group (Research Group UCM 921632)**

<http://escalera.bio.ucm.es/usuarios/bba/>

**Wildlife Monitoring Project at the CEI- Moncloa Campus**

(<http://www.ucm.es/info/seguimientofauna/index.html>): is being developed by teaching staff and students of the Zoology and Physical Anthropology Department of the Biological Sciences Faculty, UCM. The main objective of this project is to encourage the biological study of the animal populations present at the CEI- Moncloa Campus. It arises from an interest in understanding the biodiversity found in an urban environment near to our centre and it is proposed as a preliminary step leading to future research projects regarding the monitoring and recovery of potential endangered species. With regards to entomofauna, two main activities have been carried out:

**Development of an entomofauna census at the CEI- Moncloa Campus:** to understand the entomological diversity present in the urban and suburban surroundings in which the CEI- Moncloa Campus is found, a long-term census program has been undertaken, to observe and monitor the populations of daytime Lepidoptera and ants, continuing during the current year, 2013. This program aims to fulfil three main objectives: a) to help to understand the identity of the species present at the CEI-Moncloa Campus; b) to provide information about the population densities of the species; and, c) to examine the population trends of these species over time. In practice, this program follows a methodology similar to (or slightly modified in the case of ants) to that of the *UK Butterfly Monitoring Scheme* (UKBMS), and consists in following a route on foot, at a constant speed, which crosses diverse zones with different ground use across the Campus, repeated periodically, counting the species and individual numbers of butterfly and ant which the observer comes across. There is currently a list with observed and potential species at the CEI- Moncloa Campus and, amongst other results after two years of continuous sampling, we highlight the observation of four species of daytime butterflies which had not previously been noted at the Campus, confirmation of the presence of an invasive exotic species of butterfly on the campus (*Cacyreus marshalli* (Butler, 1898)) and the likely disappearance from the CEI-Moncloa Campus in the order of twenty species of daytime butterfly in the last 15-20 years. These results will be presented at the *1st Congress of the Society for Urban Ecology*, which will be held in Berlin (25-27 July 2013).

**Development of entomofauna inventories for the CEI-Moncloa Campus:** with the involvement of students, we have continued with an inventory of the entomofauna found at the CEI-Moncloa Campus, primarily directed at a number of groups of arthropods: ants, daytime butterflies, Odonata, spiders,

Microhymenoptera and beetles. A number of different sources of information have been used: a) ad-hoc sampling carried out on the Campus; b) data obtained from the census undertaken on the Campus (for butterflies and ants); c) review of specimens from the collections at the Museum of Entomology at the Faculty of Biological Sciences, Universidad Complutense de Madrid – UCME; and, d) registries extracted from bibliographic references. Durante the year 2013, we have continued to carry out excursions around the Campus aimed at the observation and identification of active individuals; for this purpose, a number of students have been trained in the use of different sampling methods and in the identification of species from the various groups. A database for each group present at the CEI-Moncloa Campus is being developed, which will allow for the progressive creation of a global inventory of these species.

**II Biodiversity Testing at the CEI Moncloa Campus:** on 19 April 2013, the *II Biodiversity Testing at the CEI Moncloa Campus* was hosted at the Faculty of Biological Sciences (Universidad Complutense de Madrid), organized by the *Arthropod Biology and Biodiversity* and *Vertebrate Biology and Conservation* Research Groups (Department of Zoology and Physical Anthropology, UCM). A number of different institutions collaborated in this event, such as the Ministry of Agriculture, Food and Environment (<http://www.magrama.gob.es/es/>), the *Spanish Association of Entomology* (<http://www.entomologica.es/>), the *Félix Rodríguez de la Fuente Foundation* (<http://www.felixrodriguezdelafuente.com/>), the *Real Sociedad Española de Historia Natural* (<http://rshn.geo.ucm.es/>), and the *SEO/Birdlife* (<http://www.seo.org/>). The event was open to all fans of nature and photography, and was primarily aimed at Bachelors (4-year and full degree) students in Biology, with the purpose of contributing to the knowledge of the biological diversity that lives with us at the Campus of International Excellence at Moncloa. A Testing is a naturalist pursuit which consists in taking the maximum number of photographs of the biodiversity of a particular area to subsequently upload them to the *Virtual Biodiversity* site (<http://www.biodiversidadvirtual.org>), with the aim of identifying the species photographed and add to the knowledge of biodiversity for scientific, teaching and conservation purposes.

**Establishment of a BV Point at the CEI-Moncloa Campus:** since the month of June, 2012, the Department of Zoology and Physical Anthropology at the Universidad Complutense de Madrid, agreed with the *Virtual Biodiversity* platform (<http://www.biodiversidadvirtual.org>) to create a *BV Point* at the CEI-Moncloa Campus. This commits the department to establish in the near future an information point for its visitors concerning the Biodiversity present at the Campus. The benefits of the establishment of a BV Point on the Campus will be as follows: a) inspire greater curiosity from their visit to visitors and students; b) make them participants in a national project and database; c) widen knowledge regarding the overall biological diversity of the Campus; d) establish a new aspect to socialization and social and participatory dynamics with visitors and students with zero cost, contributing to a great project. During this last year, collaboration has consisted in the contribution of photographs of the biodiversity of the campus, to add to the inventories of known species there.

**Day of cleaning and of ecological report at the CEI-Moncloa Campus:** with the purpose of contributing to the a good state of conservation for biodiversity at the campus, cooperating in the collection of rubbish on campus and of ecological reporting (in the latter case, in identifying and communicating to those responsible, information regarding those areas which



should be cleaned in greater detail or recovered from a neglected or degraded state), a Day of Cleaning was organised on 22 February 2013. One of the ultimate aims of this event was for the different team members (staff as well as students using the campus) to better understand the wealth of species and habitats present here, their physical location and, specially, the state of conservation of these areas. We believed an added value was achieved; by making the team members participants, as users of the campus, in the maintenance of adequate conditions for health and care, people may see the benefits (health, comfort, etc.) of working in an environment with greater biodiversity.

**Presentations at conferences:** During this last year, the following conferences or meetings have been attended:

Gómez, J.F. & Nieves-Aldrey, J.L. *Morfología larval y biología de las especies europeas de Diplolepis (Hymenoptera, Cynipidae, Diplolepidini)*. XV Congreso Ibérico de Entomología. Azores (Portugal), 2-6 September 2012.

Hernández, J.M., Martínez-Ibáñez, M.D., Álvarez, M., Ruiz, E., Cabrero-Sañudo, F.J. *Descripción del órgano estridulador de Hypoponera punctatissima (Roger, 1859) (Hymenoptera, Formicidae, Ponerinae)*. XV Congreso Ibérico de Entomología. Azores (Portugal), 2-6 September 2012.

Cabrero-Sañudo, F.J. *Reconocimiento de caracteres bioacústicos en Scarabaeoidea Laparosticti ibéricos y aplicaciones*. Jornadas de seguimiento del programa de Biodiversidad (BOS), Ministerio de Economía y Competitividad, Madrid (España), 22-24 May 2013.

Two upcoming international conferences will be attended:

\***Amore, V.**, Mañani-Pérez, J., Parrón, A., Lapeña, E., López, G. & Cabrero-Sañudo, F.J. *Evolution of an urban community of butterflies over time: the CEI-Campus Moncloa (Madrid, Spain) in the last seventy years*. 1st Congress of the Society for Urban Ecology, Berlín (Germany), 25-27 July 2013.

\***Amore, V.** & Cabrero-Sañudo, F.J. *What factors influence the stridulation of a dung beetle? The case of the species Geotrupes mutator*. XXIV International Bioacoustics Congress, Pirenópolis (Brazil), 8-13 September 2013.

**Publication of works:** (\*with reference to the Campus following the instructions; in bold to V. Amore, PICATA):

\* Fernández, M., Martínez-Ibáñez, M.D., & Cabrero-Sañudo, F.J., 2012. La distribución ibérica de las hormigas del género Goniomma Emery. *Actas del VII Congreso Ibérico de Mirmecología*. Tres Cantos, Madrid.

- \* Fuentes, I., Cabrero-Sañudo, F.J., Martínez-Ibáñez, M.D., & Vázquez, M.A., 2012. Selección del cebo en trampas de caída para el estudio de la diversidad de hormigas epígeas en ecosistemas mediterráneos. *Actas del VII Congreso Ibérico de Mirmecología*. Tres Cantos, Madrid.
- \* Valdivieso, J., Martínez-Ibáñez, M.D., & Cabrero-Sañudo, F.J., 2012. Un seguimiento piloto de hormigas de suelo en el CEI Campus Moncloa. *Actas del VII Congreso Ibérico de Mirmecología*. Tres Cantos, Madrid.
- \* **Amore, V.**, Cañas, F.J. & Cabrero-Sañudo, F.J. What factors influence the stridulation of a dung beetle? The case of the species *Geotrupes mutator*. A enviar a *Behavioural Ecology* during the month of July 2013.
- \* **Amore, V.**, Requena, F., Álvarez, M., Martínez-Ibáñez, M.D., Ruiz, E., & Cabrero-Sañudo, F.J. An examination of the stridulation in the Iberian species of *Copris* genus. To be sent during September 2013 (publication undecided).
- Álvarez, M., Munguira, M.L., & Martínez-Ibáñez, M.D., 2012. Nuevos datos y recopilación de las relaciones entre Lycaenidae y Formicidae en la Península Ibérica. *SHILAP Revta. lepid.*, 40(157): 45-59.
- Arillo, A., Subías, L.S., & Shtanchaeva, U., 2012. A new species of fossil oribatid mite (Acariformes, Oribatida, Trhypochthoniidae) from the Lower Cretaceous amber of San Just (Teruel Province, Spain). *Systematic & Applied Acarology*, 17(1): 106–112.
- Berzosa, J., 2012. Presencia de dos géneros africanos en España, con la descripción de dos nuevas especies (Insecta: Thysanoptera: Thripidae). *Bol. R. Soc. Esp. Hist. Nat.* 106.
- Cabrero-Sañudo, F.J., 2012. Chapter 16. Composition and Distribution Patterns of Species at a Global Biogeographic Region Scale: Biogeography of Aphodiini Dung Beetles (Coleoptera, Scarabaeidae) Based on Species Geographic and Taxonomic Data. *GLOBAL ADVANCES IN BIOGEOGRAPHY* (ISBN 978-953-51-0454-4). Lawrence Stevens (Editor). InTech. Rijeka, Croatia. 329-360 págs.
- Gamarra, P., De La Rosa, J.J., & Outerelo, R., 2012. *Nudobius lentus* (Gravenhorst, 1806), nueva especie para la fauna de la Península Ibérica (Coleoptera, Staphylinidae, Staphylininae, Xantholinini). *Archivos Entomológicos*, 6: 57-61.
- Gamarra, P., De La Rosa, J.J., & Outerelo, R., 2012. *Quedius (Microsaurus) aetolicus* Kraatz, 1858 nueva especie para la fauna española (Coleoptera, Staphylinidae, Staphylininae). *Boletín Asociación Española de Entomología*, 36(3-4): 315-320.
- Gamarra, P., De La Rosa, J.J., & Outerelo, R., 2012. *Sepedophilus bipunctatus* (Gravenhorst, 1802), nueva especie para la fauna española (Coleoptera, Staphylinidae, Tachyporinae). *Archivos Entomológicos*, 7: 189-192.
- Gamarra, P., de la Rosa, J.J. y Outerelo, R., 2013. *Placusa (Calpusa) adscita* Erichson, 1839, nueva especie para la fauna española (Coleoptera, Staphylinidae, Aleocharinae).. *Archivos Entomológicos*, 8: 155-158, 8: 155-158
- García-Moreno, A., Barriga Bernal, J.C., Buencuerpo Arcas, V., Cifuentes Cuencas, B., García Mas, I., Gómez Flechoso, M.A., Moreno-Eiris, E., González Jaén, M.T., López González-Nieto, P., Hernández de Miguel, Jiménez Ortega, V., Lahoz Beltrá, R., López González-Nieto, P., Muñoz Araujo, B., Ornos Gallego, C., Outerelo, R., Refoyo Román, P., Ruiz, E., Tormo

- Garrido, A., Vázquez Martínez, M.A., 2012. Modelización en 2D y 3D para la enseñanza de la Ciencia de la Naturaleza en Secundaria y Bachillerato. II Congreso de Docentes de Ciencias (Biología, Geología, Física y Química). Jornadas sobre Investigación y Didáctica en ESO y Bachillerato. Facultad de Ciencias Biológicas. Universidad Complutense de Madrid. Bloque temático II Ciencias.2.0: Aplicaciones.
- García-Moreno, A., Moreno-Eiris, E., López-Acevedo Cornejo, M.V., Barriga Bernal, J.C., Buencuerpo Arcas, V., Cifuentes Cuencas, B., García Mas, I., Gómez Flechoso, M.A., González Jaén, M.T., Hernández de Miguel, J.M., Jiménez Ortega, V., Lahoz Beltrá, R., López González-Nieto, P., Muñoz Araujo, B., Ornos Gallego, C., Outerelo, R., Refoyo Román, P., Ruiz, E., Tormo Garrido, A., Vázquez Martínez, M.A., 2012. Application of 2D and 3D models for teaching of natural sciences. pp: 5348-5354. En: L. Gómez Chova, A. López Martínez, I. Candel (eds). INTED2012 Proceedings 6th International Technology, Education and Development Conference.. International Association of Technology, Education and Development (IATED). CD-ROM. ISBN: 978-84-615-5563-5. Madrid.
- Gómez, J.F. & Nieves-Aldrey, J.L., 2012. Notes on the larval morphology of Pteromalidae (Hymenoptera: Chalcidoidea) species parasitoids of gall wasps (Hymenoptera: Cynipidae) in Europe. *Zootaxa*, 3189: 39–55.
- Gómez, J.F., Nieves-Aldrey, J.L., Stone, G.N. 2013. On the morphology of the terminal-instar larvae of some European species of Sycophila (Hymenoptera, Eurytomidae) parasitoids of gall wasps (Hymenoptera, Cynipidae). *Journal of Natural History* 00:000-000.
- Gómez, J.F., Nieves-Aldrey, J.L., Stone, G.N. 2013. On the morphology of the terminal-instar larvae of some European species of Sycophila (Hymenoptera, Eurytomidae) parasitoids of gall wasps (Hymenoptera, Cynipidae). *Journal of Natural History* 00:000-000.
- Ortiz-Sánchez, F.J., Ornos, C. y Torres, F., 2012. Especies ibéricas de los géneros *Lithurgus* BERTHOLD, 1827, *Creightonella* COCKERELL, 1908 y *Chalicodoma* LEPELETIER, 1841 (Hymenoptera, Megaclidae): Claves de identificación y nuevos datos de distribución.. *Graellsia*, 68(1): 181-206.
- Outerelo, R. y Gamarra, P., 2012. *Domene (Lathromene) barraganensis*, nueva especie de estafilínido de la Península Ibérica (Coleoptera: Staphylinidae, Paederinae). *Archivos Entomoloxicos*, 7: 123-128.
- Pérez-González, S. & Zaballos, J.P., 2012. Re-description of two species of *Typhlocharis* (Coleoptera: Carabidae: Anillini) and revision of the models of female genitalia within the genus. *Zootaxa*, 3279: 46–62.
- Pérez-González, S. & Zaballos, J.P., 2013. Antennal Morphology of the Endogean Carabid Genus *Typhlocharis* (Coleoptera: Carabidae: Anillini): Description of Sensilla and Taxonomic Implications. *Journal of Morphology* (aceptado)
- Pérez-González, S. & Zaballos, J.P., 2013. Four new species of *Typhlocharis* (*baetica* group) (Coleoptera: Carabidae: Anillini) from southwestern Iberian Peninsula with notes on their biogeographical and morphological implications. *Systematic Entomology*, 38: 104–

122.

Subías, L.S., Shtanchaeva, U., & Arillo, A., 2012. Listado de los Ácaros oribátidos (Acariformes, Oribatida) de las diferentes regiones biogeográficas del mundo. *Monografías electrónicas Sociedad Entomológica Aragonesa*, 4.

Torres, F., Ornos, C. y Ortiz-Sánchez, F., 2012. Claves y datos nuevos de las especies ibéricas del género *Chelostoma* Latreille, 1809 (Hymenoptera, Megachilidae, Osmiini. *Graellsia*, 68(2): 263-280.

#### **Use of human, material and economic resources**

The installation of the Greenhouse has been financed with a charge to Project CEI2009, Sub-program B. The cost has amounted to 330.493,83 Euros.

The Germoplasm Bank is another of the selected projects selected on the CAIMON program which obtain financing of 244.375 Euros, with a charge to the CEI2009 Program.

The teams participating in the guidelines linked to the Faculty of Biological Sciences at UCM (*Biology and Biodiversity of Arthropods*-UCM 921632 and *Biology and Conservation of Vertebrates*-UCM 910577) and to the Superior Technical College of Agricultural Engineers at UPM (*Biodiversity and Conservation of Plant Genetic Resources and Integrated Management of Plagues*) are four representatives of the teams from CEI-Moncloa that have been working for a number of years on aspects related to the conservation of biodiversity, plant-animal interactions and *ex-situ* conservation of different organisms.

Linked to the Germoplasm Bank projects are:

- UPM Research Group: “Biodiversity and conservation of Plant Genetic Resources”. Lead researcher: Jesús María Ortiz Marcide.
- UCM Research Group: “Biology and Biodiversity of Arthropods”. (UCM 921632). Group co-directors: María Dolores Martínez Ibáñez and Raimundo Outerelo Domínguez.
- UCM Research Group: “Biology and Conservation of Vertebrates”. (UCM 910577). Group co-directors: José Luis Tellería y Javier Pérez-Tris.
- UCM Research Group: “Molecular Systematics of Fungi and Plants (SYSTEMOL)”. Group director: Ana María Crespo de las Casas.
- Centre for Plant Genetic Resources (CRF) (INIA). Director: Luis Ayerbe Mateo-Sagasta

#### **Major deviations in progress towards the objectives**

All planned activities are underway, although slightly behind schedule due to technical problems.



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	E13 Creating a program for cataloguing, conservation and dissemination of Biodiversity in the University Campus
<b>Objectives</b>	To maintain for research and teaching purposes the UCM and UPM herbaria and collections, to continue with their incorporation into the international project coordinated by GBIF-Spain (Global Biodiversity Information Facility; <a href="http://www.gbif.es/">http://www.gbif.es/</a> ) and to create with this material and with the botanical gardens located on the University Campus a training schedule (with web catalogues) for university students in our community and secondary education institutions of the Community of Madrid.
<p><b>Progress towards the objectives</b></p> <p>Projects:</p> <p>Biodiversity Interpretation Centre of CEI Moncloa Campus, starting point and interpretation of the schedules, including workshops.</p> <p>Design of the Moncloa Campus Biodiversity Schedule including visits to:</p> <ul style="list-style-type: none"> <li>Vertebrates Museum, Biology, UCM</li> <li>Entomology Museum, Biology, UCM</li> <li>Herbarium, Biology, UCM</li> <li>Arboretum, Forestry, UPM</li> <li>Fish Farms, Forestry, UPM</li> <li>Royal Botanic Gardens Alfonso XIII, UCM</li> <li>Geology Museum, UCM</li> </ul> <p>Improvements to the collections and museums (Herbarium, Vertebrates Museum and Entomology Museum).</p> <p>Installing a Bio-Geological Clock and outdoor Typhological Museum.</p>	
<p><b>Description of the work done and role of the participants</b></p> <ul style="list-style-type: none"> <li>• Design of the multimedia interpretation centre of the Campus Biodiversity Schedule. This action involves the coordination between various UCM and UPM centres, with scientific collections, useful to develop public awareness campaigns among students and the general public. The Royal Botanic Gardens Alfonso XIII has designed a specific action in one of the buildings within the complex, and includes an exhibition space and workshop with a sample of the variety of natural collections Moncloa Campus. An innovative and ambitious design has been chosen for the interpretation centre, using expository criteria and highly innovative technological resources.</li> </ul>	

The action has been complemented with a FECYT project in the context of scientific dissemination that will be completed in September 2013 with the installation of a Bio-Geological clock and outdoor Typhlological museum. Refurbishment works on the Vertebrates Museum, Biology, UCM. Exhibition spaces were adapted in the annex building, where the exhibition collections are deposited. Four independent spaces were created: two 20-square metre rooms, the graduate hall and the assembly hall (approx. 30 square metres) and changing rooms (approx. 100 square meters).

- Improvement in the Entomology Collection, Biology, UCM. The Entomology collection of the Faculty of Biological Sciences is mainly for scientific use and stores specimens (many of them type-specimens used for the identification of a new species) resulting from the research work of the professors of the Department of Zoology. The specimens are stored in a 150 square metre hall (approx) which required the installation of a cooling system, as a preventive conservation mechanism that would prevent the invasion of entomophagous pests. Traditional conservation methods used chemicals (paradichlorobenzene) that have proved toxic to people working in this environment and harmful to the environment and, therefore, have been replaced by physical methods (cooling).
- Improvements in the PCI of the Herbarium. The MACB Herbarium (included in the official list of university herbaria) has two workspaces: an area for the administrative and scientific processing of new entries and a storage area for the specimens (specimens are stored on sheets of folded paper, that envelope the dried plants). The latter is a space of 150 square metres (approx.) and has a powerful air conditioning system that prevents pest activity, but did not have a fire safety system to ensure the safety of the collection (and the building), being highly flammable materials.

#### **Governance structures created**

Joint Committee for the coordination and preparation of Biodiversity Schedules

#### **Major results**

Renovation and improvement works were performed at the Museum of Comparative Anatomy of Vertebrates, with numerous school visits and participation in the second annual Summer Campus, organized by FECYT. A booklet was distributed to Campus participants.

Participation as an External partner in the Wildlife Monitoring Project Moncloa Campus -UCM (<http://www.ucm.es/info/seguimientofauna/PROFESORES.html>).

#### **Use of human, material and economic resources**

The Interpretation Centre has been renovated thanks to a grant of € 200,000 obtained through the Strengthening 2011 program, currently being conducted, with the opening scheduled for the month of October 2013.

The bio-geologic clock and the Typhlological museum is a FECYT project amounting € 19,000

The renovation of the museum is funded from the CEI2009 project for a total of about € 92,881.

#### **Major deviations in the progress towards objectives**

The Project progresses as planned.

**CEI Campus Moncloa: The power of Diversity**  
*Progress Report nº 3*



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	<p>Actions for the MATERIALS FOR THE FUTURE Cluster:</p> <p>F1 Establishing and completing the ICTS "Advanced Electron Microscopy National Centre (CMA)".</p> <p>F2 Platform for the Design and Construction of Electromagnetic Sensors and Actuators.</p> <p>F3 Creation of Network of Workshops for the Development of New Thin Film Materials.</p> <p>F4 Mechanical Properties Workshop: Durability and Sustainability of the Materials.</p>
<b>Objectives</b>	<p>The cluster aims to develop a network structure involving research groups in the fields of structural and advanced functional materials from the UCM and UPM. These groups are expert in the synthesis and structural and physicochemical characterisation of these materials and the determination of their structure-property relationships. The research lines of these groups cover some of the hottest topics in Materials Science and Technology, including metallic, ceramic, magnetic and conducting materials, biomaterials and cement-based materials.</p>
<p><b>Progress towards objectives</b></p> <p>Each cluster line of action is described in a separate form.</p> <p>Cross-functionally, the first Materials Week was held, with the intention of repeating it annually as a meeting forum for scientists, students and companies in the sector. The purpose of this action is dissemination and transfer of knowledge.</p>	
<p><b>Description of work conducted and role of participants.</b></p> <p><b>MATERIALS WEEK</b></p> <p><b>Activities for Scientific Dissemination and Connection with Society</b></p> <p>The strategy followed in the Materials for the Future Cluster for Scientific Dissemination and Connection with Society is based on several areas, corresponding to the objectives initially set in the lines of action of the Master Plan:</p> <ol style="list-style-type: none"> <li>1. Fostering of scientific culture and innovation in Society.</li> <li>2. Fostering of creativity and scientific vocation among university and pre-university students.</li> <li>3. Science, job and business fairs disseminating the results obtained at CEI Moncloa Campus.</li> <li>4. Fostering of networking and synergy between researchers, teachers, students and companies.</li> <li>5. New methods for student learning, motivation and participation.</li> <li>6. Increased University-Business collaboration.</li> <li>7. International dissemination.</li> </ol> <p>The activities listed below include the most cross-functional, innovative and original ones conducted. This is by no means exhaustive and does not include initiatives traditionally carried out in our Campus, such as the Researchers' Night, the Science Week, Job Fairs in Schools and Faculties,... The former, listed below, are described in greater detail further on.</p> <ol style="list-style-type: none"> <li>1. FECYMAT: Forum of Companies, Materials Science and Technology.</li> </ol>	

2. Workshop on Nanotechnology and Nanomaterials (activity conducted entirely in English)
3. Student competitions.
4. Technology Exhibition organised by participating companies.
5. Visits to Laboratories, Research Centres and Museums.
6. Volunteer work.
7. Theatre.
8. International projection of the Materials for the Future Cluster.
9. International Seminars on Materials Science.
10. Inter-university Master on Materials Engineering.

All actions were bilingual (Spanish-English unless otherwise indicated, in which case they are entirely in English). The rationale for this initiative is that both in science and in technology, it is essential to acquire this competence (universities request that their graduates have a level B2 of English) and this encourages its use and justifies its need. Seven of the actions proposed had a space-time centre of gravity at the UPM's School of Civil Engineering (except for the website, the booth at the congress and the visit to laboratories, for obvious reasons). This School is located in the heart of the Moncloa Campus, whose privileged location makes it a reference point for the nearly 100,000 students of the Complutense and the Technical Universities of Madrid, with excellent communications with the rest of the scientific and academic community, and the city centre.

On the other hand, the School of Civil Engineering has enough spaces, rooms and classrooms to house all the activities proposed here (including an auditorium seating 700), as well as being the site where the Degree and Master of Materials Engineering of the UPM is taught, and it is less than one thousand metres away from the site where the Degree of Materials Engineering of the UCM (Faculty of Physical Science) is taught.

Citizen support of Science can only arise from interest and curiosity about learning new ideas and technologies, something innate in humans. This is achieved through mutual knowledge and implies debate and discussion on diverse topics, in plain and understandable language, yet not empty of contents. With this project, we have aimed to collaborate in the promotion of a scientific culture in Spain, seeking a connection between citizens and generators of knowledge. To build this bridge for awareness and proximity between the two sides involved, at the Materials for the Future Cluster of the CEI Moncloa Campus we intend to generate various types of gatherings between teachers, researchers, students, citizens and companies, based on the field of Science and Materials Engineering. Therefore, we consider that the activities should focus not only on a physical space, but also a timeline that allows greater publicity impact and a higher possibility of participant interaction, to achieve an atmosphere and critical mass favouring meeting the objectives set. Thus, eight of the ten events listed took place during a short



period of time (three days, 26, 29 and 30 April, 2013), during what we called the Materials Week. Here we shared experiences, knowledge, technology and ideas. We consider this is a key effort that should be encouraged in our Campus, especially taking into account the current situation that leads to demotivation of society as a whole; so it has not been an isolated event, but rather is intended to last and the 2014 edition is already being worked on.

The Materials Week wishes to provide a ray of light, hope and optimism for a future which we believe, most sincerely, will be much better than what we can imagine now. Therefore, what is better than trying to show how we are building this future at the CEI Moncloa Campus? During the Materials Week, various types of events are carried out simultaneously: conferences, debates, demonstrations, open door days, competitions... in Spanish and English. These activities are aimed primarily at young people and they feature companies, technologists, researchers and teachers. Concentrating a high number of specialists and students, they generate a dynamic learning space.

However, it also attracts the attention of the general population, and of other universities, institutions and companies. This science education and information project is based on traditional mechanisms but with innovative approaches that encourage learning among participants, shown as a way to improve the current economic and social situation. Within the immense scientific variety of our Campus, we have focused on Materials Science and Engineering for various reasons:

1. This is the most cross-functional discipline of all those existing on the Campus.
2. It is also one of the least-known. The materials revolution is a silent one that has changed our world without our realising it, taking us stealthily from leather shoes to those made of composite materials.
3. This is one of the most transforming areas from a social, cultural, scientific and technological viewpoint.
4. It is very close to us and it can be ***touched and shown*** easily with no need for prior knowledge or major installations.
5. The Community of Madrid concentrates over 30% of the Materials research and technology of Spain.
6. Our country, and in particular this Campus, is an international reference in the area of Materials.

Below is a description of the activities conducted to date, however, given that in many cases this initiative is ongoing, we have also included what we have planned for the future. For more details on most of the activities carried out, please see the CEI Moncloa Campus website.

## **1. ACTIONS**

### **ACTION 1. FECYTMAT: MATERIALS SCIENCE AND TECHNOLOGY FORUM.**

*This action is filmed in its entirety and webcast with free access.*

At the Materials for the Future Cluster we wish to enhance the social presence of the CEI Moncloa Campus and synergy between research groups and lines, students and companies. Therefore, the main action during the Materials Week is the Business, Materials Science and Technology Forum (FECYTMAT). We want this Forum to be a meeting point for citizens, companies, professionals, students, graduates, teachers and researchers, so that they can share and disseminate experiences, knowledge, technology and ideas, contributing to scientific education and stimulating the creative, critical and entrepreneurial spirit of the attendees. In short, the aim is to create the breeding ground to favour a range of benefits, from young people finding jobs, to setting up research projects or spin-offs through University-Company collaborations, or simply, talking directly with knowledge generators. With this aim, we alternate informative presentations on the most innovative lines of research groups, with company presentations, in order to achieve higher interaction of both worlds and provide attendees with a closer and more comprehensive overview. Therefore, this activity is the ***core event*** of the whole Materials Week, serving as the backbone for all other activities.

FECYTMAT begins with the opening conference of the Materials Week (delivered by a distinguished

scientist or specialist), followed by a debate with a panel of experts from the industry, administration, science and technology. The rest of the program has the following format: on the afternoon of the first day, during all of the second day and on the morning of the third, there are several sessions with monographic conferences on specific topics such as new biomaterials, materials for nuclear plants, materials for sports, materials for defence, etc. Each one of these monographic sessions includes multidisciplinary presentations that provide an enriching view of each field, and each block lasts around four hours.

Throughout the Materials Week, there are simultaneous breaks in all the activities, so that all participants may enjoy some light refreshment (coffee, tea, soft drinks and a snack) in the hall on the first floor of the School of Civil Engineering. This turns this large hall, which must be crossed to access all the other activities, into the **meeting point**. In this hall there are also the booths of the companies in the Technology Exhibition, exhibiting the works submitted to the Photography Competition and where all the videos submitted to the various competitions are continuously shown on a screen. These breaks are an excuse to encourage the meeting between participants and specialists, and with the collaboration of students in the last years of the Materials Engineering Degree of both universities, to break the barrier hindering communication between strangers from very diverse backgrounds. Here they can all chat in a relaxed atmosphere, over coffee, on the activities carried out and they can address speakers with any questions or things they are curious about.

## **ACTION 2. WORKSHOP ON NANOTECHNOLOGY AND NANOMATERIALS**

*This action is filmed in its entirety and webcast with free access.*

The Workshop is comprised of three sessions. In each one there will be two specialists on the monographic topic of the session who deliver an informative talk on the same. After the presentations, there is a round table with, aside from the speakers, a specialised science journalist from the large media and one or two students from the Materials Engineering Degree in our universities, for a debate with the audience. The topic changes every year, depending on the interests detected when it is organised. In any case, it takes place entirely in English. This activity is of special interest for bilingual schools of the Community of Madrid (which are growing in number), as it allows pre-university students to practice their skills in this language while receiving information and scientific education by the main actors. The results of the 2013 edition were most satisfactory and for 2014 we already have reservations for participants.

## **ACTION 3. COMPETITIONS**

*This action is filmed in its entirety and webcast with free access.*

**Materialise your ideas!** That is the motto of our competitions. With this motto we wish to stimulate creativity, curiosity, imagination, knowledge, entrepreneurship and scientific and technological vocation among the young, but also among those not so young. Through fun and easy activities, and with the reward of modest but significant prizes, we will be able to achieve all of these objectives. Six different competitions have been proposed covering different areas of scientific reasoning and its technological application, so that according to the skills and competences of each participant, they can go for one competition or another, or all of them simultaneously. Competitions take place during three days, so they do not overlap and it is possible to participate in or attend all of them, at will. The prizes initially proposed for each category are: first prize of €300 and two second prizes of €100 each. This activity was experimentally carried out during the Materials Week 2013 and it was very successful.

### **3.1 Scientific Dissemination**

*This competition is filmed in its entirety and webcast with free access.*

Participants must disclose some of the research conducted in the Materials for the Future Cluster in an entertaining, fun and ingenious manner. Participants must communicate their message in a way that is understood by all of society. The objective of this competition is to foster dissemination of Materials Science and Engineering through new channels to approach society, and what better way to do so than with the young, in a language that is close to them. Participation may be individual or collective and a video in English is presented with a maximum duration of three minutes. The videos generated are posted on the website. In addition, a text is submitted, in English or Spanish, of less than one thousand words, explaining the purpose of the video and what it explains. The works selected by the jury are presented by the authors during the Materials Week, in Spanish or English, in a maximum of seven minutes, for which they can use visual aids.

### **3.2 MacroWorld Photography**

*This competition is filmed in its entirety and webcast with free access.*

Photography contest of the mesoscopic and the macroscopic world where participation may be individual or collective. The jury shall assess the contribution to dissemination of scientific research conducted in the Materials for the Future Cluster and the photographs are presented in digital format to be exhibited online. The photographs must have a title in Spanish and in English, and be accompanied by an explanatory text in Spanish and English of less than one hundred words.

### **3.3 MicroWorld Photography**

*This competition is filmed in its entirety and webcast with free access.*

Photography contest of the microscopic world where participation may be individual or collective. The jury shall assess the contribution to dissemination of scientific research conducted in the Materials for the Future Cluster and the photographs are presented in digital format to be exhibited online. The photographs must have a title in Spanish and in English, and be accompanied by an explanatory text in Spanish and English of less than one hundred words.

### **3.4 Talent Show**

*This competition is filmed in its entirety and webcast with free access.*

This is an attractive competition in which the young show their abilities (magic, music, monologues, performance,...) outside the classroom, stimulating their creativity and making them lose their fear of speaking in public (which is excessive in Spanish society). It takes place at the Auditorium of the School of Civil Engineering and participation can be individual or collective. Performances cannot be degrading, sexist, racist, or against any civic criteria expected in our society, and they can be in Spanish and/or English. This is a relaxed event where the audience, students and teachers can mingle and interact.

### **3.5 Materials Games Gymkhana.**

*This competition is filmed in its entirety and webcast with free access.*

One way for students to discover how much they know about the world of materials is asking them, but in this case instead of taking an exam we have decided to ask questions in traditional games such as Trivial, Monopoly, Cards,... modifying and adapting them to the world of Materials. The competition consists of playing five games: Materiapolis, Trivimaterial, Granta Materials Cards,... where points are obtained according to whether one is the winner, second, third, etc. in each one. There is a first qualifying round,



and winners go on to the qualifying finals, and the final takes place on the last day of the Materials Week in the morning. The organisation reserves the right to create groups of participants if there is a very high number of entries. During the 2013 edition there were close to sixty participants, and it was one of the activities with the highest demand.

### **3.6 Creativity, Entrepreneurship and Innovation.**

*This competition is filmed in its entirety and webcast with free access.*

**What is this about?** Easy, we want to encourage creativity, entrepreneurship and inventiveness. The contest is aimed at pre-university and university (undergraduate, graduate and doctorate) youths, individually or in groups. Creativity, entrepreneurship and inventiveness must be focused on the field of Materials Science and Engineering. For example, you can submit the development of a new material, an experiment, improvement of an existing product, development of a company,... whatever, as long as it is original, innovative and imaginative. Participation may be individual or collective and a video in English is presented with a maximum duration of three minutes. The videos generated are posted on the website. In addition, a text is submitted, in English or Spanish, of less than one thousand words, explaining the purpose of the video and what it describes. The works selected by the jury are presented by the authors during the Materials Week, in Spanish or English, in a maximum of seven minutes, for which they can use visual aids. The Jury shall take into account the new idea as well as how it is structured and disclosed. The purpose of this is to:

- Encourage a critical spirit aimed at creativity.
- Stimulate creativity, entrepreneurship and development of ideas among the young.
- Encourage autonomous and team work and the use of idea generation techniques.

### **ACTION 4. TECHNOLOGY EXHIBITION**

*This action is filmed in its entirety and webcast with free access.*

The Company Exhibition takes place in booths in order to allow students, specialists and companies to be in direct contact with the latest technological advances in production, analysis and characterisation of materials. Various companies, leaders in instruments for the field of Materials Science and Engineering, present their latest equipment and offer free demonstrations. There are also informative talks and mini-courses for anyone interested in learning more details about the technologies and machines displayed.

In collaboration with CSIC, and in addition to the above, in the 2014 edition, the exhibition *A Walk Through Nanoworld* shall be installed in the ground floor hall of the School of Civil Engineering. The purpose of this exhibition is to show the general public a selection of images selected as finalists in the 2007 and 2009 editions of the International Contest of SPM Microscopy Images, organised by CSIC and the Autonomous University of Madrid. The images show various "nanolandscapes" populated by atoms, molecules, carbon nanotubes, nanoparticles and other nanostructures, allowing us to see the real actors of nanotechnology, the new paradigm of knowledge that shall bring about the industrial revolution of the 21st Century.

#### **ACTION 5. VISITS TO LABORATORIES, RESEARCH CENTRES AND MUSEUMS.**

The main objective of the visits is to provide a tour of the places where knowledge is generated, with the possibility of chatting with researchers while *looking and touching*. The Moncloa Campus has a network of international centres of research excellence (ISOM, National Centre of Electron Microscopy,...), as well as the most extensive network of scientific museums of all the Spanish university campuses. Many of them are unknown, but have real gems that help understand the role of scientific and technological development in the history of Spain. This activity is primarily aimed at pre-university schools to complement what is being taught in class by teachers, and stimulate scientific and technical vocations. We contact schools directly, especially those associated to the two universities, and we offer them the possibility of full packages, in which the visit to some of our facilities is followed by participation in one of the other actions described. This way we provide participants with a more comprehensive experience, and the cost of this type of field trip for the school is optimised.

#### **ACTION 6. VOLUNTEER WORK.**

A way of involving students at our universities in this project is to make them feel key players of the same, and what better way than to have them collaborate directly in its organisation and dissemination. Their help is essential to make this initiative a reality, so we encourage them to collaborate, letting them know that just a few hours of their time means a lot to us. This way they can personally discover that on Campus there is a very rich life beyond the classrooms, and not necessarily that of the mad scientist made popular in Hollywood films. In the 2013 edition we had over thirty volunteers.

#### **ACTION 7. THEATRE PERFORMANCE**

*This action is filmed in its entirety and webcast with free access.*

The Theatre is a perfect point between science and humanities, which we do not want to leave out of the technological field. In the 2013 edition the group Teatro en Canal, of the School of Civil Engineering (UPM), entertained us with a play whose plot sought to establish a dialogue between Science and Society, serving as an enjoyable and entertaining connection with the rest of the actions of the Materials Week.

Providing this showcase is a reward for the efforts of students of technical and scientific careers to combine their specialised education with humanities. In the 2013 edition we conducted a pilot of this experience with nearly four hundred attendees.

#### **ACTION 8. INTERNATIONAL PROJECTION OF THE MATERIALS FOR THE FUTURE CLUSTER.**

Achieving international projection of scientific, technological or business activities in our Cluster, and therefore of the CEI Moncloa Campus and our country, is a must in a globalised world. That is why we have developed a very attractive and modern website showing all our work. It includes the over forty hours of videos generated every year throughout the Materials Week, with a twofold objective: i) to be able to show the international community our achievements and potential, as well as open the door to new collaborations, projects and attract talent for our classrooms and laboratories; ii) continue our work for dissemination and scientific education beyond the space and time of the Materials Week. Since the material is accessible for free and permanently, it can be used by teachers at different levels, associations, institutions and individuals for continuing education. One of the objectives of this action is to provide all the information available on the Materials Week website both in Spanish and English in order to achieve greater international projection.

In line with this, we installed a **Booth at the European Materials Congress (EUROMAT 2013)**. This is the most important and cross-functional congress, worldwide, in the field of materials. Our participation has

allowed raising awareness on our teaching, research and information initiatives among over three thousand attendees from around the world. We expect it will help encourage networking between researchers and students, attract talent, generate new research projects and establish contacts with companies.

#### **ACTION 9. INTERNATIONAL PROJECTION OF THE MATERIALS FOR THE FUTURE CLUSTER.**

International Seminars on Materials Science Boundaries ([www.mater.upm.es/seminarios.asp](http://www.mater.upm.es/seminarios.asp)) have a weekly periodicity and their objective is to serve as a meeting point for sharing and disseminating current and relevant issues in the area of Materials Science and Engineering; with a broad vision that ranges from biological materials to functional materials, and purely technological applications. They are participated voluntarily by relevant teachers, researchers, companies and technologists of Universities, Companies and Research Centres, both national and international.

They have multiple objectives: learn about what other researchers are doing, explore new ways of collaboration or simply learn something new. The Seminars are held every Monday from 9:30 to 10:30 a.m. The expected duration for the talk is about 45-50 minutes, leaving 10-15 minutes at the end for Q&A.

As for the audience, it is very diverse: from students of engineering and science degrees, to senior researchers and master and doctorate students.

The speakers are filmed in order to provide, for free, maximum dissemination of the talks and the knowledge presented. As a result, the **research of the speakers is webcast to over 60 countries**, and some videos have had over 35,000 visits. In total, we have received **over 300,000 visits to our space in YouTube-UPM**.

I believe we can be very satisfied with this activity, as it has turned us into a national and an international reference on scientific communications in the field of Materials Science and Engineering.

#### **ACTION 10. INTER-UNIVERSITY MASTER IN MATERIALS ENGINEERING**

A university without research is a bad university, but a university without education is not even a university. We could not leave aside in our approach education and its actors: students. They are the *raison d'être* of our institutions, and for them both universities have developed syllabuses for the Degree in Materials Engineering. Joining the two degrees might be a good idea, but for now it is not feasible for various reasons, many of them administrative. What we can do is try to offer our students a joint Master in Materials Engineering of the CEI Moncloa Campus.

Coordinating the efforts and interests of two large universities, with at times differing cultures and interests, can be complicated. Academic year 2013-14 will see the start of the Master in Materials Engineering. Its main characteristics are:

1. Duration: one year (72 ECTS)
2. Studies taught entirely in English.
3. Four specialities (functional, biological, for energy and structural materials) which include the main lines of research of the Cluster.
4. Attracting international students. At the time of writing this report, pre-enrolment and registration is still open, however we already have nearly ten foreign students.
5. Teacher participation from both universities, from the research centres attached to the Campus (CSIC

and CIEMAT) and international teachers.

Although officially the Master is attached to the UPM, because for administrative reasons we have been unable to include the UCM and make it an inter-university degree, we hope to be able to do so in the academic year 2014-15. In the meantime, there is almost complete parity in our teacher participation: 40% UCM, 40% UPM and 20 % teachers from other institutions.

Proof of the firm commitment of the two universities with this Joint Master is that in July 2013 **we invested €25,000 + VAT to acquire joint software** for Materials Selection (from Granta Design). This shall be used widely for the Master, as well as the undergraduate studies, by teachers and students of both universities. Furthermore, this type of software allows teaching based on case studies and methodologies that are closer to students.

