



INESCPORTO

INSTITUTO DE ENGENHARIA DE SISTEMAS
E COMPUTADORES DO PORTO
LABORATÓRIO ASSOCIADO

SCIENTIFIC AND TECHNICAL ACTIVITY PLAN

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PLAN OF SCIENTIFIC AND TECHNOLOGICAL ACTIVITIES

P1. INTRODUCTION

The transformation of the INESC Porto Associate Laboratory, by establishing an organizational architecture based on Units and Autonomous Units, is a plan that has been designed in 2007 but has had only partial consolidation. The reason behind this delay has been the requirement established by FCT - Foundation for Science and Technology, to approve any new configuration for the Associate Laboratory (LA).

This requirement could only be fulfilled with the completion of the evaluation procedures for all Units involved. But, unfortunately, this goal was not met for INESC Porto and one is still waiting for a definition from FCT.

In 2009, one has proposed for 2010 a comprehensive Plan encompassing not only the research units within INESC Porto/institution, but also the Associate Units that had requested the integration in the LA.

The continuous delay in the definition of the future configuration has led these Units to adopt cautious stances and to prefer to remain with a discrete profile. This option was followed in different degrees by the distinct Units.

The LA, in 2011, will hopefully be composed of research Units (U) anchored in the nuclear INESC Porto (the former organization of the LA) and of Autonomous Units (AG) having a large degree of autonomy in matters of management but aspiring to benefit from a scientific consolidation of plan and activities. These Units and Units are

- UESP - Manufacturing Systems Engineering (U)
- UOSE - Optoelectronics and Electronic Systems (U)
- USE - Power Systems (U)
- USIG - Information and Computer Graphic Systems (U)
- UTM - Telecommunications and Multimedia (U)
- UITT - Innovation and Technology Transfer (U)
- ROBIS - Robotics and Intelligent Systems (U)

plus

- LIAAD - Laboratory of Artificial Intelligence and Data Analysis (AG)
- CRACS - Center for Research in Advanced Computing Systems (AG)
- UGEI - Management and Industrial Engineering (AG)
- CISTER - Research Centre in Real-Time Computing Systems (AG)

These latter Units have different histories in joining the INESC Porto LA. The first two have been steadily establishing links with the INESC Porto Units in joint activities and projects. The third has maintained a careful policy of "wait and see", considering that it maintains connections with other institutions and while FCT does not clarify the recognition of its integration in the LA. The fourth has just requested, in the end of 2010, the admission to the LA. The reporting on these Units has been included in this Plan only as informative, and respecting the wishes of each Unit on the extent of the information provided.

The plan for the Scientific Council reflects the independence of this statutory organ of INESC Porto, but also demonstrates the effort devoted to maintain cross-unit ties and enhance transversal communication in an institution that has grown considerably in recent years.

The plan for the supporting activities presents in detail a large department - Information and Logistics (DIL) - and several other Supporting Services. For DIL, we use a simplified version of the format used for the operational units. For the other Supporting Services, we present a list of actions only.

This part of INESC Porto Plan is divided in several Sections:

- The plan associated with the thematic research lines of the LA (Associated Laboratory)
- The plan relative to each Unit and Unit included in the LA
- The plan of the Scientific Council
- The plan for the supporting activities.

P2. LA THEMATIC RESEARCH LINES

In the Plan for 2010, one had already mentioned that the LA Thematic Research Lines were conceived, as defined by FCT, to be the anchors for the recognition of the activity of an Associated Laboratory. One believes that this concept is born from the fact that the majority of research Units in Portugal are area-oriented and scientifically focused - and, therefore, FCT had the intention of stimulating organizational forms that would support multi-disciplinary interaction with broader scope than usual.

However, the structure of INESC Porto, since its inception, already responded to these concerns. In fact, its research Units were conceived by area of application (more than by area of knowledge) and, therefore, one has always found in them a mix of scientific expertise, allied to an orientation to produce results in specific application or business areas. A research Unit or Unit, at INESC Porto LA, already has a profile that tends to cover all the sequence of the science and technology production chain, from knowledge creation to technological application and valorization.

The challenge at INESC Porto was (is) the opposite: to guarantee inter-Unit cooperation for the scientists associated with the same scientific area.

One had hoped to see the organization and recognition of the INESC Porto LA, in its new architecture, completed in 2010. This did not happen.

