Activities Planning 2010

January, 13th

CITAB

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- **Integrative Biology & Quality**
- **Ecointegrity**
- **Biosystems Engineering**

1 – Introduction

CITAB emerged following the research strategy of the UTAD, which lead to a logical unification process of 3 research Units, in the areas of agro-food, forestry and environmental related sciences. The objective was to gain critical mass to be more competitive in the research activities requested by the agro-food and forestry chains, including their impacts in the environment. The inclusion of a group with expertise in technological engineering and new technologies was considered an added value to change, at least at national level, the concept and pragmatism of research in the agro-food and forestry areas.
In 2008 and 2009 the Direction of CITAB set several objectives and a scientific plan of activities that was achieved for most of the topics. Indeed, it was easier to meet the planned productivity (JCR publications and others, number of applied projects, etc) but difficult to get an answer to the planning, regarding the scientific development within each research Group. Thus, for 2010 it was decided that a bottom-up approach would be more effective and thus ensure a greater involvement of every researcher, in the definition of the priorities and the respective main achievements.
CITAB has reached a reasonable size with 160 members from which 64 are integrated members. During 2009 we welcomed the Group of Bioproducts & Biotechnology from the University of Minho, which brought an added value to the Integrated Biology and Quality Group.
Regarding national collaborations, during 2009 we applied with another 4 Units in Lisbon and Coimbra for an Associated Laboratory, which will be funded by FCT. We are looking forward to the final decision, during the next few weeks, which will have a significant influence on our relation with our partners.

2 – SWOT analysis

Two years following the FCT evaluation, which correspond to the middle term of another international evaluation, it is the time to perform a SWOT analysis and set a plan to correct the weaknesses and be prepared to face the threats.

S **Multidisciplinary approach**	**W** **Internal:** **Lack of communication; Interactions between groups** **External:** **Few interactions; Lack of visibility;** **Links to stakeholders; Internationalization**
O **Working areas** **(Fires, Viticulture, Biological Agriculture, Ecology, …)**	**T** **Competition: national & international** **Tougher FCT evaluation** **Tougher EU evaluation** **Reduction in nat. and int. funding available**

3 – The driving forces

We pursue with the driving forces that were set when CITAB was launched. The priority in the use of our resources relates to the internationalization activities and every Group is asked to set this as a major priority. This Unit wants to be recognized as national and international leaders in science, at least in some of the research areas covered by the 3 working Groups and so scientific innovation is another driving force which benefits from our multidisciplinary approach compared with other Units that are much more focused in specific areas within the scope of agro-food and forestry.
During the last two years we have tried to increase the links to our stakeholders in general and particularly to the various relevant industries. We have succeeded in a couple of examples however we need to reinforce our attitude for increasing these links to industry, another driving force.
A major concern in the agro-food and environmental areas is improved sustainability of crop production whilst reducing/eliminating any negative environmental and health impacts due to agro-food production. This includes a deeper understanding of how the science in the 3 working groups can effectively interact to solve key problems in sustainability e.g. more efficient utilization of resources (water, land) in a changing climate and developing methods for using agro-food and forestry wastes as sources of beneficial co-products.

4 – Major objectives

The objectives set for 2010 intend to eliminate, at least partly, the identified weaknesses from the SWOT analysis. Thus, the following major objectives were set:
- Gain international visibility as a whole (Unit) and particularly of the three Working Groups, but we also acknowledge that some Groups can be more competitive than others
- Improve the interactions within and between the Groups
- Gain higher scientific coherence within the Groups
- Increase the scientific productivity in JCR Journals and in other publications
- Increase collaboration with stakeholders
- Increase human resources (students & researchers) to obtain critcal mass in all areas

5 – Activities

5.1 – Scientific development

Researchers were challenged to present their key scientific development as members of the Working Groups; the integration of individual and team contributions results in an added value of the Group.
As referred, the major input of the present Plan of Activities, regarding previous Plans is a clear definition of what will be the main achievements for each of the ongoing projects within each of the 3 Working Groups.

BIOSYSTEMS ENGINEERING

The **Biosystems Engineering** research unit consists of three research groups and is focused on the effective and pragmatic applications of engineering for Biomaterials, Digital Image Processing and Signal Processing and Biotelemetry.