## 2. OBJECTIVES

The main objective of this project is to consolidate the scientific dissemination efforts in the field of Materials Science and Engineering that, in its institutional role, is to be expected from any public university, and to link it with the specific work of research and teaching conducted at the Complutense and Technical Universities of Madrid through their faculties, schools, research centres and institutes, and more specifically through their more than one hundred renowned research groups. This gives us a critical mass with enormous potential (to which should be added the contribution of researchers of entities attached to the Campus such as CIEMAT and CSIC) concentrated in a small geographical area. It should be noted that many of these researchers and teachers are international leaders in their respective fields of work, with significant relations with the most reputable international science and technology centres. All of this science potential is organised in the Materials for the Future Cluster, the strategic area of the Moncloa Campus of International Excellence led by the Universities.

The Materials Week was designed with the following specific objectives:

1. **Generate** a participatory, consistent and rigorous resource with a high visual impact that is attractive for all types of audiences: modern, innovative, educational, and using new technologies.
2. **Raise awareness** on the importance of Materials Science and Engineering, explaining the concept and providing illustrative examples, close to visitors and inspired on what we do at the Moncloa Campus.
3. **Introduce** participants to the magic of materials and their present and future applications, from the conception of the idea up to its industrial production.
4. **Create** space-time devoted to the reception and guidance of visitors, their education, enhancement of critical spirit, creativity, innovation, free and critical thinking,...
5. **Internationally project** the image of the CEI Moncloa Campus and of Spain as a science and technology reference in Materials Science and Engineering. Increase interaction between the scientific world, innovation and organised civil society, encouraging public participation in science and technology.
6. **Develop innovative and provocative formats and channels** to promote a scientific culture.
7. **Promote** knowledge of science, technology and innovation in society, consolidating their public image as an activity that generates wealth, development, well-being and quality of life.
8. **Encourage scientific vocation**, by increasing grassroots scientific culture.



9. **Foster a critical spirit**, which is the foundation of the scientific method, to build freer and more aware citizens.

A specific result of the project proposed is integration of various actions for scientific communications in a central physical space within the University that is easily recognisable; thus consolidating the educational and entertaining role of Science and Engineering, and bringing the University's research and academic efforts closer to the general population.

This project intends to bring the wealth, cross-functionality and multidisciplinary of Materials Science and Engineering to our target audience, through its contribution to social, cultural and economic development of Humanity. For this we follow a current and modern vision, not a historiographic one. This has the advantage of being close to the latest advances, and the disadvantage of losing the historical continuity of contributions. Nonetheless, the latter can be discovered by the recipient by unravelling the historical thread of discoveries that have led to the present situation, which endows the approach with added value. Therefore, any consideration of the proposal shall place emphasis on disseminating the most important and recent results from the Moncloa Campus as described by their actors: **the scientists, specialists and technologists**. The presentation and detailed explanation of the contributions, many of them absolute universal references, should contribute to greater awareness among citizens on materials science and technology, their study and value. Also, it shall encourage the onset and development of scientific, technological and entrepreneurial vocations, at a time when they are scarce but extraordinarily necessary in our country.

A positive collateral effect of the activity proposed is the creation of a breeding ground in a space-time where researchers and companies can present their work and studies, establish contacts and collaborations, interact with young students and graduates for Senior Projects and Master Projects, Doctoral Theses, Internships and job opportunities. Additionally, this initiative will help show Spanish society, and through the Internet, the whole world, the great competitiveness and capability of this sector, that so often goes unnoticed due to its routine nature, where we play a very significant role globally: we are the ninth scientific power in the field of materials and we have multinational companies that export to most developed and emerging countries.

### 3. LEVEL OF INNOVATION AND SCIENTIFIC-TECHNICAL RELEVANCE OF THE ACTIVITY

The proposal is not based on a display of possibilities that is overwhelming for our visitors; it aims to show in a direct, simple and entertaining manner, the potential of Materials Science and Engineering at the Moncloa Campus and its ability to transform our society.

Without underestimating the usefulness of computer communications, we wish to bring the objects of our study closer to the population (whether in the university or not). Their beauty, complexity, innovation, usefulness and presence in our everyday life cannot be perceived at a distance. This is why we bring together in a limited physical space (the School of Civil Engineering) all the activities proposed, except for the visits to laboratories, museums and research centres. Thus, there will be simultaneous competitions, guided tours, conferences, exhibitions, debates, demonstrations, booths, cultural activities,... so that visiting the Materials Week becomes a comprehensive experience captivating visitors from every nook and cranny. We shall reinforce the bonds between researchers, scientists, teachers, technologists, business owners, students and the general public, by bringing them together in the same space-time. This is why we have breaks between the sessions of the various activities where we offer some small

refreshment (mid-morning and mid-afternoon). This serves as an excuse to encourage the meeting of attendees, and with the collaboration of students in the last years of the Materials Engineering Degree of both universities, to break the barrier hindering communication between strangers from very diverse backgrounds. They shall all be able to chat in a relaxed atmosphere, while having a coffee or tea, on the activities carried out and specialists shall be available for questions or clarifications. This meeting point (hall on the first floor of the School of Civil Engineering), must be crossed to access all other activities, and it is surrounded by the booths of the Technology Exhibition companies, the photographs of the Photography Exhibition, and all the videos submitted to various competitions, continuously being shown on a screen.

This arrangement also makes visits from schools especially interesting, both for students and schools and teachers. Given the increasing difficulty of raising funds for student trips, it is necessary to optimise them. If instead of visiting a single activity we offer the possibility of complementing several events and link them, it is an added incentive for all, providing a more comprehensive and motivating experience. In the 2013 edition of Materials Week, we tried out this proposal with sixty sixth form students from the British Council School with amazingly positive results. So much so, that the head of the school has asked to book a repeat visit in 2014.

Although the project's philosophy does not consider radical methodological innovation with respect to the usual communication channels, it does provide a unique opportunity to try out new formulas and formats integrating very diverse activities that can, however, establish major synergies.

In addition, all the actions described include preparation of digital materials (by being filmed) that can be accessed remotely on the Internet. In the 2013 edition of Materials Week, we filmed over thirty hours of videos of the various activities carried out, and all the material generated is currently being edited. Once done, it shall be classified and catalogued so it may be accessed on the Internet (in our own websites and in social networks).

#### **4. TARGET AUDIENCE**

The primary audience of this action is the university community linked to any of the education or research centres included in the Moncloa Campus, as well as any attached entities, pre-university schools in the area of Madrid, and any person interested. The project has a clear inter-institutional vocation, especially when considering the preexisting close collaboration between UPM and UCM, within the Moncloa Campus of International Excellence Program of the Ministry of Education, Culture and Sports.

Since university students (and, by extension, the rest of the university community: administration and support staff and teachers and researchers) are the closest beneficiaries due to their proximity to this action, the Campus must and wants to extend its scope of influence to other social groups. This project is particularly sensitive towards teachers and students preparing to enter university. Contact with the centres attached to the two universities is regular, with frequent informative visits to the schools, and their students visit us for events such as the Science Week or Researchers' Night. This type of initiatives are always very welcome and in past years, all places offered have always filled up.

Aimed essentially at university and pre-university students, this project also welcomes other audience profiles: on the one hand, non-specialised and family audiences that may find in this environment -close and well communicated- a space for scientific leisure, and on the other, a space for scientific information. Furthermore, this activity can be especially attractive for members of the *University for Seniors* of the UCM (or other similar initiatives); this audience has enormous intellectual curiosity which, in science, can be met with communication programs such as the one proposed here. In this regard, we shall make a special effort to contact and inform associations of friends of science and senior citizen associations.

Finally, addressing various actions towards audiences with disabilities will facilitate access to scientific information by a group generally neglected in Scientific Dissemination projects. For this purpose, we shall



seek the support of associations of people with disabilities and specialists in our Campus.

## **5. STRATEGY AND COMMUNICATION PLAN**

The communication strategy for the activities includes the usual media in the university community:

- The Materials Week web page:  
(<http://www.campusmoncloa.es/es/eventos/materialsweek/>), which is continuously updated,
- Usual electronic communication channels: email, social networks, newsletter, etc.
- Information points through university, school, research centre websites, both of the Moncloa Campus and associated entities.
- University newspapers, radios, and televisions, in particular those linked to the Faculty of Communications and the specialities of Sound and Image in Telecommunications Engineering.

Regarding the general public, the initiatives developed shall be communicated to the local and regional institutions in our geography to attract schools, secondary schools (especially those associated to the two universities), cultural associations, etc., linked to the guided tours offered by both universities.

Finally, as a complement, the Moncloa Campus has its own International Office of Communications, while the participating universities each have Communications Departments and Scientific Dissemination Units, available for this project for direct contact with the media and local communication networks.

## **6. COLLABORATION, INTERDISCIPLINARITY, AND INTERNATIONALISATION**

The project submitted brings together in the same space-time point, under the coordination of the UPM and UCM Research Vice Rectors, several centres, schools, faculties and technology institutes and the over one hundred research groups present in the Materials Cluster of the Moncloa Campus. They shall conduct their scientific activities in the area of Materials Science and Engineering firmly committed to transferring their work to society, and in particular to the business world and the young in order to encourage their vocation.

The objective of the CEI Moncloa Campus is also to link this initiative to other research centres, companies and groups (not only from UCM or UPM) related to the world of materials, thus increasing dissemination and awareness among the university community and society in general of the efforts made by these two universities to enhance knowledge of Materials Science and Engineering. Given that the region of Madrid concentrates over 30% of the materials research groups in Spain, and a significant proportion of the most advanced companies in the sector, we are one of the main European poles in the field of materials. All of these centres and companies will therefore be able to use the time-space environment created by the Materials Week to show their work and research. However, we want to go further and make it the breeding ground to establish networks and collaborations among them, contact young students and graduates for Senior and Master Projects, Doctoral Theses, Internships and job opportunities. Additionally, this initiative will help show Spanish society the high competitiveness of this sector, where we hold a prominent position in the world: we are the ninth scientific power in the field of materials and we have multinational companies exporting all over the world.

Our objective, as Materials for the Future Cluster of the CEI Moncloa Campus, is ambitious and we aim to become a European, and an international, reference in the field of materials, so that the annual organisation of the Materials Week allows not only favouring scientific dissemination locally, but also

contributes to creating and spreading the Brand Spain as State policy, the efficacy of which lies in long-term, local actions with a global projection. Proof of this is that this year we have had participants from various Spanish universities, various papers submitted to the competitions from Latin America, and visits to our website from over twenty countries.

The objective is to improve the image of our country, both internally and beyond our borders, for benefit of the common good. In a global world, a positive country image is an asset that helps endorse a State's international position in politics, economics, culture, social affairs, science and technology.

In short, improving our country's image as a leader in the field of Materials Science and Technology will support our projection internally as well as abroad. We hope that with this we can, humbly, contribute to increasing exports by our manufacturers, attract new investments in our companies and universities, foreign students and researchers interested in joining the Spanish Science and Technology system. We also want to help achieve internationalisation of our companies in a niche in which Spain is and can be highly competitive.

Finally, we should highlight the firm and unswerving commitment of the universities participating in this proposal with equal rights and integration of those members of the university community living with disabilities for raising awareness among the general public (and in particular, the young) on education without barriers. Specifically, the Moncloa Campus, in collaboration with ONCE and the Ministry of Education, is promoting a university free from any type of barrier, that guarantees equal opportunities and non-discrimination of people with disabilities to access, stay and advance in the university community.

Although the activities proposed are aimed at the general public, all of them will take into special account people with any type of disability. This includes placing special emphasis on how new materials can help resolve different types of temporary or permanent disabilities. Specifically, we shall request technical assistance from associations of different types of disabilities, as well as support for communications, dissemination and fostering of various actions.

## **7. FUTURE PROJECT SUSTAINABILITY**

The events planned shall be enhanced in future with new proposals arising from the experience acquired and suggested by research groups in the universities comprising the CEI Moncloa Campus and its attached entities, which include major corporations. Through the Management Committee of the Materials for the Future Cluster of the CEI Moncloa Campus, the group of researchers, associated corporations and scientific associations shall be called upon to design initiatives for the Materials Week, thus enhancing communications of our research efforts.

The actions with a higher impact, conferences and tours of research centres and institutes, addressed not only to the university community but also to children and youths, are assured thanks to the prior experience of the two universities and their networking with pre-university schools, which guarantees their success.

The main sources of funding that guarantee the viability, sustainability and financial autonomy of the project in the medium and long-term are based on three core elements:

1. **Own funding** from the two Universities through the CEI Moncloa Campus project.
2. **Corporate sponsorship** through their participation in FECYTMAT and the Technology Exhibition. In the 2013 edition, there were nine participating companies with varying contributions.
3. **Patronage from public and private foundations.** We will strive to contact scientific associations in the field of materials (there are nearly ten in our country), foundations with a strong scientific dissemination vocation (Arecas, BBVA, Santander,...) in order to enter into multiannual contracts supporting this initiative. In the 2013 edition we had the support of SOCIEMAT (the Spanish Materials



Society) and we expect their support to be even greater as awareness of the Materials Week increases.

4. **Crowdfunding and private donations.** This is a collective cooperation option, carried out by people who set up a network to raise funds or other resources, usually web-based, to finance work and initiatives of other individuals or organisations. We believe this can be very significant for our future viability and furthermore it can gauge the level of satisfaction of participants. In the 2013 edition this channel was opened through our website.

With all of the above actions we believe continuity of the initiative shall not depend only on competitive sources of financing, so we can assure independent medium and long-term continuity of the Materials Week.

## 8. MECHANISMS TO EVALUATE IMPACT AND QUALITATIVE AND QUANTITATIVE IMPACT

The impact of the project submitted can be evaluated with quantitative and qualitative criteria. We propose the following plan to measure the impact:

1. **Visits to the website at three different periods.**
  - a) three months before the event
  - b) during the event
  - c) six months after the event.
2. **Registrations to events through the website.**
3. **Number of visitors to each event:** number of visitors received directly, number of on-site visitors
4. **Number of corporations sponsoring the event**
5. **Number of corporations collaborating in the event**
6. **Number of papers submitted to the various competitions**
7. **Quality of the papers awarded prizes in the various competitions**
8. **Satisfaction surveys of visitor groups,** as well as setting up a permanent channel for discussion through the usual social networks for possible suggestions and improvements.
9. **Satisfaction surveys of selected opinion groups.** After the event, of selected groups such as teachers, schools, student delegates and representatives,... they will be sent surveys on their satisfaction level and possible suggestions for improvement.
10. **Presence in the media.** We compile all mentions of the Materials Week in the press, radio, television, Internet and any other news mass media.

In the 2013 edition of the Materials Week, in order to test the viability of the initiative, we developed a program with no mass publicity aimed at schoolchildren, scientists and university students, and it gathered nearly one thousand attendees. Our estimate is that with a communications program for centres, associations and institutions, and for our own university students, complemented with a richer offer of activities such as those included in this proposal, we can reach a number of visitors exceeding 2,000 people on site, and over one hundred thousand visits to our website in 2014.



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	F1. Installation of new equipment in the ICTS "National Microscopy Centre"
<p><b>Objectives</b></p> <p>Increasingly advanced instruments are currently required to examine the structural complexity of matter. To understand the relationship between the structure and properties of matter, in both structural and functional terms, scientists need atomic-level resolution microscopes that can analyse the lightest elements while simultaneously providing enough special resolution for high-resolution chemical mapping and descriptions of electronic characteristics. This has been made possible in recent years with the development of devices for correcting lens aberrations. When correctly installed and configured for certain microscopes, these correctors allow scientists to directly view the structure and chemical composition of matter with atomic-level resolution, and extract information relating to its electronic properties. Under these conditions, electronic microscopes with an accelerating voltage of 200-300 kV, equipped with a cold field emission gun (Cold FEG) and spherical aberration correctors would obtain resolutions of up to 0.05 nm, leading to major advances in the development of new materials, particularly nanomaterials.</p> <p><b>Progress made towards Objectives</b></p> <p>The National Microscopy Centre continues to install, develop and configure the new equipment. The first project involved acquisition of the JEOL JEM 2100 transmission electron microscope through SUBPROGRAM B of PROJECT CEB09-0013, "CAMPUS DE EXCELENCIA INTERNACIONAL". This microscope is now fully operational and available to members of the national and international scientific community. The JEOL JEM 2100 is a highly versatile microscope that provides intermediate resolution imaging in routine operation. Materials are first characterised with this type of microscope before using the ARM 200cF high resolution microscope.</p> <p>The ARM 200cF was installed in two stages. The first stage, funded by the Moncloa Campus of International Excellence and awarded to IZASA through a public tender held in November 2011, consisted in installing the microscope and the ports needed for other analytical accessories. The second stage was also awarded to IZASA through a public tender in June 2012, and was funded through the FGUCM (General Foundation of the Complutense University) and MINECO (Ministry of Economy and Competitiveness) collaboration agreement and consisted in installing all the microscope's analytical accessories (GIF-QuantumER™ and Oxford INCA-350 spectrometers). The microscope is equipped with five different STEM detectors (JEOL HAADF, JEOL LAADF, JEOL BF, GATAN DF and GATAN BF), which were also installed during the second stage. A noise canceller and magnetic field cancellation system were also installed for the purpose of correcting problems encountered during installation.</p> <p>The microscope was assembled and aligned by technicians from JEOL France, while GATAN France installed the GIF-QuantumER™ spectrometer, and IZASA installed the Oxford INCA-350 spectrometer. Installation and verification of the cold field emission gun, CFEG, was directly supervised by staff from the central offices of JEOL in Tokyo, Japan.</p>	

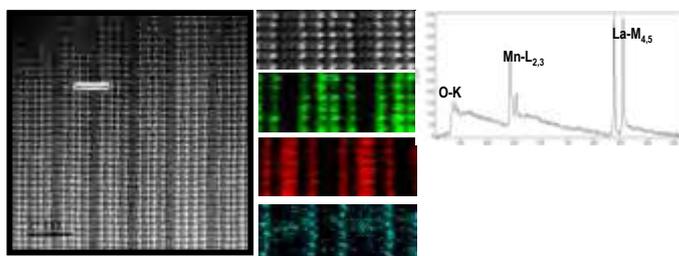


The photo shows the ARM 200 cFEG microscope with condenser lens aberration corrector. The instrument is equipped with a GIF-QuantumER spectrometer for reflection electron energy-loss spectroscopy, and an energy-dispersive X-ray spectrometer. The system is designed to take advantage of the Cold FEG, and is equipped with a 2K X 2K camera. It also has all the PC hardware required for correct operation. After completing all the resolution tests and calibration, the microscope has been available to members of the scientific community since May 2013.

**Description of work completed and role of participants:**

This year the JEOL JEM-ARM200F aberration-corrected microscope was installed and put into service. The microscope, with an aberration-corrected condenser lens and CFEG capable of operating with accelerated voltages of 200, 120 and 80 kV, can display images with a spatial resolution of 0.078 nm. A second microscope with a spatial resolution of 0.05 nm and an aberration-corrected objective lens will be installed in 2014.

During the second half of 2012, team members completed training courses on the different techniques available to solve instrumental problems and the technical requirements needed to ensure the best possible working conditions. Some stability problems were detected, making it necessary to install a noise canceller and a magnetic field compensation system in order to maximise image quality and atomic level EELS mapping. The spectrometer was also configured for the shortest chamber lengths needed for atomic-level resolution at 200 kV, 120 and 80 kV.



The following shows a HAADF (High Angle Annular Dark Field) image of a complex mixed magnesium oxide used to calibrate the microscope under the following conditions: 200 k, EELS spectrum obtained in an area of 46 nm<sup>2</sup> (in green in the HAADF image) and chemical maps compiled from La-M<sub>4,5</sub> (green) Mn-L<sub>2,3</sub> (red) and O (blue) sum spectrum signals.

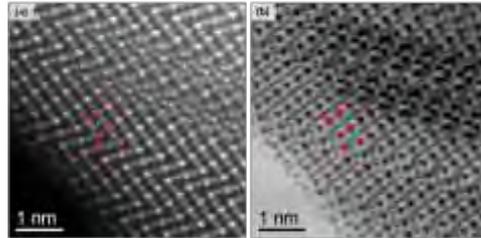


Diagram of the ARM200 microscope with examples of the different atomic-level imaging and analysis options.

The main advances made and the new challenges arising from these new microscopes, in terms of the original aims of the project, are:

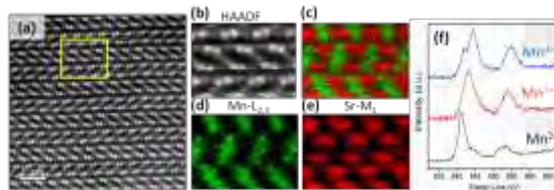
### Light and metal-oxygen element imaging and spectroscopy

The combined use of HAADF and ABF technology allows scientists to pinpoint light and heavy atomic columns in different complex small transition metal oxide molecules. The figure shows HAADF and ABF images of an oxygen-deficient mixed manganese oxide.



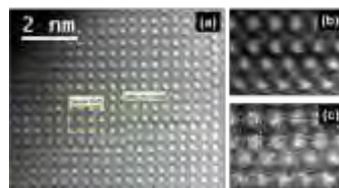
### EELS spectroscopy for detecting isolated atoms

The possibility of using a very fine ray allows scientists to perform atomic-level EELS mapping and to analyse the oxidation state of different cations using a GIF Quantum spectrometer. The figure shows the HAADF image of a nanoparticle together with the chemical maps of its different elements. The different oxidation states of the transition metal are also indicated.



### Imaging and spectroscopy of isolated defects

It is important to identify defects at a local level in order to understand the behaviour of different materials. The image shows an isolated defect in a mixed oxide matrix.



### Most significant results:

During the event held on 13 December 2012 in the assembly room of the Faculty of Chemical Sciences to inaugurate the ARM200cF microscope, chaired by the chancellor of the UCM, Dr. Marta Rosell (EMPA, Switzerland) gave a lecture on:

*"Applications of Aberration-Corrected Transmission Electron Microscopy with Focus on BiFeO<sub>3</sub> Thin Films"*

Various lectures highlighting the analytical power of the equipment acquired have been given by international experts. The first in this series (10 February 2013) was:

*"Fine structures of nanomaterials studied by SEM and TEM"*

Prof. Osamu Terasaki (Stockholm University, Sweden)

Training courses in the use of electronic microscopes, and in particular in the use of the recently acquired equipment, were held. In 2012 and 2013, Dr. J. Garcia (ICTS, UCM) taught a course titled "Characterisation of materials by electron diffraction and high resolution electronic microscopy", which was attended by more than a dozen students each year from the universities of Barcelona, Cadiz, the Basque Country, Madrid (UCM) and the Institute of Material Sciences of Madrid.

The UCM has also scheduled a summer course to be held in the Escorial palace and organised by the head of science and technology of the ICTS, titled "Atomic-level resolution: a breakthrough in electronic microscopy". The course will be taught by 10 international experts in the use of high-resolution technology, and will be held from 1 to 5 July 20113.

#### **Use of human, material and economic resources:**

The ICTS (Singular Scientific and Technological Infrastructure) is staffed by technical, scientific and administrative personnel. The highly trained technicians are in charge of ensuring that the equipment is in the best working conditions. In order to use the microscopes, research groups must submit proposals. In the case of the ARM200cF, an international scientific committee has been formed to evaluate the resources needed to conduct approved experiments.

The administrative team is in charge of organising calls for projects and taking all the steps needed to guarantee users access to the Centre's facilities.

The Centre's budget is controlled by the UCM's Vice Chancellor for Research and the terms of the collaboration agreements between the UCM and the FGUCM.

The latest budgetary expenditure involved:

Purchase of the JEOL JEM 2100 HT electronic microscope:

€467,300 from Subprogram B of the CEB09-0013 project "Campus de Excelencia"

Purchase of the JEOL ARM 200c electronic microscope and the JSM 7600 microscope:

€1,599,000 from INNOCAMPUS UCM CEPI.PA.007,11

€1,865,064 from the MINECO and FGUCM Collaboration Agreement (ERD Fund allocated to Spain).

Pending allocation: €1,818,823

The above sum corresponds to the second allocation of the ERD fund. The funds are held in the General Foundation of the UCM pending launch of the call for quotations for the purchase of a

microscope with aberration-corrected objective lens, cold cathode and maximum voltage of 300 kV. This microscope, with a point-to-point resolution of 0.05 nm, is the first of its kind on the market and the ICTS will be the first centre to provide this service.

**Most significant departures from the scheduled course of the project:**

The project progresses towards achieving its objectives, and additional funds needed to complete the installation are currently pending allocation.

**Proposal for corrective measures:**

Additional funds for further equipment needed.  
Creation of a team of scientists capable of addressing and resolving the complexity of the results obtained.

**Publications in which the Moncloa Campus CEI has been mentioned:**

- L. Cerdán, E. Enciso, V. Martín, J. Bañuelos, I. López-Arbeloa, A. Costela, I. García-Moreno. "FRET-assisted laser emission in colloidal suspensions of dye-doped latex nanoparticles". *Nat. Photonics*. 6 (2012): 621-626
- C. Visani, Z. Sefrioui, J. Tornos, C. León, J. Briatico, M. Bibes, A. Barthélémy, J. Santamaría, Javier E. Villegas. "Equal-spin Andreev reflection and long range coherent transport in high-temperature superconductor/half-metallic ferromagnet junctions". *Nat. Phys.* 8 (2012): 539-543
- J.L. López, C. Atienza, A. Insuasty, J. López-Andarias, C. Romero- Nieto, D. M. Guldi, N. Martín. "Concave versus Planar Geometries for the Hierarchical Organization of Mesoscopic 3D Helical Fibers". *Angew. Chem. Int. Edit.* 51 (2012): 3857-3861
- P. Zubko, N. Jecklin, A. Torres-Pardo, P. Aguado-Puente, A. Gloter, C. Lichtensteiger, J. Junquera, O. Stéphan, J.-M. Triscone. "Electrostatic Coupling and Local Structural Distortions at Interfaces in Ferroelectric/Paraelectric Superlattices". *Nano Lett.* 12 (2012): 2846-2851
- Querejeta-Fernández, J.C. Hernández-Garrido, H. Yang, Y. Zhou, A. Varela, M. Parras, J.J. Calvino, J.M. González-Calbet, P.F. Green, N.A. Kotov. "Unknown Aspects of Self-Assembly of PbS Microscale Superstructures". *ACS Nano*. 6(5) (2012): 3800-3812
- F. García, L. Sánchez. "Structural Rules for the Chiral Supramolecular Organization of OPE-Based Discotics. Induction of Helicity and Amplification of Chirality". *J. Am. Chem. Soc.* 134 (2012): 734-742
- Romero-Nieto, R. García, M.A. Herranz, C. Ehli, M. Ruppert, A.Hirsch, D.M. Guldi, N. Martín. "Tetrathiafulvalene-based Nanotweezers – Non-covalent Binding of Carbon Nanotubes in Aqueous Media with Charge Transfer Implications". *J. Am. Chem. Soc.* 134 (2012): 9183-9192
- Baeza, E. Guisasaola, E. Ruiz-Hernández, M. Vallet-Regí. "Magnetically triggered multi-drug release by hybrid mesoporous nanoparticles". *Chem. Mater.* 24 (2012): 517-524
- M.Cicuéndez, M.T.Portolés, I.Izquierdo-Barba, M.Vallet-Regí. "New nanocomposite system with nanocrystalline apatite embedded into mesoporous bioactive glass". *Chem. Mater.* 24 (2012): 1100-1106
- R. Cortes-Gil, L. Ruiz-Gonzalez, J. M. Alonso, M. García-Hernández, A. Hernando, J.M. González-Calbet. "Stair-like Metamagnetic Transition Induced by Controlled Introduction of Oxygen Deficiency in La<sub>0.5</sub>Ca<sub>0.5</sub>MnO<sub>3-δ</sub>". *Chem. Mater.* 24 (2012): 2519-2526
- Y. Liu, C. Visani, N.M. Nemes, M.R. Fitzsimmons, L.Y. Zhu, J. Tornos, M. García-Hernández, M. Zhernenkov, A. Hoffmann, C. León, J. Santamaría, S.G.E. te Velthuis. "Effect of Interface-Induced Exchange Fields on Cuprate-Manganite Spin Switches".

- Phys. Rev. Lett. 108 (2012): 207205
- S. R. Giblin, Taylor, J. W. Taylor, J. A. Duffy, M. W. Butchers, C. Utfeld, S. B. Dugdale, T. Nakamura, C. Visani, J. Santamaría. “Measurement of Magnetic Exchange in Ferromagnet-Superconductor  $\text{La}_{2/3}\text{Ca}_{1/3}\text{MnO}_3/\text{YBa}_2\text{Cu}_3\text{O}_7$  Bilayers”. Phys. Rev. Lett. 109 (2012): 137005
  - J. Simmchen, A. Baeza, D. Ruiz, M.J. Esplandiú, M. Vallet-Regí. “Asymmetric Hybrid Silica Nanomotors for Capture and Cargo Transport: Towards a Novel Motion-Based DNA Sensor”. Small. 8(13) (2012): 2053-2059
  - M.C. Matesanz, M. Vila, M.J. Feito, J. Linares, G. Gonçalves, M. Vallet-Regí, P.A. Marques, M.T. Portolés. “The effects of graphene oxide nanosheets localized on f-actin filaments on cell cycle alterations”. Biomaterials. 34(5) (2012): 1562-1569
  - F. Aparicio, E. Matesanz, L. Sánchez. “Cooperative self-assembly of linear organogelators. Amplification of chirality and crystal growth of pharmaceutical ingredients”. Chem. Commun. 48 (2012): 5757-5759
  - Arcos, V. Fal-Miyar, E. Ruiz-Hernández, M. García-Hernández, M.L. Ruiz-González, J.M. González-Calbet, M. Vallet-Regí. “Supramolecular mechanisms in the synthesis of mesoporous magnetic nanospheres for hyperthermia”. J. Mater. Chem. 22 (2012): 64-72
  - V. Blanco-Gutierrez, M.J. Torralvo-Fernández, R. Sáez-Puche. “Superparamagnetism and interparticle interactions in  $\text{ZnFe}_2\text{O}_4$  nanocrystals”. J. Mater. Chem. 22 (2012): 2992-3003
  - Álvarez Serrano, M.L. López García, F. Rubio, M. García Hernández, G.J. Cuello, C. Pico Marín, M.L. Veiga Blanco. “Non symmetric superparamagnetic clusters in the relaxor manganites  $\text{Sr}_{2-x}\text{Bi}_x\text{MnTiO}_6$  ( $0 < x < 0.75$ )”. J. Mater. Chem. 22 (2012): 11826-11835
  - S. Shruti, A. J. Salinas, G. Malavasi, G. Lusvardi, L. Menabue, C. Ferrara, P. Mustarelli, M. Vallet-Regí. “Structural and in vitro study of cerium, gallium and zinc containing sol-gel bioactive glasses”. J. Mater. Chem. 22 (2012): 13698-13706
  - A. Torres-Pardo, R. Jiménez-Rioboo, E. García-González and J.M. González-Calbet. “Phase Coexistence in  $\text{NaNb}_{1-x}\text{Ta}_x\text{O}_3$  Materials with Enhanced Dielectric Properties”. J. Mater. Chem. 22 (2012): 14938-14943
  - L. Miranda, K. Boulahya, D.C. Sinclair, M. Hernando, A. Varela, J.M. González-Calbet, M. Parras. “Structure–property relations in anion deficient 5H- and 3C-polytype  $\text{Ba}(\text{Ti},\text{Co})\text{O}_{3-\delta}$  perovskites”. J. Mater. Chem. 22 (2012): 15092-15103
  - G. Ovejero, A. Rodríguez, A. Vallet, S. Willerich, J. García. “Application of Ni supported over mixed Mg–Al oxides to crystal violet wet air oxidation: The role of the reaction conditions and the catalyst”. Appl. Catal. B-Environ. 111-112 (2012): 586-594
  - G. Ovejero, A. Rodríguez, A. Vallet, J. García. “Ni supported on Mg–Al oxides for continuous catalytic wet air oxidation of crystal violet”. Appl. Catal. B-Environ. 125 (2012): 166-171
  - M. Cicuéndez, I. Izquierdo-Barba, S. Sánchez-Salcedo, M. Vila, M. Vallet-Regí. “Biological performance of hydroxyapatite -biopolymer foams: in vitro cell response”. Acta Biomater. 8 (2012): 802-810
  - Lozano, C.G. Trejo, E. Gómez-Barrena, M. Manzano, J.C. Doadrio, A.J. Salinas, M. Vallet-Regí, N. García-Honduvilla, P. Esbrit, J. Buján. “Osteostatin loaded onto a mesoporous ceramics improves the early phase of bone healing in a rabbit osteopenia

model". Acta Biomater. 8 (2012): 2317-2323

- J. Gil-Albarova, M. Vila, J. Badiola-Vargas, S. Sánchez-Salcedo, A. Herrera, M. Vallet-Regí. "In Vivo osseointegration of tridimensional crosslinked gelatin coated hydroxyapatite foams". Acta Biomater. 8(10) (2012): 3777-3783
- López, A.D. Utrilla, E. Nogales, B. Méndez, J. Piqueras, A. Peche, J. Ramírez-Castellanos, J.M. González Calbet. "In doped gallium oxide micro- and nanostructures: morphology, structure and luminescence properties". J. Phys. Chem. C. 116 (2012): 3935-3943
- P. de la Presa, Y. Luengo, M. Multigner, R. Costo, M.P. Morales, G. Rivero, A. Hernando. "Study of heating efficiency as function of concentration, size and applied field in  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> nanoparticles". J. Phys. Chem. C. 116 (2012): 25602-25610
- J. Morales J.M. Astilleros, L. Fernández-Díaz. "Nanosopic characteristics of anhydrite (100) surface growth under low hydrothermal conditions". Cryst. Growth Des. 12 (2012): 414-421
- Maestre, E. Hernández, A. Cremades, M. Amatti, J. Piqueras. "Synthesis and characterization of small dimensional structures of Er-doped SnO<sub>2</sub> and Erbium-Tin-Oxide". Cryst. Growth Des. 12 (2012): 2478 -2484
- M. Essalhi, M. Khayet. "Surface segregation of fluorinated modifying macromolecule for hydrophobic/hydrophilic membrane preparation and application in air gap and direct contact membrane distillation". J. Membrane Sci. 417-418 (2012): 163-173

<b>Strategic area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	F2. Platform for the Design and Construction of Electromagnetic sensors and actuators.
<b>Objectives</b>	To develop sensors for use in medicine, radar and railway technology, and to facilitate the incorporation of researchers in industry companies.

**Progress made towards Objectives**

Equipment for the Institute of Optoelectronics Systems and Microtechnology.  
 Acquisition of the X'PERT PRO-MRD (PANalytical) diffractometer, a state-of-the-art microscope with the technical features needed to make it the ideal tool for meeting new technological challenges in the field of micro- and nanotechnology.  
 Acquisition of the incident X-ray beam module: X'Pert PRO from PANalytical B.V.

**Description of work completed and role of participants**

Acquisition of an X-ray diffractometer: The X-ray diffractometer is a fundamental tool in the structural characterisation of any kind of material, and is essential for the Institute of Optoelectronics Systems and Microtechnology (ISOM) and its Technology Centre (Singular Scientific and Technological Infrastructure in Spain), since one of the centre's main activities is to grow new, high quality multiple epitaxial layer semiconductor crystals by MBE (Molecular Beam Epitaxy) for use in optoelectronic devices and also magnetic foil.  
Acquisition of an incident X-ray beam module. This new instrument will be used to prepare new thin-film materials for the development of nanoelectronic sensors and devices. Characterisation is based on the combined use of the high-resolution microscopes installed in the STEM-EELS ICTS (Singular Scientific and Technological Infrastructure) on this Campus and X-ray scattering and absorption and polarised neutron spectroscopy, together with magnetic and electro-transport measurements. Researchers intend to use the phenomena found at complex oxide interfaces to manufacture new devices. The facilities of the ISOM ICTS of this Campus will be used for the nano-manufacturing process.  
 The project is headed by the UPM (Technical University of Madrid), and the instruments purchased will be used by researchers from the UPM and the UCM.



Photo of the Diffractometer.

**New governance structures**

Not applicable. The instruments have been installed in the ICTS: ISOM (Singular Scientific and Technological Infrastructure in Spain), which has its own governance structure.

**Most significant results**

Start-up of new instruments

**Use of human, material and economic resources**

Acquisition of the instruments was funded by the CRI2009, Subprogram B of the MICINN (Ministry of Science and Innovation). The cost amounted to €182,328.

**Most significant departures from the scheduled course of the project**

Less funding was received than expected, so the project will not be completed on schedule, and certain actions have had to be prioritised.

**Proposal for corrective measures**

Seek additional funding.



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	Installation of new equipment in the ISOM
<b>Objectives</b>	Procurement Program <b>for the acquisition of a Field Emission Scanning Electron Microscope - Cathodoluminescence (FESEM-CL) system.</b>
<p><b>Progress made towards Objectives</b></p> <p>Equipment for the Institute of Optoelectronics Systems and Microtechnology (ISOM), already operational. Acquisition of the FEI Inspect F50 Scanning Electron Microscope. A state-of-the-art microscope with the technical features needed to make it the ideal tool for meeting emerging technological challenges in the field of micro- and nanotechnology. A cathodoluminescence module has also been purchased. The structural and optical properties of semiconductor nanostructures can only be correlated using a system that combines high-resolution electronic microscopy and cathodoluminescence detection (FESEM-CL). This combined system yields local information on both structural and optic properties simultaneously. A resolution of 1 nm is needed for structural properties and 10 nm for optical properties. A system with these characteristics has never before been available in either the Polytechnic University or the Complutense.</p>	
<p><b>Description of work completed and role of participants:</b></p> <p><u>Acquisition of a field emission scanning electron microscope:</u> The FESEM is a fundamental tool in the characterisation of any kind of material, and is essential for the ISOM and its Technology Centre (Singular Scientific and Technological Infrastructure in Spain), since one of the centre's main activities is to grow both new, high quality multiple epitaxial layer semiconductor crystals and nanostructures by MBE (Molecular Beam Epitaxy) for use in optoelectronic devices and also magnetic foil. The high resolution of the FESEM (2 nm) allows scientists to study the morphology of these materials and accurately measure them on a nanometric scale (<math>10^{-9}</math>m).</p> <p><u>Acquisition of a cathodoluminescence module.</u> The aim is to prepare new materials on thin film and nanostructures for the development of semiconductors. Characterisation is based on analysing both the structure and morphology of these using high resolution X-ray diffraction (HRXRD) and FESEM, and also their optical properties. The optical properties are analysed by photoluminescence (PL) and cathodoluminescence (CL). Combining CL with SEM gives a local, nanometric view of the luminescence of target areas. This complements available PL technology, which currently only allows scientists to observe the luminescence of the whole sample.</p>	



Photo of the SEM (left) and CL module (right).

### Most significant results

Acquisition of the FESEM-CL has enriched the ISOM's infrastructure, extending and improving the range of services offered by the ICTS (Singular Scientific and Technological Infrastructure), and allowing researchers to study a wide range of device-ready nanostructures, including InAs/GaAs and InGaN quantum dots (QDs) and group III-nitride nanocolumns. One of the current research lines involves the growth of ordered arrays of InGaN nanocolumns to produce efficient, phosphor-free white light (nanoLEDS). The same structure is used in the latest multi-junction solar cells.

In addition, the presence of another Electronic Microscopy ICTS in the Campus of International Excellence (UCM) has enabled us to broaden the range of complementary technology services for the analysis of structural, chemical and optical properties. In this way, the new FESEM-CL system has allowed both the ICTS and the Campus of International Excellence to work together.

The ISOM undertakes many different research projects in which the FESEM-CL is a major component, among them:

- "Substrate nanopatterning by e-beam lithography to growth ordered arrays of III-Nitride nanodetectors: application to IR detectors, emitters, and new Solar Cells". Organisation: EU. Code SNB09, PIEF-GA-2009-253085 (2011-2013). IP: Enrique Calleja Pardo.
- "Células solares de heterounión de InGaN y alta eficiencia crecidas por MBE". Organisation: Acción de Coordinación Internacional con Japón, Ministerio de Ciencia e Innovación. Code PLE2009-0023 (2009-2012). IP: Enrique Calleja Pardo.
- "Smart Nanostructured Semiconductors for Energy-Saving Light Solutions (SMASH)". Organisation: EU Code Nº 228999, FP7-NMP-2008-LARGE-2 (2009-2012). IP: Enrique Calleja Pardo.
- "High quality Material and intrinsic Properties of InN and indium rich Nitride Alloys (The Rainbow ITN)". Organisation: EU. Code 213238- PITN-GA-2008-213238 (2008-2012). IP: Miguel Ángel Sánchez.
- "III-Nitrides alloys and plasmonic effects for high efficiency Solar Cells fabricated by MBE on Silicon and GaN substrates". Organisation: Ministry of Science and Innovation. Code: MAT2011-26703. 2012-2014. IP: Miguel Ángel Sánchez-García.
- "Nanodispositivos eficientes de luz clásica y cuántica (Q&CLight)". Organisation: Autonomous Community of Madrid. Code: CAM P2009/ESP-1503 (2010-2013). IP: Enrique Calleja Pardo.
- "High frequency Resonators on AlN/Diamond structures, ReADi". Organisation: Ministry of Science and Innovation. Code: TEC2010-19511 (2010-2013). IP: Fernando Calle Gómez.
- "III-V nanowires for third generation solar cells", ERA.Net RUS. Organisation: EU, Pilot Joint Call for Collaborative S&T Projects. Issued: 31 may 2011 IP: Enrique Calleja Pardo.
- "3D GaN for High Efficiency Solid State Lighting (GECCO)". Organisation: EU. Code: Nº 280694-2.



FP7-NMP-2011-SMALL-5, NMP-2011-2.2-3 Materials for Solid State Lighting. 2012-2014. IP: Enrique Calleja Pardo.

**Use of human, material and economic resources:**

The above instruments were acquired using funds from the CEI 2009 budget through the CAIMON (Acquisition of Scientific and Technological Instrumentation and Modernisation of Infrastructures) call for proposals and the Centre's own funds. The Moncloa Campus contributed €250,000

**Most significant departures from the scheduled course of the project:**

There have been no temporary or budgetary deviations.

**Proposal for corrective measures:**

No corrective measures are needed.