The Research Lines defined in 2002, valid for the first five year contract of LA, are obviously misadjusted to the present times. In 2007, INESC Porto suggested new 5 lines which also need updating. The definition of Research Lines will be object of negotiation with FCT in the beginning of 2011, to define the new LA contract.

Therefore, we have opted to leave out, in this Plan, the reference to LA Research Lines.

P3. RESEARCH UNITS AND GROUPS

P3.1 UESP - MANUFACTURING SYSTEMS ENGINEERING

Coordinator: Luís Maia Carneiro, Jorge Pinho de Sousa

P3.1.1 SHORT DESCRIPTION OF THE UNIT

The main goal of the Manufacturing Systems Engineering Unit (UESP) is to contribute to the performance improvement of industrial enterprises through R&D projects, consulting, technology transfer and training services. Along with a strong application focus, the Unit is committed to conduct high quality research projects.

The Unit areas of activity are related to Operations Management and Enterprise Information Systems applied to industrial companies and enterprise collaborative networks. The Unit main activity areas include: Enterprise Cooperation Networks, Operations Management, Decision Support Systems, Production Planning and Scheduling, Internal Logistics, Cutting and Packing Optimization, Systems Integration, and Consultancy Services.

The Unit's activity is grounded in research in the following scientific domains:

- Cooperative Enterprise Networks Management: Supply-Chain Management; strategies for the manufacturing of complex products; dynamic capacity management; operations planning and coordination; early warning and event management; semantic and technical interoperability; collaborative performance management; life-cycle support of self-forming business networks.
- Information and Knowledge Management in Collaborative Networks: socio-technical analysis models in organizational networks; Ontologies; collaborative processes in organizational networks; information and knowledge management in organizational networks.
- Operations Research and Decision Support: structuring of decision processes; Optimization methods; Multi-Criteria Decision Analysis; Combinatorial Optimization and Meta-heuristics, Simulation, Decision Support Systems.
- Operations Management and Production Planning: Aggregate Production Planning; Operations Scheduling; Lean Management; Layouts Design; Vehicle Routing and Logistics.
- Cutting and Packing Optimization: incorporation of real-world constraints and objectives in cutting and packing optimization models; integrated resolution of cutting and packing problems and related tactical and operational problems; use of multi-objective meta-heuristic techniques; hybridization of meta-heuristics and exact methods.

The Unit promotes and participates in applied research projects, in partnership with software houses and equipment producers, for the development of innovative products and services. The Unit also provides consultancy services to industrial companies, including the analysis and optimization of business processes, requirements analysis of IT systems, selection of IT systems (ERP and others), change management, and support in IT implementation. These services follow a proprietary methodology, developed over many years of experience. The Unit has also a large experience in the fields of manufacturing systems integration.

The Unit actively promotes the utilization of advanced technologies by industrial enterprises through dissemination, training and consultancy actions, aiming at identifying new requirements, creating awareness of the advantages and limitations of new technological solutions, and supporting their implementation. The Unit pursues R&D activities to develop innovative products for technology suppliers, software houses, systems integrators and producers of manufacturing equipment.

Table of correspondence between know-how and industrial sectors

Know-how	Status (*)	Enterprise Collaboration Networks	Manufacturing Companies	Software houses	Equipment producers
Structuring of decision processes	I	X	X	X	X
Business Models	I	X			
Information Systems Analysis	I	X	X	X	X
Socio-organizational Analysis	I	X	X	X	
Optimization	I	X	X	X	X
Decision support systems	I	X	X	X	X
Simulation	I	X	X		X
IS development methodologies	I			X	
IS advanced applications	I	X	X	X	
Enterprise integration and frameworks	I	X	X	X	
Communications	I / O		X		X
Automation	I		X		X

(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Coverage of the Innovation Process

Activity Area	Research	Development	Consulting	Training	Marketing and support	Evolutionary maintenance	Use
Enterprise Collaboration Networks	UESP	UESP, Sistrade, Oficina de Soluções, TIE, Wapice, Creative Systems	UESP	UESP	Sistrade, Oficina de Soluções, TIE, Wapice	Sistrade Oficina de Soluções	Footwear Metalworking Cork Automotive
Logistics	UESP	UESP Silva Ferreira, Flowmat, Creative Systems, EFACEC, CEI	UESP	UESP Silva Ferreira, Flowmat	Silva Ferreira, Flowmat, Creative Systems	UESP Silva Ferreira, Flowmat, Creative Systems	Footwear Metalworking Furniture
DDS and Planning	UESP	UESP, Softi9, Oficina de Soluções, PHC, Inventore, Creative Systems	UESP	UESP	Softi9, I68, CPC, Inventore, Creative Systems, Oficina de Soluções	UESP	Automobile Metalworking Footwear
Optimization	UESP	UESP	UESP	UESP	UESP, Lirel	UESP	Textile Paper Metalworking
Enterprise engineering and process optimization	UESP	UESP	UESP	UESP	UESP		All