Within the **Biomaterials** group research is performed on the characterization and exploitation of different biomaterials and is focused on the following major activities

• Development of identification methods of mechanical and fracture properties of wood, cortical bone and structural polymers and composites, based on full-field optical methods. A particular attention will be given to identification methods based on the Virtual Fields Method. This will lead to the development of a direct method to determine the cohesive law parameters controlling the fracture behavior of wood and an inverse method to evaluate elastic properties fields of wood at the growth ring scale.

• Characterization of mechanical behavior of wood dowel joints and wood bonded joints, using advanced experimental (digital image correlation technique) and numerical (finite element method and cohesive models) methods. This will lead to the development of advanced numerical tools to simulate the fracture behavior wood dowel and bonded joints.

• Development of identification methods of thermodynamic properties of lignocellulosic biomass as primary energy source. From this research a model of structure-properties relationship will be produced concerning the moisture diffusion thermodynamic properties at the scale of the growth rings.

• Improvement of energy efficiency of energy conversion processes employing lignocellulosic biomass from agro-forestry resources and wastes. Experimental and numerical modeling of anaerobic digestion process of biomass will be generated to optimize biogas production.

Within the **Digital Image Processing** group research is focused on engineering applications in relation to Agro-Forestry, Environmental and Biological contexts:

• Development of image segmentation and image based classification methods using Soft Computing. This will lead to improved methodologies for image based classification.

• Development of image based methods applied to bio-materials micro-structure characterization. A shape descriptor (through image based parameterization) of wood micro-structure will be generated.

• Development of image based methods applied to gait analysis in animal models.

• Application of local hyperspectral imaging techniques for grape analyses in order to assess the grape maturity by measuring pH, sugar content and anthocyanin content. From these studies a non-destructive grape evaluation method will be developed.

Within the **Signal Processing and Biotelemetry** group there are two major applied research activities

• Development of new methods for energy harvesting in agricultural environments.

• Development of smart data acquisition devices.

From these research activities autonomous acquisition systems for precision agriculture purposes will be developed.

ECOINTEGRITY

The **Ecointegrity** research group consists of 5 sub-groups as follows:

The sub-group of **Aquatic Ecosystems and Biomarkers** will be focused on the integrated ecological assessment of running waters and reservoirs, which will take place in North

Portugal. The group will study the different aquatic communities (invertebrates, fishes, macrophytes algae), together with the hydromorphological and landscape characterization. It is expected to extract or to improve the sensitivity of the metrics already defined and to couple these bio-indicators with the assessment of toxic contamination through the use of biomarkers based on fish (with a special mention on histopathological and genotoxic mechanisms), and finally to assess the interaction and cumulative effect of different sources of disturbance expressed at different spatial scales.

The sub-group of **Microbiology** expects to give further contribution regarding the increase of fungi use and their enzimatic extracts in two sectors: sewage treatment and in the bio-conversion of cellulosic and lenhinic components for further incorporation in biodiesel. In cooperation with the aquatic ecosystems and biomarkers group, it will be assessed the use of yeasts as indicators of disturbance in contaminated streams.

The sub-group of **Ecological Modeling** intends to perform the Stochastic Dynamic Methodology (StDM), which will be used along this year to measure biodiversity and monitor threatened species dynamics, as an investigative tool to forecast the outcome of various scenarios, to guide current management, and to develop integrated frameworks for wildlife conservation and ecological integrity management. It is expected to produce at least four simulation ecological models in the context of ongoing environmental changes at the local and landscape levels, namely to assess the impacts of the windfarms installation on bats, the impacts of hydrologic management in man-made reservoirs on waterbirds dynamics, the impacts of overhead high tension power lines on a threatened grassland bird, the Little Bustard *Tetrax tetrax*, and the impacts of the Laurissilva forest degradation on a very threatened endemic bird species, *Pyrrhula murina*, from the Madeira island.

The sub-group of **Fire Ecology and Climate** looks for a better comprehension of the relationship between fire and climate factors, through the use of thermodinamics and modellation. It is expected to conduct further studies envisaging a more comprehensive information regarding the ecology and fire management in the forest, particularly on the techniques of prescribed burning and consequences on forest stands (response of woody plants, erosion, nutrient cycling, etc.). All these actions look not only for a regional assessment but are included at the European level, thanks the international cooperation under the WP6 and FP7, where the ecological mechanisms and management techniques are compared for all the continent.