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	F3. Workshops for the development of new thin-film materials.
<b>Objectives</b>	Preparation of new thin-film materials for the development of nanoelectronic sensors and devices.
<p><b>Progress made towards Objectives</b></p> <ul style="list-style-type: none"> <li>• Refurbishment of the laboratories situated in the west wing of the UCM's Faculty of Physical Sciences.</li> <li>• Modernisation of the UCM's Physical Techniques CAI (Research Support Centre).</li> </ul> <p>N.B.: the instruments for the Institute Of Optoelectronics Systems and Microtechnology (ISOM) described in the previous project also affect this project.</p>	
<p><b>Description of work completed and role of participants</b></p> <p>Modernisation of the UCM's Physical Techniques CAI: additional infrastructure for the laboratories, electric air compressor, needle valve rotameter, power outlets, water pressure relief valve, block and tackle and frame for condenser, power line protectors.</p> <p>Refurbishment of the laboratories situated in the west wing of the UCM's Faculty of Physical Sciences. Certification of the Physics west wing (OHL): Certification no. 12, corresponding to the month of May 2009. Project management of the Physics west wing (Instituto Técnico de Materiales y construcciones): Project management, execution and health and safety coordination of the conservation, consolidation, modernisation and restoration of the west wing of the UCM's Faculty of Physical Sciences.</p> <p>The project is organised by the UCM.</p> <p><b>New governance structures</b></p> <p>Not applicable. The Physical Techniques CAI has its own governance structure.</p>	
<p><b>Most significant results</b></p> <p>Modernisation of the research laboratories</p>	
<p><b>Use of human, material and economic resources</b></p> <p>The project was funded by the CRI2009, Subprogram B of the MICINN (Ministry of Science and Innovation). The cost of the refurbishment of the laboratories in the west wing of the Faculty of Physical Sciences amounted to €207,952. Modernisation of the Physical Techniques CAI amounted to €46,782.</p>	
<p><b>Most significant departures from the scheduled course of the project</b></p> <p>Less funding was received than expected and certain actions have had to be prioritised.</p>	
<p><b>Proposal for corrective measures</b></p> <p>Seek additional funding.</p>	



<b>Strategic Focus</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	F4. Mechanical Properties Workshop: Durability and Sustainability of Materials.
<b>Objectives</b>	<p>The aim of the project is to modernise and extend the facilities in the University College of Civil Engineering by incorporating a mechanical testing centre equipped with the best and most versatile instruments for experimental analysis of structures and the assessment and characterisation of construction systems and materials</p> <p>The project will enable researchers to advance understanding of the mechanical behaviour of advanced materials, nanomaterials and coatings by means of the <i>in situ</i> analysis of their micro- and nanometric behaviour. This will allow researchers to understand and associate the macroscopic mechanical behaviour of materials with their microstructure and composition at different scales.</p>
<p><b>Progress made towards Objectives</b></p> <p>The Workshop has been created but has not been assigned a building. The internal regulations are pending approval.</p>	
<p><b>Description of work completed and role of participants</b></p> <p>A nano- and micro-mechanical testing machine has been installed for characterising the mechanical behaviour of advanced materials, nanomaterials and coatings using a high-resolution field emission scanning microscope.</p> <p>This project affects the research, technological development and advanced teaching in the field of the mechanical properties of materials, mainly at a macroscopic and mesoscopic scale, with particular emphasis on surface behaviour. It will focus on the characterisation, modelling and, if possible, advanced design of composites, alloys and compounds of particular interest today, such as ceramics and polymers. Although the main focus will be on structural materials, and specifically on studying the evolution of construction materials (cement-based, metals, ceramics, fibres and resins), research will also be conducted on certain functional materials.</p> <p>Advances will be made in the scientific and technical understanding of the life cycle of construction materials that can contribute to sustainable development by producing environmentally friendly products and require less energy consumption during the production, manufacturing and use stages. Use of construction materials made from recycled materials and urban waste products. Study of the complete life cycle of materials (from the raw material stage, through manufacturing, use, repair, elimination and recycling), focussing on production and absorption of CO<sub>2</sub> and energy consumption.</p> <p>Studies relating to the construction of the Mechanical Testing Centre</p> <p><b>New governance structures</b></p> <p>N/A</p>	
<p><b>Most significant results</b></p> <ul style="list-style-type: none"> <li>• The infrastructure has not been in use long enough to generate international publications</li> </ul>	

acknowledging use of the facilities.

An article describing the inauguration and start-up of the facilities was published in the Campus website, which has given publicity to the new service available on the Campus.

**Use of human, material and economic resources**

The project was funded by the INNOCAMPUS 2010 project. An expenditure report for the Ministry of Economy and Competitiveness is being drafted.

**Most significant departures from the scheduled course of the project**

Delayed start of the project.

**Proposal for corrective measures**

No relevant comments.



<b>Strategic Focus</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	<p><b>AGRI-FOOD AND HEALTH Cluster</b></p> <p>G1. Creation of the Moncloa Agri-food Corridor (environmental and land-use recovery).</p> <p>G2. Development of the Consortium for Integrated Agricultural Systems.</p> <p>G3. International School for Communicable Animal Diseases (EIEAC).</p> <p>G4. Improvements to the VISAVET Sanitary Vigilance laboratory.</p>
<b>Objectives</b>	<p>The Agri-Food and Health Cluster (A&amp;S) proposal encompasses the activities undertaken by the Complutense University of Madrid (UCM), the Technical University of Madrid (UPM) and partner organisations (including the National Institute for Agricultural Research and Experimentation - INIA) involving the development and implementation of new technologies for generating agricultural and livestock products, processing these products for the purpose of producing safe, health, good quality food for both human and animal consumption using sustainable techniques and systems and respecting animal welfare standards.</p> <p>The MISSION of the Cluster is to transmit knowledge, developments and sustainable solutions for safe, quality food production.</p> <p>The strategic objectives of the A&amp;S Cluster are:</p> <ul style="list-style-type: none"> <li>• To design a new, comprehensive, effective management model.</li> <li>• To build and improve shared and multiuse infrastructures.</li> <li>• To lead the field in:             <ul style="list-style-type: none"> <li>- Specialised training</li> <li>- Research</li> <li>- Anticipation, detection and assessment of risks</li> <li>- Providing prompt solutions to specific problems</li> </ul> </li> <li>• Internationalisation.</li> <li>• To promote business opportunities.</li> </ul> <p>The Cluster is divided into four strategic areas:</p> <ul style="list-style-type: none"> <li>• Animal breeding and health: nutrition, health and welfare applied to livestock and aquaculture.</li> <li>• Plant propagation: sustainable cultivation and management, including at-risk agricultural resources.</li> <li>• Agricultural technologies: advanced technologies for quality, safety and traceability.</li> <li>• Food hygiene and safety: cultivation of safe, healthy foodstuffs.</li> </ul>
<p><b>Progress made towards objectives</b></p> <p>Start-up of projects:</p> <p>G1 Creation of the Moncloa Agri-food Corridor</p>	

G2 Development of a Consortium for Integrated Agricultural Systems  
G3 International School for Communicable Animal Diseases (EIEAC)  
G4 Improvements to the VISAVET Sanitary Vigilance laboratory.



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	G1 Creation of the Moncloa Agri-food Corridor
<b>Objectives</b>	Creation of the Moncloa Agri-food Corridor (environmental and land-use recovery).
<p><b>Progress made towards objectives</b></p> <p>The services of the <i>Cultural Landscape Research Group (GIPC)</i> were engaged through the <i>Fundación Miguel Aguiló para la Investigación del patrimonio y paisaje construidos</i>, to conduct a strategic evaluation of the Moncloa Agri-food Corridor of the Moncloa Campus of International Excellence.</p> <p>The SOTO2020 project is an attempt to optimise the Moncloa Agri-food Corridor by the Agri-Food and Heritage clusters of the Moncloa Campus. The project includes a proposal to restructure the landscape while preserving the rich cultural and scientific heritage found in a strip of land on the banks of the river Manzanares. The evaluation project has been completed and specific projects are now being prepared to construct the buildings and undertake the partial improvements included in the project.</p> <p>The reforms currently under way include activities related to animal production, namely, building new animal research facilities, which will improve the capacity of the SOTO2020 Corridor.</p> <p>The following improvements put forward in the SOTO2020 project have been completed:</p> <p>School of Agricultural Engineers (Technical University of Madrid - UPM): Livestock Research Unit (UIP);</p> <ol style="list-style-type: none"> <li>a. UPI 2: rabbit breeding facilities and</li> <li>b. UIP 4: stables and other facilities for research into the digestive systems of small ruminants (sheep/goats).</li> </ol>	
<p><b>Description of work completed and role of participants</b></p> <p>The idea of creating a combined management model for the University College of Agricultural Engineering (ETSI) of the UPM is one the strategic objectives of the Agri-food and Health Cluster of the Moncloa International Campus of Excellence. To achieve this, a strategic assessment was conducted on the Moncloa Agri-Food Corridor to set the guidelines for preparing a Master Plan, provide a basis on which to take decisions regarding improvements to infrastructures, and establish priorities. The document is divided into two sections: description and assessment of the Corridor, and a strategic and management proposal.</p> <p>In the first stage, a detailed assessment was made of all the constructed elements in the Corridor. This involves general infrastructures (roads, safety, power, etc.) and also individual elements such as buildings and free space. In this respect, the document creates fact sheets that identify, catalogue and assess: 1. All existing buildings. 2. Free space, i.e., green zones and public spaces, including roads. 3. The practice fields identified according to how they change in response to production cycles and demand.</p>	



In the second stage, the study put forward the environmental, functional and technological guidelines for the future development of the Moncloa Agri-Food Corridor, and established the joint and specific strategies needed to achieve cohesion and develop the landscape and heritage potential of the area. Accordingly, a joint UPM-UCM management strategy was outlined that prioritises actions involving the infrastructure and buildings in the corridor to achieve the excellence targets. For this purpose, it establishes a schedule that can adapt to both budgetary requirements and the scope of different activities, defining an action hierarchy and criteria that will act as tools to help the management team decide the order in which each partial project should be undertaken.

Work on improving the Livestock Research Unit has mainly involved the total refurbishment of the two UIPs to be used for teaching (practical work, studies and projects) and for carrying out animal tests and experiments. The original Units (buildings), due to their age (more than 40 years old) and obsolescence, raised serious safety and operational problems, and in no way complied with existing regulations (EU laws on animal welfare and the environment).

#### **Most significant results**

It is hoped that the work done to date will attract further funding through the involvement of private agri-food companies. The Corridor, therefore, hopes to have state-of-the-art facilities for alternative farming methods that comply with the most demanding environmental regulations.

The gradual refurbishment of the existing facilities, meanwhile, should bring in large-scale funding from European calls for research projects.

Finally, we hope to raise the international profile of the project by disseminating the potential of the facilities and feasibility of the project. To attract investment capital, the Moncloa Agri-Food Corridor project was presented to the University of Colorado and the University of California (USA) and the KSI Institute (Kuwait).

The Moncloa Agri-Food Corridor project, meanwhile, aims to make the campus competitive on an international level by gradually modernising the facilities to bring them up to excellence standards, and by strengthening ties with more advanced international campuses working in the sphere of agri-food production.

#### **Use of human, material and economic resources**

Human and material resources provided by partner organisations.

The project has so far received €88.364 from the *Fortalecimiento* 2010 program for architectural and landscape development.

The refurbishment work completed to date has cost €315,985, funded by CEI 2010



The Agri-food Corridor Project

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	G2. Development of a Consortium for Integrated Agricultural Systems.
<b>Objectives</b>	Development of the Multidisciplinary consortium to increase farming system productivity by improving the use of natural resources, balancing economic and environmental sustainability and reducing the pressure on ecosystems.
<b>Progress made towards objectives</b>	
The scientific scope of the project falls within this activity. Both established research lines and the role of the Agri-Food Corridor as the focus of the cluster have been consolidated.	
<b>Description of work completed and role of participants</b>	
<ul style="list-style-type: none"> <li>- The UCM/UPM partnership continues to generate published papers, presentations in international congresses and research projects, the most important of which is the “Multiscale Climate variability. Agricultural and Economic Impacts (since 1 January 2013). Subproject I: ODYN: Ocean Influence, Predictability, Dynamics and Impacts. Subproject II: ACER-Agro: Integrated Assessment of Climatic Hazards and Economic Risks: Adapting Agricultural Systems in Spain” project included in the National R&amp;D&amp;I Plan.</li> </ul> <p>The stakeholders in this project are the Spanish National Agrarian Insurance Organisation (ENESA) and Agroseguro S.L. Collaboration extends to doctoral theses undertaken jointly by researchers from both universities. The project also bridges the activities of the Global Change and New Energies clusters (research into climatic variability and change).</p> <ul style="list-style-type: none"> <li>- CEIGRAM (Research Centre for the Management of Agricultural and Environmental Risks) has developed a joint project with the Sustainable Agriculture Technology Platform in which researchers from Ag Systems, Economy and Animal Production have participated. The project has generated a number of published papers, including “Indicadores de la Sostenibilidad de la agricultura y ganadería Españolas” (1980-2009), published by the Cajamar Foundation Sustainable Agriculture Platform. The project has been presented in several forums, including: Gestión de Riesgos Agrarios y Ambientales, MAGRAMA, 25 June 2013.</li> <li>- Collaboration with other cluster groups (Agrisost-Newgam) is ongoing, and seminars on common research topic have been organised.</li> <li>- The European project: “Effects of climate change on air pollution impacts and response strategies for European ecosystems. (ECLAIRE)” has been accepted and funded by FP7-ENV-2011. Timeframe: 2011 - 2015. This project also strengthens ties with the Global Change Cluster. The COAPA and GECA groups participate in the project.</li> <li>- The project funded by the National Plan: Uso potencial de la fertilización nitrogenada para mitigar los efectos del ozono en cultivos agrícolas. Sponsored by: Ministry of Economy and Competitiveness (MINECO). Timeframe: 2013-2015, in which the GECA group (CIEMAT - Centre for Energy, Environment and Technology Research) has participated.</li> <li>- The TAPAS (Agri-environmental Technology for Sustainable Agriculture) master’s program is still under way and has obtained the TAPAS doctorate program Mención hacia la Excelencia (Quality</li> </ul>	



label towards excellence).

**New governance structures**

The Agrisost and CEIGRAM program management committees remain active. Collaboration takes the form of meetings to discuss topics of interest put forward by researchers or other stakeholders. These structures have been stabilised.

**Most significant results**

The Agri-Food Corridor has been consolidated as the cluster's centre for interaction.

Core projects allow activities to be added, such is the case with CEIGRAM (Research Centre for the Management of Agricultural and Environmental Risks). This R&D+i centre based in the UPM welcomes researchers from the Veterinary Science Faculty as associate members, many of whom belong to VISAVET and actively participate in seminar or activities jointly funded by CEIGRAM or ENESA.

Various research articles from the AGRISOST program have been published, some involving inter-group collaboration.

**Use of human, material and economic resources**

The activities have been funded by the project's own resources and have not required contributions from the Campus of International Excellence project.

**Most significant departures from the scheduled course of the project**

The project continues to integrate with common cluster research lines according to schedule.

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Project</b>	<b>G3. International School for Communicable Animal Diseases (EIEAC)</b>
<b>Objectives</b>	<p>The results expected from the creation of the International School are:</p> <ol style="list-style-type: none"> <li>The creation of a top quality, standardised, EU-equivalent training program based on the organisation and operation of reference laboratories.</li> <li>The creation of the infrastructure required to broaden the scope of the School and create an international school focussing on key topics in the agri-food sector, taught by experts in each relevant field.</li> <li>Inter-institutional cooperation to guarantee that the knowledge taught is contributed by the best experts in the field.</li> </ol>
<p><b>Progress towards goals</b></p> <p>The activities of the EIEAC, so far, include:</p> <p><u>Training course in the theory, practice and legal aspects of diagnosing bovine tuberculosis</u></p> <p>The course aims to train veterinary professionals involved in conducting bovine tuberculosis field tests, in compliance with the provisions of the National Program for the Eradication of Bovine Tuberculosis, approved for joint EU funding by Decision 2011/807/EU.</p> <p>The course is organised by the VISAVET-UCM Health Surveillance Centre, the Ministry of Agriculture, Food and the Environment (MAGRAMA) and the different autonomous communities, and is taught over 3 days (32 teaching hours), from Monday to Wednesday, including theory and practice. The course is held at different locations, depending on the geographic origin of the students enrolled.</p> <p>Teachers include experts from the EU-RL for bovine tuberculosis, the VISAVET-UCM Centre, different veterinary sciences faculties, the Research Institute for Hunting Resources (IREC), the Research Centre for Animal Health (CRESA), the MAGRAMA and the autonomous communities.</p> <p>Twelve courses have been held to date across Spain, for a total of 350 students.</p> <p><u>Online course on Diagnosis of African Swine Fever</u></p> <p>Online course organised by the Viral Immunology and Preventive Medicine Service (SUAT) of the VISAVET-UCM Centre and the African Swine Fever (ASF) reference laboratory of the World Organisation for Animal Health (OIE).</p> <p>The course is available in two languages: English (<a href="http://www.sanidadanimal.info/cursos/asf/">www.sanidadanimal.info/cursos/asf/</a>) and Russian (<a href="http://www.sanidadanimal.info/cursos/asf-ruso/">www.sanidadanimal.info/cursos/asf-ruso/</a>), and has been designed by experts from the OIE ASF reference laboratory (VISAVET-UCM Centre and the National Institute for Agricultural Research and Experimentation - Animal Health Research Centre - CISA-INIA).</p> <p>A practical module of this online program was held from 28 November to 2 December 2012. It was taught by two experts from the Russian national reference laboratory for diagnosis of ASF, the National Research Institute for Veterinary Virology and Microbiology in Pokrov, Russia.</p> <p><u>African Swine Fever technology transfer courses</u></p> <p>The functions and duties of the ASR reference laboratory laid out in European Council Directive 2002/60/EC, 20 June 2002, specify that: "[the reference laboratory must] make the necessary arrangements for training or re-training experts in laboratory diagnosis with a view to harmonising diagnostic techniques".</p> <p>Accordingly, the CISA-INIA, in its capacity as the European reference laboratory for ASF (EURL-SWF), provides national reference laboratories and animal health laboratories with scientific and technical assistance in the form of continuing professional development courses. The aim of these course is to achieve the technology transfer of SWF diagnostic techniques established by the OIE and the EU in order to harmonise SWF diagnostic methods world-wide.</p> <p>The training courses include practical exercises combined with lectures aimed at giving a general overview</p>	

of the disease, including its history, epidemiology, control, and general SWF diagnostic techniques, with particular emphasis on laboratory techniques. At the end of the course, students receive the course material in digital format, including copies of the lectures, results of the laboratory activities, standard operational procedures (SOP) and all the SWF reference bibliography.

#### Training placement for researchers

The EiEAC's activities are particularly relevant nowadays for many Mediterranean, Latin American and developing countries.

For this reason, most of the researchers attending specialist training courses at the EiEAC come from these countries. Thirteen training placements for researchers mainly from Latin American and northern African countries have so far been organised in the VISAVET Centre. Six training placements were also organised in the CISA-INIA Centre in 2012, mainly for researchers from Russia, Africa and Latin America.

#### **Description of the projects completed and the role of each partner**

The International School for Communicable Animal Diseases (EiEAC) is one of the activities included in the initial CEI Campus Moncloa project, within the Agri-Food and Health Cluster. The aim of the School was to provide top quality, specialised, standardised, EU-equivalent training in infectious communicable diseases.

The EiEAC provides technical and scientific training on an international level, focussed on eradicating infectious, communicable (mainly zoonotic) diseases in animals, including the relevant health, legal and logistic aspects.



The EiEAC's activities continue to be relevant for many Mediterranean, Latin American and developing countries. Nevertheless, there has hitherto been insufficient training in these diseases for various reasons: in most developed countries they are considered exotic diseases; the risk of animal to human transmission; the difficulties involved in housing infected animals; and the need for special facilities and specialised diagnostic techniques. Furthermore, the creation of an international school will sow the seed for the development of an International Agri-Food School, supported by leading experts in the field.

Photo. BSL 3 Laboratory (VISAVET Centre)

#### **Most important results**

The EiEAC is linked to the EU and OIE reference laboratories, which in itself guarantees internationalisation:

- EU-RL for bovine tuberculosis
- EU-RL for African swine fever
- OIE reference laboratory for African swine fever

OIE reference laboratory for African horse sickness

The EU will probably establish a set of minimum skills required by official EU veterinaries that will be expected to have knowledge of all communicable diseases under control and eradication programs. The training is aimed at national and international post-graduate students. This means that the course is open to students not only from Europe but also developing countries, for whom the training could prove crucial. From the point of view of the Campus of International Excellence the project makes use of an existing building to stage a more broad-ranging training activity, thus increasing the likelihood of a successful outcome.

### **Use of human, material and economic resources**

HUMAN resources: So far, all the EiEAC activities have been undertaken by staff of the VISAVET Centre.

MATERIAL AND ECONOMIC resources: The EiEAC's material and economic resources have come from funding provided by the CEI Moncloa, VISAVET Centre and organisation involved on a case-by-case basis (MAGRAMA, CISA-INIA, etc.). Funding from the Moncloa Campus (CEI 2009) has totalled €55,035.

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	<p><b>Actions planned within the I-HEALTH Cluster.</b></p> <ul style="list-style-type: none"> <li>I. Design and synthesis of diagnostic and therapeutic tools</li> <li>II. Pre-clinical platform for biomedical imaging. Advanced Biomedical Imaging Analysis</li> <li>III. Platform for clinical information: System for filing and communicating clinical images and databases</li> <li>IV. "Living-Lab" Platform</li> </ul>
<b>Objectives</b>	The cluster aims to take advantage of the singularity of having on Campus Biomedical Sciences, the hospitals linked to the Faculty of Medicine, and experts in health-oriented applications of information and communication technologies. This connection allows covering from the most basic aspects of biomedical research to practical implementation and validation using clinical trials and tests.
<b>Progress towards objectives</b>	
Evolution of each action is explained in the separate forms below.	

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	I. Design and synthesis of diagnostic and therapeutic tools
<b>Objectives</b>	To provide a service for the design and synthesis of diagnostic and therapeutic tools, bringing together the proven experience of several research groups in this area.
<b>Progress towards objectives</b>	

For this action, several sections have been set up to gather teams which are currently scattered and independent in Campus, with centralised management for their operation and organisation in order to provide a wide portfolio of services.

**Medical Chemistry Section:** Services of computational chemistry (identifying targets and selecting compounds), synthesis (HPLC, mass spectrometers,... to prepare, purify and characterise molecules) and high performance screening (structural studies, computational methodologies and *in vitro* screening of compound libraries to identify bioactive molecules).

**Advanced pharmaceutical technology development section:** Design and preparation of customised pharmaceutical technologies for development of advanced diagnostic and therapeutic systems for drug delivery (nanoconjugates and nanoparticles for medical imaging techniques; conjugation and inclusion of molecules in nanoparticles/liposomes; biofunctionalization for vectorization, etc...).

**Gene transfer, transgenesis and pluripotent cell technology section:** Technology resource to develop therapeutic tools based on viral vectors for gene transfer, development of cell lines and knock-out/*in transgenic animals* and management and handling of pluripotent cells.

**Description of work conducted and role of participants:**

Coordinator: Aurelio G. Csaky.

One of the priority actions carried out is the creation of a laboratory to develop new radioactive tracers with contrast properties in molecular imaging by positron emission tomography (PET). In the case of PET tracers, the laboratory conducts cold synthesis and pharmacological studies of new molecules. The phase to incorporate the radioactive isotope is conducted at the facilities of the **PET Technology Institute**, where synthesis yield and tracer purity is determined. Next, *in vivo* biodistribution is analysed with micro-PET imaging of small animals.

The group has been established at the **UCM Multidisciplinary Institute** (they moved in 2012) and it maintains regular interaction with the **PET Technology Institute** and the **UCM-PET Centre for Research Assistance**, both located here, with the necessary radioactive facilities to execute this project.

**Most significant results:**

In the line of research being conducted, we have implemented synthesis of a set of molecules that have shown important properties for enzyme inhibition (BACE), aggregation-deaggregation of amyloid peptide and inhibition of free radicals, characteristics of interest for the development of new therapies that could help treat neurodegenerative diseases in general, and Alzheimer's Disease, in particular.

**Use of human, material and financial resources:**

This year, we plan to design new radiotracers for  $^{18}\text{F}$ -PET to be used for *in vivo* diagnosis of neurodegenerative diseases. The new HPLC-MS equipment -acquired with CEI funds- comprised of a binary pump with a degasser inside, manual injector and quadrupole mass detector (MS single-Q), will allow monitoring the synthesis process of cold ligands, monitoring drug trials, and studying contaminants

generated in the process of preparing radiotracers.

**Major deviations in progress toward objectives:**

None remarkable.

**Proposal for corrective actions:**

N/A

**Publications mentioning CEI Moncloa Campus:**

- See References on Line II. **Pre-clinical platform for biomedical imaging. Advanced Biomedical Imaging Analysis (LA2IB)**

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	II. Pre-clinical platform for biomedical imaging. Advanced Biomedical Imaging Analysis (LA2IB)
<b>Objectives</b>	<p>This line shall be provided with <b>laboratories with surgical areas</b> to conduct monitored animal surgery and recovery. It shall offer established models of prevalent diseases (cancer, cardiovascular disease and stroke, neurodegenerative diseases, inflammatory diseases, infectious diseases) and develop new models in close collaboration with the Genomics and Proteomics CAI. These services shall be available to users to find pathogenic mechanisms, identify and validate molecular and imaging markers, identify and validate therapeutic targets, new therapies and biopharmaceutical systems.</p> <p>Its platform shall be located in an environment next to the <b>Biomedical Imaging Laboratories</b> for follow-up and monitoring of models, and to validate new nanomagnetic markers and radioactive tracers. Also, the <b>LA2IB</b> shall make its knowledge available to users. This Laboratory shall help users prepare experiments, use radiopharmaceuticals efficiently and interpret images quantitatively, by developing or optimising software and hardware tools for each specific user need in order to get the most out of the increasingly complex molecular imaging equipment on Campus.</p>
<b>Progress towards objectives</b>	<p>Thanks to CEI financing, some of the refurbishment detailed in the Animal Facilities CAI have already been carried out.</p> <p>With regard to the <b>Biomedical Imaging Laboratory (LA2IB)</b>, we will acquire with CEI funds (equipment has already been tendered and we are waiting to receive it in the various centres) a series of equipment that will enhance not only quantitatively but also qualitatively, provision by the Research Assistance Centres (CAI) of: animal facilities, MRI, brain mapping, cognitive and computational neuroscience and cytometry and fluorescence microscopy laboratory.</p>
<b>Description of work conducted and role of participants:</b>	<p>Coordinators: I Lizasoain, A Santos</p> <p><b>UCM Animal Facilities CAI</b> The Animal Facilities CAI is registered under nº EX08-UCS in the Community of Madrid. Thanks to CEI funding, this Centre meets all legal requirements contemplated in Law 32/2007, of 7th November, for the</p>

Care of Animals, their Use, Transport, Experimentation and Sacrifice (BOE 268, 8th November 2007) and the new Royal Decree 53/2013, of 1st February establishing basic applicable regulations for the protection of animals used for experimentation and other scientific purposes, including teaching (BOE nº 34, 8th February 2013).

#### **1.- Refurbishment of the Medicine Unit.**

This work has consisted of fitting out an area ceded by the Faculty located next to the current Animal Facilities CAI. The space has been prepared to create an area with operating theatres and an area (isolated and soundproofed) destined mainly to study behaviour in experimental animals, specifically rodents (rats and mice).

#### **2.- Refurbishment of Biology Unit**

This work has already been tendered and it shall start in the last quarter of 2013; it will improve the quality of the facilities and meet all legal requirements regarding the use of experimentation animals.

#### **UCM - NMR CAI**

The infrastructure acquired will improve and complement the services available in this CAI. The Magnetic Resonance CAI had only one mid-field Magnetic Resonance Imaging unit (4.7 Tesla) to cover the various needs of the lines of work conducted in this cluster. Usage of this equipment is close to saturation. Under these conditions, the Magnetic Resonance CAI could no longer meet the demand for developing the lines of the Campus of International Excellence submitted by the various groups, therefore this new unit was crucial.

The Resonance Imaging equipment is simple, of low field (1 Tesla) and permanent magnet, with reduced operating and maintenance costs, high productivity and providing reproducible and quality results for studies with small animals. It will be fully functional in the last quarter of 2013. Nationwide, there is no other similar equipment in other entities. This equipment also fits in perfectly with the i-Health Cluster (i-Medicine and i-Maging). Also, work areas belonging to other Clusters, such as Materials for the Future, Agri-Food and Health and Global Change and New Energies, shall also benefit. There is a significant and growing need for Magnetic Resonance Imaging equipment that can resolve the various questions being addressed by these areas.

#### **UCM Brain Mapping CAI**

The infrastructure acquired (to be installed in the 4th quarter of 2013) by our Research Assistance Centre (CAI), shall improve and complement the services of the micro-PET equipment already installed in 2006 (PR70/05-14317 and MEC UCMA05-33-049) with an X-ray micro-CT and a new ring of PET detectors. The demand for studies with the current micro-PET service from the various research groups and biotechnology companies has increased, partly due to the existing framework agreement between UCM and the PET Technology Institute [www.petmadrid.com](http://www.petmadrid.com), a pioneering company in Spain in the production of PET radiotracers and attached to the CEI.

This equipment is included in the i-Maging line of work of the CEI innovative medicine cluster and is directly involved in the CEI action for creation of the Biomedical Imaging Platform and, indirectly, with the actions of the Advanced Pre-Clinical Development Platform, of the New Nanomagnetic Markers and PET Tracers Laboratory and the Advanced Imaging Analysis Laboratory.

#### **Cognitive and Computational Neuroscience Laboratory**

The UCM-UPM Cognitive and Computational Neuroscience Laboratory (<http://www.ctb.upm.es>) has Magnetoencephalography (MEG) and Electroencephalography (EEG) equipment used in functional resonance studies, MEG and EEG of healthy young and older individuals and patients with cognitive impairment such as Alzheimer's disease, psychiatric problems and strokes.

With CEI funds, we have moved an isolated room that shields the external magnetic field. This move was

essential for UCM and UPM to be able to set up the above mixed laboratory to study the human brain. This is now allowing us to serve not only multiple regional, national and international researchers, but also hospitals in various areas in Spain who refer their patients to us for studies with this unique infrastructure. Thanks to having installed this cognitive and computational neuroscience laboratory, we have had an extraordinary impact worldwide, not only on the number of publications in first quartile journals, but also on the number of international collaborations with countries in 3 continents and participation in international projects such as the Human Brain Project.

#### **Cytometry and Fluorescence Microscopy CAI**

The Cytometry and Fluorescence Microscopy CAI is part of the Spanish Network of Advanced Optical Microscopy (REMOA) and the Network of Laboratories of the Community of Madrid, both with an international projection. In future, the Centre shall join the European Network for Biological Imaging (EuroBioImaging, EMBL).

The main objective of the action funded by the CEI was to provide scientific and technical support to the lines of research, primarily in the Innovative Medicine Cluster (cancer, stem cells, cardiovascular diseases, neurological and psychiatric disorders and autoimmune, inflammatory and infectious diseases), as well as those in other disciplines such as Agri-Food or Biomaterials. The specific objectives were: i) meet the growing demand for confocal laser microscopy and its various applications (multicolour microscopy, colocalization, multidimensional analysis, in vitro work with live cells, ii) increase the number of services devoted to multiphoton laser microscopy with the current equipment, thanks to being able to conduct some of the present microscopy studies in new equipment, iii) include new confocal laser applications, specifically the space-time analysis of fluorescent molecules with FCS, iv) incorporate new technologies based on optical fluorescence microscopy: stereology and v) implement image processing and analysis services, by incorporating powerful computer hardware and software (Imaris, FluoView, Metamorph), in order to provide researchers/users with final results of CAI equipment conducted by highly qualified scientific-technical CAI staff

#### **Use of human, material and financial resources:**

##### **UCM Animal Facilities CAI**

The Animal Facilities CAI is registered under nº EX08-UCS in the Community of Madrid. Thanks to CEI funding, this Centre meets all legal requirements (see section above).

##### **1.- Refurbishment of the Medicine Unit.**

The work done included: i) creation of an access area only for behavioural studies with soundproofed spaces and individual control of light cycles (necessary for observation and audiovisual recording under animal perception conditions, for example, at night) ii) creation of 2 operating theatres for handling animals, and iii) installation of equipment for video recording and a computer data processing system with common software. With other non-CEI funds, the laboratories have been fitted with all necessary furnishings and equipment.

##### **2.- Refurbishment of Biology Unit**

The work proposed includes: i) repair of walls (Epoxy paint, wall-floor connections), floor renovation (vinyl), sinks, etc... and ii) renovation and soundproofing of behaviour room.

##### **UCM - NMR CAI**

The infrastructure acquired will improve and complement the services available in this CAI. The Resonance Imaging equipment is simple, of low field (1 Tesla) and permanent magnet, with reduced operating and maintenance costs, high productivity and providing reproducible and quality results for studies with small animals. It will be fully functional in the last quarter of 2013. Nationwide, there is no other similar equipment in other entities.

##### **UCM Brain Mapping CAI**

The infrastructure acquired (to be installed in the 4th quarter of 2013) by our Research Assistance Centre (CAI), shall improve and complement the services of the micro-PET equipment already installed in 2006



(PR70/05-14317 and MEC UCMA05-33-049). This consists of an X-ray micro-CT unit and a new ring of PET detectors that makes our system a hybrid PET/CT scanner capable of obtaining anatomical (CT) and functional (PET) images almost simultaneously, which assures co-recording and subsequent merging of the various tomographic images obtained. We have also increased the visual field of the micro-PET camera and implemented software for acquisition and reconstruction of the PET system matrix taking into account interaction with gamma rays on the glass and correction of gamma ray reduction on animal bodies with information obtained with the CT. All of this entails a significant reduction in acquisition times (by also increasing PET system sensitivity from 2.1% to 5%), therefore improving the machine's productivity.

#### **Cognitive and Computational Neuroscience Laboratory**

The UCM-UPM cognitive and computational neuroscience laboratory (<http://www.ctb.upm.es/>) has Magnetoencephalography (MEG) and Electroencephalography (EEG) equipment. With CEI funds, we have moved this equipment to an isolated room that shields the external magnetic field, and which is necessary to record brain magnetic fields. Thus, UCM contributed to setting up this laboratory with this isolated room and UPM with the newly acquired Magnetoencephalography equipment. The brain magnetic field is  $10^{-15}$  Tesla and ambient magnetic field is several orders of magnitude higher than this field, therefore, without this room, brain activity could not be recorded. This room has the ability to divert the field and therefore record brain magnetic field with no interference.

#### **Cytometry and Fluorescence Microscopy CAI**

The Centre has 5 technicians on staff (4 with Higher Degrees and 1 Specialist Technician) who are highly specialised and adequately trained on the new equipment and techniques. Additionally, they will take training courses delivered by the companies awarded the contracts. The Centre has additional equipment for implementation and daily operation of this proposal (laboratory, microscopy and flow cytometry) to support the technical improvements proposed. The Centre is part of the UCM network of Research Assistance Centres and it has revenue from the work conducted by the UCM's research groups, public research bodies (OPIs) and private corporations, with fees approved by the UCM Social Board. It also has financial resources from the UCM Research Service, basically for maintenance contracts with manufacturers or their representatives. Other Centre resources come from the CAM (Community of Madrid) program of excellence groups, as part of the S2010/BMD-2420 project as a laboratory in the CellCAM Network.

With CEI funds, the Cytometry and Fluorescence Microscopy CAI has obtained the following equipment: confocal laser microscopy system, FluoView1200 (Olympus) with Correlation Spectroscopy (FCS, PicoQuant), stereological microscopy system (NewCast, VisioFarm, Olympus) and two off-line workstations for processing and analysing images (HP WorkStations, Imaris, Olympus FluoView).

#### **Major deviations in progress toward objectives:**

NA

#### **Proposal for corrective actions:**

NA

#### **Publications mentioning the CEI Moncloa Campus:**

##### **2009**

- Moratti S, Keil A [Not what you expect: experience but not expectancy predicts conditioned responses in human visual and supplementary cortex](#). Cereb Cortex. 2009 Dec;19(12):2803-9. Impact Factor: 6.544
- Castro-Caldas A, Nunes MV, Maestú F, Ortiz T, Simoes R, Fernández R, de la Guía E, García E, Gonçalves M. Learning orthography in adulthood: a magnetoencephalographic study. *Journal of Neuropsychology*

17-30, 3, 2009. Impact Factor: 2.5

- Camilo J. Cela-Conde, Francisco J. Ayala, Enric Munar, Fernando Maestú, Marcos Nadal, Miguel A. Capó, David del Río, Juan J. López-Ibor, Tomás Ortiz, Claudio Mirasso, and Gisèle Marty. Sex-related similarities and differences in the neural correlates of beauty [PNAS](#) (Proceedings of the National Academy of Science USA) 3847-2852, v106(10), 2009. Impact Factor: 9.6
- Campo P, Maestú F, Morales I, Gil-Nagel A, Strange B, Morales M, Ortiz T, Modulation of MTL activity in epileptic patients with hippocampal sclerosis during verbal working memory Journal of International Neuropsychology Society (JINS) 1-10, 15, 2009. Impact Factor:2.402
- Pacios J, De Ramón I, Del Río D, González-Marqués J, Ortiz T, Maestú F Dynamics of cortical language plasticity by means of magnetoencephalography. Audiological Medicine Audiological Medicine, 65-75, 2009. Impact Factor: 0.089
- Solesio E, Lorenzo-López L, Campo P, Lopez-Frutos JM, Ruiz-Vargas JM, Maestu F. Magnetoencephalography evidence of the effects of active and passive retroactive interference during a working memory task in healthy elderly subjects Neuroscience Letters 456:85-88; 2009. Impact Factor: 2.2
- Gomez C, Stam CJ, Hornero R, Fernández A, Maestu F. Disturbed Beta band functional connectivity in patients with Mild Cognitive Impairment: a MEG study. IEEE Trans Biomed Eng. 56: 1683 - 1690; 2009. Impact Factor: 1.3
- García-Morales I, Maestu F, Perez MA, Elices E, Ortiz T, Alvarez-Linera J, Gil-Nagel A. A clinical and Magnetoencephalography study of MRI-negative startle epilepsy. Epilepsy and Behavior. 16:166-171; 2009. Impact Factor: 2.302
- Maestú F, Campo P, García-Morales I, Barrio A, Pozo F, Ortiz T, Gil-Nagel A. Biomagnetic profiles of verbal memory success in patients with mesial temporal lobe epilepsy. Epilepsy and Behavior, 16:527-533; 2009. Impact Factor: 2.302
- Kinsey K, Anderson SJ, Hadjipapas A, Nevado A, Hillebrand A, Holliday IE. [Cortical oscillatory activity associated with the perception of illusory and real visual contours](#). Int J Psychophysiol. 2009 Sep;73(3):265-72. Impact Factor: 2.144
- Hadjipapas A, Casagrande E, Nevado A, Barnes GR, Green G, Holliday IE. [Can we observe collective neuronal activity from macroscopic aggregate signals?](#) Neuroimage. 2009 Feb 15;44(4):1290-303. Impact Factor: 5.895
- **2010**
- Besga A, Ortiz L, Fernández A, Maestú F, Aráosla J, Gil-Gregorio P, Fuentes M, Ortiz T. Structural and functional patterns in normal aging, MCI and AD. Alzheimer's Disease and Associated Disorders 2010, 24(1):1-10 Impact Factor: 2.875
- Campo P, Poch C, Parmentier F, Moratti S, Elsley J, Castellanos N, Ruiz-Vargas JM, Pozo F, Maestú F, Oscillatory activity in prefrontal and posterior regions during implicit letter-location binding Neuroimage 49:2807-2815; 2010 Impact Factor:5.74
- Lindín M, Díaz F, Capilla A, Ortiz T, Maestú F. [On the characterization of the spatio-temporal profiles of brain activity associated with face naming and the tip-of-the-tongue state: A magnetoencephalographic \(MEG\) study](#). Neuropsychologia 2010 May;48(6):1757-66 Impact Factor:4.34
- Bajo, R. Maestú, F. Nevado, A. Sancho, M. Campo, P. Gutiérrez, R. Gil, P. Pereda, E. Van Dijk, B. Pozo, F. [Functional connectivity in mild cognitive impairment during a memory task: implications for the disconnection hypothesis](#). Journal of Alzheimer Disease 22(1):183-93 2010. Impact Factor: 2.875
- Castellanos N, Paul N, Ordoñez V, Demuynck O, Bajo R, Campo P, Bilbao A, Ortiz T, Pozo F, Maestú F. Reorganization of functional connectivity as a correlate of cognitive recovery in acquired brain injury. Brain. 133: 2365-2381; 2010. Impact Factor: 9.49
- Maestú F, Baikova E, Ruiz JM, Montejo P, Montenegro M, Llanero M, Solesio E, Gil P, Yubero R, Paul N, Pozo F, Nevado A. Increased biomagnetic activity in healthy elderly with subjective memory complaints. Clinical Neurophysiology. 122 (2011) 499–505. Impact Factor: 3.122
- Montejo P, Montenegro M, Fernandez MA, Maestu F. [Subjective memory complaints in the elderly: Prevalence and influence of temporal orientation, depression and quality of life in a population-based](#)

- study in the city of Madrid. *Aging and Mental Health*. 2010 Oct 4:1-12. Impact Factor:1.3
- Poch C, Campo P, Parmentier FB, Ruiz-Vargas JM, Elsley JV, Castellanos NP, Maestú F, del Pozo F. Explicit processing of verbal and spatial features during letter-location binding modulates oscillatory activity of a fronto-parietal network. *Neuropsychologia*. 2010 Nov;48(13):3846-54. Impact Factor: 4.34
  - Rosalyn J. Moran, Pablo Campo, Fernando Maestu, Richard B. Reilly, Raymond J. Dolan, Bryan A. Strange. Peak Frequency in the Theta and Alpha Bands Correlates with Human Working Memory Capacity. doi: 10.3389/fnhum.2010.00200. Impact Factor: 1.55
  - Lorenzo-López L, Gutiérrez R, Moratti S, Maestú F, Cadaveira F, Amenedo E. Age-related occipito-temporal hypoactivation during visual search: relationships between mN2pc sources and performance. *Neuropsychologia*. 2011 Jan 12 (in press). Impact Factor: 4.34
  - Castellanos NP, Leyva I, Buldú JM, Bajo R, Paúl N, Cuesta P, Ordóñez VE, Pascua CL, Boccaletti S, Maestú F, Del-Pozo F. Principles of recovery from traumatic brain injury: Reorganization of functional networks. *Neuroimage* 2010 Dec 29. (in press) Impact Factor: 5.74
  - Morales M, Campo P, Fernández A, Moreno D, Yáñez J, Sañudo I. Normative data for a six-trial administration of a spanish version of the verbal selective reminding test. *Arch Clin Neuropsychol* 2010 Dec;25(8):745-61 Impact Factor: 2.49
  - Clementz BA, Gao Y, McDowell JE, Moratti S, Keedy SK, Sweeney JA. Top-down control of visual sensory processing during an ocular motor response inhibition task. *Psychophysiology* 2010 Nov;47(6):1011-8 Impact Factor: 3.9
  - Capilla A, Pazo-Alvarez P, Darriba A, Campo P, Gross J. Steady-state visual evoked potentials can be explained by temporal superposition of transient event-related responses. *PLoS One* 2011 Jan 18;6(1):e14543 Impact Factor: 4.35
  - Maestú F. Los procesos cognitivos y su estudio en clave tecnológica: el caso de la magnetoencefalografía *Encuentros multidisciplinares* 35 (11): 73-77, 2010.
  - Huertas, E., Ponce, G., Koeneke, M.A., Poch, C., España-Serrano, L., Palomo, T., Jiménez-Arriero, M.A., Hoenicka, J. "The D2 Dopamine Receptor Gene Variant C957T Affects Human Fear Conditioning and Aversive Priming" *Genes, Brain and Behavior* 2010 Feb;9(1):103-9. Impact Factor:3.79
  - **2011**
  - Maestú F, Yubero R, Moratti S, Campo P, Gil-Gregorio P, Paul N, Solesio E, Pozo F, Nevado A. MEG Brain activity patterns in stable and progressive Mild Cognitive Impairment during working memory. *Journal of Clinical Neurophysiology*. 28(2):202-9, 2011. Impact Factor: 1.47
  - Maestú F, Baikova E, Ruiz JM, Montejo P, Montenegro M, Llanero M, Solesio E, Gil P, Yubero R, Paul N, Pozo F, Nevado A. Increased biomagnetic activity in healthy elderly with subjective memory complaints. *Clinical Neurophysiology* 2011 Mar;122(3):499-505. Impact Factor: 3.122
  - Del Río D, Maestú F, López-Higes R, Moratti S, Gutiérrez R, Maestú C, Del-Pozo F. Conflict and cognitive control during sentence comprehension: Recruitment of a frontal network during the processing of Spanish object-first sentences. *Neuropsychologia* 2011 Feb;49(3):382-91 Impact Factor: 4.34
  - Montejo P, Montenegro M, Fernandez MA, Maestu F. Subjective memory complaints in the elderly: Prevalence and influence of temporal orientation, depression and quality of life in a population-based study in the city of Madrid. *Aging and Mental Health* 2011 Jan;15(1):85-96. Impact Factor: 1.3
  - Castellanos NP, Leyva I, Buldú JM, Bajo R, Paúl N, Cuesta P, Ordóñez VE, Pascua CL, Boccaletti S, Maestú F, Del-Pozo F. Principles of recovery from traumatic brain injury: Reorganization of functional networks. *Neuroimage*, 2011 Apr 1;55(3):1189-99. Impact Factor: 5.74
  - Maestú F, Yubero R, Moratti S, Campo P, Gil-Gregorio P, Paul N, Solesio E, Pozo F, Nevado A. MEG Brain activity patterns in stable and progressive Mild Cognitive Impairment during working memory. *Journal of*

