

## **Avaliação de Laboratórios Associados – 2008**

### **Resultados da Avaliação**

Centro de Biotecnologia e Química Fina (CBQF)

Centro de Estudos do Ambiente e do Mar (CESAM)

Centro de Estudos Sociais (CES)

Centro de Investigação em Materiais Cerâmicos e Compósitos (CICECO)

Centro de Investigação Marinha e Ambiental (CIMAR)

Centro de Malária e Outras Doenças Tropicais (CMDT)

Centro de Neurociências e Biologia Celular (CNBC)

Instituto de Biologia Molecular e Celular (IBMC.INEB)

Instituto de Biotecnologia e Bioengenharia (IBB)

Instituto de Ciências Sociais (ICS)

Instituto de Engenharia de Sistemas e Computadores do Porto (INESC-Porto)

Instituto de Engenharia de Sistemas e Computadores I&D em Lisboa (INESC ID)

Instituto de Medicina Molecular (IMM)

Instituto de Nanoestruturas, Nanomodelação e Nanofabricação (I3N)

Instituto de Nanotecnologias (IN)

Instituto de Patologia e Imunologia Molecular da Universidade do Porto (IPATIMUP)

Instituto de Plasmas e Fusão Nuclear (IPFN)

Instituto de Sistemas e Robótica (ISR)

Instituto de Tecnologia Química e Biológica (ITQB)

Instituto de Telecomunicações (IT)

Instituto Dom Luís (IDL)

Laboratório Associado de Energia, Transportes e Aeronáutica (LAETA)

Laboratório de Instrumentação e Física Experimental de Partículas (LIP)

Laboratório de Processos de Separação e Reacção (LSRE)

REQUIMTE - Rede de Química e Tecnologia - Associação (REQUIMTE)

**Evaluation of Associate Laboratories**  
**from the Portuguese Foundation for Science and Technology**

**CENTRO DE BIOTECNOLOGIA E QUÍMICA FINA - CBQF**

<b>Evaluation Panel</b>
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<b>General Comments</b>
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The assessment provided below summarises the conclusions of the short reports prepared by the International Steering Committees as well as our own appraisal based on the analysis of the individual reports prepared by the Associated Laboratories.

*1. Assessment of the International Steering Committee*

Even though the overall evaluation of the Steering Committee is positive, it is critical of the publication record of the CBQF as they believe it should match the level of funding, which is extensive if one considers that both FCT and the Innovation Agency fund a substantial number of projects. More importantly, the report highlights the large imbalance in the publication record among members of the Centre. The Committee stated that as it stands, the CBQF could be considered a Centre of Excellence only if those members actively engaged in publishing are taken into consideration.

In spite of the above mentioned shortcomings, the report considers that the overall quality of research is high, although some measures must be implemented in order to assure that all members contribute to the development of the research programmes. The latter may be facilitated by improving the collaboration among groups and individual researchers.

Changes in the structure and mode of operation are suggested to ensure that the CBQF achieves a broader excellence.

## 2. Assessment of the External Advisors

As stated on their website, “the CBQF centres its activities on risk evaluation - in the context of food and environmental safety - and risk perception, in the context of education of consumers and citizens”. The Associated Laboratory has a very important role to play in the Portuguese society and is an active partner in both national and EU activities in these areas.

We agree in general with the comments and recommendations of the Steering Committee, although measuring output in terms of publication within the areas of food and environmental safety is much more difficult than when assessing basic science. Nevertheless, on the website it is stated that the average per capita publication by senior researchers is 1.5 refereed papers per year: a fact that reinforces the statement by the Steering Committee since several researchers at the centre do not seem to contribute to this number. Thus, it is important to deal with this shortcoming by implementing the recommendations made by the Steering Committee.

**EVALUATION OF ASSOCIATE LABORATORIES  
FROM THE PORTUGUESE FOUNDATION FOR SCIENCE AND TECHNOLOGY**

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Center for Environmental and Marine Studies

**CESAM**

**Evaluation Panel**

**Jean-Pierre Henriet**

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Department of Geology and Soil Science  
Geological Institute  
Ghent University  
Belgium

**Joan Albaiges Riera**

Department of Environmental Chemistry  
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Spain

**General Comments by Jean-Pierre Henriet**

I have read with interest the July 2009 Report of Professor Frederick J. Wrona, Chair of the External Advisory Committee, on the activities of CESAM which he could assess through the 2003-2007 progress report and various site visits of the EAC. I also read with interest the EAC Report of September 2003, as well as the attractive 2003-2007 Progress Report and the ample information available through online access.

I wish to congratulate both CESAM for its impressive scientific dynamics and achievements, and the EAC for a valuable follow-up and for pertinent recommendations. The CESAM Associated Laboratories argue for an exemplary and successful integration, which certainly found a fertile ground in a young university.

There is little to add, neither to the recommendations of the EAC regarding further scientific integration, possibly through the possible launching of an "Integrated Estuarine Ecology Research Programme" or and/or a "super-programme" related to wildfire disturbance and its impact, nor to the advice towards various aspects of outreach and technology transfer. The recommendation I wish to formulate below consequently will focus on the educational and training vision of CESAM.

I hereby wish to confirm my full support to the recommendation of Professor Frederick J. Wrona towards the renewal and continuation of support of CESAM's contract.

## **Recommendations**

CESAM has developed into an attractive and world-class “nursery” of PhD and MSc research with a strong multi-disciplinary flavour. The reports and the online information list an impressive and steadily growing number of students and young researchers. CESAM scientists participate in all levels of education at the University of Aveiro, from bachelor level to PhD courses.

At a relatively proximal scale and range, new initiatives are developed with the University of Porto, in association with the Associated Laboratory CIMAR. Reference is made to a 2007 protocol towards the development of joint postgraduate studies, signed by CESAM and universities in Northern Portugal and Galicia. This is a very important development, which merits to be explicated and well thought over. There is a unique potential, in particular in the Aveiro-Porto-Vigo region for example, for developing an international master course, embedded in a “graduate school” or “doctoral school”.

Developing education and training in a workable and cost-efficient way however deserves careful attention, for instance in terms of sustainable organization and mobility of students and lecturers. It would be interesting (as future move) to explicit these plans and to confront them with external advise, if only for gaining experience from other European constructions, well in time. I would consequently advice that both CESAM and the EAC would – in a future reviewing exercise – explicitly discuss and review such plans and their cost-effective and programme-effective implementation. My recommendation would be for such development to give priority to a cross-border initiative (North Portugal – Galicia) rather than to a fully internal Portuguese dimension.

It would also be interesting for any external advisor to read to what extent any cooperation between Aveiro teams and teams of the University of the Azores for instance, which I believe has been ongoing in a quite natural way since a long time, has possibly concretized in educational cooperation and exchanges.

<b>General Comments by Joan Albaiges Riera</b>
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The present report is based on the evaluation of the following documents and information sources:

- the report issued by the Evaluation Panel (2003)
- the report issued by the Advisory Committee (September 2008)
- the report issued by the Advisory Committee (July 2009)
- the CESAM 2003-2007 Report
- the reports especially prepared by CESAM and made available by FCT
- the CESAM website
- the ISI web of knowledge

The evaluation has been focused on the following issues:

- Organization and management towards its mission
- Quality of research and academic, technological and social impact
- Human resources and fund raising

- Internationalization
- Future perspectives (strategic planning)
- Conclusions

### **Organization and management towards its mission**

The mission of CESAM is to develop research in the environment, with special emphasis on the coastal and marine areas, integrating the atmosphere, biosphere, hydrosphere, and lithosphere, and the way they are influenced by anthropogenic activities.

To this end, CESAM is organized in five thematic areas:

- Atmospheric Quality
- Environmental and Analytical Chemistry
- Biodiversity and Biology of Stress
- Marine Ecosystems and Modelling
- Integrated Watershed Management

developed by ten research groups with an average of 10 to 15 scientists (Ph.D.) each, overall representing a potential of more than 100 scientists. The distribution of the research groups among the different research lines is convincing.

The organizational and management structure includes a Scientific Council (SC), the Board of Directors (BD) and an External Advisory Committee (EAC). A Development, Consulting and Services Department (DCSD) manage the external services and development contracts. All these bodies seem to be well established and contributing satisfactorily to the good execution of the mission of CESAM.

The use of internal incentives for achieving objectives is an innovative measure. The distribution of part of the basic budget on the basis of the publication quality output is also a sound measure. The implementation of external evaluation and periodic reporting procedures and the subsequent adaptation of CESAM's organizational structure and human resources for attaining the proposed objectives are important components for reinforcing the strategic planning.

### **Quality of research and academic, technological and social impact**

CESAM research aims to contribute to the resolution of marine environmental problems at regional and global scales, and in particular to the integrated management of the Portuguese coastal area. These goals are attained through high quality and state-of-the-art multidisciplinary research.

CESAM researchers have an impressive publication record. More than 500 research papers were published during the period 2003-2007, many of them in high ranking international journals. At the same time, the overall scientific quality steadily improved during the same period with an increase of the IF by 50% and the number of citations by approx. 32%/yr.

The academic activity of the CESAM staff members, supporting MSc and PhD programs on Coastal and Ocean Sciences, Ecology, Biodiversity and Ecosystems Management, Environmental Applied Sciences and Environmental Engineering, among others, is highly relevant for attracting leading young scientists and improving human capacity building in

these disciplines. The figures are remarkable. Over the period 2003-2007, 140 MSc and 58 PhD theses were concluded and currently 150 PhD theses are ongoing. The number of post-doc researchers increased from 15 to 39 over the same period.

The agreement established since 2004 with CIMAR, with the aim of reinforcing the common lines of research and particularly to create a Doctoral School in Marine and Environmental Sciences is a worthy initiative.

CESAM also exhibits good performance in developing the offer of scientific and technical services to small and medium enterprises in the areas of activity such as marine technologies and biotechnology. In addition, CESAM has been working in support of several regional, national and international decision-making and governance institutions in the field of the environment with special focus on the coastal and marine environment. CESAM plays a meritorious role in the development of public policies (e.g. for territorial management) at the national and International levels.

CESAM should continue to enhance its communications and public and scientific outreach activities. The website satisfactorily reflects the whole activity of the Institute and provides a large social visibility. The activity report 2003-2007 is attractive, readable and the facts are relatively accessible and logically presented.

In general, the position of CESAM in all these aspects is remarkable and constitutes an excellent basis for empowering its strategic programming in the coming years.

### **Human resources and fund raising**

The CESAM research staff is well recognized in their areas of expertise. The LA was able to attract a number of young scientists. In 2008, 20 new PhD researchers were contracted that will be about 40 by 2013. At present there are more than 145 PhD students and their publication output increased approximately by 26%/year.

CESAM's success is evident in its growing ability to attract and secure new funding from external sources and to train highly qualified personnel. For example, total funding for CESAM in the 2003-2007 was approximately 9.5 M Euros, with approximately 20% coming from other European research programs, 11% from industry and 5% from other sources. Over the last 5 years, CESAM's competitive annual budget increased from 1.1 M€ in 2003 to 2.9 M€ in 2007. IDAD, financed through the projects and services rendered to the external community, has an annual budget of 1.5 M€.

### **Internationalization**

Since 2003, significant progress has occurred in the international recognition of CESAM. CESAM team members are involved in more than 25 international scientific networks with other institutions in Portugal, Europe and non-European countries.

CESAM researchers take part in several international scientific committees. In addition, CESAM researchers are members of evaluation panels and advisory committees for international entities.

CESAM has been directly involved each year in the organization of several International events.

Finally, most of the research carried out at CESAM is performed in cooperation with external institutions. In 2007 44% of CESAM papers had international co-authorships; and since 2007, more than 40% of PhDs contracted were non-nationals.

Overall, CESAM is an open Institution, well placed from the international standpoint.

### **Future perspectives (strategic planning)**

CESAM has identified a number of strategic areas where it proposes to focus its future efforts. These include:

- i) continue developing world-class research programs in environmental studies and coastal and marine management;
- ii) strengthen linkages and cooperation within and among each of the thematic research units;
- iii) develop linkages and partnerships with other international scientific networks with particular attention to Portuguese speaking countries.

Although these objectives are well targeted, key strength of CESAM is that it continues to work on building multidisciplinary research programs based on its primary research themes. In this respect, efforts should be spent in developing integrative approaches in dealing with environmental issues. The EAC has noted, for example, that given the clear standards of excellence in several research areas with a strong Estuarine focus, CESAM should consider enhancing its international reputation by creating, for example, an *Integrated Estuarine Ecology Research Programme*.

On the other hand, within select sub-themes, CESAM could develop an explicit and integrated biotechnology development and transfer strategy and implementation plan.

Finally, CESAM should continue to enhance its communications and public outreach activities (synthesis reports, brochures, etc.). Such an approach would help further enhancing CESAM's already growing national and international visibility as a centre of excellence.

### **Conclusions**

The information provided evidences that CESAM has continually improved on expanding the scope and excellence of its scientific programs and overall implementation strategies. The initial objectives over the 2003-2007 period were satisfactorily achieved and, in fact, a progressive increase in several indicators is observed.

The organization and management of CESAM is well established and incorporates innovative measures and procedures. The implementation of external evaluation and periodic reporting procedures are important instruments for reinforcing the strategic planning. Human and funding resources are properly managed. However, enhancement of integrative research approaches and international endeavours should continue to be stressed within the further developments.

In conclusion, CESAM may be considered able to pursue its main objectives with the required quality, allowing for the automatic renovation of its 5 years FCT contract, with minor updating regarding the strategic planning and definition of performance indicators.



## Evaluation of Associate Laboratories

### from the Portuguese Foundation for Science and Technology

CENTRO DE ESTUDOS SOCIAIS - CES

#### Evaluation Panel

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#### General Comments

The evaluation team is divided in its general evaluation of CES. Three members are positively impressed by the performances of this LA: the broad range of research issues, its promotion of advanced training, its concern for external services and outreach activities, the development of several Observatories, the internationalisation of CES and its networking, orientated to Europe and to the reinforcement of North-South cooperation projects. The fourth member of the team expresses “reservations about the Centre’s very strong commitment to a particular kind of social science (based on critical theory)” and about the fact that the use of quantitative methods is limited, except in one group. And everyone agrees that CES has to be seriously concerned with the balance between fundamental and applied research, its outstanding reputation inducing a risk of responding to too many external solicitations that may dilute its scientific project and coherence. With the same concern, the evaluators also wonder if CES ought to reflect

on the extensive domains it covers that may sometimes mirror individual interests rather than group projects. The team also wonders about the low number of PhD and MA completed during the period under evaluation.

The research areas and groups

There are 4 thematic research areas and 11 groups. Their distribution does not always appear evident and justified (as it is the case for “Architecture and urbanism” or for “Citizenship and social policy”).

#### 1. Institutions, regulation and citizenship (3 RG and 3 Observatories)

The three Observatories seem to be involved in worthwhile and high impact activities. During the period 2003-2007, this RA has developed a growing number of projects and of networks and it has organised advanced training courses for the students and for the general public.

Publications are numerous but the number of peer reviewed articles is relatively low.

##### 1.1 State, law and administration

This group conducted important and relevant projects, many of them being applied research and resting mainly on the Observatory for Portuguese Justice (which explains why many publications are in Portuguese, with the group intending to publish more in English in the future and to publish a journal in English). It is involved in national and international networks.

##### 1.2 Peace studies

This is an important area with evidence of a solid contribution being made. The focus is on the Portuguese world, which is perfectly legitimate. The group itself identifies four main achievements: internationalisation (with the South and with European countries), articulation research/training, dissemination of the results of its research and diversification of funding sources. Publications are mainly in Portuguese, which handicaps the dissemination of interesting research.

### 1.3 Democracy, multicultural citizenship and participation

The field of research is very large. The group is engaged in essentially theoretical, comparative and cooperative studies and seems active in training activities, with international recruitment and students exchanges. It established two Observatories (one very recently). It organised many (perhaps too many? 80 in five years) scientific meetings. There are international publications.

## 2. New solidarities: local, national, global

The research focus is clear and presents innovative aspects. Inter-research group meetings are organised. They are important to stimulate theoretical and methodological discussions (and may help to solve some problems of overlapping domains). The research results are well disseminated and have had impact on policy making institutions. However the number of publications in English is low. The work of the Observatories, which have an empirical orientation, deserves appreciation. Although some postgraduate training activities are mentioned, very few students seem to have completed degrees.

### 2.1 Citizenship and social policies

This group is very concerned with rethinking the characteristics of the population in need of social protection as well as the instruments of social intervention. It is interesting to note that economists, professionals and non-profit organisations are associated in the research. The results of its research are largely disseminated through conferences, seminars and workshops for scientists as well as for the public and non-profit organisations. More publications in English would be appreciated. The group intends to develop internationalisation and networking even if these aspirations are already relatively well present.

### 2.2 Labour and trade unionism

This group is concerned both with academic knowledge and with practical perspectives and diagnoses. It has networks in Europe and in Brazil and in the lusophone world in general, which may explain why publications are mainly in Portuguese. It regularly organises conferences and makes efforts to stay in regular contact with the academic world and with social actors.

### 3. Sciences, technologies and the humanities

This is an innovative research line that intends to promote dialogues across the social and natural sciences, the humanities and the arts – a particularly welcome objective in contemporary society but, as underlined by an evaluator, a plan that may, unless one is careful, generate a risk of incoherence: what is the “fil rouge” of the research in this area? The two observatories clearly reflect current societal preoccupations. As in the other areas the number of completed PhD is low. It is not clear why this area includes the group “Architecture and urbanism” when the group “City and urban culture” is included in another area.

#### 3.1 Science, technology and society

This group develops interesting objectives, among them maintaining a good balance between its different lines of activity, considering conceptual and methodological tools of science and technology to help social research, and the creation of a new doctoral programme. It is also involved in policy making. The group participates in large international collaborative projects and it publishes in Portuguese and in English. It also has ethical concerns.

#### 3.2 Architecture and urbanism

It has already been said that we do not see clearly why this group - a new one in CES - is not in the same area as “City and urban culture”. A member of the evaluation team suggests that this may be “a marriage of convenience”. A coherent strategy has to be developed and the research focus has to be more explicit. As a newcomer in CES, it is difficult to evaluate but the group has to be concerned with internationalisation (in its publications as well) and in building networks.

### 3.3 Comparative cultural studies

This group is also questioned: what is its consistency, how is concrete expression given to the ambition to articulate social sciences and the arts and humanities and what are the links between the different projects? The intention is interesting but it may need to be better implemented. The group is a member of several networks, it organises seminars and international conferences and it publishes a lot, also in English. It is involved in several doctoral programmes of CES and the number of PhD and MA theses, without being impressive if one takes the number of PhD members into consideration, is larger than in other groups.

## 4. Cultures and social dynamics

The benefit of the bringing together these three good research groups is not evident (what do they have in common?) and, on the other hand, some groups included in other areas would perfectly fit here, at least with one or another group.

It is worthwhile to note that this area is a member of two important international networks: one with Brazil on urban studies and the European network of excellence IMISCOE.

### 4.1 City and urban culture

This group developed interesting international projects, mainly with Brazil (with whom they have a network) but also with MIT (USA) and with EHESS (France), two well known and excellent research centres. A postgraduate exchange programme was created and it was planned to develop a PhD programme in 2008 (was it done? – between 2003 and 2007, PhD numbers were low). There is a good balance between basic and applied research and the collaboration with public institutions and civil society is clearly a preoccupation of the group. Publications in international journals have to be intensified. It is considered to be an excellent group.

### 4.2 Migration studies

This group conducted mainly quantitative studies of the highest interest. (One member of the team has a concern: are they not marginalised in a Centre that seems to privilege other methods?). The group also works internationally, which generated many publications in English. It is a member of IMISCOE. The number of completed PhD is low. Nevertheless it is also a very outstanding group, with a high potential.

#### 4.3 Governance and economic institutions

In its domain, this group has the merit of departing from the rational choice perspective that currently prevails in most economic studies. By doing so it may underline the importance of institutions and public policies as well as of time and space dimensions. The group participated in several international research programmes. It is also concerned with public policy advice. Its researchers publish in several languages. Only one PhD was completed.

### **Conclusion**

CES is certainly a good research centre with an excellent reputation. It covers a very broad range of research issues. Its Observatories deserve recognition for the quality of their applied research. Training activities are increasing. Internationalisation and networking are developed and orientated both to Europe and to Latin America, particularly to Brazil.

Nevertheless the evaluators agree on a few remarks:

- It has to take care not to become victim of its success: it is possible that too many demands for consultancy, services, and so on arrive at CES, which may handicap other activities, such as fundamental research and the teaching and training of students and others. The Centre must take care to keep a balance between its several tasks.
- The members of the team were surprised by the very low number of PhD and MA completed between 2003 and 2007: if one considers the large number of researchers (many of them with a PhD) and the level of interest in the topics

studied, this appears particularly disturbing. Perhaps an explanation is to be found in the first remark.

- Publications are numerous but, in many groups, mainly in Portuguese. It is perfectly respectable to work and to write in its own language – particularly for applied research – and we know also that the researchers work a lot with Brazil and with lusophone African countries; nevertheless, it would be useful to publish more in English (and in other important foreign languages). Such dissemination would expand the reputation of the Centre and permit more comparative studies.
- A member of the team emphasizes the desirability of CES broadening its theoretical and methodological choices and the others comment that not enough information is given on these points.
- The structure of the Laboratory also deserves deep reflection. Are there too many groups, which produces overlaps between them? The location of the groups inside an area is not always clear, particularly when we find groups in different areas with aims that seem very near to one another. What is the logic that explains the composition of the areas?

These remarks would help CES to keep its deserved reputation. We consider that its achievements during the period 2003-2007 allow for the automatic renewal of its five year contract with FCT but we hope that it will seriously consider our remarks and reflect on them with the researchers.

**EVALUATION OF ASSOCIATE LABORATORIES**  
**FROM THE PORTUGUESE FOUNDATION FOR SCIENCE AND TECHNOLOGY**

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Centro de Investigação em Materiais Cerâmicos e Compósitos

**CICECO**

**Evaluation Panel**

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Germany

**General Comments**

Research activities at CICECO are organised in three different areas (Advanced Micro- and Nanostructured Materials for Communications technology; Advanced Materials for Industrial Applications and Biorefineries and Biomaterials). These 3 areas involve 8 different groups that maintain a certain status of flexibility and leadership.