The sub-group of **Flora, Fauna and Wildlife** will be concentrated on studying the flora and the assessment of disturbance in forest stands. Concerning the first item the research will look to analyse the evolution of the meditterranean flora, related to the neogenic floristic corridors, together with the improvement of the taxonomic characterization of the iberian flora. The second aspect will deal with the assessment of the ecological condition in forest stands trough two methods a) large scale, by the use of satellite imagery; small scale, though the ground checking of the effects of foliage feeders, particularly on the maritime pine.

INTEGRATIVE BIOLOGY & QUALITY

There are 3 sub-groups within **Integrative Biology & Quality** research group:

Within the **Phytochemicals & Cell Biology** there will be 4 major activities, as follows:

• Food Composition: Nutrients & Bioactives: Studies will be done on the effect of cultivar, cultivation and stress factors on the composition of important dietary nutrients and non-nutrients (phytochemicals). Comprehensive information will be generated regarding the potential health effect of these foods.
• Phytochemical Biopesticides: Portuguese, European and selected International plants will be evaluated for their development as effective antimicrobial, antifungal and anti-parasitic agents for plant, animal and human pathogens. With these studies we will identify plant species that can be used for production of biopesticides (see Plant Protection Strategies).
• Value Products from Agro-Food Wastes: Within this project valuable bioactivities (antimicrobial, antifungal, antioxidant and anticancer) will be evaluated for agro-food wastes derived from mushroom, fruit, cereal, olive and wine industries for their pragmatic development into added-value co-products (see Phytochemical Biopesticides). We will have reliable scientific data to show added values for these materials and pragmatic (sustainable) processing methods.
• Development of Human Cell Models: Human cell models will be used to gain a greater understanding of the metabolism and effects of dietary phytochemicals/secondary metabolites from foods as the first step towards performing human intervention studies and thus understanding how these natural products affect human health.

Within the **Climate, Stress & Sustainable Crop Production** there will be the following major activities:
• Sustainable Production of Mediterranean Crops:
(i) Preservation and valorization of Portuguese food plant resources and specifically the identification and selection of hazelnuts and chestnuts with optimal organoleptic and processing qualities. In addition to the application of these results to stakeholders this area will also contribute to the national germplasm banks and biodiversity studies.
(ii) Biotic and Abiotic Stresses - Studies to understand the effects of biotic and abiotic stresses on grape, olive, nuts and medicinal and aromatic plants in order to minimize the negative impacts through subsequent adaptation of agricultural practices in relation to climate change. It is expected that data will be generated that can be used to identify the key stress factors that negatively affect crop yields and quality.
(iii) Plant Protection Strategies: Evaluation of native plant species as sources of effective, low-cost and safe natural pesticides (biopesticides) that can replace the synthetic and increasingly ineffective pesticides with negative environmental and health impacts. These studies will lead to identification of natural antifungal agents for economically-important aerial and soil-borne plant fungal pathogens.
• Climate and Atmospheric Modeling: Studies will be done on atmospheric variability and its impacts on agro-forestry systems; atmospheric processes related to climate extremes: ongoing development of an atmospheric model (Euro-Atlantic and Regional scale); identification of storm tracks and extreme events concerning temperature and precipitation. It is expected that the data generated and models created can be effectively used in agro-forestry ecosystems.
•Nutrient Cycling & Greenhouse Gases Emissions from Agriculture: The effects of phytochemicals (green manures) will be studied in relation to: composting and transformation processes of phytochemicals (metabolites production); mineralization of organic C and N added to soils, and emission of C and N gaseous compounds of environmental significance; evaluating of effects of climate change (temperature increase & elevated CO2 concentration) on ammonia and greenhouse gases emissions from rice paddies. Results will provide integrated knowledge on processes of the N cycle and organic C transformation in soils and they will contribute to the sustainability of agricultural and environmental protection activities.