- Clinical Neurophysiology Apr;28(2):202-9, 2011. Impact Factor: 1.47
- Lorenzo-López L, Gutiérrez R, Moratti S, Maestú F, Cadaveira F, Amenedo E. Age-related occipito-temporal hypoactivation during visual search: relationships between mN2pc sources and performance. *Neuropsychologia* 49(5):858-65, 2011. Impact Factor: 4.34
  - Fernández A, Ríos-Lago M, Abásolo D, Hornero R, Alvarez-Linera J, Paul N, Maestú F, Ortiz T. The correlation between white-matter microstructure and the complexity of spontaneous brain activity: A diffusion tensor imaging-MEG study. *Neuroimage* 2011 Aug 15;57(4):1300-7. Impact Factor: 5.74
  - Buldú JM, Bajo R, Maestú F, Castellanos N, Leyva I, Gil P, Sendiña-Nadal I, Almendral JA, Nevado A, Del-Pozo F, Boccaletti S. Reorganization of functional networks in mild cognitive impairment. *PLoS One.* 2011;6(5):e19584. Impact Factor: 4.09
  - Claudia Poch, Lluís Fuentemilla, Gareth R. Barnes, Emrah Düzel. (2011)“Hippocampal theta-phase modulation of replay correlates with configural-relational short-term memory performance.” *Journal of Neuroscience* 31(19):7038-42. Impact Factor: 7.11
  - Zamrini E, Maestu F, Pekkonen E, Funke M, Makela J, Riley M, Bajo R, Sudre G, Fernandez A, Castellanos N, Del Pozo F, Stam CJ, van Dijk BW, Bagic A, Becker JT. Magnetoencephalography as a putative biomarker for Alzheimer's disease. *Int J Alzheimers Dis* 2011 Apr 10;2011:280289. Impact Factor: 1.2
  - Solesio-Jofre E, Lorenzo-López L, Gutiérrez R, López-Frutos JM, Ruiz-Vargas JM, Maestú F. Age effects on retroactive interference during working memory maintenance. *Biol Psychol.* 2011 Sep;88(1):72-82. Impact Factor: 3.348
  - Yubero R, Gil P, Paul N, Maestú. Influence of memory strategies on memory test performance: A study in healthy and pathological aging. *Neuropsychol Dev Cogn B Aging Neuropsychol Cogn.* 2011 Sep;18(5):497-515. Impact Factor: 1.292
  - Castellanos NP, Bajo R, Cuesta P, Villacorta-Atienza JA, Paúl N, Garcia-Prieto J, Del-Pozo F, Maestú F. Alteration and reorganization of functional networks: a new perspective in brain injury study. *Front Hum Neurosci.* 2011;5:90. Impact Factor: 2.339
  - Méndez MA, Zuluaga P, Rodriguez-Palancas A, Hornero R, Gómez C, Escudero J, Ortiz T, Fernández A. Complexity analysis of spontaneous brain activity in major depression: an approach to understand the process of symptom remission. *J Psychopharmacology.* DOI: 10.1177/0269881111408966 2011. J. Impact Factor: 3.036
  - Javier Escudero, Roberto Hornero, Daniel Abásolo, Alberto Fernández. Quantitative Evaluation of Artifact Removal in Real Magnetoencephalogram Signals With Blind Source Separation. *Annals of Biomedical Engineering,* vol. 39 (8) pp.2274-2286; 2011. Impact Factor: 2.368
  - Alberto Fernández, María Inés López Ibor, Agustín Turrero, Juan Matías-Santos, María Dolores Morón, Roberto Hornero, Carlos Gómez, María Andreina Méndez, Tomás Ortiz, Juan José López Ibor Lempel-Ziv complexity in schizophrenia: A MEG study. *Clin Neurophysiol.* vol. 122 pp.2227-2235;2011. Impact Factor: 3.760
  - Moratti S, Saugar C, Strange BA. Prefrontal-occipitoparietal coupling underlies late latency human neuronal responses to emotion. *J Neurosci.* 2011 Nov 23;31(47):17278-86. Impact Factor: 7.11
  - Ethridge L, Moratti S, Gao Y, Keil A, Clementz BA. Sustained versus transient brain responses in schizophrenia: the role of intrinsic neural activity. *Schizophr Res.* 2011 Dec;133(1-3):106-11. Impact Factor: 4.748
  - Díaz-Marsá M, Carrasco JL, López-Ibor M, Moratti S, Montes A, Ortiz T, López-Ibor JJ. Orbitofrontal dysfunction related to depressive symptomatology in subjects with borderline personality disorder. *J Affect Disord.* 2011 Nov;134(1-3):410-5. Impact Factor: 3.911
  - E. Herranz, J.L. Herraiz, J. Cal-gonzalez, P.M.G. Corzo, P. Guerra, J.M. Udias. “Iterative Reconstruction of Whole Accelerator Phase Spaces for Intraoperative Radiation Therapy (IORT) from Measured Dose Data”. *IEEE Nuclear Science Symposium and Medical Imaging Conference,* pp. 2644-2646. Valencia, Oct. 2011.
  - **2012**
  - Munar E, Nadal M, Castellanos N, Flexas A, Maestu F, Mirasso C, Cela-Conde CJ. Aesthetic appreciation: event-related field and time frequency analysis. *Frontiers in human neuroscience.* 2012, doi:

- 10.3389/fnhum.2011.00185; Jan2012 V5, article185. Impact Factor:2.339
- Bajo R, Castellanos NP, López ME, Ruiz JM, Montejo P, Montenegro M, Llanero M, Gil P, Yubero R, Baykova E, Paul N, Aurtenetxe S, Del Pozo F, Maestu F. Early dysfunction of functional connectivity in healthy elderly with subjective memory complaints. Age (Dordr). 34(2):497-506, 2012. Impact Factor: 6.280
  - Montejo P, Montenegro M, Fernández MA, Maestú F. Memory complaints in the elderly: Quality of life and daily living activities. A population based study. Arch Gerontol Geriatr. Mar-Apr;54(2):298-304, 2012. Impact Factor:3.348
  - Campo P, Garrido MI, Moran RJ, Maestú F, García-Morales I, Gil-Nagel A, Del Pozo F, Dolan RJ, Friston KJ. Remote Effects of Hippocampal Sclerosis on Effective Connectivity during Working Memory Encoding: A Case of Connectional Diaschisis? Cerebral Cortex Jun;22(6):1225-36,2012. Impact Factor: 6.844
  - Solesio-Jofre E, Lorenzo-López L, Gutiérrez R, López-Frutos JM, Ruiz-Vargas JM, Maestú F. Age-Related Effects in Working Memory Recognition Modulated by Retroactive Interference. J Gerontol A Biol Sci Med Sci. 67(6):565-72, 2012. Impact Factor:3.986
  - De hoyos A, Portillo J, Portillo I, Marín P, Maestú F, Poch-Broto J, Ortiz T, Hernando A. Comparison and Improvements of LCMV and MUSIC Source Localization Techniques. Journal of Neuroscience Methods. 15;205(2):312-23, 2012. Impact Factor:2.262
  - Becker J, Bajo, R, Fabrizio M, Sudre G, Cuesta P, Haridis A, Ambrose T, Aizenstein H, Lopez O, Wolk D, Parkkonen P, Maestú F, Bagic A. Neuronal Functional Connectivity Measured with Magnetoencephalography Identifies Persons with HIV Disease. Brain Imaging and Behavior. 6(3):366-73, 2012. Impact Factor: 0.859
  - Bajo R, Castellanos NP, Cuesta P, Aurtenetxe S, Garcia-Prieto J, Gil-Gregorio P, Del-Pozo F, Maestu F. Differential patterns of connectivity in progressive mild cognitive impairment. Brain Connectivity, 2(1):21-4, 2012. Impact Factor: To be released in 2013 expected 2
  - Munar E, Nadal M, Rosselló J, Flexas A, Moratti S, Maestú F, Marty G, Cela-Conde CJ. Lateral orbitofrontal cortex involvement in initial negative aesthetic impression formation. PLoS One. 7(6):e38152, 2012. Impact Factor:4.411
  - Nevado A, Hadjipapas A, Kinsey K, Moratti S, Barnes GR, Holliday IE, Green GG. Estimation of functional connectivity from electromagnetic signals and the amount of empirical data required. Neurosci Lett. 2012 Mar 28;513(1):57-61. doi:10.1016/j.neulet.2012.02.007. Impact Factor:2.105
  - Alberto Fernández, Pilar Zuluaga, Daniel Abásolo, Carlos Gómez, Anahi Serra, María Andreína Méndez, Roberto Hornero, "Brain oscillatory complexity across the life-span", Clinical Neurophysiology, vol. 123, 11, pp. 2154-2162, Noviembre, 2012. Impact Factor:3.406
  - David Santamarta, Daniel Abásolo, Manuel Martínez-Madrigal, Roberto Hornero, "Characterisation of the intracranial pressure waveform during infusion studies by means of central tendency measure", Acta Neurochirurgica, 154, pp. 1595-1602, Agosto, 2012. Impact Factor:1.520
  - Daniel Álvarez, Roberto Hornero, J. Víctor Marcos, Félix del Campo, "Feature selection from nocturnal oximetry using genetic algorithms to assist in obstructive sleep apnoea diagnosis", Medical Engineering and Physics, vol. 34, pp. 1049-1057, Agosto, 2012. Impact Factor:1.623
  - Gonzalo C. Gutiérrez-Tobal, Roberto Hornero, Daniel Álvarez, J. Víctor Marcos, Félix del Campo, "Linear and nonlinear analysis of airflow recordings to help in sleep apnoea-hypopnoea syndrome diagnosis", Physiological Measurement, 33, pp. 1261-1275, Julio, 2012. Impact Factor:1.677
  - Jesús Poza, Carlos Gómez, María T. Gutiérrez, Nuria Mendoza, Roberto Hornero, "Effects of a multi-sensory environment on brain-injured patients: assessment of spectral patterns", Medical Engineering and Physics, Aceptado, Junio, 2012. Impact Factor:1.623

- Ricardo Bruña, Jesús Poza, Carlos Gómez, Alberto Fernández, María García and Roberto Hornero, "Analysis of spontaneous MEG activity in mild cognitive impairment and Alzheimer's disease using spectral entropies and statistical complexity measures", *Journal of Neural Engineering*, vol. 9, 3, pp. 036007, Junio, 2012. Impact Factor:3.837
- María Andreína Méndez, Pilar Zuluaga, Alfonso Rodríguez-Palancas, Roberto Hornero, Carlos Gómez, Javier Escudero, Tomás Ortiz, Alberto Fernández, "Complexity analysis of spontaneous brain activity: effects of depression and antidepressant treatment", *Journal of Psychopharmacology*, vol. 26, pp. 636-643, Mayo, 2012. Impact Factor:3.036
- Alberto Fernández, Pilar Zuluaga, Daniel Abásolo, Carlos Gómez, Anahi Serra, María Andreína Méndez, Roberto Hornero, "Brain oscillatory complexity across the life-span". *Clinical Neurophysiology* 2012; 123 2154-2162.. Impact Factor:3.406
- Alberto Fernández, Carlos Gómez, Roberto Hornero, Juan José López-Ibor, "Complexity and Schizophrenia". *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, Aceptado, Abril, 2012. Impact Factor:3.247
- María Andreína Méndez, Pilar Zuluaga, Alfonso Rodríguez-Palancas, Roberto Hornero, Carlos Gómez, Javier Escudero, Tomás Ortiz, Alberto Fernández. "Complexity analysis of spontaneous brain activity: effects of depression and antidepressant treatment", *Journal of Psychopharmacology* 2012; 26, 636-643.. Impact Factor:3.036
- del Río, D., López-Higes, R., Martín-Aragoneses, M.T. (2012). Canonical word order and interference-based integration costs during sentence comprehension: The case of Spanish subject- and object-relative clauses. *The Quarterly Journal of Experimental Psychology*, 65 (11): 2108-2128. Impact Factor:1.964
- Becker JT, Cuesta P, Fabrizio M, Sudre G, Vergis EN, Douaihy A, Bajo R, Schubert A, Lopez OL, Parkkonen L, Maestu F, Bagic A. Brain structural and functional recovery following initiation of combination antiretroviral therapy. *J Neurovirol.* 2012 (in press). Impact Factor:2.310
- Del Río D, Cuesta P, Bajo R, García-Pacios J, López-Higes R, Del-Pozo F, Maestú F. Efficiency at Rest: Magnetoencephalographic Resting-State Connectivity and Individual Differences in Verbal Working Memory. *Int J Psychophysiol.* 2012 in press. Impact Factor:2.144
- Massimiliano Zanin, Pedro Sousa, David Papo, Ricardo Bajo, Juan García-Prieto, Francisco del Pozo, Ernestina Menasalvas & Stefano Boccaletti Optimizing Functional Network representation of Multivariate Time Series *Scientific Reports* 2. in press. Impact Factor: to be released in 2013 expected 2
- Castellanos NP, Sun L, Grützner C, Koethe D, Rivolta D, Wibrat M, Cranaster L, Singer W, Uhlhaas PJ. Evidence for Dysregulated High-Frequency Oscillations during Sensory Processing in Medication-Naïve First, Episode Schizophrenia. *Biological Psychiatry* (under second revision). Impact Factor: 8.283
- M.A. Luengo-Oroz, D. Pastor-Escuredo, C. Castro-Gonzalez, E. Faure, T. Savy, B. Lombardot, J. Rubio-Guivernau, L. Duloquin, M. Ledesma-Carbayo, P. Bourguine, N. Peyrieras, A. Santos. "3D+t Morphological Processing: Applications to Embryogenesis Image Analysis". *IEEE Trans. Image Process.*, vol. 21, no. 8, pp. 3518-3530. Aug. 2012.
- E. Herranz, J.L. Herraiz, P. Guerra, J. Cal-González, M. Pérez-Liva, R. Rodríguez, C. Illana, M. Ledesma, J. Calama, J.M. Udías. "Iterative Determination of Clinical Beam Phase Space from Dose Measurements". *Int. J. Radiat. Oncol. Biol. Phys.*, vol. 84, no. 3(suppl), pp. S869. Nov. 2012.
- **2013**
- Guiomar Niso, Ricardo Bruña, Ernesto Pereda, Ricardo Gutiérrez, Ricardo Bajo, Fernando Maestú, Francisoco del-Pozo HERMES: towards an integrated toolbox to characterize functional and effective brain connectivity. *Neuroinformatics*. In press Oct 04, 2013. Impact Factor:2.973
- Fernández A, Turrero A, Zuluaga P, Gil-Gregorio P, Del Pozo F, Maestu F, Moratti S. MEG Delta Mapping Along the Healthy Aging-Alzheimer's Disease Continuum: Diagnostic Implications. *J Alzheimers Dis.* 2013 Jan 1;35(3):495-507. doi: 10.3233/JAD-121912.
- Pacios J, Gutierrez R, Solesio-Jofre E, Moratti S, Ruiz-Vargas JM, López-Frutos JM, Lorenzo-López L, del Pozo F, Maestú F. Early prefrontal activation as a mechanism to prevent forgetting in the context of interferente. *American Journal of Geriatric Psychiatry.* 2012 in press. Impact Factor:3.566
- Aurtentex S, Castellanos NP, Moratti S, Bajo R, Gil P, Beitia G, Del-Pozo F, Maestú F. Dysfunctional and



compensatory duality in mild cognitive impairment during a continuous recognition memory task. Int J Psychophysiol. 2012 Nov 23. doi:pii: S0167-8760(12)00668-X. 10.1016/j.ijpsycho.2012.11.008. In press. Impact Factor: 2.144

- Cela-Conde C, García-Prieto J, Ramasco J, Mirasso C, Bajo R, Munar E, Flexas A, Del-pozo F, Maestú F. Dynamics of brain networks for aesthetic appreciation. Proceedings of the National Academy of Science of USA (PNAS). Impact Factor: 9.681
- Verdura Vizcaino EJ, Fernandez-Navarro P, Blanco C, Ponce G, Navio M, Moratti S, Rubio G. Maintenance of Attention and Pathological Gambling. Psychol Addict Behav. 2013 May 27. Impact Factor: 2.093
- Maestu C, Cortes A, Vazquez JM, del Rio D, Gomez-Arguelles JM, del Pozo F, Nevado A Increased brain responses during subjectively-matched mechanical pain stimulation in fibromyalgia patients as evidenced by MEG. Clin Neurophysiol. 2013 Apr;124(4):752-60 Impact Factor:3.406
- Jurado-Parras MT, Sánchez-Campusano R, Castellanos NP, del-Pozo F, Gruart A, Delgado-García JM. Differential contribution of hippocampal circuits to appetitive and consummatory behaviors during operant conditioning of behaving mice. Journal of Neuroscience 6;33(6):2293-304. Impact Factor: 7.115
- Adrián Navas, David Papo, Stefano Boccaletti, Francisco Del Pozo, Ricardo Bajo, Fernando Maestú, Pedro Gil, Irene Sendiña-Nadal, Javier M. Buldú Functional Hubs in Mild Cognitive Impairment. International Journal of Bifurcation and Chaos. In press 2013

**CUMULATIVE IMPACT FACTOR: >300**

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	III. Platform for clinical information: System for filing and communicating clinical images and databases
<b>Objectives</b>	
<p>Clinical information network with PACS (Picture Archiving and Communication Systems) and online spaces for clinical database files (biobanks, clinical cases, integrated electronic clinical records) for research purposes, meta-analysis and teaching. Space with additional use for telemedicine, digital prescriptions, demographic research and public health, and coordination with reference hospitals.</p> <p>ICT design, medical signal processing, health information systems, medical applications in ambient intelligence (Aml).</p>	
<b>Progress towards objectives</b>	
<p>This will be comprised of 3 closely related services.</p> <ul style="list-style-type: none"> <li>• <b>Biobank and Clinical Record Management Platform:</b> This platform aims to implement a computerised management network of biobanks and clinical records for improved awareness and use on Campus. Use of this platform shall improve healthcare and biomedical research.</li> <li>• <b>Biomarker Validation and Identification Platform.</b> A platform is offered comprised of clinical groups in referred hospitals to identify and/or validate new biomarkers in the pathologies described.</li> <li>• <b>Clinical Trial and Pharmacovigilance Platform.</b> The fact there are 3 large hospitals associated to the UCM allows conducting clinical trials with a sufficient number of patients. Molecular and imaging biomarkers allow selecting patient populations or subpopulations with a specific disease to be recruited for various clinical trials, which means not only reducing the size and duration of clinical trials, but also improved patient control and, in short, improved healthcare for the general population.</li> </ul> <p>1. 12 de Octubre Hospital Research Institute (i+12). Clinical Research Support Unit. (<a href="http://imas12.h12o.es/index.php/servicios-de-apoyo/investigacion-clinica">http://imas12.h12o.es/index.php/servicios-de-apoyo/investigacion-clinica</a>).</p> <p>2. San Carlos Health Research Institute (IdISSC) (<a href="http://www.madrid.org/cs/Satellite?pagename=HospitalClinicoSanCarlos/Page/HCLN_home">http://www.madrid.org/cs/Satellite?pagename=HospitalClinicoSanCarlos/Page/HCLN_home</a>)</p> <p>3. Gregorio Marañón Hospital Foundation for Biomedical Research. (<a href="http://fibhgm.hggm.es/">http://fibhgm.hggm.es/</a>)</p>	
<b>Description of work conducted and role of participants:</b>	
<p>Coordinator: José Luis de Pablos</p> <p>We have continued holding meetings with the above entities to implement a joint database of clinical groups involved in this priority line and that belong to the CEI Moncloa: <b>Centre of Biomedical Technology</b> - CTB- Campus Montegancedo (Francisco del Pozo, Director CTB), <b>Madrid-MIT M+Visión Project</b> Community of Madrid (Luis Sánchez Álvarez, Managing Director ACAP), <b>Vice Deanship of Research</b> UCM Faculty of Medicine (Francisco Pérez-Vizcaíno, Vice Dean of Research), <b>San Carlos Health Research Institute</b> –IdISSC- (Elena Urcelay, Science Director IdISSC), <b>12 de Octubre Research Institute</b> -i+12- (Jesús Fernández Crespo,</p>	



Director i+12), **Gregorio Marañón Health Research Institute -liSGM-** (Rafael Bañares, Director of liSGM).

On the 13th June 2012, we held the first CEINNOVA Innovation Conference, with the participation of the abovementioned groups. Also, we have signed the following agreements directly related to this strategic line: Agreement between CEI Moncloa and **Madrid-MIT M+Visión** (29-04-2012) and UCM-UPM Agreement with the **University of Colorado** (7-05-2011).

**Most significant results:**

This objective is highly complex as many centres from various entities are involved, and at least the conditions for this collaboration are being laid.

**Use of human, material and financial resources:**

NA

**Major deviations in progress toward objectives:**

NA

**Proposal for corrective actions:**

**Publications mentioning the CEI Moncloa Campus:**

- See References on Line II. **Pre-clinical platform for biomedical imaging. Advanced Biomedical Imaging Analysis (LA2IB)**

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	IV. Large infrastructure for 3D viewing and advanced multimodal interaction in the Living-Lab of the Moncloa Campus of International Excellence.
<p><b>Objectives</b></p> <p>The infrastructure is appropriate for conducting research of the groups involved in the two universities, and the university community in general. Below is a summary of the various lines of research being started with the support of the 3D viewing and advanced multimodal interaction infrastructure, establishing synergies between UPM and UCM. These lines of research are closely related to the line of work of the Innovative Medicine Cluster: Personalised Health (p-Health), aimed at consistent and coordinated integration of bio and nanotechnology, ubiquitous computing, ambient intelligence, self-adaptive multimodal interface and artificial intelligence for health and improved quality of life. Specifically, the objectives focus on action H7 of the Innovative Medicine Cluster and Consolidation of the Living-Lab, increasing its capabilities to achieve the expected impact on the Campus of Excellence.</p>	
<p><b>Progress towards objectives</b></p> <p>The action carried out consisted of purchasing and installing a 3D viewing and advanced multimodal interaction infrastructure for the Living-Lab at the Moncloa Campus of International Excellence.</p> <p>The equipment included an immersive system that allows showing high quality and real-time three-dimensional graphics. The system provides the option of LSHAPE projection which consists of a double projection system, front and floor, with main user position feedback in real time so the virtual reality system presents the right information through the graphic system. This way, the user's position and viewpoint are updated in the virtual world, allowing total immersion. This information is obtained with a Positioning System and several advanced multimodal interaction media.</p> <p>The system is run on hardware capable of generating 3D graphics and images, surround sound, virtual world evolution, user interaction and synchronization of all system elements. Another twin computer helps develop projects, as simulation cannot be provided simultaneously with development.</p> <p>The strengths and distinguishing elements of this infrastructure are the various types of user interaction through the camera tracking system, wireless gloves, Kinect support and voice recognition. Due to the necessary synchronism of the various systems, it will be possible to evaluate and study complex situations such as prevention of risk situations and non-conscious emotional and cognitive states.</p> <p>The 3D viewing infrastructure can be connected to the Living-Lab (with sensors and actuators distributed throughout the house) creating a link between 3D viewing, virtual environment and real environment, thus expanding the benefits provided by the Living-Lab and the 3D viewing and advanced multimodal interaction infrastructure. This will allow, among other things, obtaining an immersive advanced multimodal interaction 3D viewing room, where users can interact in a virtual world connected to real space where different scenarios can be modelled (an accessible digital home, an operating theatre, an office, etc.) and product and service prototypes can be developed quickly for developing simulation and training systems. In turn, with this new equipment, in the main room of the Living-Lab, different simulation scenarios can be reproduced as well as validation of the products and services proposed, and the environment can be changed according to interactions defined in the virtual environment.</p> <p>This connection makes real and virtual simulation possible of different training scenarios, allowing a more finely tuned study of all the cases of use and scenarios to be developed, thanks to recording of events with cameras, microphones, sensors and actuators in the Living Lab.</p>	

Aside from the multiple properties technically offered by the above infrastructure, including it in the Living Lab allows developing the following applications for the fields of e-health and personalised health (p-health):

- Clinical psychology (study of behaviours, treatment of phobias)
- Medical training and planning (3D medical images, surgery simulation: endoscopy, laparoscopy or endovascular navigation, role-play activities)
- Patient rehabilitation with the so-called "serious games"
- Applications for defence (flight simulators, military training, car simulators, accident and terrorist attack simulation)
- Energy efficiency architecture and simulation (adaptation and experimenting with spaces created, virtual tours of historical monuments)
- AAL (Ambient Assisted Living aimed at people with reduced mobility and the elderly with movement difficulties)
- Follow-up of chronic diseases (diabetes, Parkinson's, heart failure, coronary heart disease)
- Evaluation of impact of stereoscopic systems on human vision
- Support of independent living for people in a completely assisted and natural environment including a pond with fish, real and simulated pets, natural plants, simulation of context and moods, etc.

Thanks to the rapid prototypes and personalisation of the health services (p-health), there is evidence of the following advantages for acquiring and installing the 3D viewing and advanced multimodal interaction infrastructure in the Living Lab, justifying the need for the action:

- Cost and time savings: as opposed to building other Living Labs, different virtual and test environments can be created in various areas of interest inside a single structure.
- Reproducibility: once the environment has been created, appropriate for certain types of users, it can be reproduced quickly and cost-effectively.
- Safety: the AAL services and environments can be evaluated and tested in a safe and controlled manner.
- Verifiability and experimental testing of new interaction paradigms, environments and intelligent system reactions.
- Accessibility: the infrastructure provides a single solution to monitor movement of wheelchair users, whether electric or manual, allowing use by a larger population spectrum.

This solution is not currently available in any entity of the Moncloa Campus of Excellence, nor do we know of anything similar in any other Spanish university. It is presented as a ten times more cost-effective solution than a virtual reality cave, but with similar immersion properties thanks to the projection on the floor, as well as the advantages abovementioned.

**Description of work conducted and role of participants:**

**“Living-Lab” Platform (Coordinator M<sup>a</sup> Teresa Arredondo).**

The 3D viewing and advanced multimodal interaction infrastructure for the CEI Moncloa Campus Living-Lab has been connected to the Living-Lab (with sensors and actuators distributed throughout the house) creating a link between 3D viewing, virtual environment and real environment, thus expanding the benefits

provided by the Living-Lab and the 3D viewing and advanced multimodal interaction infrastructure. This has allowed, among other things, obtaining an immersive advanced multimodal interaction 3D viewing room, where users can interact in a virtual world connected to real space where different scenarios can be modelled (an accessible digital home, an operating theatre, an office, etc.) and product and service prototypes can be developed quickly for developing simulation and training systems.

Aside from the multiple benefits technically provided by the infrastructure, including it in the Living Lab has allowed increasing the quality of the research processes in the following applications in the field of e-health and personalised health (p-health): i) Clinical psychology (study of behaviours, treatment of phobias), ii) Medical training and planning (3D medical images, surgery simulation: endoscopy, laparoscopy or endovascular navigation, role-play activities), iii) Patient rehabilitation with the so-called "serious games", iv) Applications for defence (flight simulators, military training, car simulators, accident and terrorist attack simulation), v) Energy efficiency architecture and simulation (adaptation and experimenting with spaces created, virtual tours of historical monuments), vi) AAL (Ambient Assisted Living aimed at people with reduced mobility and the elderly with movement difficulties), vii) Follow-up of chronic diseases (diabetes, Parkinson's, heart failure, coronary heart disease), viii) Evaluation of impact of stereoscopic systems on human vision, and ix) Support of independent living for people in a completely assisted and natural environment including a pond with fish, real and simulated pets, natural plants, simulation of context and moods, etc.

The following research groups have participated in the action:

Life Supporting Technologies Group (UPM):

- Design and development of intelligent systems to help citizens have a better quality of life.
- Develop, validate and evaluate systems based on Ambient Intelligence, Aml system architectures, context and ambient control, system adaptability, sensors...
- Develop, validate and evaluate User Interaction systems, accessibility, adaptability, high usability interface, natural interaction, behaviour modelling, etc.
- Develop, validate and evaluate Ambient Assisted Living (AAL) services
- Develop, validate and evaluate services based on ubiquitous computing

Through the use of immersive 3D viewing systems, different techniques for real time user interaction shall be evaluated. This will be possible thanks to the rapid prototyping for ambient intelligence and different types of user control systems.

Creation and Psychosocial and Cultural Effects of Audiovisual Discourse (UCM) Group:

- Develop training materials to enhance and teach communication skills that healthcare professionals (physicians, nurses, social workers, psychologists...) must implement every day in their work (giving bad news, interaction with patients and their families, conflict resolution...)
- Development and implementation of disease prevention programs and, essentially, drug and alcohol use. Also, development of education programs for health and promotion of healthy habits, especially addressed to a young target audience and using information and communication technology.
- Proposal and implementation of communication plans in risk situations and crisis management (epidemics, natural disasters, clinical errors, eating disorders, etc.) through simulations and training in 3D environments

Applied Vision Group (UCM):

- Evaluate aspects of binocular visual function such as breadth of motor fusion, stereopsis (binocular disparity) and depth thresholds.
- Investigate the effect of artificially restricting vision and efficacy of different treatments and optical visual aids aimed at patients with vision alterations.
- Measure eye movements and gaze positions, electrooculogram and electroencephalogram activity in human subjects interacting with and navigating in a virtual reality environment with 3D viewing. This allows monitoring neurological and eye dysfunctions in various vision and attention disorders or evaluating, for example, eye movements before an imminent collision in driving simulations.
- Evaluate mobility and collisions with obstacles in the elderly or patients with low vision, as this avoids difficulties and hazards of falls and actual collisions. This would help to study sensory processing strategies (how and when a virtual obstacle is identified when walking) and guide development of new visual aids.

Biomedical Imaging Technology Group (UPM):

- Processing of functional and molecular images: application of image processing techniques to obtain functional and molecular quantitative information based on biomedical imaging.

Biomedical Technology Centre (UPM):

- Simulation, virtual reality and image-guided technologies for training and planning in minimally invasive surgery.
- Technology for personal and ubiquitous healthcare of chronic, disabled or fragile patients. Ambient intelligence for monitoring and mining knowledge, lab-on-a-chip, sensor networks, interoperability...

**Most significant results:**

The infrastructure presented is currently being used for development and evaluation of various prototypes within the following European projects:

- European Project VAALID (Accessibility and Usability Validation Framework for AAL Interaction Design Process), comprised of various author tools to create assisted ambient (AAL) 3D spaces. These spaces can be saved in a library that allows rapid design of prototypes. Although this project is finished, the results are being transformed into a prototype applicable to the new 3D viewing and advanced multimodal interaction infrastructure for the Living Lab on the Moncloa Campus of International Excellence.
- European Project VERITAS (Virtual and Augmented Environments and Realistic User Interactions to Achieve Embedded Accessibility Design). Its main objective is to provide support for all phases of design, development and validation of assistive technologies with virtual reality simulations and iterative testing. This process is applied to various areas: automotive, automation, intelligent environments, work sites, personal care, well-being and entertainment. The results shall be evaluated in the 3D viewing infrastructure.
- European Project UniversAAL (UNIVERSal open platform and reference Specification for Ambient Assisted Living). Its objective is to implement an open and standard platform that allows developing AAL solutions simply and cost-effectively. The various components of the platform are currently

being installed in the Living Lab, connecting them to its sensors and actuators. Once installation has been completed, they will be connected to a 3D simulation of the Living Lab allowing the link between 3D viewing, virtual environment and real environment.

- European Project PERFORM (A sophisticated multi-parametric system FOR the continuous effective assessment and Monitoring of motor status in Parkinson's disease and other neurodegenerative diseases progression and optimizing patients' quality of life). Among the neurodegenerative diseases that entail motor disorders, the objectives of the PERFORM project are monitoring and efficient management of patients. Although this project is completed, it has been found that Parkinson's patients can walk on their own using virtual reality (VR) tools, in spite of their movement disorder, therefore research is continuing within the framework developed in the PERFORM project applying the infrastructure movement recognition tools and virtual reality projections. Virtual reality environments have shown to be an efficient measure for neuro-rehabilitation of patients affected by Parkinson's syndrome.
- European Project CogWatch (Cognitive Rehabilitation of Apraxia and Action Disorganisation Syndrome) has the objective of improving rehabilitation of stroke patients by creating a tool to carry out rehabilitation at home. The infrastructure's movement recognition tools are being used for its development.

Aside from the abovementioned European projects for which the infrastructure presented is being used, we expect that in upcoming editions of Horizon 2020, topics shall be proposed for which the 3D viewing infrastructure shall provide remarkable added value, thereby reinforcing its position within the consortium of European projects and increasing the success of the proposals submitted.

**Use of human, material and financial resources:**

Acquisition of this infrastructure has used €250,000 of the 2009 CEI funds.

**Major deviations in progress toward objectives:**

There have been no deviations

**Proposal for corrective actions:**

N/A

**Publications mentioning the CEI Moncloa Campus:**

The worldwide manufacturer of virtual reality products and development environments, Worldviz, posted some news in their website describing the infrastructure developed in this action. This news emphasised the unique characteristic distinguishing it from all other virtual reality installations in the world, that is, the movement traction system for wheelchair users and its integration with virtual reality technologies. The news mentioned the financing received by the CEI Moncloa Campus. Below is a full link to the news and a screenshot of the same.

<http://www.worldviz.com/news/wheelchair-simulator-at-universidad-politecnica-de-madrid>



<b>Strategic Area</b>	<b>Scientific Improvement</b>
<b>Action</b>	<p><b>CULTURAL HERITAGE CLUSTER</b></p> <ul style="list-style-type: none"> <li>• International Centre for Heritage Studies (CIESPC).</li> <li>• Moncloa Science and Technology Laboratories Network for Heritage Conservation (RedLabPat).</li> <li>• Implementation of Laboratory for Dating and Palaeoenvironmental Identification in the field of Heritage Sciences.</li> </ul>
<b>Objectives</b>	<p>a) Conceptual: to develop appropriate doctrine, bases, criteria and techniques to be used as reference by other institutions.</p> <p>b) Management: to establish a series of synergies between the universities, research groups and different institutions involved to facilitate multidisciplinary work in the Heritage area.</p>
<p><b>Progress made towards objectives</b></p> <ul style="list-style-type: none"> <li>• Redefinition of the Heritage Cluster through the use of the adjective 'Cultural', to consider 'the whole human legacy of movable and immovable tangible artefacts and intangible attributes inherited from the past, decided to be worth protecting as our cultural identity, and declared to be our heritage'. By this definition, National Heritage property, declared and protected as such and linked (or potentially linked) to our Cultural Heritage assets, will be considered within this Cluster.</li> <li>• Analysis of the file content of the 168 Research Groups which had expressed an interest in forming part of the original Heritage Cluster.</li> <li>• Review of the information on the 16 laboratories which may form part of the RedLabPat, the strategic Cluster area.</li> <li>• Design and planning of the inter-university Master in Cultural Heritage Management envisaged to start in 2014-2015.</li> <li>• Technological equipment for the CIESPC, including computers, software, hardware, three-dimensional modeling equipment and other services needed for a highly specialized research space.</li> <li>• Improved collaboration between private firms and the research organization, with a focus on reaching specific agreements to provide services, especially in the field of new technologies, as well as cultural heritage consulting services for large companies.</li> </ul>	
<p><b>Description of work completed and role of participants</b></p> <p>The Cultural Heritage Cluster includes different heritage-related research and postgraduate teaching features of both universities: research groups, centres and institutes, departments, postgraduate programs, industry-sponsored Chairs, laboratories and museums. It takes full advantage of the unique presence on the Campus of teaching centres for Architecture, Fine Arts, Geography and History, along with research groups and laboratories for Heritage Science and Technology, to develop a global interdisciplinary approach to all areas related to the discovery, restoration, conservation and enhancement of our Cultural Heritage. It has the previous commitment of the <i>Instituto del Patrimonio Cultural Español (IPCE)</i>, <i>Patrimonio Nacional</i>, CIEMAT, CSIC, and has made initial contacts with the <i>Academia de Bellas Artes</i> and <i>Academia de la Historia</i>. As well as implementing the two actions described below, the Cluster coordinators have encouraged the</p>	

search for joint project funding sources through national and international programs, with the proposals listed below presented and pending approval: These include:

- PACUE (Comprehensive strategy for the assessment and management of cultural landscapes associated with energy transformation): This research project is part of the National R&D+I plan and includes researchers from the School of Architecture and Civil Engineering at the UPM and the department of Ecology at the UCM. The electric company ENDESA has joined the project and it is hoped that a university Chair will be created within the framework of CIESPC in the near future. Similarly, the Spanish Foundation for Science and Technology (FECYT) together with the Fundación ENDESA, funded the exhibition "Paisajes Culturales de la Energía" (Cultural Landscapes of Energy), which took place in May in the 'Arquería de Nuevos Ministerios' exhibition hall, which was of interest for national and international journals. In addition, the project was recognized by the Secretary of State for Culture, which decided to change one of its training courses at the National School of Heritage to include the subject, with the involvement of the researchers working on the project.
- Assessment of the rural Heritage of Public Works (VAPROP): Researchers from different fields from both the UPM and the UCM are collaborating on the project. This project, which is focused on what new technologies can offer in the field of rural heritage recognition, has developed an application for smartphones and its results were presented at the FITUR tourism fair and at other national and international meetings. The project is funded with funds from the Ministry of Environment.
- PHI Network Project: The project PHI Patrimonio Histórico + Cultural Iberoamericano proposes the development of an innovative global information system, based on the capabilities of the university and constantly updated. The aim is to create a platform that will permit a better understanding of the strategic value of heritage and to allow for more efficient management of this shared heritage to assist in the organization of the available spaces. It is useful for various reasons and at many different levels. The project includes collaboration between the UPM's School of Architecture and various faculties at the UCM (Geography and History, Fine Arts...). The project is financed by various public and private entities such as ACS or the Fundación Carolina.
- Action COST "In search of transcultural memory in Europe (ISTME)": - COST "In search of transcultural memory in Europe (ISTME)" CIESPC researchers from the UPM and UCM participate in this project that explores the construction of the European territory from the standpoint of its cultural heritage, through theoretical and practical research.

Below is a list of the proposals that have been submitted and are pending approval:

- "From the tangible to the intangible: The social dimension of European Historic Urban Landscape". Application filed with the Joint Programming Initiative on Cultural Heritage and Global Change (JPI).
- "Organization of an International Meeting on university training in Cultural Heritage Management". Application filed with the International Fund for the Promotion of Culture (UNESCO).
- - "Cultural Heritage Management in National Parks". Application filed to the National Parks Department (Ministry of Agriculture), 2013.
- Criteria for mapping territorial heritage.



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	INTERNATIONAL CENTRE FOR HERITAGE STUDIES (CIESPC).
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To promote research themes focused on basic or knowledge-based research into Cultural Heritage Management and applied research.</li> <li>2. To boost relationships with other national and international centres through research projects and participation in specialist courses.</li> <li>3. To promote cooperation with industry and the wider public, to facilitate transfer and dissemination.</li> </ol>
<b>Progress made towards objectives</b>	
<p>Adapting the facilities in the Montegancedo Campus, Central Services Building and Business Centre.</p> <p>Drawing up the project to create the CIESPC</p>	
<b>Description of work completed and role of participants:</b>	
<p>The CIESPC is an advanced scientific and technical study centre which promotes, implements and publicises research and training activities within scientific and new technological areas applied to Heritage. The basis of the CIESP is transversal, interdisciplinary and plural. This means that priority is given to research which integrates various disciplines and includes the participation of various groups from both partner universities. As the CIESP is an interdisciplinary centre, which groups already existing research areas in the UCM and UPM with all their material and human resources, and with the contribution of current and future national and international agreements, it forms a nucleus of researchers and teachers in the heritage area (museums, archaeology, palaeontology, conservation, restoration, exhibition projects, cultural landscape, theory, history and intervention criteria) applying new technology to heritage dissemination and management, enabling the transfer of scientific knowledge to the social environment of sustainable development, regulations for heritage protection or the management of cultural tourism, among other areas.</p> <p>The CIESPC is a joint centre of the partner universities UPM and UCM, and is not in itself a legal entity. The CIESPC is a Centre for Research, Training and Innovation created from the desire to contribute actively to the development of scientific research and knowledge transfer within the field of Cultural Heritage.</p> <p>The facilities of the CIESPC include a Laboratory for small-scale digital fabrication: <b>Fab Lab Madrid / CoLaboratorio</b>. This is a digital fabrication laboratory linked to the international FabLab network created by MIT in 2000, which currently has 90 active and 31 planned laboratories. Its aims are the digital fabrication of parts and rapid prototypes and collaborative research between industry and architectural projects. Spain has 5 active Fab Labs (Barcelona, Bermeo, León, Sevilla and Valldaura) and 4 projected including the FAB LAB in the UPM School of Architecture.</p> <p>The CIESP is located in a new building in the extended Business Centre on the Montegancedo Campus. Its location facilitates collaboration with the <i>Centro de Domótica Integral</i> (CeDInt) and it has already set up the contacts needed for future cooperation in research projects taking advantage of the complementary</p>	

nature of the themes and tools handled by each centre. Also underway is the acquisition of equipment and infrastructure to enable the implementation of the research projects currently in development phase mentioned above. As the main working area is the application of new technologies to the study, dissemination and enhancement of Heritage, it has the software and hardware needed to apply these new technologies (GIS, GIM, augmented reality, modelling and 3D printing).

**Use of human, material and economic resources.**

To set up the Centre, Mercedes Camina was contracted as consultant for the project follow-up and collaboration in the Cluster Strategic Plan.

This action has been assigned 24.706 € from the CEI 2009 project.