CICECO has a good publication record with around 300 papers per year. This number is also in line with the number of researchers involved in scientific activities. A brief overview at the scientific publication list suggests that CICECO must increase the quality and impact factor of its scientific publications.

An important task has been carried out in the Technology transfer side with 43 patents in the last 5 years, two spin offs and several entrepreneurship awards. In terms of funding, CICECO has acquired a considerable amount of resources with almost €24 Million in the previously mentioned period. Among these funds, one sixth has been obtained at an international level and 1/14 from the industry. These figures demonstrate that CICECO's research is well orientated to the industrial needs of Portugal and in some regard to Europe.

In terms of training, CICECO has also carried out a significant effort with 73 new PhDs in materials science, 95 Master Theses and several courses and activities.

**Additional Recommendations**

- CICECO should reconsider the performance and/or the composition of its International Advisory Board. A chairperson should be installed who takes responsibility for the evaluation reports to be prepared by the board.



- The International Advisory Board should meet regularly once a year – maybe, in a later stage, once every two years.
- CICECO should increase the impact factor of its publications. Riskier and long-term research projects and international cooperations are highly recommended in this regard.
- Clear and open parameters, ratios, and evaluation metrics to measure scientific performance must be defined to increase healthy competitiveness internally.
- The future of the laboratory implies industrial collaborations. Instead of a new International Advisory Board member, CICECO could constitute an additional Industrial Advisory Board composed by 5 members and formed by executives from National and International companies.
- CICECO should invest time and resources to provide a unified laboratory identity with more events involving the 8 research groups, a unified corporate identity in all materials, posters, related with its activities, brainstorming seminars, etc.

#### **Final Decision**

***CICECO may be considered able to pursue its main objectives with the required quality, allowing for the automatic renovation of its 5 year contract with FCT.***

**EVALUATION OF ASSOCIATE LABORATORIES  
FROM THE PORTUGUESE FOUNDATION FOR SCIENCE AND TECHNOLOGY**

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Center of Marine and Environmental Research  
**CIMAR**

**Evaluation Panel**

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Belgium

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**General Comments by Jean-Pierre Henriet**

I have read with interest the July 2009 Report as well as the former reports of Professor S.J. Hawkins on the activities of CIMAR, which he could assess through a personal longstanding activity in Portugal and through a formal involvement in CIMAR evaluation since about 2005-2006. I also read the Review of September 2004 by Prof. G. Kullenberg and Prof. L. Laubier, as well as the ample information available through online access.

I wish to congratulate CIMAR for the science achieved, and I gladly join Prof. Hawkins' appreciation of science of the highest level, well embedded in European and international projects and networks of excellence. I consequently endorse without reserve Prof. Hawkins' recommendation towards an extension of funding for a further 5 years, at least.

**Recommendations**

- (1) As CIMAR continues to develop, attention may be paid to the overall architecture of this exciting but very large Associated Laboratory, with a very broad geographical coverage, in terms of management complexity and cost-effectiveness at the level of management. One should not be shy of considering critically the "limits of growth" or "limits of size" in a research grouping. There is nothing wrong in having a clear dipole structure, with distributed management over two geographic poles, and keeping the overall

management link "light" and mainly focused on the co-ordination of only those specific efforts, which clearly benefit from co-ordination.

- (2) Where a critical attention is to my opinion justified, is where the build-up of a critical mass in research evidently shapes attractive opportunities in education and training, because in such ventures, proximity matters.

There is apparently a unique potential, in particular in the region centered on Porto and with Aveiro and Vigo as "proximal" neighbours, for developing a thematic, international "doctoral school" offering opportunities for both master students and PhD researchers.

And there is probably an equally unique potential in the South, for developing a distinct "doctoral school" for instance between the research groups centered on Algarve University and Cadiz University, or other proximal centres.

Any development of a doctoral school indeed requests attention for a feasible mobility, hence for proximity. Crossing national boundaries with a doctoral school may also provide an increased incentive towards the generalized use of English (rather than Portuguese or Spanish). Hence such distinct but international "North-West Iberian" and "South-West Iberian" poolings of resources towards doctoral schools may offer advantages, compared to any "national", unitary "long-range" construction, over more than 600 km (Faro-Porto).

Of course I may make errors in this analysis, due to my own "remoteness" and distant look.

<b>General Comments by Joan Albaiges Riera</b>
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The present report is based on the evaluation of the following documents and information sources:

- report issued by the Evaluation Panel (2004)
- report\_Prof. Edward Donaldson (2007)
- report\_Prof. S.J.Hawkins (2007)
- report\_Prof. S.J.Hawkins (2008)
- report\_Prof. S.J.Hawkins (2009)
- the reports especially prepared by CIMAR and made available by FCT
- the CIMAR website
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The evaluation has been focused on the following issues:

- Organization and management towards its mission
- Quality of research and academic, technological and social impact
- Human resources and fund raising
- Internationalization

- Future perspectives (strategic planning)
- Conclusions

### **Organization and management towards its mission**

CIMAR is dedicated to research and dissemination and transfer of technology in the area of Marine Sciences. The main goal is the understanding of natural processes in the ocean and the coastal zone, to study and implement sustainable exploitation of aquatic resources and the impact of human activities in the environment.

The Center has two main thematic areas of activity:

- Conservation and Management of Aquatic Ecosystems,
- Aquaculture, Marine Biotechnologies and Quality Control

both of which included, initially, five research lines. However, during 2003-2007, the ten research lines were condensed to four:

- 1) Biodiversity and Management of Aquatic Resources;
- 2) Environmental Chemistry and Toxicology;
- 3) Marine Biotechnology;
- 4) Aquaculture

In addition, a Marine Genomics Interface provides support infrastructure and logistics for some of these lines.

The description of their main objectives, addressing key issues in Marine Science and including particular approaches and sharing specific infrastructures, is consistent, innovative and well up-to-date.

A large number of research groups (26) are distributed among the above lines. Some of them, with 1-2 scientists and very specific focus, as well as limited funding, do not seem to have sufficient critical mass and justification. Here, there is a need for some assemblage into more coherent (and state-of-the-art) groups with an adequate critical mass.

The criteria to initial and continuing membership in CIMAR is essential to the continued success of the organization. As suggested in one of the reports, it is important to maintain or even raise the membership standards.

The management structures and *modus operandi* for strengthening cooperation and creating cross-centre teams are not very explicit in the reports but the Board of Directors, the Scientific Committee and the External Advisory Board seem to function well, with good interaction between members, despite the distance between the two main centres. Apparently, there has also been considerable progress regarding the Administrative support.

### **Quality of research and academic, technological and social impact**

The science conducted by CIMAR reflects the multidisciplinary nature of Marine Sciences ranging from cellular to ecosystem approaches and the monitoring of relevant environmental parameters. It includes innovative advances and, particularly, the recent developments of molecular biology, making these tools available throughout the research programme.

The selected areas (biodiversity and management of aquatic resources, ecotoxicology, biotechnology and aquaculture) are fundamental components of marine research, and of direct relevance for managing coastal seas and developing technical opportunities. Their development will guarantee the position of CIMAR in the forefront of Marine Science.

Across the broad spread of activities, the science performed in CIMAR is of high quality. The best evidence is in its output of peer reviewed papers in high quality international Journals within their fields. The number of articles published in international journals is outstanding, increasing from 120 to 233 in the last five years (with a maximum of 270 in 2006), that corresponds to a total of 1002 articles.

CIMAR provides also post-graduate training to students in several fields related to the Marine and Environmental area. Between 2003 and 2007, 142 MSc students and 87 PhD students have completed their degree under the (co)-supervision of CIMAR members. The agreement established since 2004 with CESAM, with the aim of reinforcing the common lines of research and particularly to create a Doctoral School in Marine and Environmental Sciences is a worthy initiative.

The external advisors emphasized the considerable added value of CIMAR research in terms of successfully competing for funding to participate in EU programmes and networks as well as nationally-funded projects. They also stressed the possibility of having spin-off consultancy or service companies to strengthen knowledge transfer and wealth creation. Although CIMAR has been qualified for providing R&D and innovation services to SMEs, these possibilities should continue to be explored and worked-out. In this respect, the creation of the Institute for the Development of the Knowledge and the Economy of the Sea (IDCEM) for the promotion of scientific knowledge, valorisation of research and technology service agreements, and promotion of entrepreneurship is to be acknowledged and adequately supported.

Finally, there are several aspects of public education and perception of science built into the programme with participation at all levels in formal education (primary to high school) as well as the general public. A significant number of outreach activities to foster the dialogue between scientists and society, to improve the public knowledge and perception of science and to increase the interest of the young students towards scientific careers have been carried out.

In summary, it should be highlighted the quality of CIMAR research and its academic and social impact. In this respect, CIMAR has been progressively more requested by governmental sectors to support public policies. Besides, the management of knowledge requires continued attention for improving its transfer to potential end-users.

### **Human resources and fund raising**

The total number of researchers and students working at this moment in CIMAR is approximately 500, 154 of which with PhD. More than 20 post-doctoral researchers were hired in the last five years. CIMAR provides an excellent next-step in their career development.

An increasing number of R&D projects (112 national and 29 European) and contracts with industry, a considerable augmentation in scientific equipment investment, with the attribution of 2 M€ through the Re-equipment Programme of FCT, can also be highlighted.

The major constrains reported have been the instability in the reception of agreed funds and the strong administrative effort required to manage the research projects. This should be taken into account in the new FCT contract.

### **Internationalization**

The internationalization of CIMAR is reflected in the number of scientific articles published in collaboration with foreign institutions, about 2/3 of the total number in the last five years. The attractiveness of CIMAR at the international level is also reflected in the number of non-national researchers, about 15% of the total research team, from 23 nationalities.

On the other hand, CIMAR has been very active in major EU-funded projects and in more than 20 networks, particularly the MARBEF Network of Excellence and two ERA-Nets. Thus, the FCT funding has levered out considerable external funding.

CIMAR has also been involved in the organization of several international scientific congresses and symposia and researchers take part in several international scientific committees. During the last five years, CIMAR has signed more than 60 Institutional agreements.

Finally, it is also important to stress the involvement of CIMAR in a large number of activities to support public policies at regional, national and European levels.

Overall, CIMAR is a centre of reference in the area, not only in Portugal but internationally.

### **Future perspectives (strategic planning)**

CIMAR has identified as future general objectives:

- (i) Consolidate the existing lines of research,
- (ii) enhance synergistic interactions of research teams, and
- (iii) integrate new approaches that may contribute to a holistic view of marine ecosystems, responsiveness to changes of natural or anthropogenic origin and contribution to social, educational and economic sectors.

And specifically:

- (i) Develop and contribute to integrate marine biodiversity initiatives and databases at a national and European level through research networks.
- (ii) Develop genomics and post-genomics capabilities to understand biogeochemical processes, short and long-term adaptation including species invasions, extreme environments, analysis of historical samples and potential biotechnological applications such as marine biofuels.
- (iii) Develop physical oceanography and modelling competences which can be associated with existing remote sensing and biology expertise to understand ecosystem dynamics, dispersion of pollutants and long term climatic variations.
- (iv) establish risk management procedures for natural toxins and xenobiotics by integrating information from multiples levels of biological organization from molecules to ecosystem.
- (v) Integrate social sciences in the evaluation of ecosystem services including fisheries.
- (vi) Develop analytical chemistry and bioscience platforms ("omics", imaging) to support the LA and provide external services.
- (vii) Stimulate technology transfer, setting up of spin offs, startups and partnerships with industry, in particular aquaculture.
- (viii) Develop an action plan to improve and stimulate cooperation between different research groups within research lines and across research lines with the aim of reducing fragmentation and stimulating cooperation.

- (ix) To promote public understanding of sciences for the general public educational programmes targeting schools at all levels.
- (x) Strive to improve cost-effectiveness of research and reduce waste and carbon footprint.

This ambitious and really exciting programme should be developed/implemented in the framework of a midterm strategic agenda for refining the general scope of the LA. In this context, there is the need of progressing in the integration of research lines within CIMAR, including the clustering of research teams into larger thematic units. On the other hand, CIMAR should continue to enhance its communications and public outreach activities that would help further growing national and international visibility as a centre of excellence. Finally, it should continue facing the challenge of stimulating knowledge transfer to potential stakeholders.

## **Conclusions**

CIMAR has done a great deal of progress since the last five years, doing very exciting and excellent science and being internationally recognized as a reference centre in marine science. During this time, it has overcome most of the planned objectives.

CIMAR provides real capability to take a strategic view of emerging marine policy issues and respond rapidly to pressing concerns and emergencies.

However, we recommend to take into account the comments and suggestions of the above sections, particularly the need for some assemblage into coherent (and up-to-date) research groups with a critical mass.

In conclusion, CIMAR may be considered able to pursue its main objectives with the required quality, allowing for the renovation of its 5 years FCT contract, with some updating regarding the planning for a strategic reorganization before its contract is renewed by FCT.

**CMDT**  
Centro de Malária e Outras Doenças Tropicais

**Evaluation Panel**

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**General comments**

The Centre for Malaria & Tropical Diseases (CMDT) was created in 1992 and formed a Research Unit by FCT. After an international evaluation in December 2004, it has been accepted as Laboratório Associado (LA). Therefore this report of CMDT covers the Centre's activities only from 2005 to 2007. The LA consists of 6 research groups:

- **Clinical Studies**
- **Parasitology**
- **Public Health**
- **Health Education**
- **Virology**
- **Biotechnology**



Two of these groups are located outside the Centro's building namely the Biotechnology and the Health Education groups. Besides the Virology group is split between two locations. *This dispersion of laboratory sites does not favour collaborative research programs and scientific interactions within the LA.*

## **Funding**

CNDT receives funding mainly from FCT but also from other national sources. The total budget of CNDT for the period 2003 – 2007 amounted to a total of €3.284.719,00. This LA starting receiving FCT LA basic funding only from 2006 onwards; until this date it received FCT funding as a Research Unit. The funding received from 3 sources – FCT basic (Units + LA), FCT projects and other national sources – corresponded only to 68.5 % of the total. There was a very small contribution from industrial funds.. The % of international funds was high: it amounted to about 40.5% of the total funding, what is very appreciable. It would have been interesting to know whether some international funding originated from the EU 7th Framework as an indicator of how successful the LA is in European competition. This dispersion of sources is an important asset.

## **Research Outputs**

The publications of the CMDT do not display a high profile. Very few are in journals with high impact with occasional exceptions as one paper in *The Lancet* and two in *Lancet Infect. Dis.* But these papers date from the early (pre-LA) period (2003, 2004). Even taking into consideration that traditionally, Tropical Medicine journals have relatively low impact factors, one expects that a LA, working on this scientific field, *should have a regular flow of publications in general clinical journals of higher impact.* The majority of publications in journals with moderate impact, besides those mentioned above, have been in journals as *AIDS, Mol. Microbiol., Antimicrob. Agents Chemother., Antiviral Therapy.*

To obtain a quantified impression of whether some papers have clear visibility internationally we screened for publications that reached at least, on average, 10 citations/year. Only one paper was identified, that was published by the Parasitology group.

*Several groups are very small and there are too many research themes taking the small staff into consideration.*

## **Research training**

At the postgraduate level the CMDT organizes a number of courses in Tropical and Public Health, Molecular Biology and Biomedical Sciences. It participates in PhD programs at the Institute of Hygiene and Tropical Medicine. In addition the CMDT participates in training programs within the framework of North-South Technology transfer particularly with African partners of Portuguese speaking countries.

## **Management and Outreach**

It appears that the organization is still being developed. For administrative issues the CMDT depends on the Institute of Tropical Medicine, and is establishing a Board of Advice and Evaluation. A Coordinating Committee exists only since 2006. Nonetheless the CMDT has a policy for sharing equipments and other laboratory resources although the dispersion between sites is a hindrance. The CMDT gives an active contribution to a number of governmental programs mainly involving tropical diseases, particularly in Portuguese speaking countries, and public health issues, namely in health services programming and delivery. Further CMDT members provide support to medical services in tropical health (clinical consultation, laboratory analyses, migrant medicine).

Although these service activities are certainly valuable, and important from a general perspective of Public Health, *they are not easy to combine with the high value scientific research that a LA should have as core activity. This is probably one of the reasons for the fact that the publication record of the CMDT as a whole does not reach the scientific level what one would expect from a LA.*

**In conclusion** (1), the review panel cannot give a positive advice with respect to the renewal of the contract of CMDT as a LA. In any case a major re-organisation should occur.

### **Recommendations**

(1) Specific recommendations are indicated in italics in the main text.

**CNBC**  
Centro de Neurociências e Biologia Celular

**Evaluation Panel**

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**General comments**

CNC is one of the first LA established by FCT in the Health and Bio-medical Sciences area. According to the present report of the LA there are 92 PhDs working in CNC organized in 24 research groups that are grouped according to 6 main scientific areas:

1. Molecular Biotechnology and Health Biological Sciences
2. Biophysics and Biomedical NMR Biological Sciences
3. Cell and Development Biology Biological Sciences
4. Microbiology Biological Sciences
5. Cell and Molecular Toxicology Biological Sciences
6. Neuroscience and Disease Health Sciences

These topics span a wide variety of scientific topics with the main accent on basic biological and biochemical themes with a bio-medical or biotechnological dimension.

The field within which the largest number of research groups is active is that of "Neurosciences and Disease".

An important feature of CNC is that this institution assembles groups from different Faculties at Coimbra University, namely Medicine, Pharmacy, and Science & Technology, as well as from the Coimbra University Hospital. This is a major asset of CNC since it enables the development of fruitful collaborations and facilitates translational molecular applications in Medicine.

## **Funding**

CNC receives funding mainly from FCT but also from other national sources. The total budget of CNC for the period 2003 – 2007 amounted to a total of €14.596.146. The funding received from 3 sources – FCT LA basic, FCT projects and other national sources – corresponded to 96 % of the total. It is remarkable that the % of funds obtained from FCT projects was 94% of the FCT LA basic, which is by far the highest % of all LAs that we evaluated. In contrast there was no contribution from industrial funds. *The % of international funds was about 4%, what is relatively low. This % could most likely be increased given the themes of research of CNC.* It would have been interesting to know whether some international funding originated from the EU 7th Framework as an indicator of how successful the LA is in European competition.

## **Research Outputs**

This Review Panel gives an overall positive report on past achievement and future plans. Overall publication standard (as judged by Journal) is very good. In an Institute of the size of this LA the research output of the different groups varies a lot. This variability reflects also the fact that the number of PhDs is not equally distributed among the groups, and that some groups have existed for a much longer time than others. The Review Panel does not make a detailed analysis of the research outputs of the different groups since this is difficult to do without a site-visit. Furthermore the amount of time that the members of each group can effectively dedicate to research is not explicitly indicated in the report, what makes it difficult to assess the performance of the Institute's members individually. Thus this external review focus only on a few salient features that should be put in evidence for further consideration of the Institute's management.

1. The level of the scientific work as assessed by the publications in important peer-reviewed journals, is high and the productivity shows a steady rising trend. Some publications appeared in journals of general high impact such as those of the Nature series (Nature Biotechnology, Nature Methods), Neuron, PNAS, and also in top journals in specialized fields namely in the Neurosciences field: Progress in Neurobiology, J of Neuroscience; in Clinical sciences field: Gastroenterology, Diabetes, Circulation Res; in Material sciences field: Advanced Materials, Biomaterials; in Cell Biology field: J Cell Biol, J Cell Sci.
2. Some groups published papers that received already a clearly visible number of citations; to give a quantified impression we noted the publications that reached at least, on average, 10 citations/year. These appeared in the following groups:
  - Vectors and gene therapy;
  - Infection, phagocytosis and pathogens(twice);
  - Neuroprotection and Neurogenesis in Brain repair;
  - Neuronal cell death and Neuroprotection;
  - Molecular mechanisms of Disease.
3. Some groups failed to score at the "very good" or "excellent" level regarding *published output*:

- Structural and computational biology;
- Cell Biophysics;
- Cellular Immunology and Oncobiology;
- Pharmacometrics;

*The management should pay special attention to this fact.*

We agree with the Steering Committee (report of June 2009) that the following are the areas of strength of the LA:

- Basic science discovery and highly productive research teams in domains of science that are relevant to human health, therapeutic development, and earth science;
- Focus on translational research; Clinical partnerships;
- Impressive cadre of Ph.D., MSc students;
- Valuable international collaborations; Partnership with MIT Portugal.
- The outstanding partnership with BioCant makes the CNC unique

We also emphasize the recommendation of the Steering Committee to establish a "Faculty Development program" in order to help creating the conditions by which the new generation of talented young scientists may develop both in scientific and in teaching abilities, so that they make take responsible positions, both at the national and international levels in the near future. *This implies implementing selection procedures and active recruitment policies. A LA of this calibre should sustain work at a high level, clear plans to enhance quality, to rearrange or even to close some laboratories, are required.*

### **Research training**

From the start of CNC the LA has been very active in creating and leading a program of Advanced Courses, involving an "International Faculty" of invited scientists, that has developed into the present PhD program in Experimental Biology and Biomedicine. Recently CNC became also involved in another prestigious PhD program that is run in the frame of the MIT/Portugal agreement. *These are important activities that need continuous support.*

### **Internationalization and Outreach**

CNC participates in many International networking activities around research themes of CNC with groups from almost all European Countries, Canada, United States, Chile, Brazil, Argentina and Venezuela. Further, CNC participates also in structured networking activities such as ENI-NET (Network of European Institutes) and MIT/Portugal Program.

CNC has launched several activities aimed to promote science dissemination among the non-scientific community with several initiatives dealing with molecular/cell biology themes, particularly aiming the youth of secondary schools, but also the public in a wide sense. CNC has been very active in promoting the interaction between scientists and students, either in laboratories ("Open Laboratories") or schools ("Neuroscientists back to School"), at a regional level.

**In conclusion** (1) the CNC LA should continue to pursue its objectives, with some adjustments, allowing the automatic renovation of the 5 year contract.

<b>Recommendations</b>
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(1) Specific recommendations are indicated in italics in the main text.



# IBMC.INEB

Instituto de Engenharia Biomédica . Instituto de Biologia Molecular e Celular

## Evaluation Panel

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## General comments

The laboratory is divided into seven main divisions which are subdivided into 38 research groups:

1. Human Genetics and Genetic Disorders
2. Biology of Infection and Immunology
3. Structural and Molecular Biology
4. Basic and Clinical Neurobiology
5. Cell Adaptive Mechanisms
6. Biomaterials, Repair and Regeneration
7. Biomedical Signal and Image Division

Divisions 6 and 7 have a cross divisional representation providing innovative solutions for problems generated in the other five divisions whilst maintaining core research strengths in their own disciplines. The external review draws attention to the growth of interdisciplinary collaboration (divisional collaboration) over the last few years. This is to be applauded – the strengths of Structural and Molecular Biology, linked to protein structure, gene expression, cell biology etc is a hallmark of the laboratory and will provide valuable biological insights to health related problems.