Within the **Bioproducts & Biotechnology** there will be 4 major activities, as follows:
• Medicinal Aromatic Plants (MAP): Development of add-value products from MAP grown in Portugal using *in vivo* plants and *in vitro* tissue cultures. Development of MAP products for biotechnological applications in environmental, agricultural, pharmaceutical and food industries. Identification and development of MAP-derived biological control agents for use against important crop pests and pathogens and against food contaminant microorganisms. It is expected that several economically-valuable MAP species and products will be identified for use in the different industries.
• Plant Genetic Engineering for Useful Plant Metabolites: The use of genetically-transformed plant cells, tissues and organs as tools for the study of biosynthesis and production of high added value MAP secondary metabolites. Studies on the molecular mechanisms of Agrobacterium recognition and defense activation to elucidate how recalcitrant plants avoid the T-DNA transfer. From these studies genetic strategies will be developed for optimizing the production of valuable MAP-derived bioactives.
• Plant Culture: Physiology & Biochemistry: Development of micro-propagation protocols and in vitro plant culture models to study the biosynthesis of secondary metabolites. Use of plant tissue cultures to determine the effects of environmental factors on physiological/biochemical aspects of C metabolism and to determine the bioherbicide effects of natural products. From this biotechnology platform valuable data will be obtained on key plant processes in relation to stress and for development of effective bioherbicides.
• Photoassimilation Biochemistry in Grapes: Several integrated approaches will be undertaken: i) purification of organelles from grapes; ii) transport studies of sugars, acids (and phenolics) by intact grape cells and organelles; iii) role of mannitol in berry development and ripening; iv) role of malic and tartaric acids in berry development and ripening under different water regimes and v) contributions of mesocarp and exocarp of unripe berries to C assimilation using PAM fluorometry. From these studies important information on C fluxes and the role of specific primary and secondary metabolites in an important crop will be obtained.

5.2 – Dissemination & Image

Every three months a newsletter will be issued in English which will be mailed to our partners nationally and worldwide.
Members of the Working Groups will be involved in the organization of National and International Conferences and related dissemination activities e.g. Seminars and Workshops:

For instance the **ECOINTEGRITY** group defined already the presence in 15 international and national meetings, where results of the different research areas will be presented. Moreover, it is intended to organize several meetings in Vila Real, with national and international guests, for each of the different areas. The first one to take place in 2010 deals with Aquatic Ecosystems and Climate Changes. The objective attempts to (besides the involvement of the local and national scientific community) spread our activities among the students of the University.

5.3 – Cooperation

5.3.1 – Internal

First, an increase in the interactions within the Working Groups (WG) it is planned: this will be achieved through regular meetings (6 times a year) to discuss the ongoing activities, future projects, results of the interactions with stakeholders and to evaluate the actions that have been taken to overcome the constraints within the WG.
Similarly, regular meetings (4 times a year) will be promoted between the coordinators of the WG and the respective members of the Executive Committee, with the same objective. Formal short Power-point presentations are envisaged for each WG.
At these meetings there will be detailed discussion of the ongoing research activities, to promote a higher integration of all members.
Sharing the results, we expect to motivate contributions to give a scientific added value or even discover other opportunities of research within the same thematic area/topic.

The main objectives are to increase the cooperation in research work with other research centers. This will allow to jointly apply for funding and to assist in supervising MSc and/or PhD students. Besides, we may organize and/or participate in scientific meetings to show our work and/or facilities and to promote future cooperation in different fields.
In general we will reinforce the cooperation at national and international level, which will involve specific activities as follows:
(Please note that we have only included 4-5 of the major cooperations for each area; in the case of international cooperations there are often more than 10 active cooperation links).

5.3.2 – National

BIOSYSTEMS ENGINEERING

CECAV-UTAD: conclusion of the research project “Fracture behaviour of cortical bone tissue”.
INEGI: conclusion of the research projects: “Fracture behaviour of cortical bone tissue”, “Repair of wood structures using artificial composites” and “Experimental assessment of moisture effects on aging and durability of thermosetting polymers”
EGF&D, ACE: progress of the project “Biogn”
SONORGAS: progress of the project “Dourobiogás”
UBI: collaboration within the local hyperspectral imaging technique development and application task
UAveiro: progress of the project “Hip femoral prosthesis for in-vivo loosening data acquisition”

ECOINTEGRITY

Instituto Dom Luiz, IDL – Associate Laboratory
University of Aveiro
Escola Superior Agrária/Polytechnique Institute of Bragança (particularly the Research Center of Mountain Studies)
CIIMAR (Also an Associate Laboratory)
Centro de Estudos Florestais (research center)–ISA
CIBIO (Research Center In Biodiversity and Genetic Resources) - University of Porto
Department of Botany - University of Porto