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	MONCLOA SCIENCE AND TECHNOLOGY LABORATORIES NETWORK FOR HERITAGE STUDIES (RedLabPat)
<b>Aim</b>	To create a laboratory network capable of implementing study techniques in Cultural Heritage.
<p><b>Description of work completed and role of participants:</b></p> <p>The motive for creating this network in the CEI-Moncloa was the need to boost the analytical capacity of the UCM and UPM in Heritage Sciences. Its main aim is to offer a specialized service to both the research groups in the CEI and other research institutions and to the business sector. Both the UCM and UPM have scientific and technical infrastructures which are not always made available to the wider public. This newly created network has enabled these resources to emerge and their inclusion through the different laboratories which wholly or partly carry out studies in Heritage Sciences. This approach has led to the inclusion of 15 laboratories in the network enabling a specialized multidisciplinary overview of different problems related to heritage conservation and enhancement. 8 of these laboratories are in the UCM and 5 in the UPM. This network also includes a joint UCM/ UPM laboratory for Dating in Heritage Sciences (DACIPA), recently set up on the Moncloa Campus, one of the objectives of the CEI-Moncloa (P4). Other collaborative institutions mentioned above also participate in the network.</p> <p>After an analysis of the available resources and infrastructure, the laboratory proceeded to acquire the equipment to enable it to extend and improve the services offered. This includes accelerated aging testing chambers to facilitate a better understanding of the useful life of materials and their behaviour in aggressive environments. This data will enable appropriate treatments to be selected to reduce deterioration of the movable and immovable heritage. The acquisition of these chambers complements those already in place in various laboratories in the Network and will allow a more complete service offer. Other planned acquisitions include equipment for high resolution infrared imaging, to obtain high definition 150 cm area images with no angular distortion. This acquisition means a great advance in the scientific and technical study of art works and the information it provides is of significant interest to art curators, restorers and historians.</p> <p>Another aspect of this network to be enhanced is the availability of non-destructive and portable techniques to obtain relevant information in field work, restoration tasks or research work in museums. Through the CAIMON Call mechanical traction multichannel Georadar equipment will be acquired for archaeological survey of large areas, an unmanned aerial vehicle designed to for field work: surveys, documentation, exploration, and inspection of areas of heritage interest and high resolution geoelectric survey equipment to determine humidity distribution at centimetre scale in the built heritage. Other equipment to be acquired includes portable XRF equipment for the chemical description of materials and their alteration products.</p>	
<p><b>Most significant results: The acquisition of equipment to complement the existing resources of the laboratories is underway.</b></p>	

<b>Area</b>	Teaching improvement / Scientific improvement / Transfer/ Comprehensive Social Campus
<b>Action</b>	P4. Creating the Laboratory for Dating and Palaeoenvironmental Identification in the field of Heritage Sciences.
<b>Objectives</b>	To implement the Laboratory for Dating using TL/OSL Techniques
<b>Progress towards objectives</b>	
Since the last report no progress has been made in the implementation process due to the delay in UCM Calls for equipment acquisition.	
<b>Description of work carried out and role of partners</b>	
As there is still no equipment available to set up the Laboratory, no specific work has been carried out except the planning phase to decide on the location and propose the acquisition of the equipment required.	
The postgraduate course " <i>Técnicas de datación absoluta: su aplicación en Ciencias del Patrimonio</i> " was organised and run, where the various techniques were presented by specialists in each thematic area.	
<b>Most important results</b>	
N/a	
<b>Use of human, material and financial resources</b>	
Budget for this Action: 450,000 Euros. Funding source: INNOCAMPUS program.	
<b>Most important progress deviations</b>	
<b>The deviations are due to three factors:</b>	
<ol style="list-style-type: none"> <li>1. <b>Delay in the Call for equipment acquisition.</b> This delay to date means that this Action is not feasible as the timeframe for supplying this equipment, which is made to the order specifications, is approx. 1 year, so that it is impossible to acquire it before the deadline for this report.</li> <li>2. <b>The provisional location of the Laboratory in the CIEMAT,</b> until its permanent location in the Instituto IGEO, has led to technical and administrative problems.</li> <li>3. <b>Human Resources.</b> It was agreed to fine-tune the equipment with CIEMAT researchers. The CSIC also proposed to include technicians in the Laboratory, but this did not happen as the delay in setting up the Laboratory was foreseen.</li> </ol>	
<b>Proposal for corrective action</b>	
As it is impossible to request any further postponement for implementing the Innocampus program, the funding source for this Action, it seems improbable that in the short term other funding sources will be obtained to implement this Action.	



<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	Actions planned within the Sustainable Mobility Cluster: <ul style="list-style-type: none"> <li>• Electromobility. Models and Technologies.</li> <li>• Mobility. Analysis and modelling.</li> <li>• Information and Communication Systems in Transport.</li> <li>• Intermodality. Models and Technology</li> </ul>
<p><b>Objectives</b></p> <p>The Sustainable Mobility Cluster aims to set up <b>research themes</b> in current areas in the development of more advanced, ecological, safe and accessible transport systems. The Moncloa Campus has important resources and research groups available in most transport related areas, in the different modes of transport, and in their integration into the transport system, in terms of their efficiency, socio-economic and environmental impact, or telecommunications. The extensive history of the work in this area of the partner universities in the Moncloa Campus also includes having stable collaborative agreements with all the relevant companies in the industrial sector covering infrastructure, vehicles and energy services and transport technology.</p>	
<p><b>Progress made towards objectives</b></p> <p>In September 2011, the Executive Committee of the Moncloa Campus agreed to include the activity of the new Sustainable Mobility Cluster in the Strategic Plan for Conversion to Campus of Excellence of the Moncloa Campus. This was launched following the proposal made by the cluster members from the <i>Instituto Universitario de Investigación del Automóvil (INSIA)</i> in the UPM affiliated to the <i>Escuela Técnica Superior de Ingenieros Industriales</i> and groups from the UCM.</p>	
<p><b>Description of work completed and role of participants:</b></p> <p>Explanations are available in the individual action files.</p>	

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>		
<b>Action</b>	<b>Partnership agreement between the TRANSyT Centre for Transport Research (UPM) and the Research Group “Transport, Infrastructure and Territory”(UCM)</b>		
<b>Cluster</b>	Sustainable Mobility		
<b>Action Areas</b>	Scientific Improvement / Transfer		
<b>Partners</b>	UPM, UCM	<b>Other entities</b>	
<b>Start Date</b>	June 2012	<b>End date</b>	2017
<b>Location</b>	<i>Escuela de Ingenieros de Caminos, Canales y Puertos [School of Civil Engineeringt] (UPM) and Faculty of Geography and History (UCM)</i>		
<b>Person(s) Responsible for Action</b>	Andrés Monzón de Cáceres (UPM) and Javier Gutiérrez Puebla (UCM)		
<b>Contact Data (mail/tel...)</b>	UPM: 91 336 5373 <a href="mailto:andres.monzon@upm.es">andres.monzon@upm.es</a> UCM: 91 394 5949 <a href="mailto:javiergutierrez@ghis.ucm.es">javiergutierrez@ghis.ucm.es</a>		
<b>Contact person for service request or webpage where applicable</b>	<a href="http://www.transyt.upm.es">http://www.transyt.upm.es</a> <a href="http://www.ucm.es/tit">http://www.ucm.es/tit</a>		
<b>Infrastructure involved</b>	The TRANSyT library, mobility and transport databases and meeting room are available to the partners. The Research Group “Transport, Infrastructure and Territory” mobility and transport databases are available to the partners.		
<b>Action Description and Rationale</b>	The general aim of the agreement is to regulate the collaboration between the two groups, to facilitate the development of joint activities within the framework of the Sustainable Mobility Cluster.		
<b>Objectives:</b>	<ul style="list-style-type: none"> <li>- To participate in national and international R&amp;D projects and programs.</li> <li>- To generate Doctoral Theses</li> </ul>		
<b>Use of human, material and economic resources:</b>			
<b>International Aspects:</b> The two partners are members of international research networks. In 2013 the project “INSIGHT. Innovative Policy Modelling and Governance Tools for Sustainable Post-Crisis Urban Development” received funding from the EC 7 <sup>th</sup> Framework Program			
<b>Impact:</b> <b>R&amp;D projects with the collaboration of more than one group in the Cluster:</b> Project Title: INSIGHT. Innovative Policy Modelling and Governance Tools for Sustainable Post-Crisis Urban Development Funding: EC 7th Framework Program			

Project dates: 2013 - 2016

Cluster Participants include: *TRANSYT (UPM)* and *Grupo Transportes, Infraestructuras y Territorio (UCM)*.

Project Title: Spillover Effects of transport infrastructure (SPILLTRANS)

Funding: MICINN. *Plan Nacional de I+D+I*

Project dates: 2012-2014.

Cluster Participants include: *TRANSYT (UPM)* and *Grupo de Economía del Transporte y las Infraestructuras (UCM)*.

Project Title: TRANSBICI – Behaviour and modelling of cyclist demand: transition to a cyclable city

Funding: MICINN. *Plan Nacional de I+D+I*

Project dates: 2011-2013.

Cluster Participants include: *TRANSYT (UPM)* and *Grupo de Economía del Transporte y las Infraestructuras (UCM)*.

Project Title: HABIT. Habit and Inertia in mode choice behaviour: a data panel for Madrid.

Funding: MICINN. *Plan Nacional de I+D+I*

Project dates: 2011-2013.

Cluster Participants include: *TRANSYT (UPM)* and *Grupo de Economía del Transporte y las Infraestructuras (UCM)*.

Project Title: DESTINO – Developing methodologies to evaluate the economic impact of transport systems through interregional input-output tables

Funding: Ministerio de Fomento (*Convocatoria 2008*).

Project dates: 2009-2012.

Cluster Participants include: *TRANSYT (UPM)* and *Grupo de Economía del Transporte y las Infraestructuras (UCM)*.

Project Title: TRANSPORTRADE

Funding: Comunidad de Madrid (*Convocatoria Redes de investigación 2007*)

Project dates: 2008-2012.

Cluster Participants include: TRANSYT (UPM) and *Grupo de Economía del Transporte y las Infraestructuras* (UCM).

## **PUBLICATIONS**

### **2013**

Gutiérrez, J. (2013). Transport Geography in Spain. *Journal of Transport Geography*, 28, 216-218

Díaz-Pacheco, J. y Gutiérrez, J. (2013). Exploring the Limitations of CORINE Land Cover for Monitoring Urban Land use Dynamics in Metropolitan Areas. *Journal of Land Use Science*, (DOI:10.1080/1747423X.2012.761736)

García-Palomares, J. C.; Gutiérrez, J. y Cardozo, O. (2013). Accessibility to public transport: Analysis of walking distance, network coverage, distance-decay functions and access quality based on microdata and GIS. *Environment and Planning, B. Planning and Design*, 40 (in press)

Condeço-Melhorado, A., Gutiérrez, J. y García-Palomares, J.C. (2013): Influence of distance decay on the measurement of market potential and the spillover effect of transport infrastructure. *GeoFocus*. 13-1, 22-47.

García-Palomares, J.C., Martín, J.C.; Gutiérrez, J. y Román, C. Spatial Analysis of the Competition between the High-Speed Train and Air Transport: The Role of Access to Terminals in the Madrid-Barcelona corridor. *Transportation Research, A* (aceptado condicionalmente)

### **2012**

Cardozo, O. D., García-Palomares, J. C., y Gutiérrez, J. (2012). Application of geographically weighted regression to the direct forecasting of transit ridership at station-level. *Applied Geography*, 34, 548-558.

Rodríguez Núñez, E. y Gutiérrez Puebla, J. (2012): Análisis de vulnerabilidad de redes de carreteras mediante indicadores de accesibilidad y SIG: Intensidad y polarización de los efectos del cierre de tramos en la red de carreteras de Mallorca. *GeoFocus*, 12, 374-394

García-Palomares, J. C., Gutiérrez, J., y Latorre, M. (2012). Optimizing the location of stations in bike-sharing programs: A GIS approach. *Applied Geography*, 35(1), 235-246

Rodríguez Moya, J. y García Palomares, J. C. (2012): Diversidad de género en la movilidad cotidiana: efecto de las variables sociodemográficas y territoriales. *Boletín de la Asociación de Geógrafos Españoles*, 58, 105-131.

del Río, I. y Rodríguez Moya, J. (2012) Nuevos espacios para las actividades logísticas: una revisión crítica para el caso de la Comunidad de Madrid. *Ería*, 89, 275-290

### **2011**

Condeço-Melhorado, A., Martín, J.C. y Gutiérrez, J. (2011): Regional spillovers of transport infrastructure investment: a territorial cohesion analysis. *European Journal of Transport and Infrastructure Research*, 11(4), 389-404

Gutiérrez, J., Cardozo, O., García-Palomares, J.C. (2011): Transit ridership forecasting at station level: an approach based on distance-decay weighted regression. *Journal of Transport Geography*. 19, 1081–1092

Gutiérrez, J. Condeço-Melhorado, A., López, E. y Monzón, A. (2011): Evaluating the European Added Value of TEN-T Projects: a methodological approach based on spatial spillovers, accessibility and GIS. *Journal of Transport Geography*, 19, 840–850

Condeço-Melhorado, A., Gutiérrez, J. y García-Palomares, J.C. (2011): Spatial impacts of road pricing: Accessibility, regional spillovers and territorial cohesion. *Transportation Research Part A: Policy and Practice*, 45, 185–203

Pozo, E. y García Palomares, J. C. (2011): Evolución reciente y pautas de distribución espacial de las migraciones internas de extranjeros: el caso de la Comunidad de Madrid (1997-2008). *Scripta Nova*, Volumen XV, núm. 384.

## 2010

García-Palomares, J.C. (2010): Urban sprawl and travel to work: the case of the Metropolitan Area of Madrid, *Journal of Transport Geography*, 18 (2), 197-213

Martín, J.C, García-Palomares, J.C., Gutiérrez, J. y Román. C. (2010): Impacts of orbital motorways in metropolitan areas on accessibility: efficiency and equity. A case study in Madrid. *Transport and Land Use*, 3 (1), 67-84

Gutiérrez Puebla, J. (2010): Las Tecnologías de la Información Geográfica en la planificación urbana y la ordenación del territorio: viejos retos, nuevas direcciones. *Ciudad y Territorio*, 165-166, 431-444

Cardozo, O.D., Gutiérrez Puebla, J. y García Palomares, J.C. (2010): Influencia de la morfología urbana en la demanda de transporte público: análisis mediante SIG y modelos de regresión múltiple. *GeoFocus*. 10, 82-102

Gutiérrez, J., Condeço, A y Martín, J.C. (2010): Using accessibility indicators and GIS to assess and monetarize spatial spillovers of transport infrastructure. *Journal of Transport Geography*, 18, 141-152

Gutiérrez Puebla, J y García Palomares, J.C. (2010): Procesos de descentralización de la actividad económica en el área metropolitana de Madrid. En Feria, J.M.: *La ciudad metropolitana en España: procesos urbanos en los inicios del siglo XXI*. Cívitas, 377-408

García Palomares, J.C. y Pozo, E. (2010): Movimientos migratorios en la comunidad de Madrid: unos flujos más intensos y complejos. *Boletín de la Asociación de Geógrafos Españoles*, 53, 87-117

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>
<b>Action</b>	Actions carried out by INSIA
<b>Cluster</b>	Sustainable Mobility Cluster (CMS)
<b>Action areas</b>	Research, technological development, postgraduate teaching
<b>Location</b>	CAMPUS SUR UPM. INSIA.
<b>Person responsible for action</b>	Francisco Aparicio Izquierdo
<b>Contact Data (mail/tel...)</b>	<a href="mailto:francisco.aparicio@upm.es">francisco.aparicio@upm.es</a> / 913365304
<b>Contact person for service request or webpage where applicable</b>	José María López Martínez <a href="mailto:Josemaria.lopez@upm.es">Josemaria.lopez@upm.es</a>
<b>Infrastructure involved</b>	<b>TEST BANK FOR HYBRID ELECTRIC CONFIGURATIONS</b>
<b>Action description and rationale:</b>	<p>Design of hybrid traction configurations for heavy duty vehicles using software simulation tools requires validation of models in a test bank. This test bank allows components to be tested separately or as a complete system, optimizing energy flows and therefore the real application in the vehicle. This method allows the correction of design faults before the solutions adopted are implemented in the real vehicle.</p> <p>To our knowledge there are no other similar test banks currently in use in Spain as heavy duty vehicle hybridization is still at a very early stage.</p> <p>The rationale for this action is:</p> <ul style="list-style-type: none"> <li>• The need to validate design and development and thus establish the technological concepts and criteria to enable progress in future developments linked to electric and hybrid vehicles in an urban context.</li> <li>• To quantify the environmental impact of the mobility of this type of vehicles in an urban environment through testing and to cover safety-related legal aspects.</li> </ul>
<b>Objectives:</b>	
<ul style="list-style-type: none"> <li>• To research into the applications of specific technologies to hybrid propulsion with heat engine and with electric only propulsion.</li> <li>• To develop or contribute to developing hybrid and electric vehicles for special uses.</li> <li>• To contribute to the drawing up of new international rules and regulations applicable to these vehicles.</li> <li>• To offer training for engineers and other professionals involved in new technologies and vehicle use.</li> </ul>	
<b>Use of human, material and economic resources:</b>	
<ul style="list-style-type: none"> <li>• All the resources are made available from the partner universities' own resources.</li> </ul>	
<b>International aspects:</b>	
<p>Information on the work of the testing bank within the international groups in this knowledge area with INSIA staff participation. ERMES, HDH, ECTRI. Participation in European projects.</p>	



**Expected impact:**

Taking into account the growing importance of the demonstrators, tests, etc. and heavy duty vehicles in the future H2020, this test bank may lead to increased participation in European level projects.  
 Reinforcement of the INSIA research area related to new propulsion systems.  
 Increased company demand for tests on hybrid and electric propulsion systems for heavy duty vehicles.  
 Contribution to the improvement and optimization of the systems and components involved.  
 Increased understanding of new propulsion systems applied to heavy duty vehicles.

**Related publications citing CEI Campus Moncloa:**

-

**Other publications related to the Cluster activities:**

Title:	Análisis de Ciclo de Vida de autobuses urbanos Euro IV (Life Cycle Analysis of Euro IV urban buses)
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Authors:	Juan Antonio García, José María López, Nuria Flores, Blanca Arenas
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Journal/Publisher/Congress:	DYN A
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Title:	Modelo para la Conducción Eficiente y Sostenible basado en Lógica Borrosa
--------	--

Authors:	Villela, M., Lahera, T., Merino, S., Zato, J. G., Naranjo, J. E., Jiménez, F.
----------	--

Journal/Publisher/Congress:	Revista Iberoamericana de Automática e Informática Industrial
-----------------------------	--

Title:	Optimización de consumo de combustible de vehículos basada en Programación Dinámica
--------	--

Authors:	Cabrera, W., Tapia, S., Jiménez, F., Aparicio, F.
----------	--

Journal/Publisher/Congress:	Dyna Ingeniería e Industria. Federación de Asociaciones de Ingenieros Industriales de España
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Title: Demanda y distribución de energía en un vehículo eléctrico configuración trihíbrida

Authors: Aguilar, H., López, J. M., Jiménez, F., Resino, D., Flores, N.

Journal/Publisher/Congress: X Congreso de Ingeniería del Transporte 2012; Granada, 20 - 22 junio 2012

Title: Comparison of greenhouse gas emissions from different vehicles covering the entire life cycle

Authors: Javier Pérez Rodríguez; Julio Lumbreras Martín; Jose Maria Lopez Martínez; Michel Vedrenne Gutiérrez  
Lopez Martínez; Michel Vedrenne Gutiérrez

Journal/Publisher/Congress: Urban Transport  
Urban Transport XVIII

Title: Life Cycle Assessment (LCA) of Electric, Hybrid (Diesel-Electric-Series) and Hydrogen Bus Transportation Systems in Madrid

Authors: Juan Antonio García, Dr. José María López, Ms. María

Nuria Flores, Julio Lumbreras, Dr. Blanca Arenas

Journal/Publisher/Congress: FISITA 2012

## BANCO DE PRUEBAS DE CONFIGURACIONES HÍBRIDAS Y ELÉCTRICAS

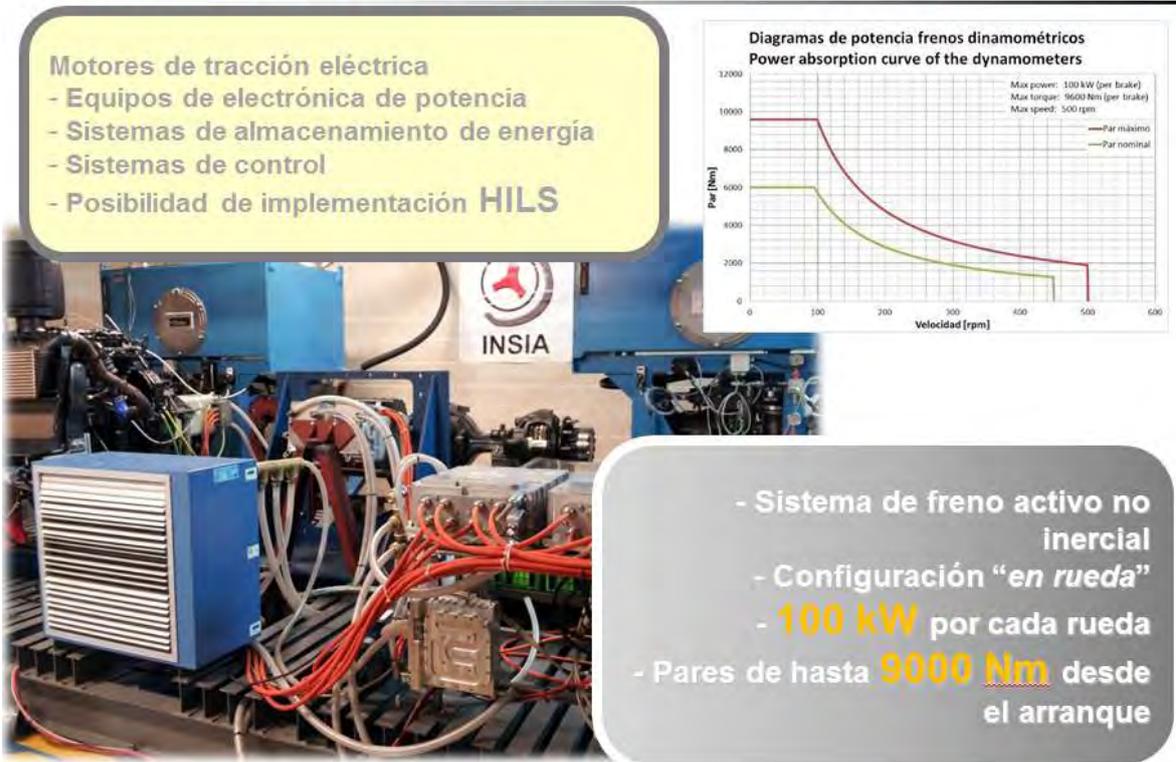


Figure 1 Characteristics of the test bank and general overview

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>		
<b>Action</b>	Actions implemented by Visual Telecommunication Applications Group in the Technological Support Network for Mobility Control, Management and Traceability.		
<b>Cluster</b>	Sustainable Mobility (CMS)		
<b>Action Areas</b>	Research, technological development and transfer, and postgraduate teaching		
<b>Partners</b>	UPM, UCM, CSIC	<b>Others</b>	
<b>Start date</b>	2012	<b>End Date</b>	N/A
<b>Location</b>	E.T.S.I. de Telecomunicación (UPM)		
<b>Person Responsible for Action</b>	José Manuel Menéndez		
<b>Contact Data (mail/tel...)</b>	<a href="mailto:jmm@gatv.ssr.upm.es">jmm@gatv.ssr.upm.es</a>		
<b>Contact person for service request or webpage where applicable</b>	Nuria Sánchez ( <a href="mailto:nsa@gatv.ssr.upm.es">nsa@gatv.ssr.upm.es</a> ) Juan Torres ( <a href="mailto:jta@gatv.ssr.upm.es">jta@gatv.ssr.upm.es</a> )		
<b>Infrastructure involved</b>	<ul style="list-style-type: none"> <li>- Cooperative service provision platform with capacity to integrate new types of sensorization, advanced processing and communications starting with the latest developments in the field of Intelligent Transport Systems.</li> <li>- Intermodal transport management platform for smart cities.</li> <li>- Mobility monitoring system for urban and interurban routes via Computer Vision and LIDAR systems</li> </ul>		
<b>Objectives:</b>			
<ul style="list-style-type: none"> <li>• To carry out transversally based quality research into areas including sensorization, intelligent processing and communications for other actions. This aim includes: <ul style="list-style-type: none"> <li>○ Use of new devices for infrastructure sensorization (motes, lighting sensors...) and development of the corresponding algorithms.</li> <li>○ Design of communications architecture and interface implementation to allow reliable data transfer between different entities in the same cooperative system.</li> <li>○ Advances in data fusion and behavioural analysis areas: sensor networks and intelligent processing.</li> </ul> </li> <li>• To promote cooperative systems and the potential impact of services based on this technology on the area of efficient, safe, sustainable and accessible mobility.</li> <li>• To carry out quality research and technological innovation from an integral and transversal viewpoint in the area of inter- or multi-modal transport; to achieve optimization and sustainability in different transport modes, to improve energy efficiency and reduce emissions and environmental impact. This aim includes: <ul style="list-style-type: none"> <li>○ Developing citizen service provision systems which boost intermodality and efficient consumption of natural resources, promoting the use of electric vehicles and reducing congestion.</li> </ul> </li> <li>• Developing technology transfer activities in the above areas.</li> <li>• Developing post graduate activities: Quality Master and Doctoral programs.</li> </ul>			
<b>Use of human, material and economic resources:</b>			



- Technical coordination for the real deployment of 7 cooperative services in different environments (motorways in Spain, Portugal, Germany and Greece) within the framework of the FOTsis European project. Some of these aim to improve various mobility related aspects in sections with high density traffic.
- Subcontract in the INNPRONTA Ciudad 2020 project to carry out design and development tasks for:
  - A Virtual Intermodal Centre for monitoring mobility in smart cities.
  - Services intended for city dwellers using *smartphones* and on-board devices for information exchange with the city manager. These services include an intermodal eco-preferred route planner and include the use of bicycles, public transport and electric vehicles.
  - Monitoring tool for particular infrastructure points using Computer Vision in relation to traffic parameters, detection of available parking spaces, incident detection, monitoring pedestrian crossings and cycle lanes.
- Developing a smartphone application within the HABIT project (Habit and Inertia in mode choice behaviour: a data panel for Madrid).
- Contributing to the proposed 'Master in Sustainable Mobility' with 60 credits for research.
- Active participation in the TG Mobility in ECTRI (European Conference of Transport Research Institutes), with attendance at various meetings organized in Brussels.
- Preparation of a proposal for the Call FP7-SST-2013-RTD-1 – OPTICITIES (Optimise Citizen Mobility and Freight Management in Urban Environments) designed to develop and implement new information services for users of any intermodal transport network and other supporting goods transport activities. Consortium Agreement initiated on approval. Expected project start date: October 2013. The technical coordination of the project, once it is underway, will correspond to the GATV.
- Active participation in national and international standardization bodies: i.e. standardization groups (AENOR CTN159, CEN TC278 WG1 [ISO TC204 WG5], CEN TC278 WG15, CEN TC278 WG16 [ISO TC204 WG18], ETSI ITS)
- Continuation of the tasks associated with the WePark project, development and testing of systems for the automatic detection of available parking spaces in controlled environments. The implementation involves the application of advanced techniques for image processing and integration of contextual information.
- Participation in the dissemination activities proposed in the DECOMOBIL project, intended to provide support and knowledge acquired in new types of sensorization, advanced processing, communications and HMI interface development with a view to safer and more intelligent mobility.

**International Aspects:**

Our participation in various European projects related to the Action Aims, in the HUMANIST Virtual Centre of Excellence created from the network of excellence (NoE) with same name, in various groups for European level standardization and in ECTRI Technical Groups, ensures the visibility of the results generated by the research activity undertaken within the Visual Telecommunication Applications Group (GATV) in the UPM.

**Expected impact:**

- Recognition of the GATV members as experts in cooperative systems designed to improve mobility in cities and reinforcement of the group research activity in the Intelligent Transport Systems (ITS) and Smart Cities sector.
- Participation in new national and European projects to guarantee the financial sustainability of the

research group.

**Relevant publications citing CEI Campus Moncloa:**

-

**Other publications related to Cluster activities:**

N. Sánchez, J. Alfonso, J. Torres, J.M. Menéndez, "ITS-based cooperative services development framework for improving safety of vulnerable road users". IET Intelligent Transport Systems, March 2013. Impact Factor: 0.512 (ISSN 1751-956X)

N. Sánchez, C. Bravo, A. Aggarwal, J.M. Menéndez, F. Bernardo, F. Marzal. "A camera-based parking guidance system for the smart cities of the future. The WePark project experience", 9th ITS European Congress. Dublin, Ireland, 4-7 June 2013.

C. Bravo, N. Sánchez, N. García and J.M. Menendez, "Outdoor Vacant Parking Space Detector for improving mobility in Smart Cities". 17th Portuguese Conference on Artificial Intelligence, EPIA 2013, September 2013

J. Alfonso, N. Sánchez, J.M. Menéndez, E. Cacheiro, "Especificación de arquitecturas ITS: La experiencia del proyecto FOTsis". XIII Congreso Español sobre Sistemas Inteligentes de Transporte. San Sebastián, España (18 al 20 Junio 2013). 20 Junio 2013.

J. Alfonso, N. Sánchez, J.M. Menéndez, E. Cacheiro, "An ITS architecture specification - The FOTsis project experience". 9th ITS European Congress. Dublin, Ireland, 4-7 June 2013.

E. Rey, J. Torres, J. Alfonso, N. Sánchez, J. M. Menéndez. Gestión de la mejora de la movilidad a partir de servicios cooperativos. Cuadernos Tecnológicos de la PTC (PLATAFORMA TECNOLÓGICA ESPAÑOLA DE LA CARRETERA) Nº 05 / 2012.

E. Rey, A.B. Mejía, N. Sánchez, J. Alfonso, J. Torres, J.M. Menéndez. "Route Optimization System for Road Emergency Services". European Conference on Human Centred Design for Intelligent Transport Systems, Valencia, June 14-15, 2012.

N. Sánchez, J. Alfonso, J.M. Menéndez, D. Sastre. "Cooperative Infrastructure-Based Intelligent Transportation Systems For Improving Safety Of Vulnerable Road Users". European Conference on Human Centred Design for Intelligent Transport Systems, Valencia, June 14-15, 2012.

A. B. Mejía, E. Rey, J. Alfonso, N. Sánchez and J. Torres. Sistema de Optimización de Rutas para los Servicios de Emergencia. In XII Congreso Español de Sistemas Inteligentes de Transporte. 2012.

A. B. Mejía, J. Torres, J. Alfonso, J. M. Menéndez and L. Merle. *Gestión de la Movilidad en OASIS. Integración de Servicios para la Gestión de Tráfico en una Arquitectura de Comunicaciones V2I I2V*. In XII Congreso Español de Sistemas Inteligentes de Transporte. 2012.

<b>Strategic Area</b>	<b>SCIENTIFIC IMPROVEMENT</b>		
<b>Action</b>	Application of research results to improve efficiency, safety, sustainability and accessibility of mobility in transport.		
<b>Cluster</b>	Mobility Cluster		
<b>Action Areas</b>	Teaching improvement/ Scientific improvement/ Transfer/ Integrated Social Campus		
<b>Partners</b>	UPM, UCM	<b>Others</b>	
<b>Start Date</b>	2012	<b>End Date</b>	2013
<b>Location</b>	Faculty of Physics, Optics Department,		
<b>Person Responsible for Action</b>	Eusebio Bernabeu Martínez		
<b>Contact Data (mail/tel...)</b>	<a href="mailto:ebnabeu@fis.ucm.es">ebnabeu@fis.ucm.es</a> /+34 91 394 45 53		
<b>Contact Person for service request or webpage where applicable</b>	Eusebio Bernabeu Martínez <a href="http://www.ucm.es/info/aocg/">www.ucm.es/info/aocg/</a>		
<b>Infrastructure involved</b>	Faculty of Physics.  Faculty of Optics and Optometry		
<b>Action Description and Rationale:</b>	The Complutense Group for Applied Optics (AOCG/UCM) is a recognised research group in the UCM Department of Optics. Its action framework is research in applied optics with emphasis on instrumentation, metrology and precision optics. The main action areas are sectors including machine tools, mobility, safety, emergencies and defence.		
<b>Objectives:</b>			
<ul style="list-style-type: none"> <li>• To implement a technological support network for other actions.</li> <li>• To engage in high quality research.</li> <li>• To research into improvements in mobility in terms of safety, efficiency, sustainability and accessibility.</li> <li>• To encourage technological transfer activities in the above areas.</li> </ul>			

- To implement the Master in Sustainable Mobility

**Use of human, material and economic resources:**

International aspects:

- Tourism of Things for Smart Destination
  - Contract type: INNPACTO-2012: "ToT" IPT-2012-0563-1000
  - Funding Source: Ministerio de Ciencia e Innovación
  - Participants: EZENTIS, DYLVIAN, FERROVIAL, WINHOTEL, PRODIGY CONSULTORES, BANKOI, CICTOURGUNE and UCM
  - Duration: 2012 - 2015
  - Lead Researcher: Eusebio Bernabeu
- Development of strategic research and engineering roadmaps in Systems of Systems Engineering and related case studies
  - Contract type: Grant agreement no: 288274
  - Funding Source: EU (European Union)
  - Participants: Steinbeis Innovation gGmbH, Karlsruher Institut für Technologie, Commissariat à l'énergie atomique et aux énergies, IFM Education and consultancy services alternatives, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Prodigy Consultores, UCM.
  - Duration: 2011 - 2013
  - Lead Researcher: Eusebio Bernabeu

**Expected impact:**

Institutional collaboration with the Ayuntamiento de Palma de Mallorca within the framework of the project INNPACTO-2012: "ToT" IPT-2012-0563-1000 for the use of CMOS cameras to control mobility of pedestrians in built up areas and vehicular traffic in critical situations.

**PROJECTS**

**Contract/Project Title: Grabación y Lectura de Encóderes Anulares "FORE"**

Contract type: IPT-020000-2010-9

Funding Source: Ministerio de Ciencia e Innovación

Participants: RofinBaaselEspaña,S.L.,FagorAutomation,Sdad.Coop.Ltda., UCM

Duration: 2010 -2013

Lead Researcher: EusebioBernabeuMartínez

**Contract/Project Title: PhotonicsTransceiver**

Contract type: Art. 83 LOU

Funding Source: Ministerio de Ciencia e Innovación

Participants: Alter, ESA, UCM

Duration: 2010 - 2013

Lead Researcher: Eusebio Bernabeu Martínez

**Contract/Project Title: Photonic transceiver for secure space communications**

Contract type: Art. 83 LOU

Funding Source: Tecnológica Ingeniería, Calidad y Ensayos, S.A.

Participants: Alter technology, UCM, Lidax, ICFO, UPV-ITEAM, Emxys, ThalesAlenia

Duration: 01/05/2008 - 01/09/2013

Lead Researcher: Prof. Eusebio Bernabeu

**Contract/Project Title: EffiCity**

Contract type: INNPACTO EFFICITY IPT-440000-2010-16

Funding Source: Ministerio de Innovación y Ciencia

Participants: MaatgNozzle. SL, I2Cat, Indal, Ekoplç, UCM.

Duration: 2010 - 2013

Lead Researcher: Eusebio Bernabeu

**Development of strategic research and engineering roadmaps in Systems of Systems Engineering and related case studies”**

**Contract type: Grant agreement no: 288274**

Funding Source: EU (European Union)

Participants: Steinbeis Innovation gGmbH, Karlsruher Institut fuer Technologie, Commissariat al energie atomique et aux energies, IFM Education and consultancy services alternatives, Fraunhofer-Gesellschaft zur fuerderung der angewandten forschung E.V, Prodigy Consultores, UCM.

Duration: 2011 - 2013

Lead Researcher: Eusebio Bernabeu

**Project Title: Asesoría en la construcción de superficies progresivas con superficies polinómicas**

Funding Source: Indizen Optical Technologies

Duration: 1/1/2010-31/12/2014

Lead Researcher: D. José Alonso Fernández, Juan Antonio Quiroga Mellado

**Project Title: Tourism of Things for Smart Destination”**

Contract type: INNPACTO-2012: "ToT" IPT-2012-0563-1000

Funding Source: Ministerio de Ciencia e Innovación

Participants: EZENTIS, DYLVIAN, FERROVIAL, WINHOTEL, PRODIGY CONSULTORES, BANKOI, CICTOURGUNE, UCM

Duration: 2012 - 2015

Lead Researcher: Eusebio Bernabeu

**Project Title: Desarrollo de sistema submarino autónomo, (UAV, Autonomous Underwater Vehicle) para detección temprana de vertidos en líneas submarinas.**

Contract type: INNPACTO AUV IPT-2012-0157-31000

Funding Source: Ministerio de Ciencia e Innovación

Participants: CEPSA, IXION, UCM

Duration: 2010 - 2013

Lead Researcher: Gonzalo Pajares Mantinsanz

**Project Title: Vialidad de sensores basados en tecnología de fibras ópticas para la detección de fugas de hidrocarburos en tuberías enterradas y /o submarinas”**

Contract type: ART 83 LOU

Funding Source: Compañía Española de Petróleos S.A. (CEPSA)

Participants: CEPSA, UCM

Duration: 2010 - 2013

Lead Researcher: Gonzalo Pajares Mantinsanz

**Project Title: Grabador fotolitografico de elementos opticos difractivos con moduladores espaciales de luz**

Funding Source: Ministerio de Ciencia e Innovación

Duration: 01/01/2012-31/12/2014

Lead Researcher: Luis Miguel Sánchez Brea

**Project Title: Computación científica con Python para módulos de evaluación continua en asignaturas de ciencias aplicadas.**

Funding Source: Universidad Complutense de Madrid

Duration: 01/10/2012-31/11/2013

Lead Researcher: Luis Miguel Sánchez Brea

**Publications related to CEI Campus Moncloa:**

- L.M. Sanchez-Brea, F.J. Torcal-Milla, “Self-imaging of gratings with two roughness levels”, *Optics Communications* 285 13–17(2012).
- I. Jimenez-Castillo, F.J. Torcal-Milla, F.J. Salgado-Remacha, L.M. Sanchez-Brea, E. Bernabeu, “Cabezales Blu-Ray como fuentes de luz versátiles: uso en fotolitografía de grabación directa”, *X Reunión Nacional de Óptica 2012, Zaragoza (España)*.
- F.J. Torcal-Milla, F.J. Salgado-Remacha, L.M. Sanchez-Brea, E. Bernabeu, “Near field of cylindrical gratings with point source illumination”, *8th EOS Topical Meeting on Diffractive Optics (DO 2012), Delft (Netherlands)*.
- J.M. Herrera-Fernandez, L.M. Sánchez-Brea, “Double DOE system for near-field imaging formation”, *8th EOS Topical Meeting on Diffractive Optics (DO 2012), Delft (Netherlands)*.
- F.J. Salgado-Remacha, José Antonio Sánchez-Martín, E. Bernabeu, *Procesado láser de fibras ópticas para el desarrollo de sensores de campo evanescente, X Reunión Nacional de Óptica 2012, Zaragoza (España)*.
- M. Irigoyen, I. Jimenez-Castillo, F.J. Salgado-Remacha, T. Morlanes, J. Zunzunegui, L.M. Sanchez-Brea, E. Bernabeu, *Redes de difracción sobre superficies metálicas cilíndricas mediante ablación láser, X Reunión Nacional de Óptica 2012, Zaragoza (España)*.
- M. Irigoyen, I. Jiménez-Castillo, F.J. Salgado Remacha, L.M. Sánchez-Brea, E. Bernabeu, *Redes de difracción sobre superficies cilíndricas mediante ablación láser, Óptica pura y aplicada, (En prensa)*.
- H. Castán, E. Perez, H. García, S.Dueñas, L. Bailon, J. Olea, D.Pastor, E. Garcia-Hemme, M. Irigoyen, G. Gonzalez-Diaz, *Electrical properties of Intermediate Band (IB) Silicon Solar Cells obtained by titanium ion implantation, 19th International Conference on Ion Implantation Technology, Valladolid (España)*.
- M. Irigoyen, E. Bernabeu, “EMERGENCY AND CRISIS MANAGEMENT. Roadmaps for System of System engineering Road2SoS project”, *RAMS in science Workshop, Madrid (España)*.
- J.L. Tercero-Gómez, E. Bernabeu, “Sensor regulador de sistemas de iluminacion urbana mediante tecnología de sensor CMOS”, *X Reunión Nacional de Óptica 2012, Zaragoza (España)*.
- J.L. Vilas, E. Bernabeu, L.M. Sanchez-Brea, “Obtención de la luz polarizada circular con altos grados de circularidad y estabilidad”, *X Reunión Nacional de Óptica 2012, Zaragoza (España)*.
- L.M. Sanchez-Brea, J.M. Herrera-Fernandez, E. Bernabeu, “Análisis de un sistema de doble elemento óptico difractivo parcialmente binario”, “Análisis de un sistema de doble elemento óptico difractivo parcialmente binario”, *X Reunión Nacional de Óptica 2012, Zaragoza (España)*.
- J.M. Herrera-Fernandez, L.M. Sanchez-Brea, E. Bernabeu, “Uso de Python para docencia en



- asignaturas de Grado en Óptica”, X Reunión Nacional de Óptica 2012, Zaragoza (España).
- E. Bernabeu, D. Vazquez-Molini, A. Fernandez-Balbuena, “Improvement in road security with optical systems and natural light,” *Securitas Vialis*, DOI 10.1007/s12615-012-9063-y.
  - J.L. Vilas, E. Bernabeu, L.M. Sanchez-Brea, Optimal achromatic wave retarders using two birefringent wave plates," *Appl. Opt.* 52, 1892-1896 (2013).
  - Javier Vargas, COS. Sorzano, JA. Quiroga, JC. Estrada, JM. Carazo, Fringe pattern denoising by image dimensionality reduction, *Optics And lasers in engineering*, 51 7 921-928 (2013).
  - Jose Maria Herrera-Fernandez, Luis Miguel Sanchez-Brea, Eusebio Bernabeu, Near-field shaping with two binary diffractive optical elements in tandem, *Optics Communications*, Volume 297, 15 June 2013, Pages 182-189.
  - Jose Luis Vilas, Luis Miguel Sanchez-Brea, and Eusebio Bernabeu, "Optimal achromatic wave retarders using two birefringent wave plates," *Appl. Opt.* 52, 1892-1896 (2013).
  - Eusebio Bernabeu, Tomás Morlanes, Jose Alonso, Luis Miguel Sanchez-Brea, Isidoro Jimenez-Castillo, Francisco Jose Torcal-Milla, Francisco Javier Salgado-Remacha, Maite Irigoyen. Configuraciones difractivas de doble paso para codificadores ópticos de la posición lineal y angular. V Congreso nacional de Metrología (Junio 2013)
  - Jose Luis Tercero, Luis Miguel Sanchez-Brea, José Luis Vilas, Francisco Jose Torcal-Milla, José María Herrera-Fernandez, Eusebio Bernabeu, Optimización de una red de sensores de vigilancia mediante la técnica de krigeado. VIII Reunión española de Optoelectrónica 2013.
  - Maite Irigoyen, Isidoro Jiménez-Castillo, Francisco Javier Salgado-Remacha, Luis Miguel Sánchez-Brea, Eusebio Bernabeu, Diffraction gratings over cylindrical surfaces by laser ablation, *Óptica Pura y Aplicada*. (En prensa)
  - J. Antón, J. Alonso, J. Pedrero, and J. Quiroga, "Topographic optical profilometry by absorption in liquids," *Opt. Express* 20, 28631-28640 (2012).
  - M. Navarro, J. Estrada, M. Servin, J. Quiroga, and J. Vargas, "Fast two-dimensional simultaneous phase unwrapping and low-pass filtering," *Opt. Express* 20, 2556-2561 (2012).
  - J. Vargas, J. Quiroga, C. Sorzano, J. Estrada, and J. Carazo, "Two-step demodulation based on the Gram-Schmidt orthonormalization method," *Opt. Lett.* 37, 443-445 (2012).
  - J. Vargas, J. Quiroga, C. Sorzano, J. Estrada, and M. Servín, "Multiplicative phase-shifting interferometry using optical flow," *Appl. Opt.* 51, 5903-5908 (2012).
  - J. Estrada, J. Vargas, J. Flores-Moreno, and J. Quiroga, "Windowed phase unwrapping using a first-order dynamic system following iso-phase contours," *Appl. Opt.* 51, 7549-7553 (2012).
  - M. Silva-López, A. Cuadrado, N. Lombart, and J. Alda, "Antenna array connections for efficient performance of distributed microbolometers in the IR," *Opt. Express* 21, 10867-10877 (2013).
  - E. Briones, J. Alda, and F. González, "Conversion efficiency of broad-band rectennas for solar energy harvesting applications," *Opt. Express* 21, A412-A418 (2013).
  - Cuadrado A, Alda J, González F; Multiphysics simulation for the optimization of optical nanoantennas working as distributed bolometers in the infrared. *J. Nanophoton.* 0001;7(1):073093-073093. doi:10.1117/1.JNP.7.073093.
  - M. Silva-López, J. Rico-García, and J. Alda, "Measurement limitations in knife-edge tomographic

phase retrieval of focused IR laser beams," *Opt. Express* 20, 23875-23886 (2012).