## **Funding**

IBMC/INEB receives funding mainly from FCT but also from other national sources. The total budget of IBMC/INEB for the period 2003 – 2007 amounted to a total of €33.387.759,00. The funding received from 3 sources – FCT LA basic, FCT projects and other national sources – corresponded to 85 % of the total. The % of funds obtained from FCT projects was 66% of the FCT LA basic. There was a small contribution from industrial funds, amounting to about 5% of the total budget. The % of international funds was about 8%, what is appreciable. It would have been interesting to know whether some international funding originated from the EU 7th Framework as an indicator of how successful the LA is in European competition. This dispersion of sources is an important asset and its further development should be encouraged.

## **Research Outputs**

This external review gives an overall positive report on past achievement and future plans. Overall publication standard (as judged by Journal) is reasonable. In an Institute of the size of these two LAs the research output of the different groups varies a lot. This variability reflects also the fact that the number of PhDs is not equally distributed among the groups, and that some groups have existed for a much longer time than others. The external review does not make a detailed analysis of the research outputs of the different groups since this is difficult to do without a site-visit. Furthermore the amount of time that the members of each group can effectively dedicate to research is not explicitly indicated in the report, what makes it difficult to assess the performance of the Institute's members individually. Thus this Review Panel focus only on a few salient features that should be put in evidence for further consideration of the Institute's management.

1. In the period assessed a remarkable number of outstanding publications appeared in high impact journals, such as Cell, journals of Nature group (Nature Genetics, Nature Methods, Nature Cell Biology, Nature Struct. Mol. Biol), PLoS Biol., Ann. Int. Med., Dev. Cell, Blood, EMBO J., PNAS, Trends Immun., Curr Biol, Progr Neurobiol, J. Neurosci; Neurology, Biomaterials (an important journal in the field of INEB).
2. Some groups published papers that received already a clearly visible number of citations; to give a quantified impression we noted the publications that reached at least, on average, 10 citations/year. These were produced by the following groups:
  - UniGENE;
  - LBG;
  - Genetics and Arthritis;
  - Cell Activation and Gene Expression;
  - Molecular Genetics, Chromosome Instability and Dynamics (4 times);
  - Morphophysiology of the Somatosensory System (twice).
3. *Some groups failed to score at the very good or excellent level regarding published output:*
  - Mitochondria;
  - Neuropharmacology;



- Stress in Animals;
- Biology of Inflammation and Reproduction;
- Geoeidemiology.

*The management should pay special attention to this fact.*

## **Management**

The fusion of the two former independent research centres appears to have been achieved satisfactorily over the last five years. The external review report comments favourably on the new structure and distribution of research groups, although the two original groupings retain separate executive councils with a governing directorate built up of members of the two councils. The 200 PhDs and almost 150 PhD students make this a formidable consortium. *This diversity of structure does give cause for concern and a more focussed choice of research themes would be welcome.* It is reassuring, however, that the plans are to further consolidate the work of the consortium around three broad themes.

1. **Molecular, cell and tissue architecture:** What is the structural organisation of complex living systems? How can the dynamics in those structures help to explain biological function?
2. **Systems biology of disorders:** Why, how and when are mechanisms disrupted or compromised? Could it be the result of changes in the cross-talk between genes or cells and the environment? Three sub-themes have been identified that seem clearly interrelated:
  - A. Genes, mutations and evolution
  - B. Infections
  - C. Stress, senescence and ageing
3. **Engineering for living systems:** How can biomaterials be engineered for tissue regeneration? Can novel engineering concepts and models help to develop intelligent diagnostic, therapeutic and educational systems? Can metabolic pathways be re-designed? Are there ethical issues involved?

Another important objective is to upgrade the current equipment and to develop new Service Platforms, which include Optical Tools for Cell Biology and in vivo Imaging and an Integrated Rodent Phenotyping Facility. There are essential if the LA is expected to continue to carry out research at an internationally competitive level.

*An Institute of this calibre should sustain work at a high level and clear plans to enhance quality, reorganizing groups and even closing laboratories, are required. Hopefully the move to concentrate the research lines according to three main themes will focus attention on performance but also on coordinating more effectively the work of individual research groups.*

## **Research training**

The LA participates in 15 MSc programmes and 4 PhD programmes, among which the pioneering Graduate Programme in Areas of Basic and Applied Biology (GABBA), as well as contributing to many other graduate training programmes. *Is this involvement in so many different programmes a positive situation or should the LA concentrate on fewer programmes? This is a question rather than a comment but the LA needs to consider this carefully.*

## **Internationalization and Outreach**

The IBMC / INEB have an extensive list of collaborations at the national and international level by way of partnerships in several European programmes and participation in training courses at the graduate level. The outreach activities of the LA are to be applauded and have clearly been innovative. There is evidence of strong external collaborations and several groups have reached levels of international visibility and significance.

**In conclusion** (1), it is appropriate for the LA to continue with an automatic renewal of its contract. However, the LA *should be advised to tackle consolidation into broad thematic areas over the next 5 years and to institute a strong internal performance review on an ongoing basis, keeping in mind the need to narrow some of the research topics within the LA.*

### **Recommendations**

(1) Specific recommendations are indicated in italics in the main text.

**Evaluation of Associate Laboratories**  
**from the Portuguese Foundation for Science and Technology**

**INSTITUTE FOR BIOTECHNOLOGY AND BIOENGINEERING - IBB**

<b>Evaluation Panel</b>
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<b>General Comments</b>
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The assessment provided below summarises the conclusions of the short reports prepared by the International Steering Committees as well as our own appraisal based on the analysis of the individual reports prepared by the Associated Laboratories.

*1. Assessment of the International Steering Committee*

According to the report of the Steering Committee, the IBB performs world class research in molecular biology, genomics, systems biology, regenerative medicine, and nanotechnology measured by the quality of the scientific publications. Moreover, members of the Associated Laboratory are very much involved in promoting the interactive communication between scientists, policy-makers, and the general public in diverse areas of research such as food, stem cells, regenerative medicine, genetics, and energy and environmental issues.

The IBB has a strong education and training programme and is viewed as a key player in the Bioengineering globalization process, with emphasis on systems and synthetic biology, nanobiotechnology, regenerative and personalized medicine, as well as production of second generation energy compounds from different feedstocks.

The Chair of the Steering Committee recommended the renewal of the 5 year contract.

## 2. Assessment of the External Advisors

We agree with the recommendations of the International Steering Committee. The IBB is a leading international bio-renewable Centre, and their future objectives are praiseworthy, logical, and achievable. The IBB prioritize collaborations and synergy between the various research units, and is well on its way to becoming an internationally competitive Centre. The latter will ensure that Portugal takes a leading position at the international level in the Biotechnology, Bioengineering, Biomaterials, and Genetics areas. The education and training programmes are sound, and the dissemination and scientific awareness activities are commendable.

## **Evaluation of Associate Laboratories**

**from the Portuguese Foundation for Science and Technology**

**INSTITUTO DE CIÊNCIAS SOCIAIS - ICS**

### **Evaluation Panel**

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### **General Comments**

All the evaluators agree: ICS is a centre of the highest quality and performance. It does excellent research across different disciplines and methods, quantitative as well as qualitative. It is well structured in 4 lines / groups of research (in 2007, + 1), regularly working in collaboration (researchers may be part of more than one of them, in relation to the area of research) and integrating students, who also benefit from a tutoring system.

Evaluators underline the significance of the research activities, the quality of consultancy activities and the contribution of ICS to the social scientific infrastructure of Portugal, particularly through the Observatories. They appreciate the balance between basic and applied research and recommend its continuation in this way.

International networks and publishing are well developed. And ICS is present in several European projects of excellence. (On this point, one may nevertheless wonder if it is mainly an attribute of some individual researchers or of research lines as such.)

Training activities are well developed and, during the period under evaluation, ICS counts a respectable number of MA and of PhDs. (On this point, important differences exist between the lines, which would be interesting to explain). One member of the evaluation team suggests that the large body of expertise in the ICS could allow it to create more Master's degree programmes than the two they have developed prior to 2008.

It is also worth mentioning that ICS has developed an "evaluation culture" that appears to be useful and successful.

The demands of ICS are perfectly justified: the recruitment of research managers, especially for the application to and the management of European programmes, and the recruitment of young researchers with specific skills, among others in methodology.

### **The research lines / groups**

#### SOLINC

The appraisal of this group is very positive, in relation to its research areas and its methods as well as its publishing in international and national journals and its participation in national and international networks, projects and events. The number of projects has increased between 2003 and 2007, as did the number of publications, particularly in international journals. Special appreciation is expressed for its Observatory on Youth and for stimulating workshops to discuss on-going research. Its plans for the future are considered coherent, particularly with respect to methodological developments. We consider that it is an excellent group.

#### DEMOLINE

This group is described as "the one with the highest quality / performance" and as "very impressive". It is a member of some of the most important European projects (EVS,

ESS, Eurobarometer) and of various other projects and networks. The members of the group have many publications, including in international journals. Besides its important basic research, DEMOLINE also has an important role in consultancy. One remark only: the number of PhD and MA dissertations seems relatively low, when the line has such a good staff, working in the main international projects. Plans for the future are reasonable and welcomed, particularly the intention to develop the methodological tools and to develop (more) relations with related disciplines.

### SUSTAIN

This group is very active in Portugal. It has also developed international collaborations and networks. Nevertheless, its numerous publications are mainly in the Portuguese language, which is perfectly respectable (we are indeed aware that Portuguese may be used for international publications!). The group appears concerned with the balance between basic research and applied research, with the importance of the latter being its current preoccupation. It is important for this group to be vigilant about this tension. The number of PhD and MA theses is relatively low. That said, SUSTAIN organised many conferences, workshops, and so on, which is understandable in view of the topicality of the subjects studied, but it may be to the detriment of other tasks, such as the supervision of PhD and MA students.

### PERMOB

The performance of this line/group seems good but less impressive than the other lines/groups of this laboratory and relatively difficult to evaluate – perhaps because the explanations are not so clear. Nevertheless the participation of this group in the Norface programme has to be underlined as is the case for a study realised in Brazil that has led to the declaration of indigenous rights. This shows that the group is at the same time engaged in fundamental and in applied research and that it is active in international networks. PERMOB has also developed training activities and it has supervised PhD and MA theses.

### MACO

Established in 2007 (at the end of the period concerned by this evaluation, which makes it difficult to appraise), MACO was previously included in DEMOLINE. Its researchers have thus worked during most of the period 2003-2007 among the researchers of

DEMOLINE, a very highly appreciated group of this laboratory. Nevertheless the group seems to be essentially if not exclusively orientated towards history, when the other groups are multidisciplinary. It would be important to keep this remark in mind and in practice.

### **Conclusion**

Based on this evaluation, ICS is considered able to pursue its main objectives with the required quality. This allows for the **automatic renewal of its contract** with the FCT.



**Evaluation of Associate Laboratories  
from the Portuguese Foundation for Science and Technology**

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**INFORMATION AND COMMUNICATION TECHNOLOGIES**

**EVALUATION PANEL**

**Kin K. Leung** (coordinator)

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**INESC-Porto**

Instituto de Engenharia de Sistemas e Computadores do Porto

**GENERAL COMMENTS**

**1. Introduction**

At the request of the President of the Portuguese Foundation for Science and Technology, this panel has assessed the performance of the three Associate Laboratories currently supported by the FCT: IT, INESC-Porto and INESC-ID. The evaluation exercise is based on information

and reports available on the FCT website, and on individual laboratory sites. The report begins with high-level comments specific to this evaluation process and common observations from the three laboratories. Then, we consider the specific performance of the Porto Lab and finally conclude with a set of general recommendations.

## **2. Overall Comments**

### *a. Challenges for Evaluation*

Although the various websites contains a very large volume of information, it is generally scattered throughout each site. Consequently, it is very difficult to find and correlate specific information associated with the laboratories and a thorough and consistent evaluation of each laboratory was therefore not possible in the limited time available to this Review. For example, financial data, the number of publications and the number of PhD/MSc students are often embedded in the text of reports and relevant information rather than in tables. Information reporting by separate Research Units is highly non-uniform. For example, some units reported citation figures for their published papers, while others did not. The exact mission of each lab is not made clear. For example, although part of the mission of the INESC-Porto Lab is to promote spin-out and technology transfer, it used the same report format as for the IT Lab, which focuses on fundamental research, publications, and student training. As a result, it is not easy to appreciate some aspects of the contributions associated with spin-out companies, technology transfer and consulting work at the Porto Lab. Due to these challenges, the panel members found it difficult to gain a good thorough understanding of the laboratories and their different contributions. Having said this, the panel has tried its best to form objective opinions and present constructive comments and recommendations.

### *b. Trends of Improvement*

From a general perspective, the three associate laboratories do indeed show a steady improvement of their performance over the years. All three appear both to note and to implement SAB recommendations. Their membership has expanded, and publication output is improving, both in terms of quality and quantity. Industrial support is evident, both at the level of small National companies and some of the strongest International names in the field. Success in obtaining research funds from EC framework programmes is significantly enhancing the overall budget, and is therefore effectively multiplying the original FCT contribution. The generation of spin-out companies and incubation of start-up companies is active, suggesting useful and growing economic value.

On the other hand, by comparison with similar institutions in Europe and USA, there still seems to be a large margin available for improvement. Particularly, the publication productivity of researchers (less than 1 journal paper per researcher each year) is below an acceptable International standard, and the impact of publications is highly uneven and low on

average (although some do show a high number of citations). Furthermore the number of PhD students per tenured researcher is low.

#### *c. Research Vision and Strategic Goals*

The three laboratories are clearly involved in many aspects of the ICT research in one way or the other. However, many of the research issues being tackled by the research groups even at different laboratories are highly related or overlap in some instances. As a result, it is difficult to identify coherent research visions or strategic goals in this work, despite a very large aggregate effort. Specifically, there seems to be little evidence that the IT, INESC-ID and INESC-Porto are working together to help FCT set a national scientific agenda, exploit synergies, maximize overall economic benefits and minimize the corresponding threats for Portugal. For example, it is difficult to identify particular research themes that are specifically important to Portuguese national infrastructure or industry, rather than to society in general. Similarly, important global issues such as green energy, climate change, national security and the challenges of low manufacturing/labor cost in different parts of the world, which are all highly related to ICT, appeared to receive little top-down attention.

#### *d. Collaboration and Synergy*

Although many research groups in the three laboratories are performing satisfactorily as individual units, it is difficult to gain an overall understanding of the organizational structures of the laboratories and possible collaborative relationships that may exist among research units within the same laboratory. It is even harder to identify and understand the cross-laboratory relationships. On the other hand, it is clear that many research topics investigated by different research groups and laboratories are related and to some extent overlap with each other. Without understanding the organizational structures, it is difficult to comment on the research overlaps and possible synergies. Because of this, the panel has an impression that collaborations among researchers working on similar issues within the same laboratory or across laboratories have not been fully exploited and promoted. Having a coherent research vision and strategic goals for the laboratories will also help promote collaboration among research units.

#### *e. Contributions from Research Groups*

It was noted that the number of participating researchers, budget, achievements, contributions, and the number of PhD and MSc graduates can vary significantly from one research group to another in the same laboratory. It is clear that some groups (units) have excellent performance (in terms of, for example, publications in the best technical journals or conferences, large number of citations and large numbers of PhD/MSc students trained), while others do not perform satisfactorily. Due to the limited amount of time available and the large number of research groups in each laboratory, it is impossible to assess the performance of

individual groups. Instead, the panel aims to consider and comment on the overall performance of the whole laboratory in this report.

### **3. The Associate Laboratory INESC - Porto**

The INESC-Porto Laboratory is mainly involved in scientific research and technological development as well as consulting and advanced training in a) telecommunications and multimedia, b) power systems, manufacturing systems engineering, c) information and communications systems, and d) optoelectronics.

#### *a. Productivity*

The Scientific Advisory Board (SAB) brief report provides an overall view of the state, and strengths and weaknesses of the INESC Porto Lab. Comments and recommendations in the report appear to be fair and objective.

The level of participation in national and international projects is satisfactory, although the crucial information on how many of these projects are led by laboratory researchers is missing. INESC Porto was the R&D Institution in Portugal with the largest participation of the 6th Framework Programme of EC. Overall, the capacity to attract competitive funds seems to be close to 80% of the budget, not including the budget of the tenured staff.

Looking at the comparison 2002-2008, the number of researchers has doubled while the number of journal publications has increased almost 5 times, which is a good indicator. However, summing the number of researchers and number of PhD students in 2008, and dividing by the number of journal papers, one obtain an average number of papers per researchers less than 0.5. This panel agrees with the SAB that the ratio of journal paper per senior researcher of about one per year would be "below the International standard" for a research Institute. However, this aspect may be of less importance to an organization such as INESC-Porto.

Given the nature of the organization, IP generation and commercialization should be more important. However, the number of patents is 1 in 2006 and 2 in 2007, which can be considered rather low. No details are given about commercializing those patents. The number of spin-offs has been 5 in the period 2002-2007 and 3 in 2008; these figures are encouraging and show a genuine economic contribution.

#### *b. Quality and Impacts of Contributions*

It has been observed that the quality of the research contributions varies drastically from one research group to another in the Porto Lab. For example, 6 out of 10 reported journal papers from the "Telecommunications and Multimedia" Group have a citation count of zero, as

reflected in the report. On the other hand, the citation figures for journal papers by the "Optoelectronics and Electronic Systems" Group appear much better. Therefore, the disparity suggests a high variability of research quality from various groups in the Porto Lab.

Combining the relatively poor productivity and varied impacts of the research contributions, the panel has the following overall impression on the Porto Lab. While some good research is certainly being carried out in addition to technology transfer to spin-out companies, it is not clear whether the performance of the lab as a whole can be ranked as "Excellent" as the SAB suggested. It seems that continued and substantial improvement will be needed to bring the Lab to a visible position in the International research community.

Having said this, it is certainly possible that contributions other than publications, such as consulting work, formation of startup companies and technology transfer of research results for practical use, also represent significant contributions of the Porto Lab. Unfortunately, given the difficulty of identifying the importance attached to this role, it is difficult to assess the quality and impacts of these contributions thoroughly and objectively.

#### *c. Graduate Education*

As indicated in the Brief Report by the Porto Scientific Advisory Board, there were 78 PhD students and 85 researchers with a PhD in 2008, respectively. It also stated that "the PhD graduating rate averages 13 per year, which is a bit low." This panel agrees with that view. The graduation rate is indeed low in light of having 78 researchers with PhD. Once again, it is difficult to assess the quality of the PhD theses.

#### *d. Professional Activities*

Many research groups in the Porto Lab are actively involved in professional activities (e.g., organizing major conferences, workshops and seminars). The Lab also has active collaborations and interactions with other universities (e.g., MIT, CMU and University of Texas at Austin) and researchers in the U.S. The researchers at the Lab have been members of various Technical Committees and their CVs show evidence of international collaborations. However it was difficult to find information about the number of IEEE Fellows and Senior Members, Editorship activities.

### **4. Recommendations**

In terms of governance, it is suggested to harmonize the sizes of the Scientific Advisory Boards (SAB), which at present range from three to eight members for the IT, INESC-Porto and INESC-ID laboratories. Also, there is a need to rotate the SAB membership, maintaining a balance between continuity and a three-year maximum length of service.

It is essential for each laboratory to establish a strategy for improving its National position, and to report annually on progress towards these goals. The strategy should include collaboration with other FCT laboratories and maximisation of the aggregate benefit to Portugal. Laboratory Heads are encouraged to meet regularly for these purposes.

The scientific collaboration between affine research groups within the laboratory and across the laboratories should be encouraged through suitable incentives, so as to form a critical mass in the field for achieving the strategic goals. Where possible, and given the limits of available expertise and geography, the combination of overlapping activities in separate Centres could be considered. As an example, possible mergers include the Optical Communications activities of IT and Optoelectronics activities of INESC-Porto, and the Power Electronics activities of INESC-Porto and Power Systems activities of IT.

Together with the Research Group leaders, the Governing Boards of the laboratories should identify a few research topics characterised by inter-disciplinary and relevance to science and society that require the harmonic collaboration of different groups, and invest resources and funding accordingly.

To promote the laboratories in the international research community, each laboratory should establish a strategy for improving its International position, and report annually on progress towards these goals. The strategy should include the formation of partnership agreements with complementary European laboratories, and establishment of International Academic Visitor program. Laboratory Heads should be encouraged to meet with European counterparts to learn and disseminate best practices.

The publication of journal papers should be strongly encouraged, as opposed to conference papers. To maximise international impact, the writing of scientific papers, PhD theses and internal reports in Portuguese should be discouraged.

Target PhD completion times should be clearly established, beyond which a PhD will not be awarded. Moreover, each completed thesis should be accompanied by evidence of a threshold number of peer-reviewed publications.

All laboratories seem to face serious problems in recruiting qualified researchers and PhD candidates. Many European academic and research institutions have partially overcome this problem by offering English-taught degrees to attract good students

All in all, the INESC-Porto Laboratory has indeed shown a steady improvement of their performance over the recent years, but it has not yet reached its potentials and should further

improve in various areas. It should undergo moderate changes and re-organization before its contract is renewed by the FCT. This may lead to a negotiation between the FCT and the Laboratory with an aim to improve its future impacts, efficiency, prioritisation and synergy with other related laboratories, as highlighted in this report.

**Evaluation of Associate Laboratories  
from the Portuguese Foundation for Science and Technology**

**INFORMATION AND COMMUNICATION TECHNOLOGIES**

**EVALUATION PANEL**

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**INESC-ID**

Instituto de Engenharia de Sistemas e Computadores: I&D em Lisboa

**GENERAL COMMENTS**

**1. Introduction**

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the three laboratories. Then, we consider the specific performance of the ID Lab and finally conclude with a set of general recommendations.

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### **3. The Associate Laboratory INESC - ID**

The Associate Laboratory INESC-ID mainly involves researchers in Electrical Engineering and Computer Science to advance the state of the art in computers, telecommunications and information systems. Its activities cover: a) Communication networks and mobility, b) Embedded electronic systems, c) Information and decision support systems, d) Interactive virtual environments and e) Spoken language systems.