INTEGRATIVE BIOLOGY & QUALITY

Phytochemicals & Cell Biology
Faculdade de Ciências da UL, Lisbon (Prof. Lia Ascensão): Active FCT Project (2007-2010)
Instituto Superior de Agronomia, Lisbon (Prof. Carla Pimentel): Active FCT Project (2010-2012)
ISEL, Lisbon (Prof. Amin Karmali): Joint Research, 2 Submitted Projects (2009), New Projects in 2010
Universidade de Évora (Prof. Manuel Mota): Active FCT Project (2007-2010)
Climate, Stress and Sustainble Crop Production
Centro de Biodiversidade, Genómica Integrativa e Funcional (BioFIG/FC/UL) (Prof. Susana Serrazina): FP7 project submission 2009
Direcção Regional de Agricultura e Pescas do Norte: Join prospections of local endangered germplasm of Corylus avellana, and join research on Chestnuts orchards.
Instituto Nacional de Saúde Ricardo Jorge: Dr. Helena Soares Costa, Join research and publication, Join projects, 1 submitted FCT project in 2009, Active FCT Project (2010-2012)
Universidade de Aveiro: Join research and publications; Active FCT Project (2010-2012); 3 submitted projects in 2009
Universidade Nove Lisboa, Instituto de Tecnologia Química e Biológica (Prof. Pedro Fereveiro): 1 FP7 project submited (2009)
Bioproducts & Biotechnology
CNC (Uni. Coimbra): active FCT project PTDC/AGR-ALI/105169/2008; several colaborations with PhD students
ICBAS (Uni. Porto): active FCT project PTDC/AGR-ALI/105169/2008
Univ. Açores (Elisabete Lima, José Baptista, José Silvino Rosa, Mª do Carmo Felgueiras): Active FCT Project (PTDC/AGR-AAM/70418/2006) and Colaboration in Ph.D work programme, FCT Grant SFRH(BD/66041/2009
UPMM-IHMT-UNL (Mª Amélia Grácio; António Grácio): Colaboration in Ph.D work programme, FCT Grant SFRH(BD/66041/2009

5.3.3 – International

We look to increase the participation in the more relevant international conferences, management and scientific meetings to be in contact with the most important researchers in the different fields. To continue and expand the current cooperative research work, to promote cooperation in future research projects and increase the number of joint publications.

BIOSYSTEMS ENGINEERING

Unité Sciences du Bois et des Biopolymères, Université Bordeaux 1(France): conjoint publications about size effects on fracture behaviour of wood
Universidade Politécnica de Madrid (Spain): conjoint publications about size effects on fracture behaviour of wood
Laboratoire de Mécanique et Procédés de Fabrication, Arts e Métiers, Paris Tech (France): conjoint publications about the identification of wood properties using the Virtual Fields Method
Institute of Polymer Mechanics, Riga University (Latvia): viscoelastic behaviour and ageing effects on polymers

Universidad Publica de Navarra: conjoint work and publications about image segmentation and image based classification methods using Soft Computing
Ghent University: conjoint work and publications about the shape descriptor of wood micro-structure
Universidad de Cartagena: conjoint work and publications about the smart data acquisition devices

ECOINTEGRITY

Disturbances on forest ecosystems
Kings College, London
Instituto di Metodologie per l'Analisi Ambientale
CNR Italia
Universidad de Salamanca, Spain
University of New South Wales
UK Institute National de Recherches Agraires (INRA)
Xunta de Galicia - Centro de Investigación y Información Ambiental, Galicia, Spain
Aquatic ecosystems
Environment Agency (UK)
Universidade de Cádiz
Centro Ibérico de Restauração Fluvial (CIREF)
Department of Fisheries & Wildlife
Oregon State University, USA
University of Cardiff, Biodiversity Research Group (River Catchment Ecology)
Flora & wildlife
Evolution, Taxonomy and Conservation Group (ECOMED)
Departmento de Botánica, Universidad de Salamanca, Salamanca, Spain
Department of Biology and Botanical Garden, Fribourg (Suiça)

INTEGRATIVE BIOLOGY & QUALITY

Phytochemicals & Cell Biology
KNUST, Ghana (Mr. Newton Amaglo): Ghanaian Plant Samples & Joint Papers
SGGW, Poland (Prof. Ewa Rembiałkowska): Student Exchange (Erasmus), Active Projects & Joint Papers
Uni. Bordeaux, France (Prof. Stéphane Quideau): Phytochemical Standards, New Projects & Joint Papers
Uni. Messina, Italy (Prof. Bruno Lo Curto): Sample Analyses, New Projects & Joint Papers
Uni. São Paulo (Prof. Beatriz Cordenunsi): Sample Analyses & Joint Papers
Climate, Stress and Sustainable Crop Production
Biocentrum - Technical University of Denmark: join research (consultant) and publications; Active FCT Project (2010-2012; 1 submitted project in 2009)
ENEA, Ente per le Nuove Tecnologie, l'Energia e l'Ambiente, Italy, (Dr. L. Bacchetta): Active AGRI GEN RES (EC) project (2007-2010), join research and communications in International Congress
Plant Research International B.V. Wageningen, NL (Doctor Rene van der Vlugt): Join research and join publications
Uni. Torino (Italy); Prof Roberto Botta; FP7 consortium ;