- Cuadrado A, Alda J, González F; Distributed bolometric effect in optical antennas and resonant structures. *J. Nanophoton.* 0001;6(1):063512-1-063512-12. doi:10.1117/1.JNP.6.063512.
- Alexander Cuadrado; Francisco J. González; Jordi Agustí; Javier Alda; Material dependence of the distributed bolometric effect in resonant metallic nanostructures. *Proc. SPIE* 8457, Plasmonics: Metallic Nanostructures and Their Optical Properties X, 845724 (October 9, 2012); doi:10.1117/12.934124.
- María Izaguirre Gilsanz; Fabricación de redes de difracción sobre acero mediante microprocesado láser, Trabajo Académicamente Dirigido (Licenciatura en Física), F. Javier Salgado Remacha y Luis Miguel Sánchez Brea, julio 2012 Calificación: 9.5 (sobresaliente) Universidad Complutense de Madrid.
- Maite Irigoyen Irigoyen; Sistema de control de posicionado de haces láser para micrograbación láser en superficies cilíndricas, Trabajo Fin de Máster (Máster en Física Aplicada), F. Javier Salgado Remacha y Luis Miguel Sánchez Brea, septiembre 2012, Calificación: 9.0 (sobresaliente) Universidad Complutense de Madrid.
- Ana Rodríguez Aramendía; Transductores de fibra óptica para la detección de fugas de hidrocarburos, Trabajo Académicamente Dirigido, F. Javier Salgado Remacha y Luis Miguel Sánchez Brea, septiembre 2012, Calificación: 9.0 (sobresaliente) Universidad Complutense de Madrid.
- Anahí Villalba Pradas; Optimización e implementación de sensores de campo evanescente en fibra óptica para la detección de fugas de hidrocarburos en la superficie del mar, Trabajo Académicamente Dirigido, F. Javier Salgado Remacha y Luis Miguel Sánchez Brea, septiembre 2013, Calificación: 9.0 (sobresaliente) Universidad Complutense de Madrid.
- F.J. Salgado-Remacha, J.A. Sánchez-Martín, E. Bernabeu, " On location of a focused Gaussian beam inside a refractive cylinder," *Optics and lasers in Engineering* (En prensa).
- J.A. Sánchez-Martín, J.M. Álvarez, M.A. Rebolledo, A. Díez, M.V. Andrés, Amplifiers and lasers based on erbium-doped photonic crystal fiber: Simulation and experiments, *IEEE Journal of Quantum Electronics*, U.S.A, Vol. 48, Nº 3, pp. 338-344, 2012
- J.A. Vallés, V. Berdejo, M.A. Rebolledo, A. Díez, A., J.A. Sánchez-Martín, M.V. Andrés, Dynamic characterization of upconversion in highly Er-doped silica photonic crystal fibers, *IEEE Journal of Quantum Electronics*, U.S.A, Vol. 48, Nº 8, pp. 1015-1022, 2012
- J.A. Sánchez-Martín, M.A. Rebolledo, J.M. Álvarez, V. Berdejo, A. Díez, M.V. Andrés, Erbium-doped photonic crystal fiber lasers optimization by microstructure control: experimental study and analysis, *Appl. Physics B: Laser and Optics*, Alemania, Vol. 110, Nº 4, 579-584, 2013
- J.C. Martín, V. Berdejo, J.A. Vallés, J.A. Sánchez-Martín, A. Díez, M.V. Andrés, Study of the use of methanol-filled-Er-doped Suspended-core fibres in a temperature-sensing ring laser system, *Laser Physics*, Rusia, (en proceso de revisión).
- Luis Miguel Sanchez-Brea, Francisco Jose Torcal-Milla, Self-imaging of gratings with two roughness levels, *Optics Communications*, Volume 285, Issue 1, 1 January 2012, Pages 13-17, ISSN 0030-4018
- Francisco Jose Torcal-Milla, Luis Miguel Sanchez-Brea, Eusebio Bernabeu, Near field of stacked diffraction gratings, *Optik - International Journal for Light and Electron Optics*, Available online 30 May 2013, ISSN 0030-4026.
- José Luís Tercero Gómez; Sensor regulador de sistemas de iluminación urbana mediante tecnología de sensor CMOS, Trabajo fin de Máster del Máster en Física, F.J. Torcal-Milla,



septiembre 2012, Calificación: 9.0 (sobresaliente) Universidad Complutense de Madrid.

- David Pérez Sánchez; Protocolos de criptografía cuántica y telecomunicaciones seguras, Trabajo Académicamente Dirigido, F.J. Torcal-Milla, septiembre 2012, Calificación: 9.0 (sobresaliente) Universidad Complutense de Madrid.
- Eusebio Bernabeu, José Luís Tercero and Maite Irigoyen, Case Studies in System of Systems, Enterprises, and Complex Systems Engineering, Ed Taylor & Francis, (En proceso de publicación)
- Experimental verification of intermediate band formation on titanium-implanted silicon H. Castán, E. Pérez, H. García, S. Dueñas, L. Bailón, J. Olea, D. Pastor, E. García-Hemme, M. Irigoyen and G. González-Díaz, J. Appl. Phys. 113, 024104 (2013).
- H. Castán, E. Pérez, H. García, S. Dueñas, L. Bailón, J. Olea, D. Pastor, E. García-Hemme, M. Irigoyen and G. González-Díaz, Electrical Properties of Intermediate Band (IB) Silicon Solar Cells obtained by titanium ion implantation, 19th International Conference on Ion implantation technology, Valladolid, Spain, June 25-29, 2012.
- Eusebio Bernabeu, Maite Irigoyen, Emergency and Crisis Management Roadmaps for System of Systems engineering Road2SoS project, International Workshop on Reliability Engineering in Scientific Installations, Thursday 27 September 2012 - Friday 28 September 2012
- Roadmapping Workshop on Systems of Systems in Emergency and Crisis Management, Madrid 26th October 2013. Director: Eusebio Bernabeu
- Workshop de difusión sobre Planes de trabajo para Sistemas-de-Sistemas en Ingeniería (SoSE) en la gestión de emergencias y crisis. Madrid 20 de Junio de 2013: Director: Eusebio Bernabeu.

<b>Strategic Area</b>	<b>TEACHING IMPROVEMENT AND ADAPTATION TO EUROPEAN HIGHER EDUCATION AREA</b>
<b>Action</b>	A2. ADAPTATION OF TEACHING INFRASTRUCTURE TO EHEA DEPLOYMENT
<b>Objectives</b>	<p>To adapt teaching facilities to face the new challenges of the EHEA and the internationalization of the Campus by:</p> <ol style="list-style-type: none"> <li>1. Adapting classrooms, areas and furnishings to provide more flexible mobile learning areas to facilitate student –teacher interaction.</li> <li>2. Incorporating new teaching tools and networking to enable online access to teaching material and class work.</li> <li>3. Setting up multimedia classrooms enabling real time online teaching and establishing a teaching network between the Campus institutions and other Spanish and international universities.</li> </ol>
<b>Progress towards objectives</b>	
All the actions described in the aims are already underway	
<b>Description of work carried out and role of partners. Governance structures created</b>	
<p>a) <i>Campus Virtual</i>.</p> <p>For the on-line <i>Campus Virtual</i>, SAKAI open learning software was acquired with the equipment needed to implement it and was completely installed by September 2011. The new platform was in use by academic year 2011-2012. Integration with Adobe Connect and other available resources was also implemented in 2011-2012.</p> <p>b) Distance learning classroom:</p> <ul style="list-style-type: none"> <li>• The installation and roll out of the <i>Aula de Telepresencia-1</i> in the central Campus building (Edificio Jardín Botánico), with the material required to record and upload master classes, tutorials, seminars, generate multimedia content for the open learning campus and use video conferencing. The equipment includes: <ul style="list-style-type: none"> <li>○ Interactive projector, hybrid surface 16:10 format whiteboard for projection and writing, rack and table connection boxes, wall-mounted SONY EVI camera with ¼" color CCD image sensor.</li> <li>○ Computer for teacher, with keyboard and wireless mouse with laser sensor.</li> <li>○ Computer for capture devices, HD/SD capture device, VGA-DVI capture device, production and live streaming software, 8x8 VGA and audio stereo matrix switcher, cordless microphone system, flexible microphone, 3-input stereo mixer, 2 compact HiFi loudspeakers, audio mixer, control system, rack.</li> <li>○ Rack and wall installation, connection boxes, cables and all other elements required.</li> </ul> </li> <li>• Installation of <i>Aula de Telepresencia-2</i> in the auditorium in the UCM Chancellor's Office to record and upload master classes, tutorials, seminars and generate multimedia content material for the <i>Campus Virtual</i> etc. The corresponding equipment includes: <ul style="list-style-type: none"> <li>○ 3 wall-mounted robot cameras</li> <li>○ Laptop with camera and software, memory card, dazzle DVD recorder.</li> <li>○ Installation and cabling required for the equipment and network access points.</li> </ul> </li> <li>• Acquisition of portable material to enable videoconferencing and streaming or live video</li> </ul>	



broadcasting, standard quality, which can be used in the distance learning classrooms or other areas of the campus as required:

- Laptop, HSDS capture device, VGA DVI capture device, broadcasting software
- Hand held and lapel microphone, boom, closed headphones, camera tripod with case, 9"LCD monitor, case with 3 quartz lights and tripod

The portable equipment is kept in the Faculty of Education.

- Acquisition of portable equipment for high video recording and viewing for use in the distance learning classrooms or as required in other university areas:
  - Canon 14x optical zoom HD digital camcorder, tripod adapter, charger with 2 batteries, memory card and carrying case
  - HD video and audio recorder

This equipment is also kept in the Faculty of Education.

- c) Actions in areas including the Library, Multimedia, on-line Campus Virtual and Area Management and the implementation of a Collaborative Environment.

The Library is a support service for learning, teaching and research in the University, and uses appropriate software tools to manage and update information on all library books and document collections, and to manage user loans. Among all the Library management programs, the catalogue search facility is of particular importance, to ensure that all users can access the resources available. To ensure this, given the increasing demand, a new server was acquired to improve response times and update the Millennium Library management software to the latest version to improve catalogue and indexing performance.

During 2012 the equipment needed to improve the services as described above was acquired and installed and is currently providing the services as planned.

#### **Most significant results**

- The SAKAI platform has allowed on-line presentation of 528 subject areas, with 288 teachers. It also enabled more than 130 videoconferencing sessions to be held last year using Adobe Connect videoconferencing communication platform.
- The *Aula de telepresencia 1* offers its services to 6595 teaching and research staff on the Moncloa Campus, and may be booked by any university teacher or administrative staff. The devices are controlled by a wireless touch screen with a user friendly menu which allows the movement of the teacher in the classroom and the independent use of the equipment.
- The *Aula de telepresencia 2*, has enabled more than 50 sessions where some 200 hours of activities have been recorded and streamed.
- The mobile filming equipment has allowed on-demand recording and broadcast of videoconferences and teaching and academic activities, as well as the possibility of setting up a mobile distance learning classroom in any area with network connection.
- Improved performance of the applications and user response time.
- New infrastructure for installing the research website *Portal del Investigador*, Academic Management and on -line Administration.

#### **Use of human, material and financial resources**

CEI 2009 funding has been deployed to implement the actions described. The final developments took

place in the first semester of 2013, so that this expenditure will be audited next year.

**Most significant deviations from progress towards objectives.**

Work has been completed as scheduled in the Strategic Plan.

**Corrective Actions proposed**

N/a



<b>Strategic Area</b>	<b>TEACHING IMPROVEMENT AND ADAPTING TO THE EUROPEAN HIGHER EDUCATION AREA</b>
<b>Action</b>	A7. IMPROVING THE DATA NETWORK AND COMMUNICATIONS
<b>Objectives</b>	To provide improved accessibility and broadband to enable the production of new services and applications for the university community and the integration in new R&D initiatives at a national and international level.
<p><b>Progress towards objectives</b></p> <p>In April 2013, the Chancellors of the three public universities in the Ciudad Universitaria –<b>José Carrillo</b> (Complutense), <b>Carlos Conde</b> (Technical University) and <b>Juan A. Gimeno</b> (UNED) – signed an agreement by which the three universities would share the use of the optic fibre installation and cables of each one, so that each institution would be able to extend its own academic communication network efficiently and economically. The agreement signed was to include the UNED in the project.</p> <p>Granting mutual rights to use communications infrastructure means a <b>significant saving for each of the three institutions</b> with centres and services scattered and mixed in adjacent areas in the Ciudad Universitaria: they thus agree to the regulated use of existing and future installations independently of which university these belong to. The agreement means an <b>important improvement in the speed and capacity of the academic and scientific communications network used by university staff with connection to REDIMADRID, the Madrid region’s high capacity network</b>, and also to the national RedIRIS network; both these networks allow 10 Gb connections, an essential requisite for some of the ambitious R&amp;D projects which are underway in the three universities.</p>	
<p><b>Description of work completed and role of partners</b></p> <p>In terms of the actions in areas of network infrastructure and security, this description can be subdivided into three action areas:</p> <ol style="list-style-type: none"> <li>1. Enterasys security console. The new user license has been in operation since late August 2012, with maintenance renewal.</li> <li>2. Acquisition of Palo Alto firewall. The new equipment is installed and operative since February 2013.</li> <li>3. Laying of fibre optic cables:             <ul style="list-style-type: none"> <li>• Connection with the Museo del Traje (Costume Museum): The work was completed in 2012 and the connection has been available since then.</li> <li>• Updating of the fibre backbone in various buildings (Faculty of Physics, Biology-Geology, Philology, Edificio de Alumnos and Colegios Mayores) to allow future 10Gb connection. Completed 2012.</li> <li>• Connection to the Rediris Nova point located in the CIEMAT. Finished in 2012, this is waiting for RediMadrid to activate the connection nodes.</li> </ul> </li> </ol>	

### Governance structures created

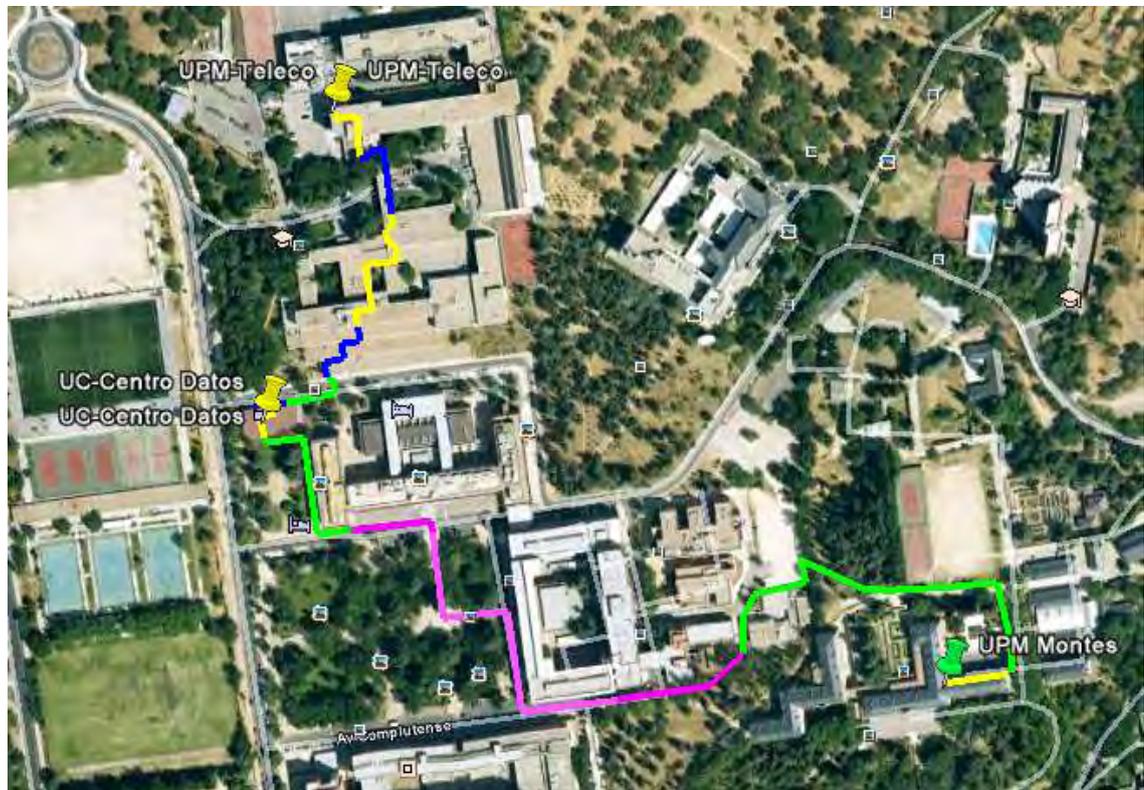
N/a

### Most significant results

- Protection from attacks and other security problems in servers and work stations. Average 1000 attacks logged per month.
- Improved broadband management allowing greater granularity in policy definition.
- Eliminating points of failure in old non-maintained equipment.
- New simpler and more secure SSL VPN which allows its use to be extended to students and enables the use of scientific software licenses and provides the university community with access to off-campus bibliographic resources.
- Network connection from the Museo del Traje building enabled since October 2012.
- Connection of UCM network to 10G fibre.

The graphics below show the optic fibre route between the UPM facilities

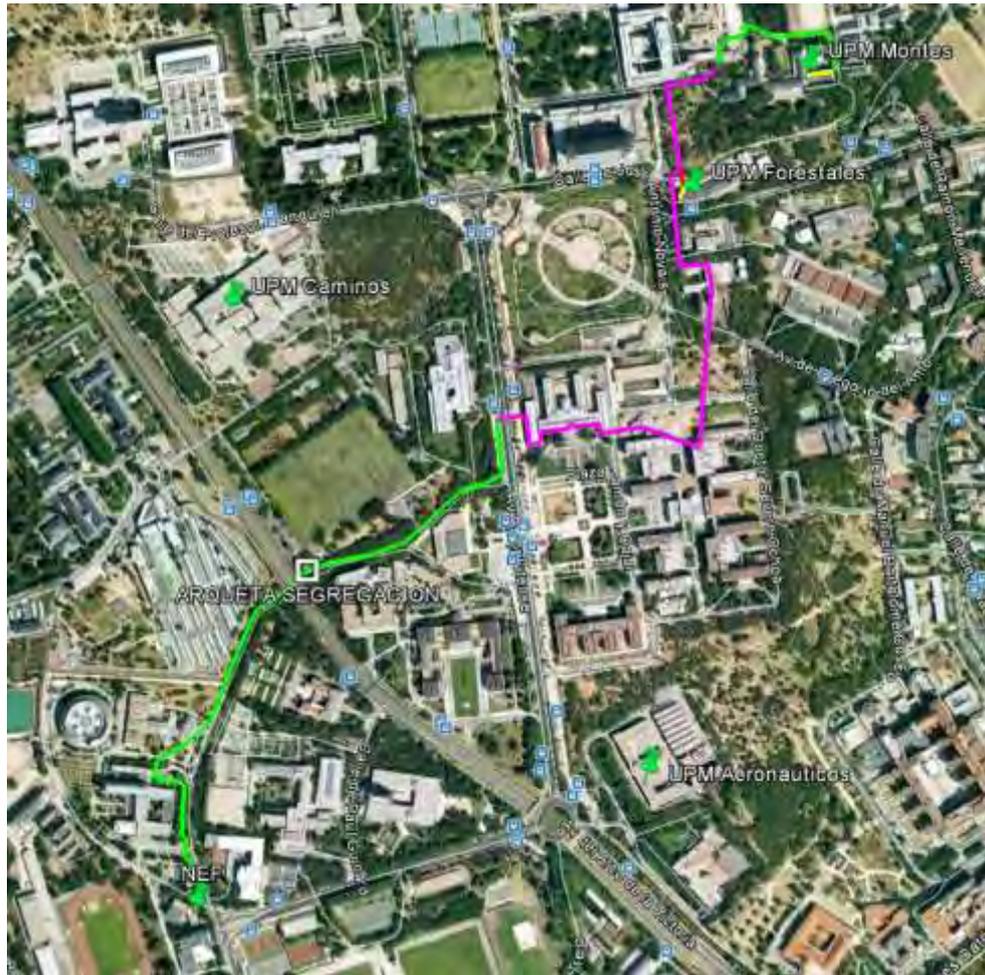
### Section 1: ETSI Telecomunicaciones-ETSI Montes



This section runs from the Escuela Técnica Superior de Ingenieros de Telecomunicaciones to the Escuela Técnica Superior de Ingenieros de Montes passing through the Data Centre. A 64 single-mode optical fibre cable was installed in this section because of the different types of cable installations.



### Section 3: ETSI Montes- ETS de Arquitectura



This section in fact runs from the INEF passing through the Escuela Técnica Superior de Arquitectura to the *arqueta de segregación-1*. A 64 single-mode optical fibre cable was installed in this section because of the different types of cable installations.

The 8 mts. of new underground cabling in sub-section 52, were laid to join the existing underground cabling in sub-section 50 to sub-section 53. The construction of an 80 x80 manhole was also needed as well as access for the new cabling to the gallery.

#### Use of human, material and financial resources

The cost of this action was 671.563€ funded by *Fortalecimiento 2010*

#### Most significant deviations in progress towards objectives

N/a.



<b>Strategic Area</b>	<b>TEACHING IMPROVEMENT AND ADAPTING TO THE EUROPEAN HIGHER EDUCATION AREA -EHEA</b>
<b>Action</b>	A3 and A4. INTERNATIONAL POSTGRADUATE SCHOOL CEI MONCLOA (EIP-MONCLOA)
<b>Objectives</b>	<p>Creation and implementation of the International Postgraduate School CEI Moncloa, making the Campus an international reference for postgraduate education.</p> <p>The specific aims are to:</p> <ol style="list-style-type: none"> <li>1) Encourage the development of inter-university Master courses, particularly with the UCM and UPM, streamlining the joint offer of both universities to maximize use of their resources.</li> <li>2) Increase the number of foreign students enrolled in Master programs.</li> <li>3) Promote student and teacher exchanges with other Spanish and international universities and increase the number of foreign teachers on the Moncloa Campus.</li> </ol>
<p><b>Progress towards objectives</b></p> <p>During this period the UCM/UPM collaboration protocol was signed on 21 May 2013. This establishes: the Academic Committee, the main location for the School, and a maximum timeframe of five months to implement the Action.</p> <p>Prior to the start of EIP activity, joint educational events were already run during the UCM and UPM summer courses in 2012 and 2013.</p> <p>The courses given as the result of this collaboration are listed below:</p> <ul style="list-style-type: none"> <li>- <a href="#">Observación de satélite y riesgos naturales</a></li> <li>- <a href="#">Astrofísica del siglo XXI: la ciencia del universo</a></li> <li>- <a href="#">Los Desafíos de las Ciudades del Futuro</a></li> <li>- <a href="#">La encrucijada de la energía: Energías del Futuro.</a></li> <li>- <a href="#">Patrimonio Histórico Cultural Iberoamericano</a></li> </ul>	
<p><b>Description of work completed and role of partners</b></p> <p>The EIP is a university entity dependent on both partner universities, responsible for the academic organization of activities leading to the awarding of the degree of Master, to the Universities' own qualifications and Lifelong Learning programs. It is also expected to organize specialist courses, symposia, meetings and other future training and educational events. The School was formally established on 21 May 2013, with the signing of the implementation protocol by both partners and will start to offer Masters and other courses in academic year 2013/2014.</p>	

The EIP brings together the competent academic bodies from the UCM and UPM at this level and is responsible for promoting the course programs, encouraging inter-university actions and collaboration and the participation in these of public and private institutions and companies.

The EIP intends to play an essential role in shaping the educational and training activities of the CEI Campus Moncloa, which should be both closely linked to R&D activities on Campus and to the wider social environment which it is intended to serve.

The guidelines for the School's activity are based on the teaching and research of the staff of the two partner universities in the CEI Campus Moncloa, and on its collaboration with other partner organizations, institutions and companies to ensure a wider social awareness of campus activities in terms of the configuration and potential of human capital inherent in the CEI Campus Moncloa.

The acceptance criteria for qualifications in the EIP-Moncloa take the following factors into account:

**Origin:** The Masters should be proposed mainly by teaching staff from the various Schools and Faculties of the two partner universities or CEI Clusters and must always be approved by the Schools and Faculties concerned.

**Excellence:** Measured by Spanish and International Evaluation Agencies. Requisites for student acceptance and staff CVs.

**International features:** Provenance and/or careers of students and teaching staff, international relevance of the content, working language, etc.

**Effective use of the Campus:** Advantage should be taken of Campus synergies, in particular the participation of teaching and technical staff from both partner universities (UCM/UPM) and other partner institutions, and the joint use of their infrastructures and resources (classrooms, workshops, laboratories).

**External relations:** It is also essential to count on the support and participation of external companies, organizations and foundations to contribute both funding (in the form of agreements, collaboration or contracts) and expertise or know-how, and also to facilitate essential contacts in the industrial sector and wider society with a view to future professional opportunities for students.

**Contents:** These must be novel in terms of inter-disciplinarity, opportunity, emerging technologies, new uses of existing technologies and future projection and should take advantage of potential niches identified in the UCM and UPM, and on a national and international scenario.

**Methodology:** This must be innovative in aspects of both course content and methodology, technology, modules or coaching, to provide an offer attracting potential students.

**Long term projects:** The long term projection envisages the possible extension to include Doctoral Courses.

**Demand:** The proposed courses must be based on the real demand expected from both provisional and confirmed enrolments, with a minimum intake of at least 20 students.

The central office of the EIP has been installed on the ground floor of the UCM *Edificio Multiusos 2*. The School has been assigned the following facilities: Room 1 (SI- 172.25 m<sup>2</sup>) with the main entrance and general area with access to toilets and other rooms (the definitive use of these is still pending) giving onto a patio (167.7 m<sup>2</sup>); Room 2 (SII - 37 m<sup>2</sup>) which will be used as a study area or open plan offices; Room 3 (SIII - 292.50 m<sup>2</sup>,) which will be used for classrooms, meeting room and office space, and finally an auditorium (SA - 307 m<sup>2</sup>.) Work is currently underway to provide the required spatial distribution of the School and the Masters offered in the current academic year will therefore start their courses in the relevant Faculty or School.

The joint UCM-UPM Master courses already envisaged in the EIP-Moncloa framework and which **will be**



offered in academic year 2013-2014 are:

- [Máster Universitario en Producción y Sanidad Animal](#). [Master in Animal Production and Health]
- Máster Universitario en Tratamiento Estadístico Computacional de la Información. [Master in Statistical Computer Information Processing]
- Máster Universitario en Gestión de Desastres (pending approval by ANECA). [Master in Disaster Management]

In addition, various academic committees have been appointed, with members from different UCM and UPM Faculties and Schools, responsible for the design of new Master programs which meet the criteria of the EIP-Moncloa and which may be offered in academic year 2014-2015. These include the following:

- Máster Interuniversitario en Estrategias y Tecnología para el Desarrollo: La cooperación en un mundo en cambio. [Inter-university Master in Strategies and Technologies for Development: Cooperation in a changing world]
- Máster Interuniversitario en Gestión de Áreas de Alta Montaña. [Inter-university Master in Management of Upper Mountain areas]
- Máster Interuniversitario en Ingeniería de Materiales. [Inter-university Master in Materials Engineering]
- Máster Interuniversitario en Gestión del Patrimonio Cultural en el Siglo XXI. [Inter-university Master in the Management of Cultural Heritage in the 21<sup>st</sup> Century]

The CEI clusters are also continuing to work on the design of other official Master programs related to the specialisms in each area, which may also be included in the EIP-Moncloa.

#### **Governance structures created**

The Academic Committee created to set up the EIP-Moncloa includes the following members:

##### From the UPM:

- General Campus Coordinator and Vice-Chancellor for Research: Roberto Prieto López
- Vice-Chancellor for Academic Planning and Doctoral Studies: Emilio Mínguez Torres
- Assistant to the Vice-Chancellor for Academic Planning and Doctoral Studies: Francisco Javier Elorza Tenreiro

##### From the UCM:

- General Campus Coordinator and Vice-Chancellor for Research: J. Francisco Tirado Fernández
- Vice-Chancellor for Postgraduate Studies and Further Education: José María Alunda Rodríguez
- Vice-Chancellor for Quality Control: Elena Gallego Abaroa

##### Director of the EIP:

D. Antonio Dobado González

**Most significant results**

- Signing of the protocol for the creation of the EIP-Moncloa and the start of its activities.
- Planning and implementation of the inter- university Masters for academic year 2013-2014:
  - Máster Universitario en Producción y Sanidad Animal.
  - Máster Universitario en Gestión de Desastres (pending approval by ANECA).
- Organization and work of the inter-centre academic committees for the design and creation of new Master courses for the academic year 2014-2015 mentioned above.

**Use of human, material and financial resources**

The work carried out to date has not incurred significant costs. The work to alter and equip the main building for the School will take place in the last quarter of 2013.

The syllabus for each course has been drawn up by the staff of the partner universities.

**Most significant deviations in progress towards objectives**

On 2 February 2010 the Governing Committee took the decision to create a single Postgraduate School (EIP) combining the two Actions originally proposed: the International Doctorate School and the International Postgraduate School.

The creation of the EIP has been pending for a some time, awaiting publication of the official decision on Doctoral Studies. The relevant *Real Decreto 99/2011, de 28 de enero*, published in 2011, regulates official Doctoral Programs. After it was published, the CEI Moncloa partner universities had then to devise their own regulations for their doctoral schools and adapt this joint postgraduate school to them. Once this legal framework had been established, the EIP- Moncloa was created.

**Proposal for corrective action**

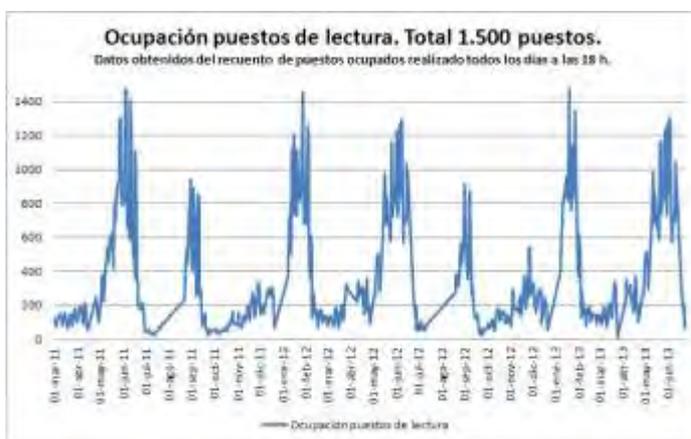
N/a. Work has been carried out as planned.

<b>Strategic Area</b>	<b>TEACHING IMPROVEMENT AND ADAPTATION TO EUROPEAN HIGHER EDUCATION AREA</b>
<b>Action</b>	A8. Improvement of the María Zambrano Library (BMZ)
<b>Objectives</b>	Since the BMZ opened in 2011 work has continued on the facilities to increase services offered to users

**Progress towards objectives**

The re-inauguration of the BMZ, planned for October 2013, after the second phase of CEI Actions, represents a real milestone for the CEI Moncloa Campus. The space made available to the public to date in the BMZ has allowed:

- Improved student/study space ratio for the Law and Philology Faculties which both have large student numbers. As well as this, it has meant a significant increase in the study spaces on offer in the UCM libraries and in general terms on the Moncloa Campus as a whole, offering direct service to the university community of around 65,000 students and more than 5,000 teachers and researchers.
- The BMZ will be the library of reference on the Moncloa Campus, and in terms of surface area and provision of study spaces is the largest university library in Spain and one of the most important in Europe.
- The improvements in the library service are outstanding. Concentrating the main part of the collections in highest demand in both Faculties into the BMZ allows these to be made available in spacious areas with easy user access, while the rest of the collections still in their original locations are those less requested by users, therefore meaning a reduced staff workload. This selection of library stocks, arranged for easy user access, plus the implementation of a user friendly, efficient self issue/return facility, guarantee a quality service and are a considerable improvement over the previous situation.
- It also means a significant improvement in special extended seasonal opening hours on the Moncloa Campus. Since it was opened in February 2011, the BMZ has played a major role in the policy of extended library opening hours on the Moncloa Campus during exam periods. This had been repeatedly requested by students and is achieving increasingly improved satisfaction ratings in user surveys due to the comfortable and spacious facilities. These results are expected to improve considerably after the Actions implemented in the Project Phase 2.



spaces freed in the original teaching centres can now be re-used by these Faculties for teaching and research. Secondly, the improved offer in the BMZ itself of study spaces and areas adapted to different

- Two-fold impact on improved teaching and research. First, the

needs will have very positive repercussions on learning and research and will encourage library use. Recent studies show that students who use libraries obtain better academic results and have a lower dropout rate (<http://www.jisc.ac.uk/publications/browsetypes/reports.aspx>). It has also been shown that the students who are prize-winners at the end of their degree course are among the most active library users.

#### **Description of work carried out and role of the partners.**

The Moncloa Campus includes the UCM Library, the largest in Spain, with around 3.000.000 volumes, the second most important historical collection after the Biblioteca Nacional and digital collections comparable to other top ranking world-class university libraries. One of the Strategic Actions of the Moncloa Campus has been the creation and implementation of the María Zambrano Library (BMZ), a new library facility intended to concentrate library stock previously scattered in different locations (collections from the Law Faculty Library and the Philology Faculty Library in Faculty Buildings A and B) to allow a reallocation of space for teaching and research in the Faculties of Law, Philology, Geography and History. The BMZ offers its services to all the surrounding teaching centres, including various UCM Faculties and UPM Schools including the School of Civil Engineering (Escuela Técnica de Ingenieros de Caminos, Canales y Puertos). The design of the BMZ is configured as an advanced Resources Centre for Teaching and Research (CRAI). Its freely accessible rooms, with their perfectly finished architectonic features and a surface area of around 8.000 m<sup>2</sup> with a capacity of 2.200 study spaces adapted to different needs (group work, study, research and reading), completely justify its use as a library area without further delay, even though the overall original plan for the BMZ has not been fully implemented. This included plans to create, under the Philology and Law buildings, large research rooms, meeting rooms and work areas and for large scale stacks with the potential capacity for housing all UCM library stocks.

The Actions carried out to date for the opening and improvement of the BMZ within the CEI framework were in two phases:

##### First phase

The first Action, included in CEI 2009, was implemented in late 2010 /early 2011:

- Acquisition of furnishings for the entrance hall, group workroom, much in demand as a result of the implementation of the EHEA, and one of the two large reading rooms, intended for the Philology Dept Library Collection, with the creation of 1500 study spaces and shelving for more than 90,000 volumes.
- Provision of 46 computers.
- Implementation of wifi infrastructure for 100 laptops.

This enabled the inauguration of the library in February 2011. The entrance hall and group work room were designed for shared use of BMZ partner libraries. The entrance hall includes a large exhibition space which housed several successful exhibitions and cultural events during the *Semana de la Ciencia* and the *Semana Complutense de las Letras*.

##### Second phase

The CEI 2009 and 2010 envisaged additional Actions, carried out in 2013 and which include:

- Acquiring new furniture for opening to the public for the first time the other large reading room (Sala Rafael Ureña), intended to house the Law Library Collection. This meant the number of study spaces in the BMZ increased to a total of around 2200.
- Moving the collections from the reading room of the Law Dept Library (15,000 volumes) and of the high demand items from the Philology Library (60,500 volumes) to their respective new Reading Rooms.
- Implementing a modern radiofrequency system (RFID) to manage the stocks, loans and security of the collections.
- Reinforcing the electrical and IT infrastructures and the wifi connection in the BMZ.



**Most significant results**

- Increased number of study spaces used on the Campus.
- Improved number of study spaces/student ratio on Campus.
- Improved efficiency of the user and lending services in the partner libraries.
- Recovery of areas currently used by library services for teaching and research.
- More efficient deployment of user help resources.
- More efficient extended library opening library hours.

**Use of human, material and financial resources**

- The first phase of CEI Actions in the BMZ required the purchase of equipment to a total value of 296.020€
- The second phase of the CEI Actions in the BMZ requires a total investment of 394,019.00€. The main costs apart from the minor costs of repairs, optimization of electrical installations and signage are:
  - Furniture (tables, chairs, shelving etc.): 252,113.94€.
  - Transfer of library stocks from the Law and Philology Department Libraries: 17,769.00€.
  - Reinforcing the wifi installation with new antennas, installing additional voice and data points and 2 information screens: 15,694.49€.
  - IT equipment (32 laptops, 4 scanners, 1 digital whiteboard and mobile storage cupboard for laptops: 20,687.87 €.

- Installing radiofrequency system (RFID): 71,994.40€

**International aspects:**

- The BMZ will become a university library of reference in Spain and on the international scene, offering facilities and services similar to the best European university libraries.
- The offer of study spaces for researchers reinforces the existing availability in other libraries on the Moncloa Campus and provides appropriate study and research areas for international students and researchers, whose numbers have already increased and are expected to continue to grow as a result of the internationalization efforts of the UCM and UPM, with the backing of the CEI.

**Expected impact:**

- Increase in number of study spaces used on the Campus.
- Improved student/study space ratio on the Campus.
- Improved efficiency of user and lending services in the partner libraries.
- Recovery of spaces currently occupied by libraries for teaching and research use.
- Efficient deployment of user help desk resources.
- Efficient extended library opening hours.

**Most important deviations from progress towards objectives**

N/a

**Proposal for corrective action**

N/a



<b>Area</b>	<b>TEACHING IMPROVEMENT AND ADAPTATION TO EUROPEAN HIGHER EDUCATION AREA</b>
<b>Project</b>	A26 SCHOOL OF GOVERNMENT
<b>Objectives</b>	Two primary objectives: First, to connect with the tradition of the most prestigious schools of government in order to update course materials and teaching approach to align them with the current demands of society. Second, to combine the excellent work done at the CEI Moncloa, mainly in the field of technology, with the potential of the UCM and UPM in the public management field, with particular emphasis on technology management.
<p><b>Progress towards goals</b></p> <ul style="list-style-type: none"> <li>The protocol creating the School of Government (SG) was signed during the meeting of the Governing Council of 21 May 2013. This protocol appointed a joint commission to define the syllabus and set up the School of Government. Members from the UPM: Vice-Chancellor for Academic Planning and Doctorate Studies Jorge Pérez Martínez, or his delegate - University Professor - School of Telecommunications Engineering, and Antonio Hidalgo Nuchera - University Professor - School of Industrial Engineering.  Members from the UCM: Vice-Chancellor for Postgraduate Studies and Continuing Professional Development María Esther del Campo García, or her delegate. University Professor. Faculty of Political Sciences and Sociology. Director of the University Institute of International Studies (ICEI), and Emilio Cerdá Tena. University Professor. Faculty of Political Sciences and Sociology. The Director of the International School of Postgraduate Studies, Antonio Dobado, is also a member of the commission.</li> <li>The preliminary report on the creation of the SG, "CEI Campus Moncloa School of Government: Strategic Decisions", was prepared.</li> </ul>	
<p><b>Description of the projects completed and the role of each partner</b></p> <p>Building on the document that laid the foundation for the School of Government of the UCM-UPM Campus of International Excellence, which was approved by the Ministry during the 2010 call for proposals, the commission created to set up the SG held a number of board meetings and encounters with various national and regional organisations, and commissioned a study on the leading European and US Schools of Government. Based on these, the Commission took a number of strategic decisions relating to the final profile of the project. These decisions, though not yet fully implemented, are summarised below:</p> <p>I. PROFILE OF THE SCHOOL</p> <p>The SG will essentially be an academic institution dedicated to training professionals for leadership roles and public management in the broadest, most current, sense. A number of research lines, consultancy and technical assistance (terms of reference - ToR) activities will also be implemented, together with surveys,</p>	

studies and dissemination activities - in short, a series of activities aimed at developing the ability of the School to help improve public life, while opening additional funding channels. The School will not, in principle, cater for students wishing to prepare for public service exams, although the possibility of participating in the continuing professional training of public servants attached to different government offices with *ad hoc* or more general courses cannot be ruled out. In this regard, the SG does not intend to follow the European model, where such schools come under government control and are an extension of the administration. However, given our starting point, neither can we adopt the US model, in which SGs are very much market- and civil society-oriented. Inevitably, the School's initial funding and resources will be provided by public institutions (mainly the UCM and the UPM), although our long-term aim is to become self-funding. This would enable the School to work on demand, invoicing both public and private organisations or individuals, and cooperating with different government offices that are, after all, the source of both potential academic staff and funding, and of professionals looking for the kind of training the School can offer.

The main objectives of the SG can be summarised as follows:

- To offer comprehensive, top level, multidisciplinary training that is of great practical value in the sphere of top management positions in public and private institutions, and in the preparation, assessment and implementation of policies, infrastructures and public services.
- To drive research, studies and projects involving the most relevant problems encountered in these areas.
- To disseminate the most relevant results of research conducted both in the SG and in other excellence centres.
- To be recognised as a meeting place and forum for discussing the most pressing problems in these areas.

## II. THEMATIC AREAS

In a world of head-long privatisation dominated by the concept of curtailing government influence, a growing number of public assets, services, spaces, etc., are coming under private or public/private management. As a result, many aspects of public governance fall beyond the scope of the administration as a whole (state, autonomous community, community, or local) and have to include the activities of private companies or other civil society associations. Globalisation has also meant that national autonomy and the development of national policies is increasingly conditioned by variables controlled beyond national borders, meaning that public management must include the need to manage the impact that such external pressures have on domestic affairs. Knowledge and technology are held to be the main assets of any advanced society, and determine its structure and its social, political and economy dynamism. As such, particular attention must be paid to these elements when providing state-of-the-art training in public management. This is what we mean when we say that the main theme of the SG is public management in the broadest, most current, sense. Based on this idea, on the strong points of both universities and the findings of the study on leading SGs, we have initially divided public management in five thematic areas

The SG's priority thematic areas are:

- *Political management, public management and public policies*
- *Knowledge society and governance*
- *International economy and development*
- *Technology, innovation and enterprise management*

These thematic areas will focus on sectorial policies in which both universities specialise, such as energy, telecommunications, urban planning and housing, the environment and rural affairs, social policies, research and development (R&D), transport, etc.

## III. ORGANISATION MODEL

In view of the complexity of the project, the organisation model must be open and flexible, capable of adapting to and consolidating its activities in a context dominated by increasingly rapid social, economic

and political change. In addition to a management team and administrative staff that must be directly linked to the CEI School of Postgraduate Studies, the SG will be organised into four or five main teaching and research units. These will either correspond to each of its thematic areas or to the list of strategic programs offered (masters or other qualifications), and based on these, each will implement its interdisciplinary activities, its relationship with the departmental structure and with the different centres established in each university, and will recruit and manage their academic staff.