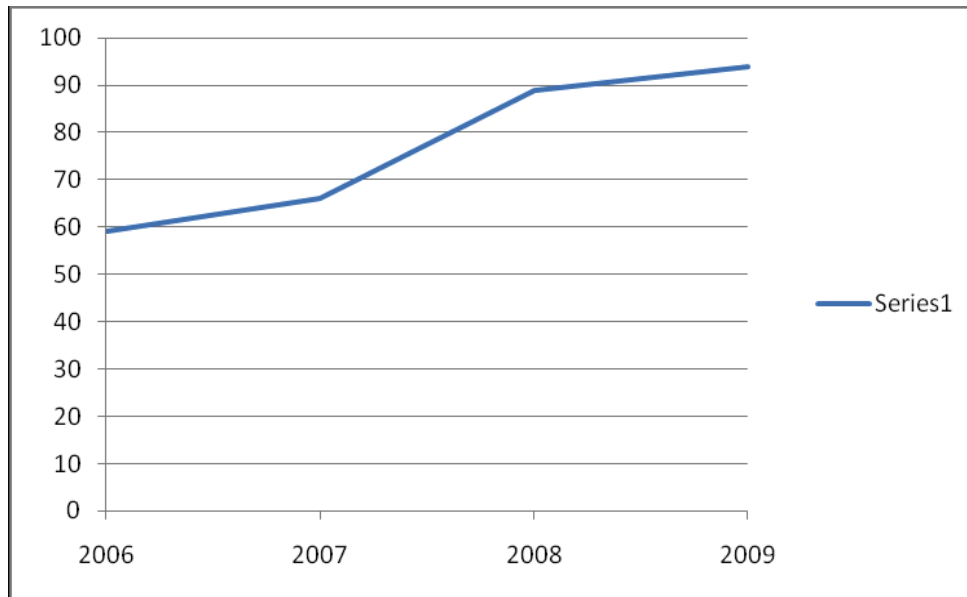
#### *a. Productivity*

Evidently, the INESC-ID Lab has gone through significant changes and improvements over in the last several years, as observed in the Advisory Board report. Researchers were enthusiastic and energetic. Exciting and cutting-edge projects have been started. The level of participation in national and international projects is satisfactory, although the crucial information on how many of these projects are led by laboratory researchers is missing. The percentage of revenues deriving from services to third parties (industrial contracts) is around 25% in the period 2003-2007 (no more recent data are available); however there is a declining of industrial contracts in 2007. Overall, the capacity to attract competitive funds seems to be close to 66% of the budget, not including in the budget the tenured staff. A substantial number of good quality journal papers were published. The number of PhD students has increased significantly. All point to the positive direction for the ID Lab.

Despite the positive improvement trend, it seems that this Lab also has room for continued improvement on the absolute scale. For example, the number of FTE researchers is 78 and the number of completed PhD's is 16 in year 2007. Relatively speaking, given the number of senior researchers available, more PhD students could be produced.

Figure 1 shows the total number of journal publications (including books and book chapters) for the ID Lab from 2007 to 2009. From the online report of "ResearchTeam", the ID Lab had 98 researchers with PhD. Therefore, assuming that all PhD researchers worked full time, the average number of journal publications published per PhD researcher is approximately 1 in 2009, which could be considered to be "acceptable", but not excellent according to the international standard.

Similarly, assuming that the figures on the Lab website are reliable, the number of patents appears rather low. Nothing is said about commercializing those patents, and there is not a single section dealing with start-ups stemming from the Lab, although the information may be scattered at various parts of the website.



**Figure 1.** Number of journal papers published by the ID Lab in years 2006 to 2009

*b. Quality and Impacts of Contributions*

Many papers published by the ID Lab researchers are highly cited. For example, 3 out of the 4 most cited papers in Portugal in computer science are from researchers in this laboratory of “Information and Decision Support Systems”. The journal papers published by the “Software Algorithms and Groups for Constraint Solving” group were well cited (e.g., citation of more than 20 times), as indicated in the report on the website. Two articles of members of the “Knowledge Discovery and BioInformatics (KDBIO)” group are amongst the 4 highest cited articles in computer science in Portugal. The number of citations of articles from members of the KDBIO group exceeds 800 (Google scholar). On the other hand, citation figures for some groups (e.g., “Distributed Systems” group and “Data Management and Information Retrieval” group) are relatively low. The disparity in citations among various research groups reveals non-uniform quality of contributions across the groups within the ID Lab.

By considering the productivity and varied quality of research papers, the overall impression of this panel is that the ID Lab as a whole performs at an “acceptable” level in terms of productivity and quality. It certainly has room for improvement, especially for those research groups with poor performance, when compared with leading researchers in the field. Having said this, the panel remarks that there exist individual researchers and research groups in the ID Lab who perform excellently.

*c. Graduate Education*

As indicated in the report “Report Form” for the ID Lab on the website, the number of FTE researchers at the Lab was 69, 67, 69, 76 and 78 in years 2003 to 2007, respectively. So, the

number of FTE researchers averaged over time is about 72. In the same years, the total number of PhD graduates is 39. That is, each FTE researcher trained only 0.54 PhD student in 4 years, which is again considered to be very low.

#### *d. Professional Activities*

Generally, research groups in the ID Lab are actively involved in professional activities such as organizing major conferences, workshops and seminars. The Lab researchers have been members of various Technical Committees and their CVs show evidence of international collaborations. However it was difficult to find information about the number of IEEE Fellows and Senior Members, Editorship activities in major publications or international cooperation leading to researcher exchanges.

#### **4. Recommendations**

In terms of governance, it is suggested to harmonise the sizes of the Scientific Advisory Boards (SAB), which at present range from three to eight members for the IT, INESC-Porto and INESC-ID laboratories. Also, there is a need to rotate the SAB membership, maintaining a balance between continuity and a three-year maximum length of service.

It is essential for each laboratory to establish a strategy for improving its National position, and to report annually on progress towards these goals. The strategy should include collaboration with other FCT laboratories and maximisation of the aggregate benefit to Portugal. Laboratory Heads are encouraged to meet regularly for these purposes.

The scientific collaboration between affine research groups within the laboratory and across the laboratories should be encouraged through suitable incentives, so as to form a critical mass in the field for achieving the strategic goals. Where possible, and given the limits of available expertise and geography, the combination of overlapping activities in separate centres could be considered. As an example, possible mergers include the Optical Communications activities of IT and Optoelectronics activities of INESC-Porto, and the Power Electronics activities of INESC-Porto and Power Systems activities of IT.

Together with the research group leaders, the governing boards of the laboratories should identify a few research topics characterised by inter-disciplinary and relevance to science and society that require the harmonic collaboration of different groups, and invest resources and funding accordingly.

To promote the laboratories in the international research community, each laboratory should establish a strategy for improving its International position, and report annually on progress towards these goals. The strategy should include the formation of partnership agreements

with complementary European laboratories, and establishment of International Academic Visitor program. Laboratory heads should be encouraged to meet with European counterparts to learn and disseminate best practices.

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Target PhD completion times should be clearly established, beyond which a PhD will not be awarded. Moreover, each completed thesis should be accompanied by evidence of a threshold number of peer-reviewed publications.

All laboratories seem to face serious problems in recruiting qualified researchers and PhD candidates. Many European academic and research institutions have partially overcome this problem by offering English-taught degrees to attract good students from Asia, Eastern European and South America countries.

All in all, the Associate Laboratory INESC-ID has indeed shown a steady improvement of their performance over the recent years, but it has not yet reached its potentials and should further improve in various areas. It should undergo moderate changes and re-organization before its contract is renewed by the FCT. This may lead to a negotiation between the FCT and the Laboratory with an aim to improve its future impacts, efficiency, prioritisation and synergy with other related laboratories, as highlighted in this report.

**IMM**  
Instituto de Medicina Molecular

**Evaluation Panel**

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**Michael Spyer**

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United Kingdom

**Steve Oliver**

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Cambridge Systems Biology Centre &  
Dept. Biochemistry  
University of Cambridge  
United Kingdom

**Hugo Lagercrantz**

Professor of Pediatrics  
Karolinska Institute  
Astrid Lindgren Children´s Hospital  
Sweden

**General comments**

IMM was established 2002 by merging five research units from the University of Lisbon School of Medicine: The Biology and Molecular Pathology Centre, The Lisbon Neurosciences Centre, the Microcirculation and Vascular Pathobiology Centre, the Gastroenterology Centre, and the Nutrition and Metabolism Centre. Most of the research groups were moved to a new building at the University of Lisbon School of Medicine, while some clinical groups remained based at the adjoining University "Hospital de Santa Maria".

The institute consists (up to 2007) of 38 research groups; 19 of these have been established after 2003: 2 in 2005; 4 in 2006; 5 in 2007; 6 in 2008; and 2 in 2009. In the course of time the initial 3 research lines were reshuffled into 3 Scientific Programs (and in addition 5 core facilities mentioned below):

- **Cell & Developmental Biology;**
- **Immunology & Infectious Diseases;**
- **Neurosciences;**

This is a welcome development that gives a more transparent structure to IMM, both internally and with respect to the outside world. Nonetheless the report does not use systematically these headings and follows different numbering regarding "Research Lines" and "Research Groups", what makes reading unnecessarily more complex.

## **Funding**

IMM receives funding mainly from the FCT and other national sources. The total budget of IMM for the period 2003 – 2007 amounted to 15.622.470,00, the FCT specific LA, FCT projects and other national funds correspond to 76.6 % (it is noteworthy that the % of funds obtained from FCT projects was only 38 % of the LA FCT basic funding, but IMM received appreciable funding from other national funds); International funds amounted to 18 %, what is very appreciable, and Industrial funds to 5.4%. Although the international contribution is commendable, it would have been interesting to know how much originated from the EU Seventh Framework, as an indicator of how successful the institute is this international competition.

## **Recruitment of young scientists**

An important asset of IMM has been its successful policy regarding recruitment of young scientists, especially Portuguese post-Docs working abroad. Concerning recruitment of researchers at the group leader level, between 2003 and 2006 IMM hired 5 group leaders; although IMM offered positions to additional bright candidates, the start up package was not competitive enough to attract these candidates, due to budgetary limitations. In addition IMM recruited 2 more group leaders thanks to contracts offered by the Medical Faculty, and 16 new investigators in 2007, through a special government program to promote scientific employment (CIENCIA 2007). Thus, between 2003 and 2007 IMM recruited a total of 23 new investigators. This is a remarkable achievement.

Unfortunately we have also *to underscore the remark that the IMM encounters a problem in the recruitment of scientists working outside Portugal due to the limited resources that it can offer them for start-ups.*

*These hurdles should be clearly acknowledged by the responsible institutions (FCT in the 1st place) and creative solutions should be put in practice, in order to open up the possibility of IMM competing for talented scientists with the best Bio-Medical Institutes world-wide.*

Nonetheless IMM has gained prestige at the international scene by the fact that two of her recruits, Antonio Jacinto and Henrique Veiga-Fernandes, were awarded European Research Council starting independent researcher grants and that Maria Manuel Mota received the prestigious EURYI award of the ESF in 2004. An important driving force to reach this reputation has been the continued inspiring role of the director Carmo-Fonseca, who has kept the standards for recruitment of new scientists very high.

All investigators hired by IMM in 2004-2006 initiated their own independent Research Units, with no teaching obligations. Here we should place a note for thought: *we may wonder whether this is the best policy in the long run, since research can be stimulated by a combination with teaching if the latter is kept within acceptable limits. Particularly teaching at the graduate level is, in general, an incentive to innovative and creative research and an inspiring school for young scientists.*

## **Research Outputs**

Most of the research groups carry out high level research and have been very productive. Nevertheless it is not surprising that such a large assembly of groups working on a variety



of themes shows some heterogeneity in research performance. *The plan to schedule internal evaluations in depth of the different Scientific Programs should be encouraged.*

The evaluation Panel made an analysis of the objectives and performance of the different groups, although not going into details since this would have been possible only if a site-visit would have been included in this evaluation round. We should note that the report has some insufficiencies in terms of presentation of the relevant information. As already indicated above it is not easy to get an impression of the productivity of some groups because the "input" in terms of human resources is not clearly presented, namely time dedicated to research of individual researchers and duration of their participation in the group's activities in not indicated precisely. Many papers are carried out in collaboration with foreign scientists so that the level of the contribution of the IMM researchers is also not easy to infer. *These aspects should be made more explicit in future reports of this kind.*

In short, we may put in evidence some salient features of the profile of IMM's scientific production.

1. The majority of publications belong to the "Cell and Developmental Biology", followed by the "Immunology and Infectious diseases" and by the "Neurosciences" programs, what reflects the relative distribution of researchers within the 3 Programs. The publications profile of the "Cell and Developmental Biology" groups shows a predominance of high impact papers published in Journals of the Nature group (Revs Mol. Cell Biol., Cell Biology,), Science, Cell, Blood, J. Cell Biology, J. Clin Oncology, J. Am Chem Soc. The profile of the publications of the "Immunology and Infectious Diseases" Program is distributed among a variety of journals of high impact including Nature and journals of the Nature group (Medicine, Immunology, Rev Microbiology). The profile of the "Neuroscience" group displays publications in high impact journals in the field including clinical journals as The Lancet, Brit Med J., Stroke and Neurology, and basic science journals as Progr. Neurobiology, J. Neuroscience, Neuropsychopharmacology.
2. Some groups published papers that received already a clearly visible number of citations; to give a quantified impression we noted the publications that reached at least, on average, 10 citations/year. These were published by the following groups. We should note that many of these papers were carried out in international collaborations.

Developmental Biology;

Molecular Immunology (twice);

Embriology;

Nutrition and Metabolism (twice);

Microvascular Biology;

Neurological Clinic (4 times);

Angiogenesis;

Immunobiology;

Cell Biology of the Immune System

Molecular Parasitology;

Molecular Oncology;

Neuroprotection;

Malaria (twice);

Cell Biology of Mycobacteria;

Cellular Immunology;

3. Some groups were extinct and some reorganization took place; other groups just joined IMM or are starting up. A number of these carry a strong publication record from the past. *One group, the Autonomic Nervous System group, however, does not score at the "very good" or "excellent" level regarding published output.*

### **Management**

Core facilities include one conventional animal facility, which will be substituted by a new larger facility. Bioimaging including confocal microscopes; flow cytometry, systems of Information Technology Resources and a facility with three Zebra Fish Housing Systems. We endorse the remark of the Chair of the Steering Committee *that it is necessary to invest regularly on novel microscopical systems in order to be able to carry out competitive research. There is, namely, a need for a confocal microscope with faster data collection (e.g. spinning disks) and a 2-photon light microscope for investigations in live animals. Therefore we underscore the report of the Steering Committee with respect to increase funding for updating IMM's equipment and infrastructure.*

### **Research training**

A new PhD program was launched in 2006 to promote integrated scientific education including "hands-on" laboratory practice, seminars and courses. It is not clear how many graduate students were recruited from abroad. It is most important that IMM will be able to strengthen its International PhD Program and to offer extended collaboration in advanced training programs for medical doctors/clinical scientists (MD/PhD Program). *IMM should have the necessary facilities to develop an international post-doctoral training program.*

### **Internationalization and outreach**

The level of internationalization is high (as evident also from the % of international funding), taking into consideration that IMM manages 20 international large research projects, including European research networks (Marie Curie Training Networks, European Networks of Excellence, Industry-Academia Partnerships, and Integrated Projects) and grants from The European Research Council, Howard Hughes Medical Institute, Gemi Foundation, EMBO, Human Frontiers Research Program and the European Science Foundation (EURYI Award), involving 94 international partner participations (10 of which are from the industry).

IMM has been also active in outreaching activities. The Communication and Training Unit provides an Educational Programme that includes visits from and to schools, education workshops, and organization of science communication events. Several research units have developed a diverse range of public tools such as a website for the microbial typing community and a database of information on Rheumatoid Arthritis.

**In conclusion** (1) the IMM LA should continue to pursue its objectives, with some adjustments, allowing the automatic renovation of the 5 year contract.

## **Recommendations**

(1) Specific recommendations are indicated in italics in the main text.

**EVALUATION OF ASSOCIATE LABORATORIES**  
**FROM THE PORTUGUESE FOUNDATION FOR SCIENCE AND TECHNOLOGY**

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Instituto de Nanoestruturas, Nanomodelação e Nanofabricação

**I3N**

<b>Evaluation Panel</b>
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**José Rivas** (Coordinator)  
Director General  
INL-International Iberian Nanotechnology Laboratory  
Portugal

**Ludwig Schultz**  
Wissenschaftlicher Direktor  
IFW Dresden  
Germany

<b>General Comments</b>
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I3N, the Institute of Nanostructures, Nanomodelling and Nanofabrication is a recently joint venture between the IPC (Institute of Polymers and Composites, University of Minho), CENIMAT (Materials Research Centre, New University of Lisbon) and FSCOSD (Physics of semiconductors, optoelectronics and disordered systems, University of Aveiro). The I3N officially started its activities in June 2008.

According to the Internal Evaluations section, I3N planned to appoint an International Scientific Council there is no reliable and detailed report from this International Scientific Council available for us.

I3N is composed by four different Portuguese Research groups covering semiconductor physics, theoretical and computational physics, non-crystalline material and disorder systems and optics and optoelectronics. According to the information received, it seems that I3N has an important number of researchers and each group has separately managed a significant amount of funds (at National and International levels). The laboratory also produces a reasonable amount of PhD thesis and Master thesis per year and it seems that it can contribute to the development of materials science in the medium term.

<b>Additional Recommendations and Final decision</b>
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This evaluation committee hasn't received any International Scientific Council Report and this document is compulsory in order to provide additional recommendations.

**EVALUATION OF ASSOCIATE LABORATORIES**  
**FROM THE PORTUGUESE FOUNDATION FOR SCIENCE AND TECHNOLOGY**

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Instituto de Nanotecnologias

**IN**

**Evaluation Panel**

**José Rivas** (Coordinator)  
Director General  
INL-International Iberian Nanotechnology Laboratory  
Portugal

**Ludwig Schultz**  
Wissenschaftlicher Direktor  
IFW Dresden  
Germany

**General Comments**

The scientific work carried out by IN can be considered very good, or even excellent. It is important to highlight that IN research is ready to compete at an international level. Another important aspect is that the experimental techniques available at the three sites which are complementary, providing IN exploiting synergies in current and future projects.

The IN is especially strong in the areas of Spintronics/biosensors, MEMS/BioMEMS and in Surfaces, Interfaces and Molecular Dynamics. All these areas provide the possibility of a broad range of future and high added value applications. Besides, this research is also well supported by the expertise gained in the design and synthesis of organic polymers, hybrid composites and fluorescent organic compounds by the CQFM as well as the knowledge about polarizable materials such magnetoelectric nanostructures and magnetic materials available at the IFIMUP.

In terms of funding, it is important to highlight the high success rate in attracting external funds through EU projects. This corroborates the high potential of the research carried out by IN in the medium-long term. To this regard, it is also important the high ratio observed in the funding received from foreign industry in relation with national industry.

Regarding the educational effort, IN publishes around 7 theses per year. This number is commensurate with the dimension of the laboratory. However it shows a moderate number of Master Theses presented per year. Besides the publication and citation record is also good to very good, with about 130 papers per year in refereed international journals, some of them published in highly cited journals (impact factor >5) and 14 patents between 2003 and 2006.

Considering the international visibility of the IN, the principal investigators achieved a good or even excellent citation records and h-indexes. But also the younger principal investigators are on a promising way.

### **Additional Recommendations**

- Allocate special resources to increase the exploitation of synergies among the Research groups involved, such as technology transfer activities, periodic meetings, group events, travels, etc.
- Foster research stages of PhD students in all 3 laboratories.
- Try to increase the number of patents in relation to the number of publications.
- Increase the number of Master students and PhD students through more effective communication campaigns, also targeting international students.
- Strengthen the theoretical activities.
- To strengthen the visibility of the IN as a unit an increased number of papers shared by the different groups is recommended.
- An IN summer school might bring the younger scientists from the three locations into closer contact.
- The international cooperation might be further improved by visiting scientists in both directions
- The Advisory Board should meet regularly once a year – maybe in a later stage once every two years. One or two international members could be added.

### **Final Decision**

***IN may be considered able to pursue its main objectives with the required quality, allowing for the automatic renovation of its 5 year contract with FCT.***

# IPATIMUP

Instituto de Patologia e Imunologia Molecular da Universidade do Porto

## Evaluation Panel

**Fernando Lopes da Silva**, (coordinator)

Emeritus Professor  
Center of Neuroscience, Swammerdam Institute for Life Sciences  
University of Amsterdam  
The Netherlands

**Colin Berry**

British Academy of Forensic Science  
Dulwich  
London  
United Kingdom

**Michael Spyer**

Vice-Provost (Enterprise)  
University College London  
United Kingdom

**Steve Oliver**

Professor of Systems Biology & Biochemistry  
Cambridge Systems Biology Centre &  
Dept. Biochemistry  
University of Cambridge  
United Kingdom

**Hugo Lagercrantz**

Professor of Pediatrics  
Karolinska Institute  
Astrid Lindgren Children´s Hospital  
Sweden

## General comments

IPATIMUP was created in 1989 and from the early days has been engaged in research activities in diagnostic anatomic pathology. It evolved since to enclose also research on the fields of population and forensic genetics (since 1991), molecular pathology, molecular genetics and molecular epidemiology (since 1996). At present IPATIMUP has two main research lines: molecular pathology – mostly focusing on the pathogenesis of cancer- and population genetics, and is organized in 5 Research Groups:

1. **Cancer Biology,**
2. **Cancer Genetics,**
3. **Carcinogenesis,**
4. **Genetics, Evolution and Pathology,**
5. **Population Genetics.**

In addition to the 5 Research Groups there are four very small groups, each one formed around one Principal Investigator, that have applied to constitute new Research Groups, but are being kept in a probatory period.

## **Funding**

The total funding for the period 2003 – 2007 was € 19.437.115; 85.2 % was covered by FCT LA basic, FCT projects and other national funds. We note that the % of funds obtained from FCT projects was 53% of the FCT LA basic funding. International funding accounted for only 2.6 % what has to be considered very modest; in contrast 12 % was earned through industrial funds, most of which ( 97.2%) were national, what is very appreciable. Thus the contribution of national industries is remarkable but international funding is very small. *IPATIMUP should try to increase this source of funding, since it is the internationally acquired research funding that best defines the external regard in which the group is held.* It would have been interesting to know whether some international funding originated from the EU Seventh Framework, as an indicator of how successful the institute is in international competition.