Bioproducts & Biotechnology
King's College, London (UK): active project "Good Practice in Traditional Chinese Medicine Research in the Post-genomic Era (Acronyme: GP-TCM)" European Project (Cooperation)
Max Plank Institute (Cologne): Studentds Exchange (PhDs), Active Projects & Joint Papers
University of Aarhus (Denmark) (Prof. Suresh Rattan): Scientific Advisement and Joint Papers
Univiversity of Leiden (Netherlands) (Robert Verpoorte): Metabolomics - Collaboration in the Ph.D work programme FCT Grants SFRH/BD/42513/2007

5.3.4 – Stakeholders

BIOSYSTEMS ENGINEERING

Through the submission of a Marie Curie Initial Training Network get the involvement of two companies, one from the technological area and one from the application area in order to establish a fruitful collaboration and the development of conjoint scientific projects.

ECOINTEGRITY

We intend to maintain and to strengthen excellent existing relationships with public agencies (National Forest Authority, National Civil Protection Authority, The National Water Institute-INAG and Regional Water Authorities -ARH-N). Concerning the private stakeholders, we intend to increase the outreach effort towards actual or potential end-users ranging from the forestry industry (Grupo Portucel Soporcel), and SME's (Gestão Integrada de Fogos Florestais, S.A.) and organizations dealing with environmental impact assessments or ecosystem rehabilitation, mainly associated with renewable sources of energy; this is the case of PROFICO, PROSISTEMAS, ECOSFERA, ENERGIA VERDE.

INTEGRATIVE BIOLOGY & QUALITY

Research activities within this group are in close cooperation with agro-food industry covering areas from plant production to food processing and marketing, including aspects linked with waste production, processing and reuse as raw materials for co-products generation. Relations with stakeholders cover:joint participation in projects, know-how transfer, dissemination of results,development of new products and technological solutions.
Sousacamp (Mushrooms & Mushroom Residues), Douromel (Fruit Products & Fruit Residues), CERES (Cereals & Cereal Residues), Valpaços/Vila Flor (Olive Leaves and Fruit Residues), Noval (Wine & Grape/Wine Residues), ADVID, FENALAC, AGROS, Bioalvo, Ervital, Cant. Aromáticas, Marron-Glacé-Galiza, Mapprod Lda, Real Companhia Velha, Sogevinus, Natural Concepts, Palácio da Brejoeira, SA, Delta Cafés, AGERE, EM (Braga), Águas do Ave, SA

6 – Human resources

Human resources is one of the major constraints for all three of the research Units since the majority of our researchers are full time professors with relatively high teaching duties. This plan reflects the intention to gradually and effectively increase of our critical mass in every Research Group. Thus, apart from trying to attract members, with a high scientific productivity

which will be proposed as "integrated members", we expect to increase the number of collaborators, scholarships (masters and PhD students) and post-doctoral researchers/positions. Many of the recently submitted projects for National (e.g. FCT, QREN and Vale I&DT) and International (e.g. EU programs such as FP7) have new PhD and/or post-Doctoral positions costed within them.

BIOSYSTEMS ENGINEERING

Through the submission of a Marie Curie Initial Training Network apply for two scholarships for early stage researchers.
Through the submission of FCT projects apply for grants for researchers (MSc or PhD).

7 – Summary table 2010

Item	BE	EI	IB&Q	TOTAL
JCR Publications	23	38	71	**132**
Publications: Books and Chapters	0	0	5	**5**
Publications: Proceedings	24	16	17	**57**
Projects: QREN	2	2	6	**10**
Projects: FCT	8	8	20	**36**
Projects: EU Programs	3	4	5	**12**
Projects: Other Programs	3	25	6	**34**
Degree Thesis	n/a	6	11	**17**
Master Thesis	9	3	4	**16**
PhD Thesis	2	1	4	**7**
Post-doc Thesis	2 (Ciência 08 Programme)	2	0	**4**