The first issue to clarify in terms of academic staff is their relationship with the academic structure of both universities (centres, department, institutes, etc.). Initially, the SG will engage the services of lecturers and professors attached to either university, although in the long-term it will gradually build up a core, full-time academic staff that will be complemented by visiting lecturers or out-sourced teachers. In all cases, the academic staff of the SG will be recruited according to the rules of the centre, and the teaching, research and consultancy requirements to be fulfilled.

#### IV. TRAINING PROGRAMS

Because of its profile, the SG will offer courses aimed at professionalising the many different aspects and forms of public management in government, and exploring the different ways in which these can be approached. Accordingly, the core academic catalogue will consist of a few interconnected multidisciplinary *master's* (between one and three) aligned with the excellence criteria of *Erasmus Mundus* (namely, strict acceptance requirements, 120 credits, international students, partly taught in English, etc.) that implement in a flexible way the aforementioned thematic areas.

Other types of courses are also planned, including:

- *Mid-Career programs*, lasting less than one year, that systematise in a highly concentrated and practical manner the basic content of the above master's. These could take the form of proprietary degree courses.
- *Executive programs*, of variable duration (from two days to several months) that would mainly focus on broadening or updating the existing skills of professionals working in different spheres related to public policies and policy management, including innovation and technology management in a globalised world. These could take the form of tailor-made courses for certain public or private institutions.
- *Specialisation programs* that, though in some cases are part of a master's course, will also be available as a separate program.

In any event, all forms of teaching must prioritise flexibility to ensure that high standards and professionalism come together to enable each student to personalise their study program. Another general feature will be a basic, applied teaching approach: the final objective does not depend on the amount or depth of the knowledge transmitted, but on teaching a broad range of skills and resources. Case studies could be the preferred teaching approach. Finally, we consider that e-learning should be used essentially to complement classroom teaching and to help transmit knowledge.

#### V. STUDENTS

The course will be designed, generally speaking, with two types of students in mind.

- Postgraduate students, possibly with some work experience in the public sector, seeking the training required for these types of jobs.
- Professionals already employed in the public sector who wish to update their knowledge base or skills.

The SG will consider entering into agreements with institutions or organisations for whom *ad hoc* executive

course can be designed. The student profile, however, will be further defined by the requirements established for each course on offer.

#### VI. RESEARCH, CONSULTANCY AND TECHNICAL ADVICE

The comparative analysis of leading schools of government worldwide has shown that all complement their teaching activity with research and the transfer of knowledge to the public and private sectors. The SG, therefore, will give excellence research groups from both universities the chance to channel their public management-based research, studies and projects through the School. The SG, in turn, will benefit from the prestige of such academics and researchers,

Research, mainly in its applied form, will take the form of funded research projects relating to the key thematic areas of the School. Consultancy and technical advice services will be offered within the framework of decision-making processes in both public administrations and private organisations. Likewise, specialised advisory services related to the formulation, implementation and evaluation of public policies will also be offered.

#### VII. DISSEMINATION

We consider it necessary to gradually introduce the technical tools and organisational structures needed to publish studies and research conducted both by the SG and by third parties. This will also provide a means of consolidating the SG as a meeting point for debating the most pressing issues relating to the topics taught in the School. These activities will include series of conferences and seminars that will be a part of the School's annual program of activities, and an attractive webpage.

#### VIII. SOCIAL RESPONSIBILITY

The overriding goal of the School of Government is to train students to become fully accomplished professionals, capable of working anywhere in the world, with a highly developed sense of their own responsibilities as both citizens and professionals. The SG aims to help drive and promote social responsibility in companies and organisations.

Our ongoing challenge lies in conducting quality research to build a body of knowledge relevant to CSR, thereby enriching social debate on these issues and providing the kind of education that will help individuals create and manage companies capable of generating economic wealth that is in turn reinvested in social and environmental improvement.

We must, therefore, approach our contribution from this perspective: to develop the kind of knowledge that forms a well-grounded, solidarity-based commitment to justice and the human development of society.

#### IX. FUNDING

The SG is made possible by funding received through different grants awarded to the Campus of International Excellence and from contributions made by both universities that, for the time being, also include facilities, resources and academic staff. Our long-term goal, however, is to be practically self-sufficient, based on three fundamental sources of funds:

- Course fees paid directly by students or by their employer. Our executive and specialisation programs should be particularly lucrative.
- Public and private funding, either in return for specific research (article 83 of the Universities Act), or for the organisation of specific courses. It is important for the SG itself to instigate and manage research projects and the corresponding budget, although this does not preclude providing incentives for the researchers involved.
- Donations for creating university chairs or specific programs.

In order to benefit from these funding sources the SG, by creating a reputation for efficiency and high standards, must become a guarantee of quality. To achieve this it is essential to have good professionals who are committed to the School; students who feel valued, challenged, respected and supported; and sponsors convinced that joining their name to that of the School is a good investment. We have also



considered the possibility of creating, from the start of the project, a Unit focussed entirely on obtaining funding by developing and complementing the above channels.

**Most important results**

The protocol creating the School of Government was signed and the founding commission created.

**Use of human, material and economic resources**

Provisionally, the School of Government has been housed in the Finca Mas Ferré, ICEI building, Somosaguas Campus, UCM.

All of the work done to date has been carried out by the members of the founding commission. A preliminary report was drafted in 2010 by Dr. Scheherezade Pinilla, who received funds to travel to Boston for a week to interview representatives of the Harvard and MIT schools of government.

**Most significant departures from the scheduled course of the project**

There have been no significant departures from the objective and schedule. There has, however, been a certain delay in reaching the second objective. This, though, is not only justified, but even in the best interests of the projects, since the best criteria for associating, selecting and implementing what both universities and other CEI-Moncloa centres can contribute to the SG must be based on a well-defined project that has been tested against other excellence SGs and backed by the institutions consulted.

**Proposal for corrective measures**

Focus more on the search for partners and sponsors, and in establishing agreements with other SGs worldwide.

<b>Field</b>	<b>TEACHING IMPROVEMENT AND ADAPTATION TO EUROPEAN HIGHER EDUCATION AREA</b>
<b>Project</b>	A27 INTERNATIONAL CENTRE FOR LATIN AMERICAN STUDIES (CEI-AL)
<b>Objectives</b>	<p>The aim of the project is to create an International Excellence Centre that will set new standards for the development, transmission and management of knowledge relating to Latin America and become an internationalisation and knowledge transfer tool for the CEI-Moncloa.</p> <p>It is hoped that the Centre will inspire and motivate both universities to further improve research and postgraduate teaching of Latin American topics.</p>
<p><b>Progress towards goals</b></p> <ul style="list-style-type: none"> <li>The protocol creating the Centre for Latin American Studies was signed during the meeting of the Governing Council of 21 May 2013. This protocol appointed a joint commission to define the syllabus and set up the CEI-AL.</li> </ul> <p>Members from the UPM: Vice-Chancellor for Academic Planning and Doctorate Studies Jorge Pérez Martínez, or his delegate. University Professor. Department of Economy and Agricultural Social Sciences. School of Agricultural Engineers, and Carlos Mataix Aldeanueva. Tenured University Lecturer. Director of the Centre for Development Cooperation of the Technical University of Madrid (UPM). School of Industrial Engineering.</p> <p>Members from the UCM: Vice-Chancellor for Postgraduate Studies and Continuing Professional Development, María Esther del Campo García, or her delegate. University Professor. Faculty of Political Sciences and Sociology. Director of the University Institute of International Studies (ICEI), and Heriberto Cairo Carou. University Professor. Dean of the Faculty of Political Sciences and Sociology. The Director of the International School of Postgraduate Studies, Antonio Dobado, is also a member of the commission.</p> <ul style="list-style-type: none"> <li>The preliminary report on the creation of the CEI-AL was prepared. "International Centre for Latin American Studies: Strategic decisions". <ul style="list-style-type: none"> <li>The first CEI-AL seminar "Una mirada hacia América Latina" (Focus on Latin America) was held on 18 June 2013 in the Paraninfo hall of the main building of the UPM.</li> </ul> </li> </ul>	
<p><b>Description of the projects completed and the role of each partner</b></p> <p>The Centre for Latin American Studies (CEI-AL) is part of the Moncloa Campus of International Excellence (CEI) formed by Madrid's Complutense (UCM) and Technical (UPM) universities. The aim of the Centre is to become an academic centre of reference for all issues relating to Latin American societies. Both universities have a long tradition of Latin American studies and many top-level professors and researchers.</p> <p>The CEI-AL hopes to achieve a level of academic excellence through its research, teaching, and both area-specific and case studies. In the area of research, the Centre will establish systematic cooperation mechanisms with institutions and companies operating in or with Latin America as a means of ensuring that much of the research conducted will both contribute to the teaching activities and have a practical</p>	



analytical application.

#### **Collaboration with top level Latin American teaching staff, researchers and research centres.**

The Centre will establish permanent research and researcher training collaboration agreements with leading Latin American centres and with Latin American study centres of high standing in other countries. Depending on the available resources, the Centre will attempt to attract the best Latin American academics and other experts in the field of Latin American studies.

#### **Multidisciplinary centre**

Today's societies are becoming increasingly complex, as are their most pressing issues. The CEI-AL, therefore, will take a multidisciplinary approach to topics addressed in the teaching, research and studies areas. This decision is based as much on methodological convictions - complex subjects require a broad-ranged approach - as on the firm belief that such an approach will maximise the synergies arising from the collaboration between the two universities in which the Centre is based, one of which specialises, *inter alia*, in Humanities and Social Sciences, and the other in Applied Sciences. In today's world, many problems must be approached simultaneously from both fields of knowledge. Consider, for example, the economic, biological, social and political problems facing the traditional agricultural methods used by native populations in Latin America; or the issue of climate change, sustainable development, or the diversification of energy sources in this region.

#### **Core activities: doctorate programs, research, and the preparation of reports and studies.**

The core activity of the Centre will consist of a top quality, highly flexible, modular doctorate program focussing on a concise series of Latin American issues. The doctorate program is also linked to the topics that will form the focus of the Centre's research lines, in which both academic staff and doctorate students will participate. The research undertaken during the doctorate program will contribute towards the reports and studies conducted by the multidisciplinary teams. Other *ad hoc* postgraduate courses linked to both the core doctorate programs and demand from both public and private institutions will also be offered, as explained in section 4 of this document. The following 4 subjects will form the core of the Centre's teaching activity, and are in turn divided into different topics that include, but are not limited to, the following:

- **Democracy and government reform**
  - Cultural differences and social inequalities.
  - Political integration of indigenous peoples and ethnic identity processes.
  - Traditional societies and their response to modernity and postmodernity. Racial intermingling and global culture.
  - Cultural heritage. Latin American culture and thought in the 21<sup>st</sup> century.

- **Science and technology for Development**
  - Information technologies for development.
  - Renewable energies.
  - Biotechnology and development.
  - Regional and urban planning.
- **Sustainable development**
  - Agriculture and development.
  - Climate change.
  - Biodiversity.
  - Sustainable management of natural resources and global economy.
  - Mining and development.
- **Globalisation and integration**
  - Democratic security.
  - Supranational integration processes.
  - North-South and South-South relations.
  - Cross-border migration.
  - The Euro-American arena.

### **Organisation model**

In view of the complexity of the project, the organisation model must be open and flexible, capable of adapting to and consolidating its activities in a context dominated by increasingly rapid social, economic and political change. In addition to a management team and administrative staff that must be directly linked to the CEI's School of Postgraduate Studies, the CEI-AL will be organised into four or five main teaching and research units. These will either correspond to each of its thematic areas or to the list of strategic programs offered (masters or other qualifications), and based on these, each will implement its interdisciplinary activities, its relationship with the departmental structure and with the different centres established in each university, and will recruit and manage their academic staff.

The first issue to clarify in terms of academic staff is their relationship with the academic structure of both universities (centres, department, institutes, etc.). Initially, the CEI-AL will engage the services of lecturers and professors attached to either university, although in the long-term it will gradually build up a core, full-time academic staff that will be complemented by visiting lecturers or out-sourced teachers. In all cases, the academic staff of the Centre will be recruited according to the rules of the centre, and the teaching, research and consultancy requirements to be fulfilled.

### **1. Training programs**

Because of its profile, the CEI-AL will focus on courses related to the development, transmission and management of knowledge rooted in Latin America. Accordingly, the core academic catalogue will consist of a few interconnected multidisciplinary *master's* (between one and three) aligned with the excellence criteria of *Erasmus Mundus* (namely, strict acceptance requirements, 120 credits, international students, partly taught in English, etc.) that implement in a flexible way the aforementioned thematic areas.

Other types of courses are also planned, including:

- *Mid-Career programs*, lasting less than one year, that systematise in a highly concentrated and practical manner the basic content of the above master's. These could take the form of proprietary degree courses.



- *Executive programs*, of variable duration (from two days to several months) that would mainly focus on broadening or updating the existing skills of professionals working in Latin America in different spheres. These could take the form of tailor-made courses for certain public or private institutions.
- *Specialisation programs* that, though in some cases part of a master's course, will also be available as a separate program.

In any event, all forms of teaching must prioritise flexibility to ensure that high standards and professionalism come together to enable each student to personalise their study program. Another general feature will be a basic, applied teaching approach: the final objective does not depend on the amount or depth of the knowledge transmitted, but on teaching a broad range of skills and resources. Case studies could be the preferred teaching approach. Finally, we consider that e-learning should be used essentially to complement classroom teaching and to help transmit knowledge.

### **Students**

The course will be designed, generally speaking, with two types of students in mind.

- Graduate students wishing to specialise in one of the research fields pursued in the Centre.
- Professionals already employed in the region who wish to update their knowledge base or skills.

The CEI-AL will consider entering into agreements with institutions or organisations for whom *ad hoc* executive course can be designed. The student profile, however, will be further defined by the requirements established for each course on offer.

### **2. Research, Consultancy and Technical Advice**

A comparative analysis of leading Latin American research centres worldwide has shown that all complement their teaching activity with research and the transfer of knowledge to the public and private sectors. The CEI-AL, therefore, will give excellence research groups from both universities the chance to channel their Latin America-based research, studies and projects through the Centre. The Centre, in turn, will benefit from the prestige of such academics and researchers,

Research, mainly in its applied form, will take the form of funded research projects relating to the key thematic areas of the Centre. Consultancy and technical advice services will be offered within the framework of decision-making processes in both public administrations and private organisations. Specialised consultancy services related to the Centre's core subjects will also be offered.

### **3. Dissemination**

We consider it necessary to gradually introduce the technical tools and organisational structures needed to publish studies and research conducted both by the CEI-AL and by third parties. This will also provide a means of consolidating the Centre as a meeting point for debating the most pressing issues relating to Latin America. These activities will include series of conferences and seminars that will be a part of the Centre's annual program of activities, and an attractive webpage.

### **4. Social responsibility**

The overriding goal of the CEI-AL is to train students to become fully accomplished professionals, capable of working anywhere in the world, with a highly developed sense of their own responsibilities as both citizens and professionals. The Centre aims to help drive and promote social responsibility in companies and organisations.

Our ongoing challenge lies in conducting quality research to build a body of knowledge relevant to Latin America, thereby enriching social debate on these issues and providing the kind of education that will help individuals create and manage companies capable of generating economic wealth that is in turn reinvested in social and environmental improvement.

We must, therefore, approach our contribution from this perspective: to develop the kind of knowledge that forms a well-grounded, solidarity-based commitment to justice and the human development of society.

## 5. Funding

The CEI-AL is made possible by funding received through different grants awarded to the Campus of International Excellence and from contributions made by both universities which, for the time being, also include facilities, resources and academic staff. Our long-term goal, however, is to be practically self-sufficient, based on three fundamental sources of funds:

- Course fees paid directly by students or by their employer. Our executive and specialisation programs should be particularly lucrative.
- Public and private funding, either in return for specific research (article 83 of the Universities Act), or for the organisation of specific courses. It is important for the CEI-AL itself to instigate and manage research projects and the corresponding budget, although this does not preclude providing incentives for the researchers involved.
- Donations for creating university chairs or specific programs.

In order to benefit from these funding sources the CEI-AL, by creating a reputation for efficiency and high standards, must become a guarantee of quality. To achieve this it is essential to have good professionals who are committed to the Centre; students who feel valued, challenged, respected and supported; and sponsors convinced that joining their name to that of the Centre is a good investment. We have also considered the possibility of creating, from the start of the project, a Unit focussed entirely on obtaining funding by developing and complementing the above channels.

### **First CEI-AL seminar: "Focus on Latin America"**

The seminar was attended by leading experts from influential Latin American institutions during the morning session, together with representatives from major Spanish companies with ties to Latin America. The sessions were organised around the following round tables:

ROUND TABLE: "Demands from Latin America: An institutional outlook"

Moderator: Rosa Conde (Centre for Constitutional and Political Studies)

Ramón Santos (Adviser to the Secretary of State for International Cooperation and Latin America)

Javier Quintana (Director of the International Latin American Foundation for Public Administration and Public Policies)

Ignacio Corlazzoli (Inter-American Development Bank)

Rafael Garranzo (Cooperation Director for Latin America and the Caribbean at the Spanish Agency for



International Development Cooperation)

ROUND TABLE: "Spanish companies in Latin America: university-business synergies"

Moderator: Marisa Ramos (Conference of Ministers of Justice of Latin American Countries)

Emma Fernández (Director General, Indra)

Antonio Merino (Director of Environmental Study and Analysis, Repsol)

Arancha Díaz-Lladó (Director of Public Affairs, Telefónica Latin America)

Rafael Pérez (Managing Director, Global Strategic Accounts, International Organisations at Microsoft Corporation)

#### **Most important results**

The founding bodies were created.

The document defining the characteristics of the Centre, its doctorate and research program was prepared. This document will be used to present the Centre and seek additional sources of funding, to recruit top-level teachers and attract future doctorate and master's students.

#### **Use of human, material and economic resources**

Provisionally, the International Centre for Latin American Studies has been housed in the Finca Mas Ferré, ICEI building, Somosaguas Campus, UCM.

Both the work of those involved and the material and economic resources have been mainly dedicated to establishing contacts and holding meetings with national and foreign institutions and in creating and organising the meeting of the agreement monitoring committee and the executive committee,

<b>Strategic Area</b>	<b>TRANSFORMING THE CAMPUS TO DEVELOP AN INTEGRATED SOCIAL MODEL AND INTERACTION WITH ITS LOCAL ENVIRONMENT</b>
<b>Action</b>	A10. International Visitors Reception Centre (CIVA) <a href="http://www.campusmoncloa.es/es/servicios/">http://www.campusmoncloa.es/es/servicios/</a>
<b>Objectives</b>	To set up a 'one stop' International Reception Centre for students and researchers arriving on Campus, offering information and possible solutions to their queries related to settling into the Campus.
<p><b>Progress towards objectives</b></p> <p>Design for the International Visitors Reception Centre. Implementing the Project: Moncloa Campus Accommodation</p>	
<p><b>Description of work carried out and role of partners</b></p> <p>Providing an integrated help desk for international students and researchers, offering the following services:</p> <ul style="list-style-type: none"> <li>Before their arrival, they are offered information, advice and assistance with the official bodies responsible for the administrative aspects of recognition of academic qualifications, access regulations and information on obtaining an entry visa, where applicable, to facilitate the completion of all the entry requirements for the student or researcher arriving in the CEI.</li> <li>On arrival in Spain, they are offered information and advice on available accommodation, managed by us through rented accommodation, university residences, partner residences or other options of interest.</li> <li>To facilitate their stay in Spain, information is offered on legislation issues and administrative procedures and related paperwork.</li> <li>To ensure their successful integration into the CEI, information is provided on the educational and research institutions which form part of the CEI.</li> <li>Finally, with a view to facilitating recognition of studies completed in the CEI, a service is offered for the collection of the degree certificate or course diploma obtained, its legalization and forwarding to their home address.</li> </ul> <p>In academic year 2010-2011 there were 7010 international students enrolled in the UCM and UPM. The provisional statistics for 2012-2013 show there are 8970 undergraduate and graduate foreign students enrolled in the UCM and 3157 in the UPM. This means a total of over 12,000 international students, plus the different types of researchers currently engaged by both universities and the other public institutions which form part of the CEI Moncloa.</p> <p>The number of international students accepted by the CEI Moncloa makes it essential to improve reception and integration services for these students on Campus and highlights the importance and relevance of the creation of the International Visitors Reception Centre.</p>	
<p><b>Most significant results</b></p> <p><b>International Visitors Reception Centre (CIVA)</b></p>	

With the Centre set up and running since January 2013, once the necessary work had been completed to provide suitable office space and technical facilities, international students now have a specialized reception centre available to facilitate their arrival on the CEI Moncloa Campus.

In the CIVA they can find a portfolio of services which attempt to satisfy their needs before, during and after their stay and provide them with specialist staff to answer their queries.

The new premises ensure:

Easy access by public transport.

Easy to find central Campus location, with clear signage.

Multiple help desk modes: face to face, by phone, by email and website, ensuring the best possible service.

Users have four computers available for internet access and most common software applications.



### **Accommodation Office**

This office has become a reference point on Campus for finding accommodation. As a result of the different types of information and contact available (in person, Webpage, email and phone) the number of users has continued to grow with currently around 4000 requests for information per year.

Other points to note are that since January 2013, the Help Desk has handled 5562 face to face enquiries from Campus members; 984 by phone and email; there have been 70,174 Webpage visits, 809 messages on Facebook, with 615 followers, and 809 tweets on Twitter, with 456 followers.

### **Use of human, material and financial resources**

The first Action, in mid 2010, was to set up the Moncloa Campus Accommodation project with the creation of a joint UCM-UPM office and the *Sociedad Pública de Alquiler (SPA)* agency to manage rented accommodation and facilitate the reception of students and researchers on Campus. The office also managed other accommodation options including a database with offers of accommodation for rent, the inter-generational program "*Vive y convive*", and offered information on other options of interest to students including University or private Residences.

This Office was managed by the UCM Student Centre providing three members of staff and was located until the end of 2012 in the campus building known as *Edificio Real Jardín Botánico Alfonso XII*.

The delay in implementing the agreement between the UCM, Ministry of Culture and the Prime Minister's Office on the use of various buildings located in the Ciudad Universitaria, such as the building currently used by the Museum of Costume, led to the delay in setting up the International Visitor Reception Centre,

as its location in the original plan was on the ground floor of that building. This resulted in the decision to use an alternative location for the Visitor Reception Centre in an area which until then had been used by the UCM Student Centre. Alterations were made to the office space and facilities, and furniture and IT equipment purchased. This was funded by the CEI. The International Visitor Reception Centre has been in operation since January 2013 on its new site. It now includes the Accommodation Office as one of its services, since the SPA has been dissolved by the Government. The UCM Office of the Vice-Chancellor for Students provided the physical location for the Centre and also 8 members of staff, in addition to the original 3 staff from the Accommodation Office. Finally, the CIVA has its own webpage with information on the services available. For more information see:  
<http://www.campusmoncloa.es/es/formacion/alojamiento.php>  
<http://www.ucm.es/civa>  
<http://www.ucm.es/oficina-de-alojamiento-en-la-ucm>

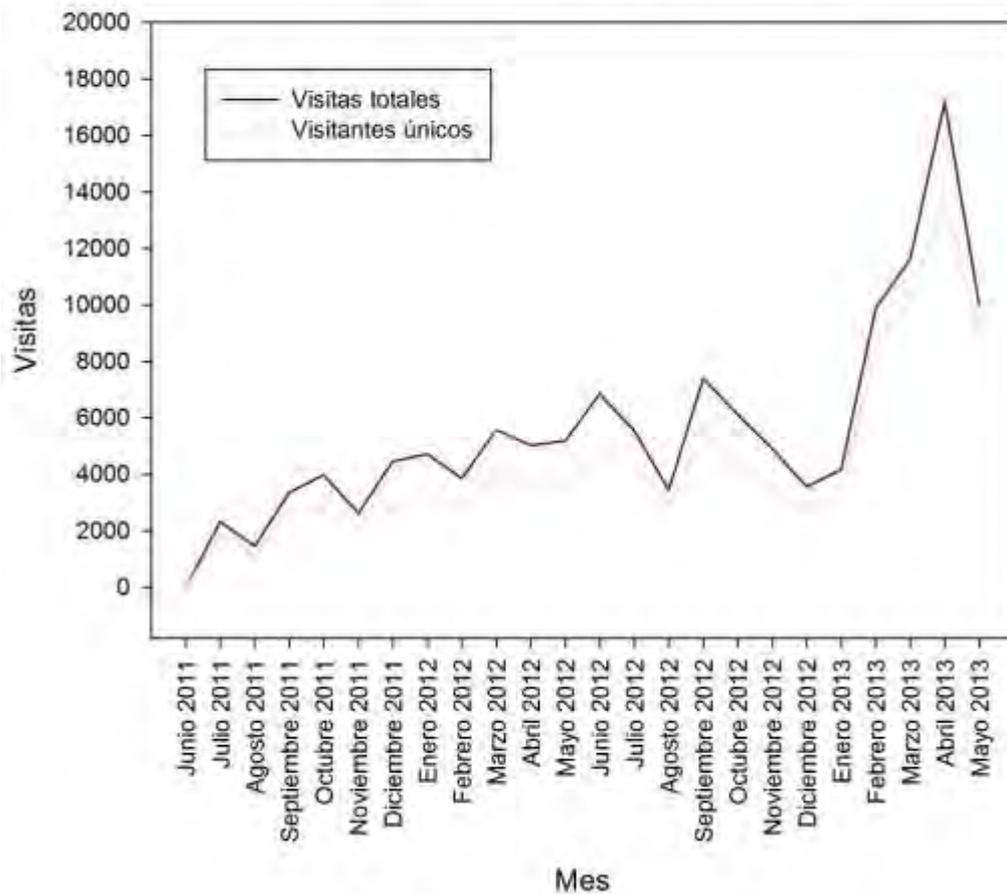
**Most important deviations from progress towards objectives**

The disappearance in 2012 of the SPA meant the service offered had to be redesigned.



<b>Strategic area</b>	<b>TRANSFORMATION OF THE CAMPUS FOR THE CREATION OF AN INTEGRAL SOCIAL MODEL AND ITS INTERACTION WITH ITS TERRITORY</b>
<b>Action</b>	<b>A12.</b> International Office for Communication and Knowledge Promotion of the Campus (OICD)
<b>Objectives</b>	<p>To set up an office to coordinate and manage the Campus's communications activities towards the exterior and the activities for disseminating the knowledge generated on the campus, with the following specific missions:</p> <p>Promotion of the Campus's international profile. Coordination of the dissemination of its scientific output. Congress organization. Encounters with Nobel laureates. Campus radio and television (in relation with action A23)</p>
<p><b>Progress towards the objectives</b></p> <ul style="list-style-type: none"> <li>• Organization of the First Moncloa Campus course on 23-25 February, 2011.</li> <li>• Visit by the Nobel laureate Carlo Rubbia (Nobel Prize for Physics 1984). <i>Institute for Advanced Sustainability Studies, Potsdam, Germany, CERN, Geneva, Switzerland.</i></li> <li>• Design and development of the web page for the Moncloa Campus <a href="http://www.campusmoncloa.es">www.campusmoncloa.es</a></li> <li>• cei[innova] course on 13 June 2011.</li> <li>• Informative courses on participation in EU projects.</li> <li>• CEI Moncloa Campus Award for Scientific Dissemination.</li> <li>• Activities to encourage the scientific spirit: Science Ambassadors and Researchers' Night.</li> <li>• <i>MaterialsWeek</i> (<a href="http://www.campusmoncloa.es/es/eventos/materialsweek/">http://www.campusmoncloa.es/es/eventos/materialsweek/</a>) held on 26, 29 and 30 April 2013.</li> <li>• Dissemination of scientific results through Redescubre (<a href="http://www.ucm.es/red.escubre">http://www.ucm.es/red.escubre</a>) and Tribuna Complutense.</li> </ul>	
<p><b>Description of the work carried out and the role of the participants</b></p> <p><b>Website of the CEI Moncloa Campus:</b> <a href="http://www.campusmoncloa.es">http://www.campusmoncloa.es</a></p> <p>The website of the Moncloa Campus showcases the activity carried out on the Campus. It is the communications channel for interacting with potential or current users, namely students, researchers and institutions interested in the research activity that takes place at the Moncloa Campus.</p> <p>Although it is true that at its launch the website was somewhat insubstantial, this lack of content has been gradually resolved in recent months, as can be seen in the following graph which shows a steady increase in the number of visits to the Campus website.</p>	

Visitas mensuales campusmoncloa.es



The peaks of activity coincide with the opening of electronic applications for postdoctoral grants and the registration period for the scientific communication competition organized for researchers at the Moncloa Campus. Finally the dip observed in August corresponds to the reduction in the activity of the Moncloa Campus at that time due to the suspension of a number of functions and the closing of the Complutense and Polytechnic universities that make up the Campus.

**Activities and dissemination of research results.**

Since the start of the CEI Moncloa project, particular emphasis has been placed on disseminating the scientific results of the researchers who form part of the Campus. To this end, Rocío Oña, contact manager of the CEI website, has worked in collaboration with others to repackage these scientific results into journalistic articles that are accessible to audiences of all kinds, and to translate them into English for the purpose of raising the international profile of the campus. These articles have been published on the CEI website and on the websites of both the universities, and thanks to the combined efforts of both institutions they have in several instances had considerable impact in the communications media. This dissemination activity continues today.

Compilation of all the news about the CEI: <http://www.campusmoncloa.es/es/noticias/>

**Communication 2.0: Facebook and Twitter**

The need to find new ways to communicate and to reach the university community and the general public

gave rise to the CEI's entry in the social networks through Facebook (232 likes) and Twitter (553 followers). These communications tools have made it possible to spread word of the events that taking place within the framework of the CEI Moncloa Campus. It has also helped to set up an interaction between researchers and social networks users who are interested in the scientific results produced on the campus.

#### **First Moncloa Campus Course on 23-25 February 2011.**

From 23 to 25 February 2011, the First CEI Moncloa Scientific Course was held in the Assembly Hall of the Dentistry Faculty at the UCM. The primary objective of this course was to present the lines of action of the Moncloa Campus in R+D+i before the scientific and university community and to society in general, and to highlight the most important and ground-breaking research within the themed areas in the scientific clusters for which the Campus of Excellence has defined a strategy for the advancement of knowledge.

The course included six plenary sessions that were open to the public in which researchers of renowned international prestige gave talks on cutting-edge scientific topics in the fields of Agri-food and Health, Global Change and New Energies, Materials for the Future, Innovative Medicine, and Heritage. The guest speakers were Professor Paolo Bonato (Harvard Medical School, Harvard-MIT; Professor Víctor M. Orera Clemente (Materials Science Institute of Aragon, Saragossa University), Professor Ricardo García Herrera (President of the AEMET), Professor Malcolm Mitchell (Scottish Agricultural College - SAC), Professor Javier García Fernández (Professor of Constitutional Law. Ministry of Defence).

In parallel, each cluster organised specialised sessions designed to reinforce already existing collaborations and to seek new synergies between the different research groups in the two universities and the associated institutions.

Finally, in the closing act of the course, on the 25th at 11:30 am the Nobel Laureate for Physics, Professor Carlo Rubbia gave a talk on *Innovative energies for a sustainable development*.

The courses are available on the website of the CEI Moncloa Campus:

<http://www.campusmoncloa.es/es/media/video/>

In 2011, this office continued to manage the activities of dissemination and awareness-raising of the Moncloa Campus. Some of the highlights of these activities include:

#### **Innovation Day [cei]nova at the Moncloa Campus.**



Last June 13, 2012 the [cei]nova Innovation Course of the Moncloa Campus took place in the Faculty of Medicine of the UCM. It had a predominantly business-oriented focus and was designed to serve as a meeting point between companies and the groups that work in the clusters in the Moncloa

Campus. The event served as an opportunity to highlight the R&D+i capacities, solutions and services of the Moncloa Campus, while companies and experts from a range of institutions shared their current view of the challenges and technological requirements involved in their area of activity.

The event was attended by almost 400 participants who took part in sessions in the different themed clusters.

More information: <http://www.campusmoncloa.es/es/eventos/jornada-innovacion>

### **Informative courses on participation in EU projects.**

**Activities to encourage the scientific spirit** such as the “Science Ambassadors” and Science Week projects, participation in Researchers' Night and the 1st Biodiversity Testing initiative at the CEI Moncloa Campus, which resulted in the identification of a butterfly previously thought to be extinct.



### **Event for the presentation of the Agri-food and Health cluster.**

The event took place on 15 December 2012 in the School of Agricultural Engineering and featured the participation of the groups involved in the cluster. The proceedings included the presentation of the Agri-food Corridor project, the strategic lines of the cluster, and possible sources of funding for research in this field, with particular emphasis on EU programs.

### **CEI Moncloa Campus Scientific Dissemination Awards.**

Between 20 March and 30 April various works in the areas of photography, video and news were collected together in order to promote the culture of dissemination among the researchers of the Moncloa Campus. The prize-winning works have been published on our website. You can see them at:

<http://www.campusmoncloa.es/es/convocatorias/premios-divulgacion-cientifica/>

In addition to the prize money, the winners were invited to take part in the 3rd Course on Science Journalism and Dissemination organized by the OTRI at the UCM in collaboration with the UCC+i of the UPM.

### **Materials Week at the CEI Moncloa Campus**

Organized by the Materials for the Future cluster, the activities took place on 26, 29 and 30 April 2013 in the ETS Engineering Faculty. The objective of Materials Week was to reinforce the cluster's social presence, and to explore the synergies between the teaching staff, researchers, students and companies in the field of materials science and engineering. The various events arranged were a chance to share experiences, knowledge, technologies and ideas that will contribute to excellence among the members of the CEI Moncloa Campus, and serve to benefit citizens as a whole.

A range of parallel events took place in Materials Week, including lectures, debates, the presentation of lines of research on companies, a workshop on nanomaterials and nanotechnology, demonstrations, courses, visits, open-doors events, specialized photography contests, innovation, video, talent shows, etc. in Spanish and English. These activities were aimed primarily at students with a range of academic qualifications, as well as companies, researchers and teaching staff.

More information at: <http://www.campusmoncloa.es/es/eventos/materialsweek/>

### **RED.ESCUBRE**

The digital newsletter **RED.ESCUBRE** was launched to raise awareness of scientific activity. This is a project organised by the UCM's Communications Office in collaboration with the university's Research Department in order to disseminate the scientific and cultural activity that takes place on the campus, thereby raising its profile and reinforcing the cohesion between its centres.

**RED.ESCUBRE** is a bimonthly publication appearing on the website of the Complutense University which already has over 700 subscribers, each of whom receive the issue by e-mail. In addition to its internal



distribution, **RED.ESCUBRE** also circulates in institutional circles with links to science –the Ministry of Education, Department of Education, the Education Committee of the Madrid Assembly– and also among journalists specializing in the field of science.

Five issues of **RED.ESCUBRE** were published in 2012, featuring scientific articles which showcase the quality of the research work currently being done.

More information at: <http://www.ucm.es/red.escubre>

#### **Tribuna Complutense**

This is a bimonthly publication by the UCM which throughout the academic year 2012-2013 included reports highlighting the activities of the multiple actors responsible for the CEI Moncloa Campus.

More information:

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna136/#/46-47/>

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna135/#/20-21/>

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna134/#/22-23/>

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna133/>

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna131/#/22-23/>

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna131/#/32-33/>

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna130/#/28-29/>

<http://pendientedemigracion.ucm.es/info/tribunacomplutense/Tribuna129/#/30-31/>

#### **Most significant results**

Improvement in the visibility and communication of the CEI Moncloa Campus.

#### **Use of human, material and economic resources**

This action accounted for €139,419 in the 2009 CEI program

#### **Most significant deviations in the progress towards the objectives**

Although the original idea was to set up a communications office for the Moncloa Campus, finally the management of the CEI opted to appoint Braulio Calleja, Coordinator of the UCM Department of Communication, as the director of the CEI's communications activities, thereby combining the press and communications offices of both universities in the task of raising awareness of the campus.

#### **Proposal for corrective actions**

The joint work of the communications offices of both institutions improves and unifies the work done by both institutions in the sphere of action of the CEI Moncloa Campus.

<b>Strategic area</b>	<b>TRANSFORMATION OF THE CAMPUS FOR THE CREATION OF AN INTEGRAL SOCIAL MODEL AND ITS INTERACTION WITH ITS TERRITORY</b>
<b>Action</b>	A13. CAMPUS RECOVERY PLAN: PROJECT CAMPUS
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. Recover green and wooded spaces in areas of public use. Design a system of clearly defined and prioritized footpaths and install urban furniture. Alfonso XIII Royal University Botanical Gardens</li> <li>2. Regulate motorised traffic and aboveground parking: Sustainable Mobility Plan of the University City (PMUS) <ul style="list-style-type: none"> <li>○ Reduce aboveground parking and encourage the use of the underground car park existing on the university premises.</li> <li>○ Reinforce public transport.</li> <li>○ Increase pedestrian and cycle mobility.</li> <li>○ Improve accessibility.</li> <li>○ Determine street ownership, in most cases poorly defined at present.</li> <li>○ Reduce environmental and noise pollution.</li> <li>○ Implement a mobility office to integrate sustainable mobility in the campus's urban planning policies.</li> </ul> </li> <li>3. Implement of system of bike stations for on-campus transport and lay out a bike lane connecting the various university centres. Reduce through traffic and the use of private vehicles on the campus.</li> </ol>
<b>Progress towards the objectives.</b>	
<ul style="list-style-type: none"> <li>• PMUS mobility plan completed.</li> <li>• Completion of the recovery of green spaces and improvements to the Alfonso XIII Royal University Botanical Gardens.</li> </ul>	
<b>Description of the work carried out and the role of the participants.</b>	
<p><b>1. Recovery of green and wooded spaces in areas of public use on the campus.</b></p> <p>The geographic scope of the International Campus of Excellence is delimited by the perimeter of the Madrid University City where the CEI Moncloa is located, and also coincides with scope of the University City Urban Planning Consortium. This consortium was created to protect, conserve, and simultaneously highlight the importance of the main environmental and scenic sites in the University City, and comprises the Complutense and Polytechnic universities, the UNED distance learning university, and the Madrid City Council. The Consortium is responsible for applying the Special Plan for the University, whose objectives include the recovery of the urban, architectural and environmental features of the site, and particularly its relationship with the existing and future system of green spaces; the protection of the site and its architectural and scenic heritage; and –as a connecting element– the establishment of channels to facilitate its integration with the city.</p> <p>As part of the Moncloa Campus, the old Royal Trail that leads through the University City was opened to the public. The Royal Trail is a pedestrian pathway 2.7 kilometres long between the Puente de los Franceses bridge and Sinesio Delgado street that represents the restoration of a natural environment in an example of joint collaboration between the Madrid City Council and the three universities whose teaching and research work takes place in the University City. This action combines progress and economic development with respect for nature, and provides new green spaces for members of the university and citizens.</p> <p>Recovery of green and wooded spaces in areas for public use on the campus: November 2011 saw the completion of the work to refurbish the landscaped areas and the installation of urban furniture in the</p>	



emblematic Plaza Ramón y Cajal square.

The aims of the UCM's **Alfonso XIII Royal University Botanical Gardens** are to play a key role in training future graduates, and to support research and environmental education. In addition, today –when over 20% of European flora is on the red list of threatened species– we should not overlook the role of this kind of facility as a means of conservation and as a gene pool, and to guarantee the study and possible reintroduction of some of these species in their natural environment.

Moreover, as with every landscaped area in an urban environment, it is also worth mentioning the aesthetic and architectural aspects that contribute to creating a harmonious space which serves as a stimulus for simple contemplation, observation and study. A Botanical Garden is considered essential in all universities whose activities include subjects related to Plant Biology, and a number of these facilities have been built in Europe in recent years. A Botanical Garden is probably one of the most pleasant and efficient means of promoting the precise dissemination of science that the University can offer its students and society as a whole.

The following actions are currently underway:

- Extension of the plant collection.
- Extension of pedestrian footpaths and minor infrastructures.
- Maintenance and improvement of supports.

## **2. Regulation of motor traffic and aboveground parking.**

As this is part of the actions promoted by the CEI, an agreement was signed in 2010 between the University City Urban Planning Consortium –as the body responsible for acting on the University City Campus– and the Regional Transport Consortium (CRT), aimed at the ***“Creation of a Sustainable Mobility Plan for the University City Campus in Madrid. Moncloa”***

From the technical point of view, this agreement states that the action plan will be drawn up by the CRT, which will consider the scope of execution and its specific set of problems. It also establishes the maximum funding limit for the study –set at €200,000– of which the Campus of Excellence will be responsible for 30% of the total.

The action consists of the following phrases:

- Collecting information on fieldwork
- Analysis and diagnostic of the current situation and process
- Determining objectives, benchmarking and compiling action questions
- Assessing and collecting questions
- Final document on the Mobility Plan

Justification: the fact that the Moncloa Campus has been a Property of Cultural Interest since 1999 means that any action aimed at its improvement is in itself of interest.

A point worth noting is that the use of private vehicles has increased in the area of the University City, despite the high rate of use of public transport. An example of this is the more than 100,000 car journeys recorded during work days, to which must be added the pressure of the through traffic on the A-6 motorway. This traffic situation gives rise to problems of congestion and parking which need to be corrected.

### **3. Implementation of a system of bicycle stations on the campus and layout of a lane to link the various university centres**

During 2010 the bike-loan system was awarded on the University City campus. For the correct application of this system, there is a bike lane which runs mainly through the centre of the University City to bring the system closer to the various university buildings.

#### **Structures created in governance**

N/A

#### **Most significant results**

- With regard to the development and implementation of the PMUS: the action has a twofold impact; on the campus itself, and on the users. As mentioned above, the campus has been listed since 1999 as a Property of Cultural Interest, and therefore traffic, the excessive use of private vehicles and poor parking have led to a deterioration which must now be rectified. The PMUS will regulate all those issues and give on-campus mobility a dimension of sustainability that is essential today. This result would in itself justify the implementation of an action designed to enhance the value of a unique environment.

However it will also have an additional impact on users of the Campus, a place frequented on a daily basis not only by the students and workers in the universities, but also by the staff of all the other institutions located in the University City, as well as by many of the inhabitants of the city of Madrid, within whose boundaries it is located. This suggests that the PMUS would bring an evident benefit to a considerable number of people who in one way or another would come into regular contact with this environment.

The fact that the Moncloa campus has an important international dimension with a high number of annual visitors from all over the world exponentially increases the impact of this action.

- Opening of the Royal Trail.
- Refurbishment of the Plaza de Ramón y Cajal square
- Improvements in the RJB Alfonso XIII.
- Bike loan system.

#### **Use of human, material and economic resources**

##### **1. Recovery of green and wooded spaces in the areas for public use on campus.**

Until January 2013 this action has involved work for a value of €55,429.

##### **2. Regulation of motor traffic and aboveground parking.**

The aim has been optimise the use of the available economic resources for the purpose of improving the campus. It should be noted that the Madrid University City Urban Planning Consortium's scope of action – particularly in the area of infrastructures– is the Moncloa Campus, the sphere of action of the CEI. Therefore priority was given to using the available public resources, combining forces which used in isolation would be insufficient to achieve the proposed objective.

The resources were used to seek technical solutions for mobility on campus. The total budget for drafting the Plan was €178,520.00, divided as follows: €124,991.40 assumed by the Madrid University City Urban Planning Consortium, while €53,550.60 was subsidised by the Moncloa International Campus of Excellence. The material and human resources were by and large those of the universities themselves, the Madrid City Council, the CRT and the awarding company.