## **Research Outputs**

This external review does not make a detailed analysis of the research outputs of the different groups since this is difficult to do without a site-visit. Furthermore the amount of time that the members of each group can effectively dedicate to research is not explicitly indicated in the report, what makes it difficult to assess the performance of the Institute's members individually. Thus this external review focus only on a few salient features that should be put in evidence for further consideration of the Institute's management.

1. The level of the scientific work as assessed by the publications in peer-reviewed journals, is high. There are a few publications in journals of general high impact such as Cell and PNAS, but most publications are in high impact specialized journals within in the "Genetics" and "Cancer" fields that appeared in journals as Genome Research, Am. J. Human Genetics, Trends in Genetics, Human Mol. Genetics, Cancer Research.
2. Some groups published papers that received already a clearly visible number of citations; to give a quantified impression we noted the publications that reached, on average, at least 10 citations/year. These appeared in the following groups:
  - Population Genetics (twice);
  - Genetics, Evolution and Pathology (twice);
  - Cancer Genetics (3 times);
  - Cancer Biology (4 times).
3. One group failed to score at the "very good" or "excellent" level regarding published output:
  - Carcinogenesis.

In general the scientific output is of high standard. We note, however, that some groups could have a clearer focus in the context of IPATIMUP as a LA, notably the Population Genetics Group. More specifically we may *note that this group could work in a way that would complement a number of the other activities within the LA*, considering that there are other activities related to Helicobacter within IPATIMUP and that recent work showed the importance of dietary co-factors in stomach cancer (Gastroenterology. 137; 10 2009) and on the production of urease by the bacterium as a way of penetrating gastric mucus. Thus the Review Panel endorses the statement of the Steering Committee that this group is somewhat isolated from the mainstream research focus in the Institute, and *that more interaction should be promoted. It should be realized that IPATIMUP's research field is a highly competitive area and focus is necessary.*



Another issues that should receive special attention of the management are the need for a *stronger emphasis on international recruitment of trainees (postdocs) and staff, the investment of seed money for transdisciplinary studies (notably in the upcoming new I3S environment), and an enhanced emphasis on hypothesis based (experimental studies) to parallel excellent observational studies on patient material.*

### **Management**

IPATIMUP is well structured and appears to be very effectively managed. In addition to IPATIMUPs core activity, basic and applied scientific research, the Institute has engaged also on providing scientific and technical services both nationally and internationally through 3 Service Units (Pathology; Kinship and forensic testing; and Molecular pathology and genetic susceptibility). The Review Panel recognizes that these services are a major asset of IPATIMUP since they deliver valuable material for pathology-oriented research, and they foster the collaboration with clinicians; in addition these services contribute to IPATIMUP's income. Nonetheless the Review Panel notes *that the LA should take care to keep an appropriate balance between the time allocated to the core activities and to other service oriented activities (diagnostic platforms, outreach programmes) in order not to dilute research time available.*

### **Research training**

IPATIMUP is engaged in the training of fellows with research initiation grants, Master and PhD students, young physicians (residents and specialists in pathology, mainly) and lab technicians The Institute has an active training programme and a large number of PhD graduates has been produced. Specially valuable was the creation in 1996 of the Graduate PhD Program on Basic and Applied Biology Areas (GABBA) that resulted from the merging of the two Master Courses on Oncobiology and Human Genetics that were previously organized at IPATIMUP, with those on Immunology (ICBAS) and Cell Biology (Medical Faculty). IPATIMUP holds regularly some of the annual international meetings, seminars and workshops of GABBA Graduate students and postdocs are exchanged with Institutes worldwide. Furthermore IPATIMUP organizes with other partners, since 2007, the PhD programmes in Molecular Pathology and Molecular Genetics.

### **Internationalization and outreach**

IPATIMUP is involved in the training of residents and specialists of pathology from several European countries, Brazil and Mozambique mainly in cancer histopathology and cytopathology, and molecular pathology. *In general sense it would be advisable for IPATIMUP to setup a plan regarding the international recruitment of trainees and postdocs.*

IPATIMUP organizes through the Unit for Scientific Diffusion and Continuous Education a series of activities with the aim of promoting awareness of scientific research and knowledge about cancer among the general public. A valuable example is the Program "INFOCANCER" for the public at large and physicians, on prevention and early diagnosis of familial cancer. Furthermore a "Book on Cancer" for the public at large was published.

Although the review panel considers that these activities can be most useful for the community and can motivate researchers, it *also endorses the warning of the Steering Committee that IPATIMUP should not "dilute research time available through service oriented activities".*

**In conclusion** (1) IPATIMUP should continue as LA to pursue its objectives, with some adjustments, allowing the automatic renovation of the 5 year contract.

<b>Recommendations</b>
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(1) Specific recommendations are indicated in italics in the main text.

## **IPFN - Instituto de Plasmas e Fusão Nuclear**

### **Evaluation Panel**

**Daniel Treille**  
CERN  
Suisse

### **General comments**

Concerning IPFN activities, although not being a specialist of plasmas, I have some acquaintance with the field since I was member of the working groups which established the French roadmap for TGIS (Très Grandes Infrastructures Scientifiques) for the French presidency of EU.

I based my evaluation on the reports of the External Advisory Panels (EAP), and the Scientific Reports of the laboratories. IPFN has a strong technical orientation, based on a deep knowledge of plasma physics, a strong international involvement, coupled to a solid scientific home base, a very good track record and an excellent visibility on the international scene. The EAP reports are quite laudatory and underline the quality of the leadership.

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In IPFN, Instituto de Plasmas e Fusão Nuclear, the programme is built on a very strong and recognized expertise in plasma physics and a high degree of internationalisation of all scientific activities. There are two thematic areas:

1/ Controlled nuclear fusion: besides home based activities, it includes cooperation with and use of JET, a future cooperation with ITER, cooperation with several other EU associations.

2/ Intense Laser and Plasma Technologies: IPFN is a member of LASERLAB-Europe. It cooperates with ESA, ESO, and aims at a participation in the future pan European projects HIPER and ELI.

The first Thematic Area, Controlled Nuclear Fusion, is part of the EURATOM fusion program. IPFN had already an exceptionally high impact in this field, by exploiting its home based tokamak and cooperating with all major fusion labs in Europe. Some of IPFN leaders hold quite important international positions in the field.

Opinions about the role of fusion as a future source of energy are quite divergent and this can only be a remote possibility. But the choice was made to pursue worldwide R&D programs aiming, in the long term, to conclude about its feasibility. It is thus necessary for IPFN to get well involved in the present international projects, as it succeeded to do so in the past. It must also keep a good balance between installing and operating devices, and harvesting physics from them, in order to progress in plasma physics.

Of these projects, ITER is certainly the key one, provided it develops as foreseen. The IPFN programme concerning ITER needs therefore substantiation and possibly concentration on a few focal points.

In CODAC, Control and Data Acquisition, the expertise is very strong. IPFN designed and operated it in several programs, for instance in JET. The lab could aim at playing a leadership role in Europe.

The know how and achievements in microwave diagnostics and reflectometry are remarkable. A successful demonstration program with ASDEX-upgrade should help on the way to qualify IPFN for ITER reflectometry.

The experimentation concerning an air transportation system may be the most important one to pave the way towards a future cooperation with ITER.

As stated in the EAP, it is clear that PhD students cannot constitute the backbone of such projects, which need permanent or long term positions.

Besides these activities, one should secure the long term operation of ISTTOK.

The second Thematic Area, Intense Laser and Plasma Technologies, has two established groups and two new ones. Overall, this represents a wide range of plasma physics, and it will be important to monitor carefully the development of the groups to avoid dispersion.

The group Lasers and Plasmas performs studies aiming at demonstrating, in the long term, the feasibility of laser driven fusion. It will first need a new computing cluster and a new terawatt-class laser system, which look as reasonable requests. Then the plan is to participate to the project HIPER. However, on the road to HIPER, which is far away, there are a few steps foreseen, like PETAL. Is there any portuguese interest in these programmes which are closer in time?

Considering the relativistic laser plasma dynamics and applications, a somewhat remote goal is ELI (Extreme Light Infrastructure, the construction of which is probably not before 2014). I have a similar question about a possible participation in programmes which are intermediate in time scale and ambition.

The group concerned with Gas discharges and gaseous electronics and application fields has an intense cooperation in Europe. Its activities are of excellent quality and seem to focus on the right items, which include environmental plasma physics, planetary atmospheres, surface physics, modelling, etc, leading in particular to contracts with ESA and ESO.

About the new groups:

The Quantum Plasmas has quite different requirements (cooling, trapping, Rydberg physics) from the laser plasma group. I suppose several such enterprises are existing or planned in Europe. Can one define some specific objective for this program? Quite rightly, a strong international networking is encouraged.

The group Fundamental physics in space quotes a set of quite interesting topics, but it is difficult for me to see the overall coherence and to guess the way the group will take.

The records for IPFN concerning education and outreach are excellent.

Summarizing for IPFN, a well defined mission statement should be set for each thematic area, and the management should "scrutinize the coherence in the research portofolio", especially for the second thematic. For the first one, CODAC, reflectometry and mostly air transportation seem to be the strong points. A remarkable feature is the presence of three main lines in plasma physics and they should interact as much as possible.

Needless to say, the way and the pace at which ITER develops are crucial questions for the future of the laboratory.

## **Conclusion**

IPFN has expertise in the participation of Portuguese firms in large international programmes and industry liaison officers for ITER.

In conclusion, I agree with the rating of the EAP as "excellent". I consider that IPFN has met his mission and obligation and built a convincing programme for the next period.

## **Recommendations**

Therefore I don't see any reason against granting IPFN an automatic renovation of their 5 years contract with FCT, and I recommend it.

Concerning the Consortium FISICA N, it offers obvious advantages, in particular concerning the room available. LIP Lisbon in particular, but also IPFN, should benefit much from it.

Can one build a synergy between the proponents? On the physics side, this is not completely obvious. It would help if theoretical physics and astrophysics groups join as well.

From the technical point of view however, one can hope for and one should aim at synergies in several fields, like CODAC, ATCA instrumentation, advanced networking and GRID computing, medical physics, the use of workshops, etc.

The main potential interest of a consortium would be to offer more local contact with students. While building a campus is probably out of question, one could think of some sectors of advanced formation and training. The will to establish something of that kind seems to exist and should be strongly supported.

**Laboratório Associado Instituto de Sistemas e Robótica – ISR Lisboa**

**SANJOY K. MITTER**

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**REPORT ON THE INSTITUTO DE SISTEMAS E ROBÓTICA (ISR) NOVEMBER 23, 2010**

**1. Introduction**

*This report attempts to evaluate the accomplishments and future plans of the Associate Laboratory Instituto de Sistemas e Robótica (ISR) composed of the following research units:*

- *Instituto de Sistema e Robótica – Lisbon (ISR-Lisbon, Leader unit)*
- *Centro de Estudos em Inovação, Tecnologia e Políticas de Desenvolvimento (IN+, associate unit);*
- *Centro de Recursos Minerais, Mineralogia e Cristalografia (CREMINER, associate unit) and*
- *Centro do IMAR de Universidade dos Açores (associate unit).*

*As far as the associate units are concerned, of particular importance is the Group for Energy and Environmental Studies of IN+. In ISR – Lisbon the group of Intelligent Systems and the group of Mobile Robotics will become one unit with the title Group for Intelligent Robots and Systems. I regard this as a positive development. The other groups residing within ISR of importance are the Group for Computer and Robot Vision, and the group for Dynamical Systems and Ocean Robotics.*

*The Institute is also organized (virtually) around four Thematic Areas:*

- *Science and Technology for Ocean Exploration and Management*
- *Robotic Mentoring and Surveillance*
- *Sustainable Energy, Environment and Economic Development*
- *Advance Signal Processing for Communication Networks and Multimedia.*

*I find this virtual organization around these thematic areas to be particularly appropriate for ISR as viewed in the national context of Portugal.*

Before going into more specific comments, let me state categorically that I find ISR to be an excellent research institution doing high-quality research as measured by the highest international standards. My suggestions and comments are motivated by improvements ISR can make in its intellectual charter for research and education.

## **2. Overall Comments and Recommendations**

The original document that discusses the research plan of the thematic areas is an impressive document. It clearly articulates the goals of the projects and the research strategies to be pursued to attain these goals. I find the sections on Technologies for Ocean Exploration and Signal Processing to be particularly strong. For example, the publication list of the Signal Processing group is very strong. There is excellent synergy between the groups and strong collaborative arrangements with international research organizations. The productivity of the research groups in terms of publications, technology development and sponsoring workshops is uniformly high.

In the case of Ocean Exploration, it would seem that a strategic alliance with Woods Hole Oceanographic Institute would be particularly appropriate (unless I have missed something). In the broad area of Signal Processing there is now close research collaboration with Carnegie Mellon University and strong participation in the Doctoral Program. There could be similar collaborations with CSAIL and LIDS at MIT in the areas of Robotics and Signal Processing.

I found the documents on Future Plans to be equally impressive, but less detailed. What is unclear from the documentation provided is which parts of the original plan have been accomplished. For example, on p. 6A and 7A of the original document, there are sections on Habitat mapping with clearly-defined deliverables at the end of 5 years and at the end of 10 years. Where does that project stand now? On p. 24A there are clearly-delineated deliverables for Underwater Acoustic Communications at the end of 5 years and 10 years. Where does the project stand now? The new initiative for research in BioSystems with possibilities of significant interaction with Signal and Image Processing is an important development.

There is potential for a new project on Systems Aspects of Smart Grids where there would be considerable synergy between the groups working on Signal Processing, Control and Communication and the Thematic Area of Sustainable Energy, Environment and Development. There are several such efforts in Europe (Imperial College; Cambridge; Oxford; Lund). Before one embarks on such a project, careful consideration needs to be given to availability of resources (human and material).



### **3. Management and Organization**

*As I have mentioned, I find the virtual organization of ISR around thematic areas to be particularly appropriate. The organization and management structure of ISR should reflect how best to meet the goals of the thematic areas.*

*I find the current organizational structure of ISR with a Coordinator (Director), Coordinating Board, Executive Board and Managers for the Thematic Areas to be too cumbersome. In addition, there are laboratories with their own coordinators (directors). It is clear that several laboratories contribute to the thematic areas as they should, but I firmly believe that the organizational structure can and should be simplified. ISR could study models of organization such as in CSAIL in MIT, which is a large laboratory and undertakes large thematic projects.*

*Finally, the Advisory Committee, if appropriately constituted, can act as an advocate for ISR vis-a-vis the higher administration of the university.*

### **4. Evaluation and Recommendation**

*I consider ISR to be an excellent research institution conducting outstanding research which contributes to the advancement of the field.*

*I recommend that LA continue to pursue its well-articulated objectives and I recommend its 5-year contract be renewed.*

### **5. Recommendation for FCT**

*I am not making a judgment about the quality of work at ISR, which is excellent, but for future evaluations it would be necessary to provide information about the Institute in a more streamlined form. For example, there should be a 2-page summary outlining the major accomplishments of the Institute, and a list (say 20) of the most significant publications with a short commentary on the contributions. In addition, the contributions of the research groups should be presented in a similar format with details about their budget, number of PhD's graduated and educational contributions.*



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**REPORT ON THE INSTITUTO DE SISTEMAS E ROBÓTICA (ISR) MARCH 17, 2011**

**1. Evolutionary Systems and Biomedical Engineering**

*This is a small research group, mostly driven by the work of Professor Agostinho Rosa, focusing on two aspects –Modeling of Biomedicine and BioSystems. The area is of emerging importance, and the group has some international contacts.*

**Evaluation Parameters**

**Productivity**

*The papers published have appeared in good quality journals and at international conferences. The information on the total number of publications during the period of the review is not directly included in the text of the submission, nevertheless for a small research group, this is appropriate.*

**Relevance**

*The subject of research for some of the themes is very useful e.g. the work on sleep in general and sleep apnea in particular can have benefits worldwide..In general, the topics chosen during the period of review are useful, though somewhat fortuitous. Results obtained are interesting. The researchers have organized a good number of conferences, some international, though not all are of a very high international standard.*

**Feasibility**

*The work being carried out is feasible, the methodology adopted of conducting fundamental research augmented by the use of practical data sets, simulations and finally collaboration with worthy labs is an entirely appropriate approach.*

**Training**

*During the review period the Group has produced five PhDs, some in collaboration with other groups; and three MSc theses. This would be about average for a group of this size.*

## **2. Centre of IMAR of the University of Azores/Department of Oceanography and Fisheries**

*This is a large complex and very successful research group; it has established a high international reputation, taking advantage of its location to develop a keynote facility for internationally comparable research on Ecosystems for marine habitats, biodiversity and Oceanography. The establishment of the LabHorta is commendable as it offers world class facilities for research which needs to be nurtured. Of necessity the work requires substantial resources, and multidisciplinary teams. Thus collaboration with underwater robotics groups is an important element of the work of the Centre.*

### **Evaluation Parameters**

#### **Productivity**

*The quality of the research output and the quantity of papers is impressive, covering the output of the 5 Working Groups and the key themes of the Centre; these have been published in high quality journals and international conferences.*

#### **Relevance**

*The work of the Centre is internationally important, addressing the strategically important areas of Ocean Ecosystems, Biodiversity and the associated issues of the Management of Ocean Resources. The topics being investigated are of international relevance. The Centre has exploited its location to work on areas that are not otherwise easily accessible. The outputs are of interest and relevance of the whole of the oceanography research community. The researchers are well embedded in the international research community and it is good to note that the researchers include a good number of international researchers. Some of the Conferences organized by the research groups have had an international impact both in terms of the science delivered and also on their impact on policy making.*

#### **Feasibility**

*The Research Group has clearly demonstrated its capacity to deliver high quality output. It has the critical mass and the capacity to meet objectives and to conduct work according to plan both its outputs and outcomes are impressive. It is an important resource for Portugal and should be supported and maintained.*

#### **Training**

*The number of PhDs included in the Report is listed as 15. This is somewhat small for such a large Research Group.*

### **3. Signal and Image Processing Group**

*This Group comprises of two distinct partners –one at IST Lisbon concentrating on fundamental research in signal and image processing with applications to wireless communications, and biomedical imaging, while the other at UALG works on underwater signal processing and its application to acoustic oceanography. The Group has critical mass with some 21 PhD researchers, and close to 40 supporting researchers. It is a good sized and manageable group.*

#### **Evaluation Parameters**

##### **Productivity**

*Overall the Group has been very productive in terms of high value and high prestige publications, with papers appearing in some of the highly rated international journals and conferences. The Group has an impressive set of international patents on areas of emerging technologies. The Group has benefited from international collaboration particularly with Carnegie Mellon University.*

##### **Relevance**

*The topics chosen for research and the projects carried out represent the state of the art work and address cotemporary problems in their respective fields, In this context, fundamental work on the use of Riemannian Geometry; time reversal principles, 3D image reconstruction from 2D objects are particularly worthy of note.*

##### **Feasibility**

*The Group has amply demonstrated its capacity to deliver results. The quality of the publications and patents speak for themselves. The Group has participated in several EU Projects, where deliverables are very important, and that training has ensured the successful completion of projects and delivery of results.*

##### **Training**

*According to the information provided, the Group has 9 PhDs and 8 MSc theses, during the Evaluation period. .This is a somewhat small number for the size of the Group. It may be that the Group has committed itself to several EU Projects, which may be of short duration or of a developmental nature.*

#### **4. Mobile Robotics Laboratory**

*This is a relatively small Group concentrating on two aspects of mobile robots – Navigation of mobile robots in structured and unstructured environments and Human Robot Interactions – presumably reflecting the interests of the two PhD researchers. The Group collaborates with ISLab and has participated in EU Projects, including RAPOSA – search & rescue robot.*

#### **Evaluation Parameters**

##### **Productivity**

*The productivity, for a small Group is acceptable. The papers identified in the document, appear to have been published in second tier journals, while the conference papers quoted seem to have been presented at a mix of conferences, including those in Eastern European, Japan or Asia Pacific. From the records presented it appears that only one PhD and two Masters theses have been produced during the review period. This is somewhat minimal even for a small group. Though this may be compensated by work carried out under the EU Programs on RAPOSA and RIOL.*

##### **Relevance**

*The work on EU projects is worthy of note, especially on the RIOL Project for the inspection of suspended electricity cables, where the team has obtained a patent. The work has led to a spin-off company, which is attracting interest and contracts.*

##### **Feasibility**

*While the Group has been carrying out interesting work, it is too small on its own to make a significant impact.*

##### **Training**

*As stated earlier, the Group has only produced one PhD and Two Masters Theses. This is minimal.*

**Recommendation:** *Some consideration should be given to the merger of the Group, with a larger and well-resourced Group.*



## **5. Intelligent systems Laboratory**

*The ISLab complements the work of the Mobile systems Laboratory, with research on decentralized decision making and control for complex robotic systems. The key attributes of the Laboratory are systems theory and its applications using artificial intelligence and control techniques. He Laboratory has participated in a number of critical EU Programs on Robotics.*

### **Evaluation Parameters**

#### **Productivity**

*From the sample of published papers included in the documentation, the Group has published in quality journals and presented work at good international conferences. The productivity, for the Group is reasonable. With 4 PhD theses, and 9Masters theses plus an additional 8 post-Bologna MSc theses. The Group has played a strong part in the design of robots to play soccer supported by ISLab spinoff company IdMind. Participation in the RAPOSA Project has led to contributions towards the design and construction of robots that can operate in hazardous environments. The Group has participated in a number of International conferences, particularly as members of conference programmes.*

#### **Relevance**

*The work on EU projects is worthy of note, especially on the RAPOSA Project, and the contributions towards the use of discrete event systems, and extensions to Cooperative Perception. This last area offers significant opportunities.*

#### **Feasibility**

*The Group has demonstrated its performance, and the merger with the MRLab will strengthen its capabilities and lead to improved critical mass.*

#### **Training**

*As stated earlier, the Group has only produced 4 PhD and 8 Masters Theses. This is sufficient.*

**Recommendation:** *The merger of the Group with the MRLAb should be accelerated.*

## **6. Laboratory for Energy and Environmental Studies at IN + Center for Innovation, Technology Policy and Research**

*This multidisciplinary Laboratory is aimed at conducting research and providing advice and guidance on issues related to sustainability, technology assessment, and the study of complex systems in the context of industrial ecology –topic that of great current interest in the present environmentally sensitive era of research and development. The projects conducted are of national relevance, such as the 'National Policy for Residues management; Hybrid economic Input-Output Life Cycle Assessment and Activity Analysis; Sustainability network for Portuguese Agriculture.*

### **Evaluation Parameters**

#### **Productivity**

*Members of the Laboratory have published in quality journals and presented work at good international conferences, and at events of direct relevance to innovation and environmental economics. The productivity for the Group is reasonable. With 5 PhD theses, and 9 Masters Theses, though with 12 PhD researchers this number could be improved. The Laboratory has participated in and supervises a large number of impressive industrial contracts that are directly relevant to the aims of the Laboratory and to current international industrial and environmental issues.*

#### **Relevance**

*The work of the laboratory is of national importance and highly relevant to the EU environment objectives, and indeed further afield. This has been evidenced by the research output and the projects conducted, as well through the participation in conferences and events.*

#### **Feasibility**

*Through their work and output, the members of the Laboratory have amply demonstrated the quality of work and effective performance. They have achieved critical mass and are addressing key note issues.*

#### **Training**

*As stated earlier, the Laboratory has produced 5 PhD and 9 Masters Theses. This is sufficient.*

**Recommendation:** *The Laboratory should be strongly supported, as it fills a unique niche in Portugal.*

**7. Laboratory for Thermo fluids Combustion and Energy Systems at IN + Center for Innovation, Technology Policy and Research**

*This is a small highly focused group working on the niche area of thermodynamics of fluid flows, with applications to pollutants and combustion processes. It has good collaboration.*

**Evaluation Parameters**

**Productivity**

*Members of the group have published in niche journals well known in the area of heat transfer and combustion technologies. The Group has been every effective in producing some 14 Masters theses in key*

*areas of interest of the Laboratory The Laboratory has participated in and organised conferences on areas such as laser techniques in fluid flows and Combustion, and presented invited lectures. Its participation in a major international consortium has been beneficial.*

**Relevance**

*The work of the Laboratory is very focused and is paying dividends in terms of publications. It is attracting research funding form Government and industry, though the latter could be improved.*

**Feasibility**

*The work of the Laboratory is addressing a niche activity and is making interesting contributions it can maintain its existence by working in the area, and attracting research support from Government and EU. The topics for future research in the area of thermodynamic transport plays to the strength of the laboratory.*

**Training**

*As stated earlier, the Laboratory has produced 9 Masters Theses. The Laboratory with 4 PHD researchers should be encouraged to take on more PhD students*

**Recommendation:** *Contributions to the work on Forest fire phenomena is not obvious, and some effort could be made to collaborate with colleagues working on the area at the LAETA.*

## **8. Laboratory of Technology Policy and Management of Technology at IN + Center for Innovation, Technology Policy and Research**

*This is a key unit in the Center for Innovation Technology Policy and Research, providing an important source and resource for fundamental research on areas including innovation, knowledge generation and entrepreneurial activity that form the backbone of economic growth. With work of the Group addresses policy issues that can have an impact on future success of the national, regional or local economies. The spectrum of work ranging from policy papers to aspects of technology management and entrepreneurship reflect a rich seem of activity.*

### **Evaluation Parameters**

#### **Productivity**

*Members of the group have published in key journals in their area of expertise, as well as contributed to good quality international compendia, as well as to international conferences in the subject. The introduction of new Masters Degree programs in the area of expertise is laudable, and the tie-up with Carnegie Mellon University for a dual degree PhD program is paying dividends in terms of good quality PhD theses on topics of international interest.*

#### **Relevance**

*The work of the Laboratory is of immense relevance to the development of strategic areas that would contribute to the well being of Portugal. These include work in support of small firms, higher education policy, technology based entrepreneurship, and associated extra mural programmes on entrepreneurship education and new venture development.*

#### **Feasibility**

*The Laboratory through its research, innovative initiatives, contributions to the research literature and the hosting of international conferences has amply demonstrated the feasibility of its work, and the future objectives are well aligned to this approach, which reflect seeking answers to emerging problems in technology policy, entrepreneurship and higher education offering insights to policy makers, practitioners and researchers. The work is linked to a number of Government contracts.*

#### **Training**

*The Masters Programme is paying dividends in the form of substantial Theses completed during review period, with 11 masters theses completed, and four PhDs. With only four PhD researchers this level of output is commendable.*

**Recommendation:** *The Laboratory may wish to consider developing a model for the Innovation Framework of specific sectors of Portuguese industry, e.g. the telecommunications sector or the energy sector.*



## **ROLAND SIEGWART**

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### **REPORT ON THE INSTITUTO DE SISTEMAS E ROBÓTICA –LISBOA (ISR-LISBOA), MARCH 28, 2011**

#### **1. Introduction**

*This report attempts to evaluate the accomplishments and future plans of the Associate Laboratory of the Instituto de Sistemas e Robótica (ISR) with a special focus on the following labs:*

- Evolutionary Systems and Biomedical Engineering (LaSEEB)*
- Dynamical Systems and Ocean Robotics Laboratory (DSORL)*
- Signal and Image Processing Group (SIPG)*
- Mobile Robotics Laboratory (MRLab)*
- Intelligent Systems Laboratory*
- Computer and Robot Vision Laboratory (VisLab)*

*The evaluation is based on the evaluation reports of the individual research group of the ISR we got access through the Foundation for Science and Technology -FCT . Unfortunately, it is not clear what FCT expects as added value from the grouping of the individual research labs into the ISR. Furthermore the document is missing some more recent information (e.g. publications, collaborators) and therefore publically available information from the ISR Webpage has been consulted.*

*The ISR is operational since 1996 and has developed to a quite successful and visible institute in artificial intelligence and robotics. Through its six core research labs the ISR covers an wide span of key topics in the field. The ISR has furthermore three associate unites in the fields of:*

- 1. Environmental study, energy systems and innovation research;*
- 2. Marine biology, and*
- 3. Geology*

*Whereas the core research labs nicely fit together and complement each other to form a strong unit in artificial intelligence and robotics, the association of the other research groups seems less obvious, at least from an outside perspective. Also from the ISR webpage the integration of the associated groups outside robotics is not clear.*

## **2. Assessment of Individual Research Groups**

*In the following a short assessment of the individual research labs is made.*

### **2.1 Evolutionary Systems and Biomedical Engineering (LaSEEB)**

*LaSEEB is covering interesting and relevant research topics at the interface between systems engineering, biology and medicine. However, considering the size of the group with 1 PI (Principle Investigator) and 4 Senior Researchers, the diversity of the covered topics is probably too large, thus resulting in a low international impact and visibility. A stronger focus would probably help to strengthen the group and enable them to be more successful in acquiring additional funding, e.g. through European projects. The most obvious fields of focus might be sleep research and biological data analysis.*

*The acquired funding and number of students (master, PhD) is considered rather low, especially in the recent years.*

### **2.2 Dynamical Systems and Ocean Robotics Laboratory (DSORL)**

*DSORL is among the leading research labs in autonomous marine vehicles in Europe and beyond. Furthermore they have also a considerable impact in aerial robotics. The group's core competence is in control and navigation of robotic vehicles and various design and perception issues related to autonomous robots. The group with its 6 PIs has established a coherent program and regularly attracts important funding through European projects and other sources. They have a good publication record and were able to attract many master students. Their future research objectives build upon existing competences and will surely allow them to further evolve as internationally leading research group. A strong focus on marine robotics is highly recommended.*

### **2.3 Signal and Image Processing Group (SIPG)**

*SIPG is the largest research group in Robotics and AI of the ISR with 16 PIs. It has a strong focus on wireless communication and 3D image retrieval from video and ultrasound signals. The published research is of high quality and presented in important journals and at key conferences of the field. However, considering the number of professors, SIPG's productivity is not overwhelming and very unequally distributed among the PIs. The same holds for external funding.*

*The proposed future research objectives, combining fundamental theoretical work with specific applications, sounds convincing. This will hopefully strengthen collaboration within the research group and with other groups of ISR.*

#### **2.4 Mobile Robotics Laboratory (MRLab)**

*The MRLab is small research group with 2 PIs and one Senior Researcher focusing on mobile robot navigation and human-robot interaction. The Lab's performance during the last year was reasonably good, with a strong focus on navigation in challenging terrains and driven by real world applications. Considerably funding was acquired through European projects and industrial contracts. The merger of MRLab and ISLab in 2009 is a good move that will surely be beneficial for both groups and help them to develop a strong program on intelligent robots. The proposed common research program (MRLab & ISLab) sounds convincing, building upon existing competences and take advantage of the fusion.*

#### **2.5 Intelligent Systems Laboratory (ISLab)**

*The ISLab consist of 3 PIs and 6 Senior Researchers and Postdocs. The research focus is on intelligent cognition, multi-robot control and human-robot interaction. Often real world challenges, e.g. in search and rescuing or robo-soccer are the driving forces for the research. The group played a very active role in the development of robotics spirit among the kids in Portugal and the RoboCup competition. It has a good international standing and especially Pedro Lima has an important international visibility and standing. ISLab is also quite successful in acquiring funding through European projects and other funding agencies. The merger of MRLab and ISLab in 2009 is a good move that will surely be beneficial for both groups and help them to develop a strong program on intelligent robots. The proposed common research program (MRLab & ISLab) sounds convincing, building upon existing competences and take advantage of the fusion.*

#### **2.6 Computer and Robot Vision Laboratory (VisLab)**

*The VisLab consists of 7 PIs and is probably the most visible and renowned robotics and AI lab in Portugal. The main focus of the group is in computer vision and its application to robotics. This includes visual object recognition, visual learning and visual motion control and navigation. Jose Santos Victor is the most productive and international recognition researcher in this group and probably also at ISR. The future research objectives have a strong focus and nicely build upon the existing competences and achievements.*

### **3. Overall Comments and Recommendations**

*The organization of the six research labs into the Instituto de Sistemas e Robótica (ISR) enabled Portugal to develop a strong and very visible research focus in Robotics. The individual research labs cover a wide span of key topics in the field and nicely complement each other. However, the size and performance strongly varies among the labs and also within the research lab. The main international visibility of the ISR results from a few very strong and active researchers.*



*The fusion of the MRLab and ISLab will surely be beneficial for the two labs and the ISR in general. In order to get a better balance between the labs, you might consider to also fuse LaSEEB with SIPG.*

*The review document presents a lot of important information for the assessment of the performance and quality of the ISR. However, details about the organization of the ISR and especially about the budget allocation are missing. From the available evaluation document the development over the last years (e.g. basic funding, number of permanent positions of each research lab) is not visible. It would also be interesting to know more about the recruiting process of professors at ISR and on what basis basic funding and permanent positions are allocated. It is very important that excellence in research and teaching are the central element for recruiting and budget allocation.*

#### **4. Conclusion**

*ISR is an internationally visible research institution conducting great research in large spectrum of robotics, artificial intelligence and signal processing. The institute developed well during the last years and was able to bring forward some leading researchers in the field.*

*I therefore strongly recommend continuing the Instituto de Sistemas e Robótica – Lisboa (ISR-Lisboa) as an Associate Laboratory.*

**Evaluation of Associate Laboratories**  
**from the Portuguese Foundation for Science and Technology**

**INSTITUTO DE TECNOLOGIA QUÍMICA E BIOLÓGICA - ITQB**

<b>Evaluation Panel</b>
-------------------------

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<b>General Comments</b>
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The assessment provided below summarises the conclusions of the short reports prepared by the International Steering Committees as well as our own appraisal based on the analysis of the individual reports prepared by the Associated Laboratories.

*1. Assessment of the International Steering Committee*

The Steering Committee pointed out that the mainstream of the ITQB research was competitive at the international level and found excellence in all five divisions of the Associated Laboratory. Furthermore, the Centre was viewed as a showpiece for chemistry and life sciences research in Portugal.

Although the overall impression of the Steering Committee was positive, they had concerns about the lack of a strategic forward looking plan for recruitment of new groups as well as about the fact that some groups contributed little to the development of the ITQB. To deal with these problems they suggested introducing staff development procedures, including a mentoring system and an effective mechanism to monitor performance. There were also concerns about management as well as the poor state of some equipment and facilities.

The follow up by the Chair of the Panel, Professor Jeff Cole, concerning progress made by the new Director in realizing their recommendations identified several problems that still remained unattended; these included shortage of space, inadequate funding, as well as lack of

mentoring and of an operational management structure. The Chair stressed the need to address these recommendations seriously if the ITQB is to remain at a top level.

## *2. Assessment of the External Advisors*

In general, we concur with the statements made by the International Steering Committee. Even though the report states that the ITQB-IBET partnership relationship is now working well and that all the partners are very much committed to strengthen the Associated Laboratory, we believe that there is a need to look closely at the management structure, scientific productivity, as well as to ongoing interdisciplinary collaborations since these are crucial for achieving the proposed objectives set for each one of the six research lines. The future objectives of the Associated Laboratory are admirable, but their execution will require a great deal of additional coordination, state-of-the-art instrumentation, and supplementary expertise. Only one large piece of equipment has been added to the infrastructure lately and it is not clear what will be the specific function of the 30 new positions that are requested. Prioritization may be necessary given the resources at hand. Also, a long-term strategic review in view of space and financial restrictions is strongly urged.

**Evaluation of Associate Laboratories  
from the Portuguese Foundation for Science and Technology**

**INFORMATION AND COMMUNICATION TECHNOLOGIES**

**EVALUATION PANEL**

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**GENERAL COMMENTS**

**1. Introduction**

At the request of the President of the Portuguese Foundation for Science and Technology, this panel has assessed the performance of the three Associate Laboratories currently supported by the FCT: IT, INESC-Porto and INESC-ID. The evaluation exercise is based on information and reports available on the FCT website, and on individual laboratory sites. The report begins with high-level comments specific to this evaluation process and common observations from

the three laboratories. Then, we consider the specific performance of the IT Lab and finally conclude with a set of general recommendations.

## **2. Overall Comments**

### *a. Challenges for Evaluation*

Although the various websites contains a very large volume of information, it is generally scattered throughout each site. Consequently, it is very difficult to find and correlate specific information associated with the laboratories and a thorough and consistent evaluation of each laboratory was therefore not possible in the limited time available to this review. For example, financial data, the number of publications and the number of PhD/MSc students are often embedded in the text of reports and relevant information rather than in tables. Information reporting by separate Research Units is highly non-uniform. For example, some units reported citation figures for their published papers, while others did not. The exact mission of each lab is not made clear. For example, although part of the mission of the INESC-Porto Lab is to promote spin-out and technology transfer, it used the same report format as for the IT Lab, which focuses on fundamental research, publications, and student training. As a result, it is not easy to appreciate some aspects of the contributions associated with spin-out companies, technology transfer and consulting work at the Porto Lab. Due to these challenges, the panel members found it difficult to gain a good thorough understanding of the laboratories and their different contributions. Having said this, the panel has tried its best to form objective opinions and present constructive comments and recommendations.

### *b. Trends of Improvement*

From a general perspective, the three associate laboratories do indeed show a steady improvement of their performance over the years. All three appear both to note and to implement SAB recommendations. Their membership has expanded, and publication output is improving, both in terms of quality and quantity. Industrial support is evident, both at the level of small National companies and some of the strongest International names in the field. Success in obtaining research funds from EC framework programmes is significantly enhancing the overall budget, and is therefore effectively multiplying the original FCT contribution. The generation of spin-out companies and incubation of start-up companies is active, suggesting useful and growing economic value.

On the other hand, by comparison with similar institutions in Europe and USA, there still seems to be a large margin available for improvement. Particularly, the publication productivity of researchers (less than 1 journal paper per researcher each year) is below an acceptable International standard, and the impact of publications is highly uneven and low on average (although some do show a high number of citations). Furthermore the number of PhD students per tenured researcher is low.



### *c. Research Vision and Strategic Goals*

The three laboratories are clearly involved in many aspects of the ICT research in one way or the other. However, many of the research issues being tackled by the research groups even at different laboratories are highly related or overlap in some instances. As a result, it is difficult to identify coherent research visions or strategic goals in this work, despite a very large aggregate effort. Specifically, there seems to be little evidence that the IT, INESC-ID and INESC-Porto are working together to help FCT set a national scientific agenda, exploit synergies, maximize overall economic benefits and minimize the corresponding threats for Portugal. For example, it is difficult to identify particular research themes that are specifically important to Portuguese national infrastructure or industry, rather than to society in general. Similarly, important global issues such as green energy, climate change, national security and the challenges of low manufacturing/labor cost in different parts of the world, which are all highly related to ICT, appeared to receive little top-down attention.

### *d. Collaboration and Synergy*

Although many research groups in the three laboratories are performing satisfactorily as individual units, it is difficult to gain an overall understanding of the organizational structures of the laboratories and possible collaborative relationships that may exist among research units within the same laboratory. It is even harder to identify and understand the cross-laboratory relationships. On the other hand, it is clear that many research topics investigated by different research groups and laboratories are related and to some extent overlap with each other. Without understanding the organizational structures, it is difficult to comment on the research overlaps and possible synergies. Because of this, the panel has an impression that collaborations among researchers working on similar issues within the same laboratory or across laboratories have not been fully exploited and promoted. Having a coherent research vision and strategic goals for the laboratories will also help promote collaboration among research units.

### *e. Contributions from Research Groups*

It was noted that the number of participating researchers, budget, achievements, contributions, and the number of PhD and MSc graduates can vary significantly from one research group to another in the same laboratory. It is clear that some groups (units) have excellent performance (in terms of, for example, publications in the best technical journals or conferences, large number of citations and large numbers of PhD/MSc students trained), while others do not perform satisfactorily. Due to the limited amount of time available and the large number of research groups in each laboratory, it is impossible to assess the performance of individual groups. Instead, the panel aims to consider and comment on the overall performance of the whole laboratory in this report.

### **3. The Associate Laboratory IT**

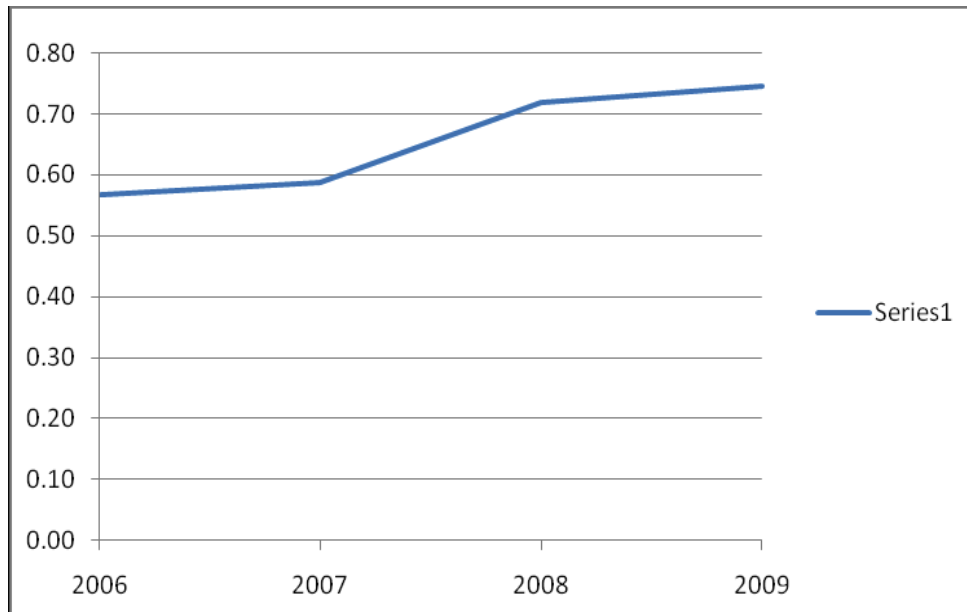
The IT Laboratory is mainly involved in fundamental and applied research in the areas of a) wireless communications, b) optical communications, c) networks and multimedia, and d) basic sciences and enabling technologies. Based on the information available on the website, the panel has the following comments.

#### *a. Productivity*

Looking at 4 consecutive years, 2006-2009, and comparing the number of researchers including PhD students and the number of publications, we can make the following observations: The number of researchers has increased steadily from 296 to 354. The number of journal publications (including books and book chapters) has also increased. The level of participation in national and international projects is satisfactory, although the crucial information on how many of these projects are led by laboratory researchers is missing. The percentage of revenues deriving from services to third parties (industrial contracts) is around 20% in 2006 and 2007, while it decreases to slightly more than 10% in 2008. Overall, the capacity to attract competitive funds seems to be close to 50% of the budget, which does not seem to include though tenured staff.

The online report states that there were 173 PhD researchers in 2007 in the IT Lab and that the number of journal papers published in the same year is 142. An active faculty member of a leading university in the U.S. and U.K. would publish at least a couple of journal papers per year. Therefore, at a very high level, publishing 142 journal papers by a total of 173 PhD researchers (plus many other researchers without PhD) in one year is characterized as "low" relative to the international standard, not as "excellent" as the Scientific Advisory Board (SAB) Report suggested, when compared with other leading researchers in the ICT area.

The panel also examines productivity from another perspective as follows. The number of researchers (with or without PhD) at the IT Lab increased steadily from 296 to 354 in year 2006 to 2009. However, the ratio of the number of journal publications (including books and book chapters) to the number of researchers is shown in Figure 1. The ratio, although increasing, is still only about 0.75 in 2010, and again reveals that the scientific productivity of the Lab is below the international standard of leading researchers.



**Figure 1.** Ratio of the number of journal papers to the number of researchers from 2007-2010

The number of patents is rather stable over the years, with the exception of 2007 in which it is significantly lower than the average. Nothing is said about commercializing those patents, and the panel did not find a section dealing with start-ups stemming from the Laboratory.

These comments aside, many researchers associated with the IT Lab are active and productive. They have generated significant research results and actively involved in the professional activities such as conference and workshop organizations, and journal editing. Combining these activities with their research contributions helps to maintain the high reputation of their groups or universities in the international research community.