<b>Strategic area</b>	<b>TRANSFORMATION OF THE CAMPUS FOR THE CREATION OF AN INTEGRAL SOCIAL MODEL AND ITS INTERACTION WITH ITS TERRITORY</b>
<b>Action</b>	A15. GENERAL ACCESSIBILITY PLAN
<b>Objectives</b>	To improve accessibility in all its dimensions, both in exterior spaces and in the buildings and their facilities, and in all the different areas of activity of the campus. Its actions will be applied transversely and incorporate –through to 2012– a system of global accessibility management through the <b>UNE 170001, 1-2 certification processes</b> , for the purpose of obtaining the aforementioned certification. It will also include extending measures to support people with disabilities to the whole campus, endorsed by the approval of a Campus regulation on this point. This program includes the already existing Accessibility Plan, whose overall cost is 7 million euros and is co-financed by the Madrid Regional Government.
<p><b>Progress towards the objectives</b></p> <p>Improvement in the accessibility to different premises in the Moncloa Campos and the adaptation of two rooms for the severely disabled in the Colegio Mayor Santa Teresa de Jesús student residence.</p>	
<p><b>Description of the work carried out and the role of the participants</b></p> <p>Through the 2010 and 2011 Reinforcement programs, the Madrid Complutense University signed two agreements with the Ministry of Education and the ONCE Foundation whereby actions for accessibility and have been implemented in range of university facilities, the most important of which were the works to improve accessibility in the C.M. Santa Teresa de Jesús student residence. These actions were designed to guarantee universal accessibility for people with disabilities through the construction and refurbishment of university accommodation.</p> <p>In addition, these agreements made possible the acquisition of IT and technical material adapted for both the visually and hearing disabled. The material was installed in the libraries at the Information Science and Economics faculties, the latter on the Somosaguas Campus. The Optics Faculty has been improved by the installation of signage to the Optical Clinic, a tactile paving guide and audio loop indicator for the deaf, as – in addition to teaching– the premises are used to provide healthcare services, the patients of which frequently have reduced visual capacity.</p>	
<p><b>Most significant results</b></p> <p>Organisation of agreements with the Ministry of Education and the ONCE, and implementation and completion of the financed projects.</p>	
<p><b>Use of human, material and economic resources</b></p> <p>Agreement between the ONCE and the Complutense for the elimination of architectural barriers and improvement of accessibility in student residences. Funding: €75,000 (2010 Reinforcement Sub-program). With resources from the 2011 Reinforcement Sub-program it was possible to fund actions for a total of</p>	

€83,333

**Most significant deviations in the progress towards the objectives**

None

**Proposal for corrective actions**

Not applicable



<b>Strategic Area</b>	<b>TRANSFORMATION OF THE CAMPUS TO DEVELOP A COMPREHENSIVE SOCIAL MODEL AND ITS INTERACTION WITH ITS WIDER ENVIRONMENT</b>
<b>Action</b>	A23. ESTABLISHMENT AND IMPLEMENTATION OF THE CAMPUS RADIO AND TELEVISION SERVICE (IRTV-CAMPUSMONCLOA)
<b>Objectives</b>	Social and international profile of the Campus. Release and dissemination of knowledge
<p><b>Progress made towards objectives</b></p> <p>Moncloa Campus has continued to focus on providing information about our work and the results obtained through the Internet, encouraging the creation of audiovisual material with the help of scientists and students working on the campus, and on offering this through free channels and social networks, accessed through our website: <a href="http://www.campusmoncloa.es/es/media/">http://www.campusmoncloa.es/es/media/</a>. These platforms allow us to inform society about our results.</p>	
<p><b>Description of work completed and role of participants</b></p> <p>In the Order of 26 July 2010, from the Secretary General of Universities, the Moncloa Campus was awarded the project applied for, UCM receiving the income for the amount corresponding to the project financed.</p> <p>As a result of an agreement between the two universities, and for the more efficient management of resources, the actions in the <i>Fortalecimiento 2010</i> sub-program, as well as the funds received by UCM, were divided.</p> <p>Under the Framework Agreement signed between the Ministry of Education and the European Foundation for the Information Society, in May 2010, the universities coordinating Moncloa Campus (UCM and UPM) signed an Agreement for the Awarding of Grants with the aforementioned Foundation in October 2010 (a copy of the Agreement is attached).</p> <p>The aim of Moncloa Campus was to launch the Campus Radio Television service (IRTV-CampusMoncloa), via webcast. This would help to relate the campus to its surroundings, while enabling students from the Schools of Information Sciences and Telecommunications Engineering to learn and acquire practical work experience. IRTV-CampusMoncloa would be a key tool in establishing the social and international profile of the campus and in the release and dissemination of knowledge.</p> <p>The Foundation, in accordance with the commitments in the agreement, developed the broadcast platform which was added to the CEI Campus Moncloa website through the following link: <a href="http://www.irtvcampusmoncloa.tv/">http://www.irtvcampusmoncloa.tv/</a>. Videos recording the events taking place on Moncloa Campus were</p>	

uploaded there.

To create the broadcast content, work began on a new specific agreement between the parties from 2011. The foundation, as manager and owner of the application developed, offered through the new agreement the commitment to produce regular content and live broadcasting, establishing as the fee for this €5,000 per month for two years to be paid by CEI Campus Moncloa for this work.

The financial terms proposed were unaffordable for the coordinating universities, as well as moving away from the original idea of producing its own content through practical work by our students, so the aforementioned agreement was not signed.

**Most significant results:**

The fact that running a campus television station over the long term would not be viable has been resolved by publishing multimedia content on the web. This includes videos of campus events and knowledge generation.

**Use of human, material and economic resources:**

As agreed with the European Foundation for the Information Society and e-Government, Moncloa Campus contributed €20,400 for testing the IRTV service, funding received through the *Fortalecimiento 2010* program.

**Significant problems in advancing towards the goals**

On not being able to financially afford the costs involved in the daily broadcast of a television channel, it has been decided to opt for a support model through the CEI Campus Moncloa website.

**Proposed Corrective Actions**

The UCM and UPM press offices update the information on the work being carried out on our campus.



<p><b>Strategic Area</b></p>	<p><b>TRANSFORMATION OF THE CAMPUS TO DEVELOP A COMPREHENSIVE SOCIAL MODEL AND ITS INTERACTION WITH ITS WIDER ENVIRONMENT</b></p>
<p><b>Title of Action</b></p>	<p><b>A24. Implementation of the museum project: Creation of a Management and Storage area in the Complutense Art Centre.</b></p>
<p><b>Objectives:</b>                  Convert the art c (Complutense Art Centre) into a space that helps to catalyse and regenerate the historical, urban, environmental and cultural value of the Complutense University of Madrid campus.                  Exhibit the artistic treasures in Complutense's Museums and Collections as historical examples of immense cultural heritage in a collection that is permanent, dynamic and open to researchers and participation by the public.                  Establish a leading facility for creative innovation and socio-cultural integration with an ongoing dialogue between creators and the public.</p>	
<p><b>Description of the action and justification of the need for the action:</b></p> <p>Creating a home for the UCM's permanent collection requires a museum project to be implemented that defines the content and the form for exhibiting the works.</p> <p>For this project it was necessary to adapt or buy the museum material needed to exhibit the selected works. This material includes display cabinets, stands, information panels and other items needed to create a versatile and modern exhibition space in which to display UCM's historical, artistic, scientific and technical heritage.</p> <p>At the same time, it was necessary to adapt an area as a place where the Museum Management Unit could work since this unit will be responsible for managing the collection on display and supervising, in compliance with UCM's Regulations on Historical Heritage Museums, the management of UCM's museums and collections.</p> <p>A storage area has been created in which to store the technical elements from the room and to act as temporary storage for exhibition material.</p> <p>As a complement to the entire project, an area has also been established as a restoration workshop for the works displayed in the room.</p>	
<p><b>Use of human, material and financial resources:</b></p> <p>This project has been funded entirely through being charged to the CEI 2009 budget.                  The work to adapt the areas has been carried out, completing the museum management area which includes the storage and restoration areas.                  The furniture for the storage area has already been delivered, as has all the computer equipment.                  The network cabling for the installation of the computer stations has yet to be completed.                  Also pending is the transfer, from the current location, of the office furniture in the Cultural Technical Unit,</p>	

which currently occupies the unit, to create up to six workstations.  
 Work has already started on the museum project. It is expected to be completed during December.

**International aspects:**

The creation of this exhibition space will improve the visibility of the collections in the international environment of university museums, especially through UMAC (University Museum and Collections, ICOM Section, with formal links to UNESCO, which deals specifically with University Museums).  
 The graphics related to the exhibition will be created in Spanish and English to improve awareness about it.

**Expected impact:**

The creation of a permanent exhibition featuring Complutense University's historical, artistic, scientific and technical heritage, in a space suitable for that, will provide the University with a platform for the research and dissemination of its heritage, offering exhibition and conservation conditions comparable to the best found in public and private institutions in Madrid. This will give a big boost to awareness of the importance and richness of the university's collections, which will enhance the research and the educational roles of the collections and the search for financial resources for their maintenance.

<b>Title of Action</b>	<b>A24. Implementation of the museum project: Preparing spaces for the Complutense Veterinary Museum</b>
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**Objectives:**

- Consolidate a heritage restoration project started in 2006, bringing together UCM's entire veterinary heritage into a single exhibition.
- Exhibit, with the appropriate conservation and security guarantees, the museum's extraordinary collections, among which we can highlight the collection of nineteenth-century anatomical waxes and Dr. Auzoux's papier-mâché models, with examples that are unique in the world.
- Create a leading facility for research, teaching and socio-cultural integration, making it easier to handle the high demand for visits to the Faculty of Veterinary Medicine's collections.

**Description of the action and justification of the need for the action:**

Before opening the Complutense Veterinary Museum, some work is needed first to adapt the space adjoining it to complete the security measures and create an area for the storage and treatment of museum pieces.

This work involves cleaning and panelling a room attached to the museum, installing a water intake to facilitate the conservation work on the pieces and installing a surveillance camera security system connected to Complutense University's general security system.

**Use of human, material and financial resources:**

The project is funded entirely by Moncloa CEI.  
 The area in question has been panelled to create storage and restoration space.  
 Security cameras suitable for the surveillance of the museum are being installed.  
 The installation of the water intake in the storage-restoration space is pending.

**International aspects:**

The creation of this exhibition space will improve the visibility of the collections in the international environment of university museums, through UMAC (University Museum and Collections, ICOM Section, with formal links to UNESCO, which deals specifically with University Museums).  
 The graphics related to the exhibition will be created in Spanish and English to improve awareness about it.

**Expected impact:**

Creating a permanent exhibition with the Faculty of Veterinary Medicine's collection will allow the Complutense Veterinary Museum to be opened in the near future.

This will give a big boost to awareness of the importance and richness of the veterinary collections and will facilitate the research and the educational role of the collections and the search for financial resources for their maintenance.



<p><b>Title of Action</b></p>	<p><b>A24. IMPLEMENTATION OF THE MUSEUM PROJECT: "JAVIER PUERTA" ANATOMY MUSEUM</b></p>
<p><b>Objectives</b></p> <p>Enhance the preventive conservation of the collections in the museum, among which are pieces of great historical and artistic value.</p> <p>Contribute to a new project raising awareness about the Complutense's Museums and Collections, which will allow their true value to be demonstrated, in addition to facilitating access for the public and improving study conditions for researchers and teaching staff and therefore for projects and students related to these.</p>	
<p><b>Description of the action and justification of the need for the action:</b></p> <p>The sorry state of the Anatomy Museum's premises was endangering the conservation of the pieces in its collections</p> <p>It was necessary to remodel the space, change the electrical system, refurbish the walls and ceiling and fix leaks and paintwork. Also required was the replacement of the shutters, the installation of blinds and the repair of the windows, to allow for greater control of the natural light and temperature. These actions were necessary to prevent damage to the pieces, especially the important collection of anatomical waxes.</p> <p>This work meant that all the pieces and most of the display cabinets in the Museum had to be temporarily moved.</p> <p>This movement was used as an opportunity to conduct a full audit, photographing all the pieces and adding them to the University's database, assessing the condition of each piece and creating a report with the data.</p> <p>The return of the pieces was carried out to reflect a new exhibition plan, relocating the display cabinets and creating a new route through the exhibition more in keeping with the nature of the pieces and their display to visitors and researchers.</p>	
<p><b>Use of human, material and financial resources:</b></p> <p>The work involved in altering the museum space and the pieces in its collection has been funded entirely by the Moncloa Campus of Excellence International (CEI-Moncloa).</p> <p>This project has been designed by members of the Cultural Technical Unit at Complutense University, who supervised and directed the movement of the pieces and the personnel from its service involved in handling pieces.</p> <p>It involved cooperation from the Department of Anatomy and Human Embryology I, which houses the Museum, and from Anatomy and Human Embryology II, which temporarily housed the pieces, both part of the Medical Faculty at Complutense.</p> <p>Members of the Faculty of Fine Arts, specialists in the field, were involved in drawing up the exhibition plans.</p>	
<p><b>International aspects</b></p> <p>The refurbishment of the space and the exhibition raises awareness about this museum and the research projects taking place there.</p> <p>Some of the collections on display are unique in the world and their importance can attract a large number of foreign researchers and visitors.</p>	

**Expected impact**

An improvement in the conservation of these collections, which include pieces of great historical and artistic value, increased visibility for the collections, their dissemination and an increase in the possible number of visitors

<b>Title of Action</b>	<b>A24. Implementation of the museum project: storage that can be visited for the Educational textile collection's museum at the Complutense University of Madrid</b>
<p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>– Create a store that can be visited to house the Complutense University of Madrid's Educational Textile Collection.</li> <li>– Increase the visibility of this collection, contributing to its diffusion and making it accessible to more visitors, providing researchers with a study space that is appropriate given the materials in the collection.</li> <li>– Improve the conservation of these collections, which include pieces of great historical and artistic value, some dating back to the fifteenth century, and many pieces from the seventeenth to twentieth centuries.</li> </ul>	
<p><b>Description of the action and justification of the need for the action:</b></p> <p>The pieces in UCM's Educational Textile Collection have been housed in a classroom on the third floor, the top floor, of the Faculty of Documentation Sciences since November 1997, a space that is unsuitable for the conservation of the textile and documentary works that make up this museum collection. Therefore, it was considered necessary to transfer it to UCM's space on the ground floor of the Costume Museum, due to the need for conservation and display space that is more appropriate given the type of heritage collection. Incidentally this move would improve accessibility for researchers and the general public. The old furniture that did not meet the minimum requirements for the conservation of the textiles has been replaced with new furniture more in keeping with recent advances in preventive conservation systems for textile heritage.</p>	
<p><b>Use of human, material and financial resources:</b></p> <p>This project is funded entirely by CEI Moncloa.</p> <p>We have dismantled the items from their former location in the Faculty of Documentation and moved them to the new facilities located on the ground floor of the Costume Museum.</p> <p>The storage and display furniture has been purchased, as has the computer equipment proposed. This has all been stored pending the completion of the work planned. The materials purchased for the new facility are the appropriate ones according to studies and research in the preventive conservation of textile collections. Its location in the new space will allow for the optimisation of the personnel working at the museum since it will have the support of the personnel in the museums, located in rooms adjacent to it.</p>	
<p><b>International aspects:</b></p> <p>One of the objectives of UCM's Educational Textile Museum is to become known internationally through the UMAC (University Museum and Collections), ICOM Section, with formal links to UNESCO, which deals specifically with University Museums). From among the collections in the Educational Textile Museum we can highlight the lace collection which is internationally famous, having featured in international exhibitions "Espanjalaisia Pitsejä" in Finland in 1991 and receiving visits from Germany, Mexico and the Netherlands, among others, during its exhibition in the Faculty of Documentation Science building.</p>	

<b>Strategic area</b>	<b>TRANSFORMATION OF THE CAMPUS FOR THE CREATION OF AN INTEGRAL SOCIAL MODEL AND ITS INTERACTION WITH ITS TERRITORY</b>
<b>Action</b>	A25. CAMPUS MONCLOA EDUCATION ORIENTATION PROGRAM FOR SCHOOLCHILDREN IN THE MADRID REGION (PROMOVER)
<b>Objectives</b>	Raise awareness among secondary-school students of the institutions and educational possibilities available on the CEI Moncloa Campus

**Progress towards the objectives**

**SUMMER SCIENCE CAMPUS**

Raise awareness among secondary-school students of the institutions and educational possibilities available on the CEI Moncloa Campus.

In collaboration with the Ministry of Education, Culture and Sport and FECYT (Spanish Foundation for Science and Technology), since 2010, the aim of these Campuses has been for students in the fourth year of compulsory secondary education and the first year of the sixth form to have a preliminary contact experience with the research work carried out in the CEI Moncloa by taking part in science outreach projects designed and run by university professors of the highest possible level, in collaboration with secondary education teachers.



Photo: Official inauguration of the Science Campuses in 2012 with the presence of the Ministers of Science and Innovation and Education, and the Vice-chancellors of the UCM and UPM, with some of the participants.

**PRE-UNIVERSITY ORIENTATION COURSES**

The aim of these courses is to provide future students of the CEI Moncloa with information on the university access exam and the educational offering, and to help them with the task of choosing their university studies.

## **Description of the work carried out and the role of the participants**

### **SUMMER SCIENCE CAMPUS**

In order to comply with the proposed objectives, each year a range of different theoretical and practical programs have been designed which combine theoretical classes with practical activity and scientific and technological visits, in addition to other activities with a recreational and cultural content.

Projects carried out:

- Biodiversa: Scientific collections as evidence of biodiversity.
- Introduction to research through astronomical observation.
- Scientific applications to the field of conservation and restoration of heritage.
- New technologies in agri-food and health: from the farm to the table.
- Global change and teledetection.

These projects took place in several research departments in the universities of the CEI Moncloa, always in July, with differing lengths of stay and a number of participants ranging from 60 students in 2010, to 112 last year.

The Campuses were taught by university professors and secondary school teachers, and were also tutored by qualified leisure and activity instructors. Staff from the UCM Students Department took part in coordinating and setting up the program.

The students had access to the material and instrumental equipment of the laboratories in which they carried out their practical work, in addition to the necessary IT and audiovisual material for creating the scientific presentation they were required to make on completion of the activity.

More information:

<http://www.campusmoncloa.es/es/formacion/campus-cientificos.php>

<https://docs.google.com/file/d/0BwvvL6QBtPwfYnpvZ2dJUENIQOE/edit?usp=sharing>

<https://docs.google.com/file/d/0BwvvL6QBtPwfT3dmc1VBZy1MRWs/edit?usp=sharing>

### **PRE-UNIVERSITY ORIENTATION COURSES**

These courses take place in four different venues according to the knowledge area with which they are associated: Science and Engineering, Health Sciences, Social and Legal Sciences, Arts and Humanities. In each venue the visiting pre-university students receive a preliminary explanation by students currently attending the Campus of the characteristics of the PAU (university entrance exam), the offering of educational courses, the cultural resources and services they will find on the Campus, and any queries they may have about what they have heard are answered. Then, teachers from each faculty deliver a presentation of each of the degree courses on offer and answer any queries the students may have. Finally the university students take the future students on a guided tour of the Campus.

The number of university students taking part is around 150, the number of sixth-form centres that have visited the Campus is around 200, and the total number of students in the program is around 12,000.

More information:

<http://www.ucm.es/estudiantes-1>

## **Most significant results**

### **SUMMER SCIENCE CAMPUS**

The main achievement of the Summer Science Campuses has been to improve awareness among secondary and sixth-form students of the activities carried out in a research laboratory at the CEI Moncloa, from the methods applied through to the usefulness of the results obtained for society; another result has been to stimulate and reinforce the scientific vocation among the participants.

### **PRE-UNIVERSITY ORIENTATION COURSES**

Improvement of the information available to future Campus students on university entrance exams,



educational offering, facilities and services, in order to help them to choose their university studies.

**Use of human, material and economic resources**

The Science Campuses were taught by university professors and teachers of secondary education, and were also tutored by qualified leisure and activity instructors. Staff from the UCM Students Department –mainly– and other services of the UCM-UPM (Student residences, Culture etc) took part in coordinating and setting up the program.

The students had access to the material and instrumental equipment of the laboratories in which they carried out their practical work, in addition to the necessary IT and audiovisual material for creating the scientific presentation they were required to make on completion of the activity.

The campuses, in their different editions throughout these years, have been supported by funding from the Science and Technology Foundation (FECYT), the body that organised them. In 2011 the CEI Moncloa Campus obtained funding through the 2011 Reinforcement program from the Ministry of Education, Culture and Sport for financing the summer campuses; however this subsidy could not be applied as the decision to award it was made after the activity had been carried out, and therefore the UCM bore the expenditure generated.

**Most significant deviations in the progress towards the objectives**

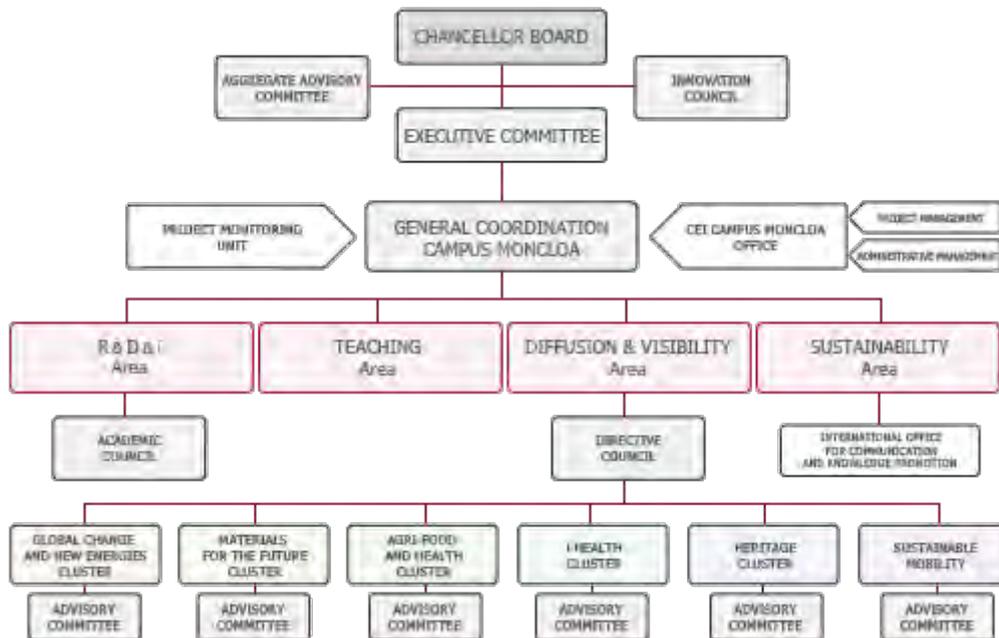
There were no deviations.

**Proposal for corrective actions**

Not applicable

### **3. Governance of the project**

The governance structure has the following configuration, in which the main bodies have representatives from the two universities:



**General Coordination of the Moncloa Campus.** This is the unit directly monitoring the project, a responsibility that lies with the vice rectors for research at both universities. It is the decision making body involved in implementing the project.

As support for the General Coordination of the Moncloa Campus we have the **Management Board**, consisting of the general coordinators of the campus together with the coordinators of the clusters. This management board sets the strategic areas relating to R&D and innovation activities and to the coordination of the research groups associated with the CEI. The coordinators of the clusters are renowned scientists belonging to the universities and appointed by the rectors after being nominated by the vice rectors, for the tasks entrusted.

The **Partner's Advisory Council** is the body coordinating the representation on Moncloa Campus of the research institutes, hospitals and other institutions that constitute the critical

mass of research on the Moncloa Campus. These institutions are actively engaged in developing the CEI strategies through their participation on the Advisory Boards for the clusters.



Photo: Meeting of the Partner's Advisory Council

The **Innovation Council** has been created, along with the Partner's Advisory Council, and is waiting for there to be a large enough critical mass of business representatives to formalise an independent body. Cooperation agreements have already been signed with renowned companies such as Indra and Central Lechera Asturiana (CAPSA) and contact has been made with others, which will hopefully soon culminate in new agreements. Agreements and ongoing collaborations with large companies and SMEs are the foundation for our work on innovation.

Also in the scientific area, the Advisory Boards for the clusters were appointed to support and advise the cluster coordinators.

**The Academic Committee** created for the launch of EIP-Moncloa is composed of the following members:

On behalf of UPM:

- General Coordinator of the Campus and Vice Rector for Research, Roberto Prieto López
- Vice Rector for Academic Planning and Doctoral Studies, Emilio Mínguez Torres
- Deputy Vice Rector of Academic Planning and Doctoral Studies, Francisco Javier Elorza Tenreiro

On behalf of UCM:

- General Coordinator of the Campus and Vice Rector for Research, J. Francisco Tirado Fernández
- Vice Rector for Postgraduate and Continuing Education, José María Alunda Rodríguez
- Vice Rector for Quality Assessment, Elena Gallego Abaroa

Director of the EIP:

- Antonio Dobado González

The tasks assigned to the Academic Committee are:

- Directing the International School of Postgraduate Studies on Moncloa Campus
- Coordinating all the teaching activities on the CEI Moncloa Campus.
- Promoting the creation of joint masters
- Raising the international profile of the teaching activities on Moncloa Campus

**CEI Moncloa Campus Office**

This office coordinates all the activities carried out on Moncloa Campus. Under the direction of the General Campus Coordinators we have the economic management structures of both universities along with the technical promoters of the project.



The Moncloa Campus Office comprises personnel from the general workforce and also staff hired to carry out the project. The people making up the team are:

PERSONNEL	INSTITUTION
Casado Almarcha, Ana María	Moncloa Campus
González de la Rocha, M <sup>a</sup> Eugenia	UCM
Menéndez Nieto, Sonsoles	UPM
Oña Rosado, Rocio	UPM
Puerta Pérez, Aurora	UCM
Semprún Balenciaga, Lourdes	UCM

The CEI Moncloa Campus Office was housed in a wing of the administrative offices of the Royal Botanic Gardens Alfonso XIII. The wonderful location of this Garden, equidistant and independent to the Rector's offices at the Complutense and Polytechnic universities in Madrid, allows for the connection with the university community since it is located at the southernmost point of the Moncloa Campus. The office has a meeting room often used by working groups formed by members of the UCM and the UPM who are involved in different areas of work. The office has become a neutral meeting point for everyone bringing value to Moncloa Campus.

The people involved in the governing bodies for the Moncloa Campus can be found on the website:

<http://www.campusmoncloa.es/es/campus-moncloa/gobernanza.php>

4. *Tables showing Results, Indicators and Future Milestone*

**Table II. Main Results**

Number	Strategic Area	Description	Format	Date completed
1	1. Teaching Improvements and Implementation of the European Higher Education Area (EHEA)	Moncloa Campus International Postgraduate School (EIP-Moncloa) Signing of Protocol for its creation	Document	21 May 2013
2		Three new inter-university degrees offered by the EIP	Document	June 2013
3		School of Government: Signing of protocol for its creation by both Universities	Document	21 May 2013
4		International Centre for Latin-American Studies Signing of protocol for its creation by both Universities	Document	21 May 2013
5		First seminar CEI-AL: “A look at Latin America”	Event	18 June 2013
6		María Zambrano Library: new services offered	Facility	1 <sup>st</sup> phase December 2010
7		Adaptation of teaching infrastructures to EHEA deployment: New infrastructures for academic management and electronic administration	Facility	2012-2013 academic year
8		Improvement to data networks: Optical fibre network shared by the institutions on the Campus	Facility	December 2012
9	2. Scientific improvement and knowledge transfer	Program for International Talent Recruitment (PICATA) Sub-program Young Doctors, Sub-program Pre-doctorate aide, Sub-program Mobility for pre-doctorate students 7 calls for applications finalized ( <a href="http://www.campusmoncloa.es/es/convocatorias/">http://www.campusmoncloa.es/es/convocatorias/</a> )	Document	From October 2010
10		Aid for the acquisition of scientific and technological equipment and infrastructures (CAIMON)	Document	March 2011.
11		Creation of scientific clusters and publication of master plans	Document	May 2011
12		Creation of the Sustainable Mobility Cluster	Document	December 2011
13		Purchase of high-performance scientific equipment for the work being done by the Campus Moncloa research teams.	Facility	2012-2013 academic year
14		Singular Scientific and Technical Infrastructure – Advanced Electron Microscope: Install new electronic microscope	Facility	January 2013
15		“Living Lab”, initiated and co-funded by UPM (ETSIT)	Facility	March 2010.

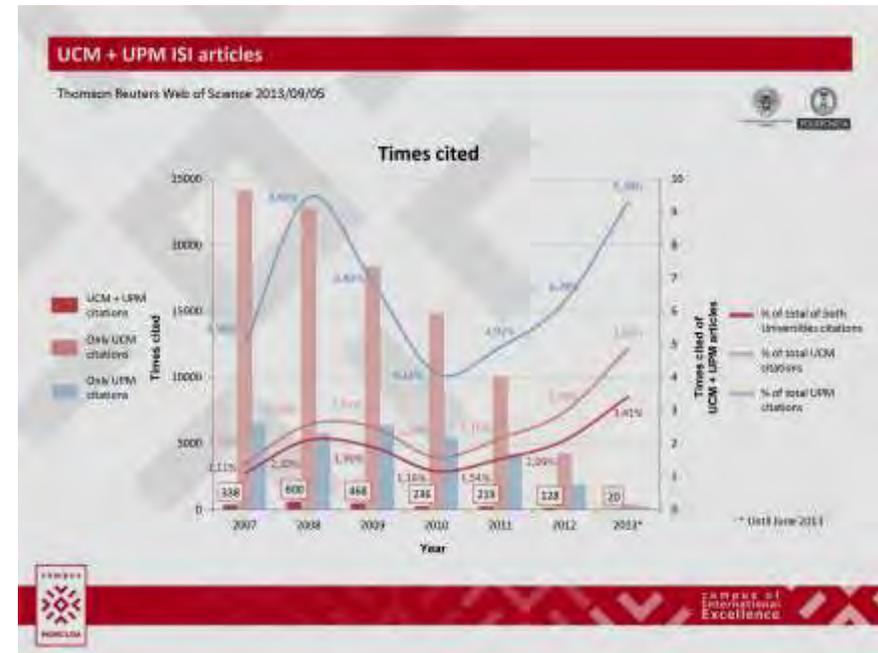
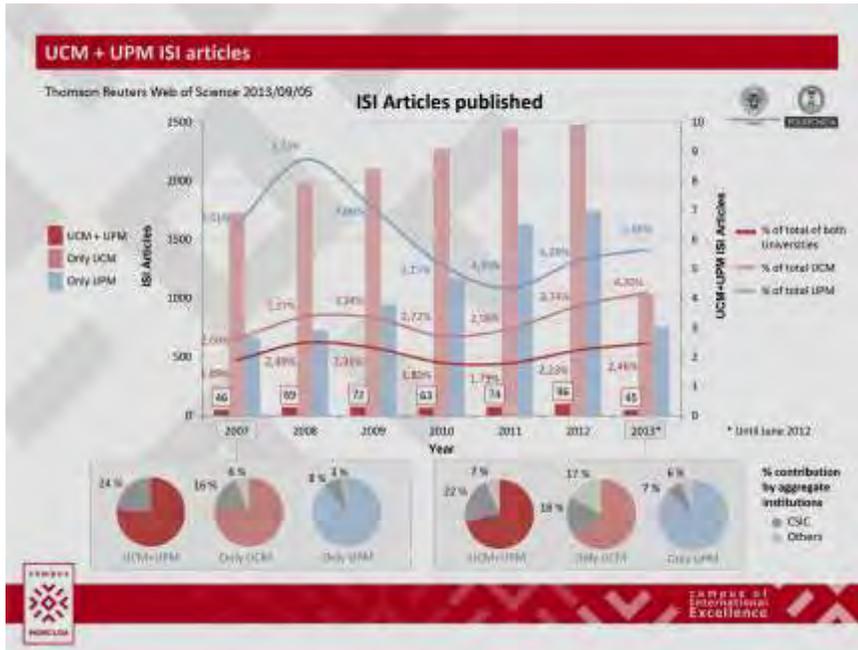
16		First Campus Moncloa conferences held	Event	23-25 February 2010
17		[cei]nnova innovation conference	Event	13 June 2012
18		Materials Week in the Moncloa Campus	Event	29 – 30 April, 2013
19		PICATA meetings: Annual meeting of all of the students that had received support from the PICATA program	Event	2011, 2012 and 2013
20		General Accessibility Plan: Adaptation of the Colegio Mayor Santa Teresa de Jesús to provide access for the disabled	Facility	May 2012 and May 2013
21		Agri-food Corridor installations work	Facility	December 2012
22	3. Transform the campus to promote an inclusive social model and its interaction with its surroundings.	Campus Project: Recovery of green areas	Facilities and Document	2011, 2012 and 2013
23		Campus Project: Sustainable Mobility Plan for the <i>Ciudad Universitaria</i> (PMUS)	Facilities and Document	May 2013
24		Campus Project: Implement a system of bicycle stations	Facilities and Document	2011, 2012 and 2015
25		Participation in the Summer Science Camps from 2010 to 2013	Document	July 2010, July 2011, July 2012 and July 2013
26		International Visitors Reception Centre	Facility	September 2012

Table III. Progress indicators

Area	Indicator	Starting point	At the time report issued	% progress
Scientific improvement	Number of R&D projects with national public funding	<b>793</b>	936	<b>18%</b>
Scientific improvement	Amount for R&D projects with national public funding	<b>65,750,000</b>	101,534,328	<b>54%</b>
Scientific improvement	Number of R&D projects in international programs	<b>161</b>	286	<b>78%</b>
Scientific improvement	Amount for R&D projects in international programs	<b>14,000,000</b>	75,578,382	<b>440%</b>
Scientific improvement	Number of Singular Scientific-Technical Infrastructures (ICTS)*	<b>2</b>	2	<b>0.0 %</b>
Scientific improvement	Number of students with pre-doctoral aid (PICATA)*	<b>0</b>	33	
Scientific improvement	Number of post-doctoral contracts (PICATA)	<b>0</b>	22	
Knowledge transfer	Number of spin-offs	<b>7</b>	22	<b>214%</b>
Knowledge transfer	Number of national patents applied for	<b>36</b>	16	<b>-56%</b>
Knowledge transfer	Number of international patent extension applications (PCT)	<b>22</b>	101	<b>359 %</b>
Knowledge transfer	Number of University-Firm cooperation projects (R&D, consulting, services)	<b>1,371</b>	1,957	<b>43%</b>
Knowledge transfer	Amount for University-Firm cooperation projects (R&D, consulting, services)	<b>85,420,000</b>	84,059,596 €	<b>-2%</b>

\*During the period being evaluated the Program for International Talent Recruitment (PICATA) was launched. This is a specific CEI Campus Moncloa program where young researchers can run their projects under the co-direction of a professor from each university.

Joint projects by CEI Moncloa Campus researchers



**CEI Campus Moncloa: La energía de la Diversidad**  
*Informe de seguimiento 3ª anualidad*

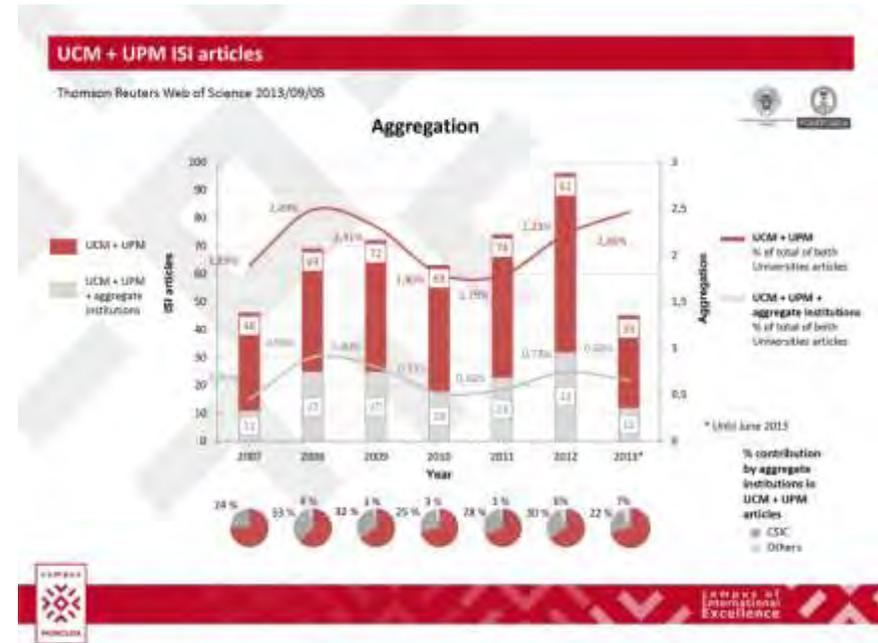
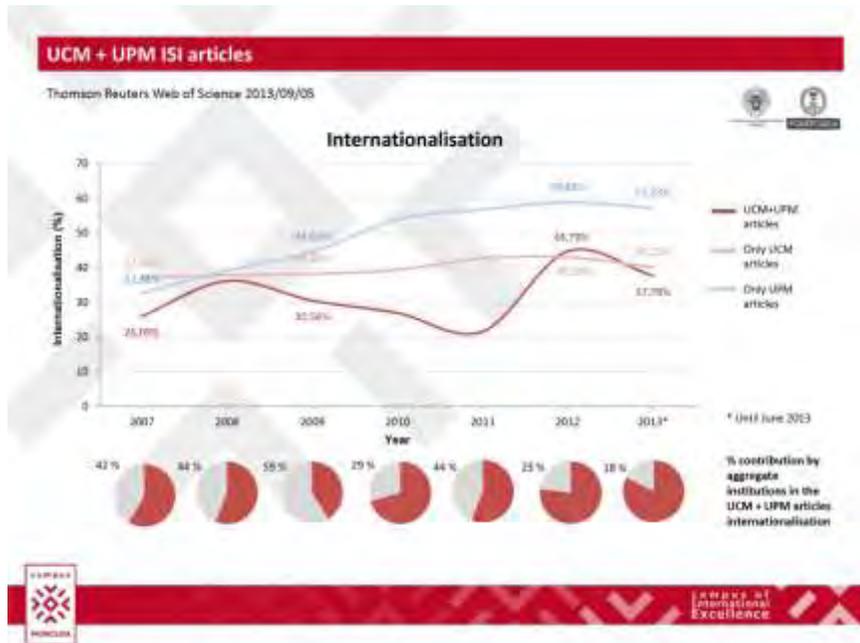


Table IV. Future Milestones

Milestone	Strategic Area	Description	Expected completion date	Verification method
1	1. Teaching Improvements and Implementation of the European Higher Education Area (EHEA)	María Zambrano Library: new services offered	October 2013	Facilities
2		New academic offering: Inter-University Masters in Strategy and Technology for Development: Cooperation in a changing world, Inter-University Masters in High Mountain Management, Inter-University Masters in Materials Engineering and Inter-University Masters in Cultural Heritage Management in the 21 <sup>st</sup> Century.	September 2014	Website
3		Collaboration of the clusters in the activities of the Real Colegio Complutense in Harvard	Academic Year 2014 - 2015	Website
4		Teaching collaboration with the University of Denver (Colorado), UC Davis (California) and the Kuwait Institute for Scientific Research, KISR (Republic of Kuwait)	Academic Year 2014 - 2015	Website
5	2. Scientific improvement and knowledge transfer	PICATA call for proposals: Sub-program – Support technicians	October 2013	Website
6		PICATA call for proposals: Sub-program – strengthening young doctors	March 2014	Website
7		Launching and advertising all technical services with the new equipment purchased by the CEI Moncloa Campus	January 2014	Website
8		Purchasing of scientific equipment - CAIMON (pending equipment)	June 2014	Facilities
9		Finalize purchases funded by the INNOCAMPUS program	December 2013	Facilities
10		E1. Construction of the Bioclimatic Multipurpose Building (EBM).	December 2015	Facilities
11	3. Transform the campus to promote an inclusive social model and its interaction with its surroundings.	Campus Biodiversity Interpretation Centre	October 2013	Facilities
12		Biogeological Clock and Museum for the Blind	October 2013	Facilities
13		2nd Edition of Materials Week	April 2014	Website
14		Moncloa Campus Museum	December 2013	Facilities
15		Sports installations improvements	December 2013	Facilities

Table V. Use of Resources\*

\*The table shows audited spending through January 2013

STRATEGIC AREAS	ACTION	FUNDING	PERSONNEL	OPERATIONAL EXPENSES	INVESTMENT	TOTAL
Scientific improvement	A9. International Program for Talent Recruitment (PICATA)	CEI 2009	2,234,886 €	4,827 €		2,239,713 €
	A5. Moncloa Campus call for Research Grants (CAIMON)	CEI 2009			1,674,364 €	1,674,364 €
	A6. Drafting of the Cluster Master Plans.	CEI 2009		2,467 €		2,467 €
	A22. Joint office for the Evaluation of Research Results.	Reinforcement program 2011		46,821 €		46,821 €
	E2, E5 and E6: Global Change and New Energies Cluster	Sub-program B			801,971 €	801,971 €
	E11. Advanced Scientific Instrumentation Laboratory (LICA)	CEI 2009			187,129 €	187,129 €
	E12. Creation of a Joint Unit (UCM-UPM) for ex situ Conservation. Installation of a research greenhouse.	Sub-program B			330,494	330,494 €
	E13. Creating a program for cataloguing, conservation and dissemination of Biodiversity in the University Campus.	CEI 2009			92,881 €	92,881 €
	F1. <i>Installation of the Advanced Electronic Microscopy Centre del (CMA)</i>	Sub-program B			467,300	467,300 €
	F3. Creation of the Workshop Network for the development of new thin film materials.	Sub-program B			262,343 €	262,343 €
	F4. Mechanical Properties Workshop: Durability and Sustainability of the Materials. Sub-action: Creation of a Building for Mechanical Trials of Construction Elements.	Innocampus			513,308 €	513,308 €
	G1. Agri-food Corridor	CEI 2009		88,364€	315,985€	404,349€
	G3. International School of Infectious Communicable Animal Diseases (EIEAC)	CEI 2009			55,035 €	55,035 €
	H2. Creation of an Advanced Preclinical Development Platform	CEI 2009			42,686 €	42,686 €
	H4. Creation of the Advanced Biomedical Imaging Platform	Sub-program B			139,700 €	139,700 €
P2. International Centre for Heritage Studies (CIESP).	CEI 2009	24,706 €			24,706 €	
Teaching	A4. International Postgraduate School (EIP)	CEI 2009			9,280 €	9,280 €

Improvements and Implementation of the European Higher Education Area (EHEA)	A7. Improvement to data and communications networks	Reinforcement program 2010			671,564 €	671,564 €	
	A8. Inauguration of the María Zambrano Library	CEI 2009			300,707 €	300,707 €	
Transform the campus to promote an inclusive social model and its interaction with its surroundings.	A1. Governance	CEI 2009	316,149 €	29,495 €	23,170 €	368,814 €	
	A10. International Visitors Reception Centre				47,670 €	47,670 €	
	A12. International Office of Communication and Promotion (OICD)	CEI 2009	32,593 €	51,454 €	55,372 €	139,419 €	
	A13. Campus Project	CEI 2009			73,310 €	73,310 €	
	A16. Moncloa Campus University Residence	CEI 2010		10,991 €		10,991 €	
	A23. Creation and implementation of the Campus Radio and Television Service (iRTV-CampusMoncloa)	Reinforcement program 2010				20,400 €	20,400 €
	A24. Creation of the Moncloa Campus Museum	CEI 2009 and 2010				59,066 €	59,066 €
	A25. For Guidance In School Education (PROMOVER)	CEI 2009			634 €		634 €
	<b>Total</b>		<b>2,608,335 €</b>	<b>374,120 €</b>	<b>6,004,033 €</b>	<b>8,987,121€</b>	





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