*b. Quality and Impacts of Contributions*

It was noted that the volume and significance of contributions can vary significantly from one research group to another. To illustrate this point (please bear in mind that these groups and researchers are mentioned below only to illustrate the point), let us consider the "Communications Theory and Pattern Recognition" Group (Lisboa). M. Figueiredo's work represents the most cited Portuguese engineering paper from 1998 to 2008. In particular, his paper entitled "An EM Algorithm for Wavelet-Based Image Restoration" in the IEEE Transactions on Image Processing (2003) has been cited 292 times (as reported in Google scholar on May 14, 2010), although the report indicated only 58 times in 2008. Clearly, papers published by the group have generated considerable impact, as reflected by their publications in the most prestigious journals and their high citations. In contrast, although the "Applied Mathematics" group (Coimbra) published 16 peer reviewed journals, their reported citation

figures are low, ranging from 0 to 5. Furthermore, another group in the Lab with 4 PhD researchers does not seem to have any journal papers published in 2003 to 2007. During the same period, the group had only one PhD thesis completed, which appears unsatisfactory. Finally, some groups (e.g., "Communications Theory and Pattern Recognition" Group, Porto, "Networks and Multimedia" Group, Coimbra, "Power Systems" group, Coimbra) do not report their citation figures, which make the assessment difficult.

Overall, the quality and impacts of research work averaged across the research groups (units) in the IT Lab appear to be satisfactory.

#### *c. Graduate Education*

As reported on the website, there were 79 and 173 PhD researchers at the IT Lab in 2003 and 2007, respectively. These data do not of course distinguish the number of researchers capable of PhD supervision, which may differ significantly. In the same time period, 67 PhD students completed their doctoral research. Assuming that the number of PhD researchers increased linearly from 2003 to 2007, the average number of PhD researchers throughout the time period is 126. That is, each PhD researcher trained only 0.53 PhD student in 4 years, which is low. On the other hand, it is difficult to assess the quality of the PhD theses.

#### *d. Professional Activities*

Many research groups in the IT Lab are actively involved in professional activities (e.g., organizing major conferences, workshops and seminars), and collaborations and interactions with other researchers in Europe, the U.S. and even Asia. The Lab researchers have been members of various Technical Committees and their CVs show evidence of international collaborations. However it was difficult to find information about the number of IEEE Fellows and Senior Members, Editorship activities in major publications or international cooperation leading to researcher exchanges.

### **4. Recommendations**

In terms of governance, it is suggested to harmonise the sizes of the Scientific Advisory Boards (SAB), which at present range from three to eight members for the IT, INESC-Porto and INESC-ID laboratories. Also, there is a need to rotate the SAB membership, maintaining a balance between continuity and a three-year maximum length of service.

It is essential for each laboratory to establish a strategy for improving its National position, and to report annually on progress towards these goals. The strategy should include collaboration with other FCT laboratories and maximisation of the aggregate benefit to Portugal. Laboratory Heads are encouraged to meet regularly for these purposes.

The scientific collaboration between affine research groups within the laboratory and across the laboratories should be encouraged through suitable incentives, so as to form a critical mass in the field for achieving the strategic goals. Where possible, and given the limits of available expertise and geography, the combination of overlapping activities in separate centres could be considered. As an example, possible mergers include the Optical Communications activities of IT and Optoelectronics activities of INESC-Porto, and the Power Electronics activities of INESC-Porto and Power Systems activities of IT.

Together with the research group leaders, the governing boards of the laboratories should identify a few research topics characterised by inter-disciplinary and relevance to science and society that require the harmonic collaboration of different groups, and invest resources and funding accordingly.

To promote the laboratories in the international research community, each laboratory should establish a strategy for improving its international position, and report annually on progress towards these goals. The strategy should include the formation of partnership agreements with complementary European laboratories, and establishment of International Academic Visitor program. Laboratory Heads should be encouraged to meet with European counterparts to learn and disseminate best practices.

The publication of journal papers should be strongly encouraged, as opposed to conference papers. To maximise international impact, the writing of scientific papers, PhD theses and internal reports in Portuguese should be discouraged.

Target PhD completion times should be clearly established, beyond which a PhD will not be awarded. Moreover, each completed thesis should be accompanied by evidence of a threshold number of peer-reviewed publications.

All laboratories seem to face serious problems in recruiting qualified researchers and PhD candidates. Many European academic and research institutions have partially overcome this problem by offering English-taught degrees to attract good students from Asia, Eastern European and South America countries.

All in all, the Associate Laboratory IT has indeed shown a steady improvement of their performance over the recent years, but it has not yet reached its potentials and should further improve in various areas. It should undergo moderate changes and re-organization before its contract is renewed by the FCT. This may lead to a negotiation between the FCT and the

Laboratory with an aim to improve its future impacts, efficiency, prioritisation and synergy with other related laboratories, as highlighted in this report.

**EVALUATION OF ASSOCIATE LABORATORIES**  
**FROM THE PORTUGUESE FOUNDATION FOR SCIENCE AND TECHNOLOGY**

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Instituto Dom Luís

**IDL**

**Evaluation Panel**

**Jean-Pierre Henriet**

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Department of Geology and Soil Science  
Geological Institute  
Ghent University  
Belgium

**Joan Albaiges Riera**

Department of Environmental Chemistry  
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**General Comments by Jean-Pierre Henriet**

I have read with interest the recommendations of Prof. S. Cloetingh based upon the May 2008 report of the committees which had been set up for evaluating both CGUL and LATTEX. I also read the general information related to the 2003-2007 reporting period and the ample relevant information, available through online access. It might have been interesting to read the conclusions of the 23-24 July 2009 assessment, announced in Prof. Cloetingh's letter, but I could not find this document in the available package (maybe I overlooked a reference).

The scientific achievements of the groups that gathered within the Instituto Dom Luis are impressive. Strengths and weaknesses have been reviewed in detail by the Advisory Committee members. My understanding of the concluding statement of Prof. Cloetingh, recommending that the LA undergoes minor reorganizations (not specified in the letter) before its contract is renewed, is that it implies a positive advise for further support of the funding of IDL. I indeed did not find in the 10 pp. report of the Advisory Committee any significant obstacle for such continuation.

My approval of the report consequently implicit a recommendation for continuing support.

**Recommendations**

The hardcore and unique feature (to my knowledge not duplicated in other clusters) of IDL is to my perception in the field of solid Earth physics and in the coupling of deep and surface

processes. The research lines on Geophysics and Tectonophysics, Earth Observation and Geodynamics exemplify that research momentum. The integration of an atmospheric and climatological research string, with the research lines Global Change / Societal Risks and Meteorology / Climate Research, may sound surprising in this context. Heat waves and wildfires on one side, earthquakes and tsunamis on the other side, only share the human perception of catastrophic events as binding agent. But if such combination works and results in a stimulating, multidisciplinary environment, why shouldn't we keep it like that. I am inclined to respect combinations which prove to work.

I do not fully follow the Advisory Committee's rationale for recommending an additional surface hydrology component. There is a surface hydrology component (run-off) in the Meteorology research line, and that sounds fine to me. More comprehensive surface hydrology can to my perception adequately be covered within other associations, more related to the overall analysis of the water cycle in hydrological / estuarine / oceanographic research. The AL already features a significant size, and should not be inflated by the addition of non-essential components, which only can fragilize cohesion and make management more complex.

I do support the recommendation of the Advisory Committee to develop a strong master programme, fully exploiting the large available expertise, but paying attention to a thematic focus.

#### **General Comments by Joan Albaiges Riera**

The present report is given after the evaluation of the following documents and information sources:

- the report issued by the Advisory Committee (May 2008)
- the report issued by the Steering Committee (January 2010)
- the reports especially prepared by IDL and made available by FCT
- the IDL website
- the ISI web of knowledge

The IDL evaluation has been focused on the following issues:

- Organization and management towards its mission
- Quality of research and academic, social and technological impact
- Human resources and fund raising
- Internationalization
- Future perspectives (strategic planning)
- Conclusions

#### **Organization and management towards its mission**

The IDL is the result of a joint venture between CGUL and LATTEX and up to now it has no independent management structure. However, in September 2009, a new organization was implemented, with a 5 members Direction Board, elected by the Scientific Council. Apparently,



the Research Groups are now more integrated, and a leader for each transversal research line is chosen by the Director. However, the process should continue aiming at having a more integrated and executive structure, combining the present bottom-up approach with a more top-down decision making to convey national strategic priorities.

The Institute has four areas of activity relating to climate change, hazards, natural resources, and energy:

- Global change and societal risks
- Geophysics and tectonophysics
- Earth observation and geodynamics
- Meteorology and climate research

developed by ten research groups with an average of 5 to 10 scientists (Ph.D.) each.

Overall, the mission of the Institute, integrating earth sciences and climate change, is of growing impact in Europe and worldwide, and will allow Portugal to play a role of international excellence in the earth sciences domain. Moreover, the size of the groups is acceptable for pursuing efficiently their objectives.

### **Quality of research and academic, technological and social impact**

The focus of the research in the areas of meteorology and climate science is largely based on numerical modelling of atmospheric processes and analysis of large data sets provided by satellite agencies, international research institutions (e.g. ECMWF, IPCC, etc) and through participation in European programmes. In turn, the focus of the geophysics and geodynamic science is on monitoring of solid Earth processes and imaging of Earth's structure. Their strong base in field studies is an asset of great value for participating in international projects.

In general, the research is of very good quality in the different areas but the two scientific approaches are rather isolated and it will be worth to progress on the effective combination of field observation, laboratory research and modelling.

IDL researchers have a notable publication record in mid to high peer-reviewed Journals with still possibilities for improving, particularly regarding the number of citations (h index).

The academic activity of the IDL staff members, supporting MSc and PhD programs on Meteorology, Geophysical Sciences, Survey Engineering, Geology and Energy Engineering, is highly relevant for attracting leading young scientists and improving human capacity building in these disciplines.

IDL has a strong position in terms of its equipment as for example a pool of land-based seismometers (ULISSEIS) and OBS (ocean bottom seismometers), to serve the seismological community with high quality broad band seismic data for all kinds of scientific and surveillance tasks and allowing it to actively participate in international programmes and initiatives (e.g. TOPO-EUROPE, TOPO-IBERIA, EMEPC). IDL is responsible for the installation and data management (acquisition, storage and processing) of the network of Continuous Operating Reference Stations installed around the world (GPS/GNSS Network).

IDL participates in a large number of national and international networks (e.g. BRIEF, LANDSAF, EUREF, ESONET, etc.), providing services to the scientific and civil communities. The role of IDL on the development of public policies (e.g. for territorial management) at the national and International levels is of great merit.

The relevant topics addressed by the Institute, related to earthquakes, natural hazards and climate change, have been disseminated to the society through seminars, public conferences, and the presence of IDL researchers on the major Portuguese newspapers and magazines. As a result, IDL has a large social visibility. The website satisfactorily reflects the whole activity of the Institute and incorporates windows for making observations in real time.

In general, the position of the Institute in all these aspects is remarkable and constitutes an excellent basis for developing a powerful strategic programming in the coming years, with the support of the FCT.

### **Human resources and fund raising**

The Institute was capable of attracting a number of young researchers. The number of PhD thesis has also increased during the last 5 years.

The level of funding has been increasing since the establishment of the Institute. Particularly significant is the funding obtained from international and private (industrial) sources.

According to the previous statement on the management and organization, a programmatic funding should be made available, to help the continued effort to stabilize and optimize the existing laboratory facilities (including the necessary technicians), concentrate infrastructure and support the needs on instrument development, computing facilities and leading edge instruments for earth observation, and hire high level researchers (international) to strengthen leading research areas.

### **Internationalization**

IDL is strongly connected to the international scientific community. It is an active partner in most international research networks, participates in the organization of a large number of international research meetings.

IDL develops intense international cooperation with a number of entities devoted to Earth Sciences. Particularly relevant is, among others, the international collaboration with European groups on Mediterranean climate studies in the framework of the MedCLIVAR (ESF) and CIRCE (FP7) projects or the installation and data management of the GPS/GNSS Network. Besides, IDL is the Portuguese Institution of reference in a large number of international networks.

IDL has the adequate momentum for opening of research positions to the international community with the FCT funding.

### **Future perspectives (strategic planning)**

The recommendations of the Advisory Committee in 2008 covered three complementary issues:

- (i) Internal organization;
- (ii) Research careers; and
- (iii) Implementation of IDL Science Plan.

Although the progress has been evident during this time, there is still room for improvement.

In turn, IDL has defined as the main future challenges:

- (i) establishing an adequate conceptual framework for dealing with Earth's processes;
- (ii) attracting highly qualified national and international scientists and students to the University of Lisbon; and
- (iii) disseminate to the public high quality information regarding some of the major societal problems of the XXI century: Climate Change, Environmental Hazards and Renewable Energy Resources.

The future plans reported by each research line, particularly on climate research and global change, are well defined. The following new trends are identified:

- (i) Increase of the effort concerning modelling of Earth Processes and the interactions between atmospheric, lithospheric and oceanic sub-systems. This objective will shape the objectives of each research group and the cooperation between them;
- (ii) Participation in the efforts of the scientific community in three of the main societal concerns: climate change, natural hazards and energy. This objective will be materialized in transversal research lines that will integrate focused research in different domains with the societal needs;
- (iii) Development of tools for the share of research results with the national and European institutions and private end-users. For instance, strengthening the links with the industry in the development of meteorology applications, namely for the energy (wind, hydro-electricity) but also forest and agricultural sectors is one of its future objectives.

## **Conclusions**

Since the establishment in 2005, the Institute has made a great deal of progress in consolidating its scientific structure and gaining public visibility. However, the process of structuring a centre of excellence should continue in cooperation with the main supporting Institution, FCT. The general political and financial support should progress towards a more programmatic contract with mutually agreed objectives and indicators.

In this respect, some of the actions to be considered are the definition and approval of a fifth-annual science plan, the support to the existing laboratory facilities, including the necessary technicians and the updating of the infrastructures, and the hiring of high level researchers (international) to strengthen leading research areas. The implementation of external evaluation and periodic reporting procedures should be strengthened.

In conclusion, the Laboratory should undergo moderate changes and reorganization before its contract is renewed by FCT. This will lead to a negotiation between FCT and the Laboratory.

Laboratório Associado **LAETA** - Laboratório Associado de Energia, Transportes e Aeronáutica

**MICHEL GERADIN**

University of Liège  
Belgium

***PERFORMANCE OF LAETA AS AN ASSOCIATE LABORATORY, FEBRUARY 15, 2011***

***1. The organization of LAETA: collaboration of the Research Groups through selected Thematic Areas.***

*LAETA (The associate Laboratory on Energy, transport and Aeronautics) aims at organizing the collaboration of 13 research groups in 5 major thematic areas of Mechanical Engineering: namely, Transport, Energy, Fires, Aeronautics and Space. The general coordination of LAETA is under the leadership from Professor Carlos Alberto Mota Soares (IST).*

*The research groups (RG) involved in LAETA belong to 4 different Portuguese institutions: IST (Technical University of Lisbon): 6 RG, FEUP (Faculty of Engineering of the University of Porto): 3 RG, INEGI (Institute for Mechanical Engineering and Industrial Management): 2 RG, ADAI (Association for the Development of Industrial Aerodynamics): 2RG.*

*The table hereafter shows the participation of the different RG to the thematic areas. It illustrates the facts that, due to the LAETA structure:*

Table 1: participation of research groups to thematic areas

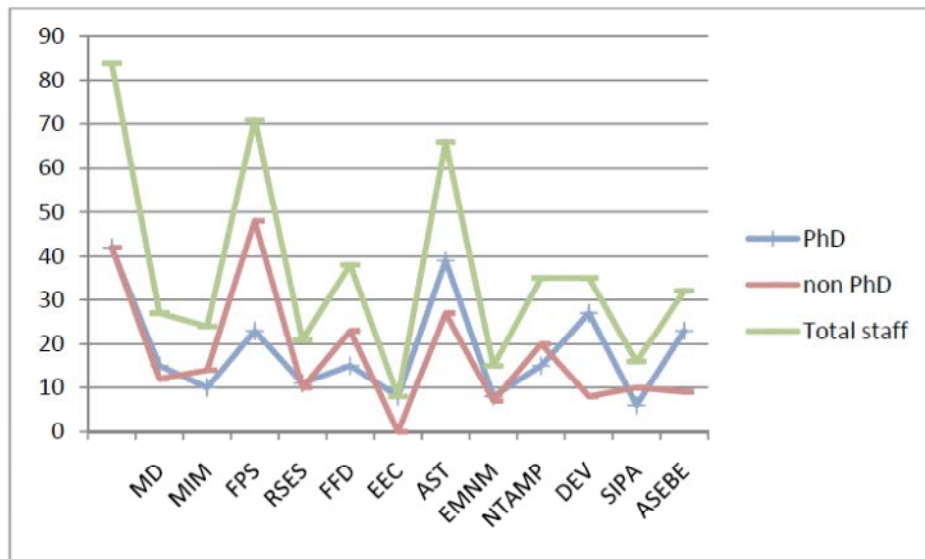
	Transport	Energy	Aeronautics	Space	Fires
Mechanical Design (IST)	Dark Yellow		Dark Yellow	Light Yellow	
Manufacturing and Industrial management (IST)	Light Yellow				
Flow Physics and Simulation (IST)		Light Yellow	Light Yellow		Light Yellow
Renewable and Sustainable Energy Systems (IST)	Light Yellow	Light Yellow			
Forest Fires and Detonics (ADAI)					Dark Yellow
Energy, Environment and Comfort (ADAI)		Light Yellow	Light Yellow		
Aerospace Science and Technology (IST)			Light Yellow	Dark Yellow	
Experimental Mechanics and New materials (INEGI)	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
New technologies and Advanced Manufacturing processes (INEGI)	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Design and Experimental validation (FEUP)			Light Yellow		
System Integration and Process Automation (FEUP)	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Advanced Studies on Energy in the Built Environment (FEUP)	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Intelligent Systems (IST)	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow

- There is significant interaction existing between RG in most thematic areas since each thematic area involves the collaboration of at least of 3 RG (as it is the case in the rather specialized areas of Space and Fires) and a maximum of 10 in the quite multidisciplinary area of Transport.
- Due to the multidisciplinary character of their activities, the RG on Mechanical Design, Flow Physics and Simulation, Intelligent Systems and Experimental Mechanics and New Materials collaborate to at least 3 thematic areas (the last cited one collaborates to all groups).
- The leadership of the thematic areas in transport, aeronautics and space is assumed by RG from IST, while the leadership for the group on fires is assumed by ADAI.
- There is effective collaboration between the 4 participation institutions.

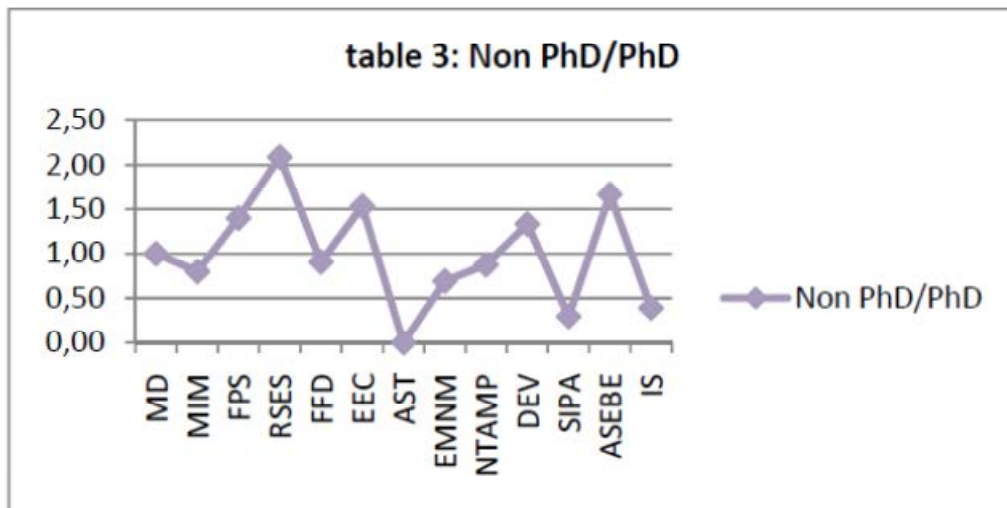
## 2. Staffing of the Research Groups

The total staff of LAETA is as follows: 472 in total, 242 with PhD, 230 non-PhD. Table 2 shows the staff repartition between research groups. The research groups vary thus greatly in size, the minimum being in Aerospace Science Technology (8 in total), and the maximum in mechanical Engineering (84 in total). 6 RG reach the critical mass of 30 staff members in total.

**Table 2 : staff repartition between Research Groups**



An interesting figure is also the ration between non-PhD and PhD staff, as displayed by Table 3. The average value over LAETA is 0.95, with a maximum of 2.09 in Renewable and Sustainable Energy Systems and a minimum of 0 (!) in Aerospace Science Technology.



### 3. Funding of the Research Groups

Table 4 provides comparative information about the funding of the different groups in LAETA during the period 2003-2007.

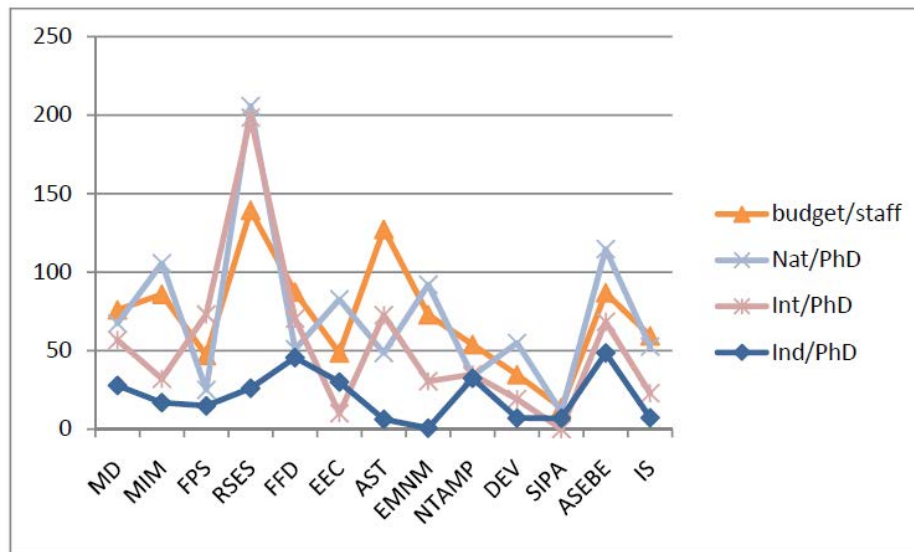
The total funding of LAETA during that period can be summarized by the following figures: 35 M€ over the 5 year period, with 52 % coming from national funding, 35% for international sources (essentially ECDG RTD projects) and 12 % from industry. Both the total amount of funding and its origin vary greatly from RG to RG, as indicated by Table 4. The following figures are given:

- total funding per staff: average = 74k€, minimum = 14 k€, maximum = 139k€.
- national funding per PhD staff: average = 76k€ , minimum = 11k€, maximum = 206 k€.
- international funding per PhD staff: average= 51 k€, minimum = 0k€, maximum = 198 k€.
- industrial funding: average = 17 k€, minimum = 1k€, maximum = 49 k€.

There is thus huge discrepancy regarding the funding of the different groups. It is also worthwhile noticing from table 4 that:

- The most successful group in getting international funding is also the group which gets the highest share in national funding.
- In some RG, international and/or industrial funding were almost inexistent.
- There is even one research group that has not obtained any international funding during the period of concern.
- The funding from industrial contracts remains generally very limited compared to other sources of income.

**Table 4: funding per unit staff in the different research groups**



#### 4. Scientific output of the research groups

Tables 5 and 6 aim at providing a comparison between the different research groups in terms of global scientific production (however, the numbers given may not be fully accurate for some of the RGs due to the discrepancy in the way the figures were provided). 2 types of indicators have been selected:

- The production of papers in international journals with peer review by the whole staff of the RGs,
- The production of papers at international scientific conferences.

In average, during the period of reference, 1.8 papers were published in international journals and 3.6 papers were published in international scientific conferences proceedings, which can be regarded as a very good performance at global level. However, Table 5 shows that there is again great discrepancy between the different RGs regarding their scientific production.

**Table 5: Production of international scientific papers per staff by the different Research Groups**

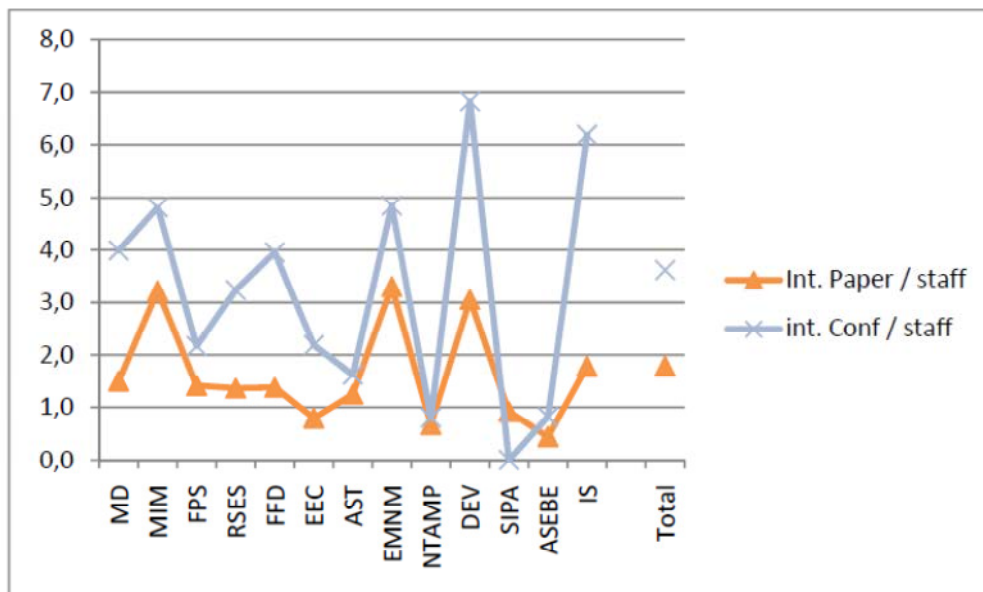
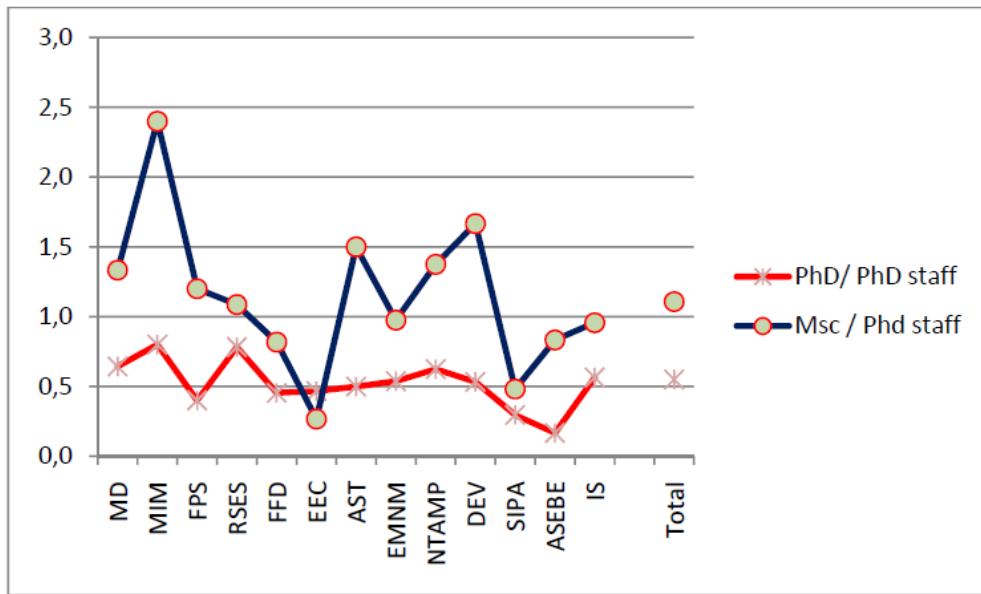


Table 6 provides a measure of the training of researchers by the different RGs. Over the reference period, the TGs associated in LAETA have delivered 0.5 PhD and 1.1 MsC per staff with PhD during the reference period. The discrepancy in performance between the different RGs appears significantly larger in terms of MsCs than PhDs.



**Table 6: Training of PhDs and MsCs by PhD staff of Research Groups**



### **5. Some comments about the specific thematic areas developed in LAETA**

#### **• Transport:**

- well-established research thematic area due to past experience of the supporting research groups.
- Very large participation of the research groups (10), due to its multidisciplinary character. It is thus a federating thematic area at LAETA level.
- Clearly defined general objectives.
- Large critical mass.
- Very good performance in terms of scientific output.
- Realistic and well-focused future plan.
- High international visibility.

#### **• Energy**

- Well-established research thematic area due to past experience of the participating research groups.
- Research field of LAETA with the highest potential, due to the critical importance of the energy sector for the society.
- Clearly defined general objectives.
- Large critical mass.
- Very high performance in terms of scientific output.
- Large participation of the research groups (6).
- Realistic and well-focused future plan.
- High international visibility.

#### **• Aeronautics**

- *Highly technical thematic area.*
- *Probably less strategic to LAETA than the areas of Transport, Energy and Fires.*
- *Good performance in terms of scientific output.*
- *Wide general objectives, possibly too ambitious future plan.*
- *International visibility of some of its members.*

• **Space**

- *Highly specialized general objectives.*
- *Probably less strategic to LAETA than the areas of Transport, Energy and Fires.*
- *Possibly too ambitious future plan in regard of available critical mass.*
- *Good performance in terms of scientific output.*
- *International visibility of some of its members.*

• **Fires**

- *Strategic thematic area at national level.*
- *Well-established research thematic area due to past experience of the AIDA in the field.*
- *Very specialized topic, and therefore limited participation of the research groups (3), but clearly defined general objectives.*
- *Very good performance in terms of scientific output.*
- *International visibility.*

**6. Some conclusions**

*The decision to organize the research activities of the 13 participating research groups in one Associated Laboratory certainly highly beneficial. It has allowed*

- *To create an entity for research in mechanical engineering with very important critical mass (> 500 researchers) in regard to the size of the country.*
- *To federate the research activities on well selected thematic areas, some of them transport, being either critical at national level (fires) or of current primary importance at European level (transport and energy).*

*The organization of the Associated Laboratory as presented in the report is sound, simple and effective.*

*The performance of LAETA as a whole in terms of scientific output ranges between very good and excellent. Funding level is adequate.*

*There are of course numerous discrepancies still existing between the different research groups in terms of critical mass, scientific performance and visibility which still require significant*

*harmonization effort. The integration into LAETA of the smaller research groups will certainly help to benefit from the dynamics provided by the general structure.*

*It is thus essential to LAETA for its success to rely upon a continued support from FCT to consolidate its relatively new structure and organization.*

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***EVALUATION OF LAETA FEBRUARY, 2011***

- 1. Classification**                      **Very Good**
  
- 2. Grades**                                **Minor Reorganisation**
  
- 3. Productivity**

*I have reviewed the productivity of LAETA based on the following measures:*

***Quality of research lines and breadth of coverage:***

*LAETA covers the key areas of Transportation, Energy, Aeronautics, Spaces and Fires through collaborative work conducted in research laboratories with branches in Lisbon, Porto and Coimbra in Portugal.*

*The subject areas covered and the research groupings involved are very comprehensive, ranging from basic research to design to implementation and testing.*

*It would be worth identifying and reducing overlap, and more importantly ensuring that greater focus and emphasis is placed on the areas of greatest success.*

*From the information and data provided the strengths of LAETA appear to be in the areas of Transportation, Energy, Aeronautics, and Space, while the area of Fires, if maintained in the future, needs to be built up*

*A further element that may be taken into account is to consider the relevance and demand of the work to meet the long term needs of EU and Portuguese industry.*

Some consideration could be given to bringing the Research Lines on Aeronautics and Space under a single umbrella.

**Number of researchers and training including degrees awarded**

The Tables provided in the Report Form appear to be somewhat confusing;

On page.3 under General Indicators the numbers for 2003 appear to be 100200 (FTEs), and for 2004 etc the numbers are 168, 204 etc. Similarly the numbers for Master's Thesis completed and PhDs trained appear to be excessive for the year 2003, while for the rest of the years appears to be more sensible.

Similar comments can be made for the Funding figures for 2003, as compared for 2004 etc.

Discounting the numbers for 2003, the number of PhDs completed for the size of the Program is somewhat on the low side. The aim should be to achieve one PhD per full time Faculty per year.

While this Report does not cover the period from 2008, I note that 16 research associates and 20 research positions have been hired in 2008; this indicates a reduction over the period 2003-07.

I was able to find the following information in the text given on the different Research Lines:

	Transport	Energy	Aeronautics	Space	Fires	TOTAL From Table*
Books & Chapters	68					200
Papers in International Journals	289					908
In Intl. Conferences	627					1942
PhDs completed	75	26	15	22	5	141
Masters	134	35	30		9	278
Patents	9					
Ed Boards	34					
Organising conferences	57					

*Some of the data was missing for the above Table. However the last column is culled from the Table given on page 8 of the Report Form.*

*Knowledge transfer has become an important third stream activity of research teams and it is good to note that as part of the Outreach work the Research Lines are involved with the provision of training and partnering with organizations such as Marie Curie Action and joint PhD programmes with universities outside of Portugal, as well as through organisation of events to promote strong communications between science and society.*

#### **Quality and Quantity of publications**

*The number of publications for each of the Research lines is impressive, particularly in the areas of Transport, followed by Energy, Aeronautics, Space and then Fires. The Research Line on Transport is by far the most productive.*

*From an observation of the selected list of publications, it is evident that papers have appeared in internationally rated journals and have been presented at prestigious international conferences.*

#### **4. Internationalisation**

*To evaluate the performance in terms of Internationalisation I have taken into account the following parameters:*

##### **Representation on international organisations and Esteem**

*For the five Research lines, colleagues in the area of Transport are particularly well represented on national and international committee, especially on EU Boards.*

*The list of LAETA members, as editors and on Editorial Boards of International Journals and Book series is very impressive, and is a clear indication of esteem that colleagues are held internationally.*

##### **Organisation of international event**

*It is good to see that several colleagues are members of international committees of conferences, and participate in organisation of conferences and events in Europe.*

*Members of the Research Lines participate in some of the key Networks in the European Union and in Portugal, especially the Networks of Excellence in the EU. The links to MIT and University of Austin are also worthy of note.*

**Attraction of international faculty, researchers and students.**

*It was difficult to determine if there has been an increase in the number of international faculty, or researchers and students. However it may be a factor that colleagues may take into consideration in the next phase of development.*

**5. Feasibility**

*To evaluate the Feasibility of LAETA, I took the following factors in to account:*

**Management & Funding**

*The overall Management team is very impressive, and the structure is well organized. The Scientific Council for LAETA provides oversight and strategic directions, while the Executive Council comprising of the Directors of the Research Units carry out operational responsibilities for the performance of LAETA.*

*A point worth considering is the replenishment of the Executive Council, by having a stated period of membership, so that new blood can be introduced into the Council over a period of time.*

*The Advisory Council has international experts representing the key disciplines of LAETA, and is a useful vehicle to support and assess performance as well as to give guidance on emerging areas.*

*The level of funding is given on page 3 of the Report Form. However there are three observations to make here:*

- (i) It is good to note the FCT funding has attracted significant gearing from other national and international sources.*
- (ii) The funding from FCT is very high in 2003 and is tapered in the following years. If so, it is not clear how the Research units have managed the salary costs of staff in the following years?*
- (iii) Not clear what the figures in the Total column mean.*

### **Internal Services & Resources**

*The approach to sharing equipment between research groups in LAETA and other institutions is laudable. In Engineering, costs of specialist facilities is getting quite high, thus by sharing of resources , economies of scale can be achieved, and technical knowhow can be shared. The list of Laboratories participating in the initiative is impressive.*

### **Future Vision and Plans**

*The vision statement and plans are laudable, and the objective of being a major player in the EU Programs is to be encouraged. To achieve this will require large and powerful teams. I note the plans for consolidating the work into three institutes:*

*Institute of Transports and Aeronautics*

*Institute of Energy and Environment*

*Institute of Manufacturing and Engineering Systems*

*This will provide critical mass and focus as well as act as a ballast to nurture emerging fields, and facilitate multi-disciplinary projects. It will be important to diffuse boundaries, as exciting engineering research is increasingly being carried out by multi disciplinary teams. To nurture this I would recommend that some funding is identified to promote inter-and cross-disciplinary research.*

### **Recommendations:**

- 1. To identify and reduce overlap and more importantly ensure that greater focus and emphasis is placed on the areas of greatest success. The restructuring into three Institutes in place of several laboratories is a move in the right direction.*
- 2. The strengths of LAETA appear to be in the areas of Transportation, Energy, Aeronautics, and Space, The Management team needs to review the performance of the group on Fires, and if it is maintained in the future, then the area needs to be built up.*
- 3. Some consideration should be given to the relevance and demand of the work to meet the long term needs of EU and Portuguese industry. A closer engagement with industry should be considered, with senior industrialists appointed to the Advisory Council.*

4. *It was difficult to determine if there has been an increase in the number of international faculty, or researchers and students. However some encouragement should be given to attracting international faculty and students in the next phase of development.*
5. *Representation on the Executive Council should have some element of rotation. This may be achieved by having a stated period of membership, so that new blood can be introduced into the Council over a period of time. Some consideration could be given to having research staff represented ion the Council.*
6. *Inter-disciplinary research should be encouraged. To nurture this I would recommend that some funding is identified to promote inter-and cross-disciplinary research.*



# LIP

## Laboratório de Instrumentação e Física Experimental de Partículas

### Evaluation Panel

**Daniel Treille**

CERN

Suisse

### General comments

From previous Portuguese committees and a long collaboration with LIP physicists in DELPHI at LEP, I know well the laboratory.

I based my evaluation on the reports of the External Advisory Panels (EAP), and the Scientific Reports of the laboratories. LIP deals mostly with fundamental research in Particle Physics, which implies much technological involvement. LIP has a strong international involvement, coupled to a solid scientific home base and has very good track record and an excellent visibility on the international scene. The EAP reports are quite laudatory and underline the quality of the leadership.

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In LIP, Laboratório de Instrumentação e Física Experimental de Partículas, the collaboration between Lisbon and Coimbra laboratories is good and still being reinforced.

The activities of the laboratories exploit very well the existing know how in various fields. They show a satisfactory balance between various topics. Physics at the High Energy frontier with LHC (ATLAS, CMS) is the backbone activity and represents a long term commitment.

Given the foreseeable long timescale of the LHC programme (which is presently starting), it is good and even mandatory to run in parallel a diversified experimental programme. This is what LIP does, both in accelerator particle physics (COMPASS, HADES) and mostly in astroparticle physics, which includes AUGER (with measurements of nitrogen fluorescence, AUGER SUD upgrades and preparation of AUGER Nord), AMS, the future of which is now settled (launch in 2010) and the ZEPLIN direct dark matter search.

In all these programmes, LIP is present and plays important roles in key instrumental sectors: trigger, DAQ, control, in particular the trigger and read out of CMS ECAL, the ATLAS Tilecal detector control system...

LIP is also quite active preparing and performing physics analyses of the data. This was the case in the past (NA50, DELPHI...). This happens for AUGER. At LHC LIP has taken a leading role in top physics.

On the computing side, crucial for LHC and a very strong side of LIP activity, one may quote the excellent achievement of the Portuguese Tier2 which was outstanding in the most recent CMS October Exercise, aiming at extensive tests of the GRID.

There exist smaller involvements, like in SNO+ and HADES. They are probably welcome, given the timescale of LHC. However their development must be well monitored. On HADES, the actors also need to find a physics topic to exploit.

In instrumental physics, LIP has much experience and expertise, which are presently exploited, for instance in ZEPLIN (liquid xenon) and in HADES (use of RPC with outstanding time resolution performances).

As for medical physics, the ClearPEM tests should start in Porto, provided a positive advice of the Ethical Committee. Another set up from Portugal is being installed in Marseille. This is a considerable achievement. As for the TOF PET, based on RPC, in Coimbra, it is potentially promising and should be investigated further. Needless to say, a closer collaboration with other centers of medical physics can only be profitable.

Education and outreach, one of the priorities of LIP, are very active and successful sectors.

Several new people have got positions in the last years. However it is vital to ensure a steady flow of young newcomers.

I think the laboratory is on the right track and performs excellently.

### **Conclusion**

LIP has expertise in the participation of Portuguese firms in large international programmes and industry liaison officers for CERN.

In conclusion, I agree with the rating of the EAP as "excellent". I consider that LIP has met his mission and obligation and built a convincing programme for the next period.

<b>Recommendations</b>
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Therefore I don't see any reason against granting LIP an automatic renovation of their 5 years contract with FCT, and I recommend it.

Concerning the Consortium FISICA N, it offers obvious advantages, in particular concerning the room available. LIP Lisbon, in particular, but also IPFN, should benefit much from it.

Can one build a synergy between the proponents? On the physics side, this is not completely obvious. It would help if theoretical physics and astrophysics groups join as well.

From the technical point of view however, one can hope for and one should aim at synergies in several fields, like CODAC, ATCA instrumentation, advanced networking and GRID computing, medical physics, the use of workshops, etc.

The main potential interest of a consortium would be to offer more local contact with students. While building a campus is probably out of question, one could think of some sectors of advanced formation and training. The will to establish something of that kind seems to exist and should be strongly supported.

**Evaluation of Associate Laboratories**  
**from the Portuguese Foundation for Science and Technology**

**LABORATORY OF SEPARATION AND REACTION ENGINEERING –LSRE**

<b>Evaluation Panel</b>
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*Julio E. Celis* (Chair)  
CERN  
Suisse

*Marc van Montagu*  
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9000 Gent,  
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*Brian F.C. Clark*  
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Denmark

<b>General Comments</b>
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The assessment provided below summarises the conclusions of the short reports prepared by the International Steering Committees as well as our own appraisal based on the analysis of the individual reports prepared by the Associated Laboratories.

*1. Assessment of the International Steering Committee*

The report praises the growing number of collaborations both at the national and the international level and in particular, the quality and standing of the many young researchers. The latter is viewed as a major asset of the LSRE. The report also approved the new structure of the Associated Laboratory in five research areas (cyclic adsorption/reaction processes, product engineering, environmental science and engineering, chemical engineering thermodynamics, and catalysis and materials) as it was deemed well suited for future developments.

As a whole the Advisory Committee considered that the Associated Laboratory has attained a remarkable level of expertise and achievements as judged by publications and international recognition. The only concern was related to the tight space situation.

The Chair of the Steering Committee recommends the renewal of the 5 year contract.

*2. Assessment of the External Advisors*

The aim of the Centre is to develop materials and chemical processes for applications in nanotechnology, fine chemistry, energy, and environment, as well as to improve education and training within these areas. Both innovation and technology transfer are key objectives of the Associated Laboratory.

We agree with the Steering Committee's positive statement that the Associated Laboratory has achieved international status. The quality of the research is high and the fact that many young scientists choose the Laboratory to develop their careers testifies to its high standing. Their future plan of activities is sound and deserves support.

**Evaluation of Associate Laboratories**  
**from the Portuguese Foundation for Science and Technology**

**REDE DE QUÍMICA E TECNOLOGIA - REQUIMTE**

<b>Evaluation Panel</b>
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*Julio E. Celis* (Chair)  
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<b>General Comments</b>
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The assessment provided below summarises the conclusions of the short reports prepared by the International Steering Committees as well as our own appraisal based on the analysis of the individual reports prepared by the Associated Laboratories.

*1. Assessment of the International Steering Committee*

The report and further statements by Professor Luigi Marzilli gave high marks to the REQUIMTE, a large Chemistry and Chemical Engineering network in which fundamental research, education, and innovation are at the centre of their activities. Critical mass has been established and there is significant evidence that the number of publications and collaborations, in particular internationally, is on the rise. The REQUIMTE is viewed as a very sound and visionary investment by the government to promote the use of clean materials and technologies. The Associated Laboratory has many foreign scientists and recently launched a much needed joint Doctoral programme in Sustainable Chemistry.

One of the REQUIMTE important functions is to help setting scientific and technological policies for national products, food quality and safety, clean production processes and technologies, environmental control, as well as catalysis, solvents and non toxic compounds.

The Chair of the Steering Committee recommended the renewal of the 5 year contract.

## 2. Assessment of the External Advisors

We very much agree with the positive comments from Professor Marzilli. REQUIMTE was established to promote Sustainable Chemistry in a unifying theme, “Green Chemistry”, and is currently the largest chemical network in Portugal. The outcome of their research activities has been very positive judged by the quality of the publications, increasing joint collaborations, international recruitment, invitations abroad, as well as by the ability to attract funding from both national and international agencies. REQUIMTE activities are highly internationally oriented and the training and outreach activities have been very successful.