P3.1.2 DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

The Manufacturing Systems Engineering Unit is jointly coordinated by Luís Maia Carneiro and Jorge Pinho de Sousa.

Currently the areas with more significant activity are Decision Support Systems, Enterprise Cooperation Networks, Internal Logistics, Operations Management, Cutting and Packing, Combinatorial Optimization and Meta-heuristics. Consultancy services are structured and provided by a specific group in the Unit.

P3.1.3 SWOT ANALYSIS

Strengths

- Good technical and scientific background;
- Considerable experience in structuring complex, real problems;
- Internationally recognized competences in Combinatorial Optimization and Meta-heuristics;
- Good relationships with enterprise associations and technological centres from several industrial sectors;
- Trust relations with a significant number of companies;
- Active participation in the Manufacture and Footwear European Technology Platforms;
- Good network of contacts at the European level, mainly based on the participation on multiple international projects and European Technological Platforms.

Weaknesses

- Wide activity scope leads to reduced critical mass in some areas;
- Insufficient commercial effort.

Opportunities

- Companies are aware of the need to innovate and improve productivity;
- The 7th European RTD framework is fully operational;
- Increased funding from the European Commission associated with the Public Private Partnership - Factories of the Future;
- Due to the economical crisis funding programs to support RTD and innovation activities in companies have been widened also at a National level;
- Good relationships with many foreign entities and researchers.

Threats

- Reduced number of technological Portuguese companies, with own products, especially in the software domain;
- Foreseen reduction of structural funds for Portugal in the medium term;
- Dependency of Portuguese companies from structural funds to perform RTD projects.

P3.1.4 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Medium term objectives and management principles include:

- Increase scientific excellence by focusing activities in specific areas, by participating in research projects with leading research organisations, at a national and an international level, by empowering younger researchers, and by promoting PhD and MSc projects;
- Increase critical mass in the Unit's main activity areas;
- Improve the alignment between basic research, applied research and consultancy activities;

- Maximise the impact of the Unit's activity in companies, and promote the valorisation of results;
- Establish strategic partnerships with more software houses and producers of manufacturing equipments, allowing the alignment of the research activities with future industrial projects, for a better valorisation of the developed intellectual property;
- Reinforce cooperation with other RTD organisations at an international level;
- Improve the balance of income resulting from national projects, European projects and company projects, through an increased participation in European RTD projects, and an increase in RTD activities and consultancy services for companies- these services should represent a minimum of 40% of the total activity volume in three years;
- Improve internal competences by:
 - developing the competences and motivation of human resources;
 - creating conditions for attracting high level national and international researchers;
- Improve the Unit's external visibility, through the organisation and participation in key national and international scientific and industrial events;
- Develop innovative training initiatives, with an impact in the total income of the Unit, and providing a powerful marketing instrument.

P3.1.5 ACTION PLAN (GLOBAL)

For 2011 a number of structural actions are planned, including:

- Consolidate the scientific activity in a few focused areas where the Unit's research is considered to be of high quality - this is the case of enterprise cooperation networks, multi-objective meta-heuristics, cutting and packing optimization; flexibility and engineering systems;
- Pursue the reinforcement of the scientific activity in the areas of supply-chain management, internal logistics, simulation, and forecasting;
- Continue and support the growth of the last two years, by promoting new initiatives in the above key areas, especially through European projects and contracts with companies - internal management structures will be reinforced to cope with this expected significant growth;
- Maintain strong participation in industrial and academic networks such as the European Technology Platforms (especially in the Manufature and the Footwear ETPs) and in the IMS programme;
- Reinforce the internal communication mechanisms and promote the definition of multidisciplinary research projects; promote an internal discussion on research opportunities and on the set-up and organization of new research projects;
- To develop and disseminate a pragmatic framework and methodology to support the adoption by the companies of the region, of the developed concepts and tools for enterprise cooperation networks;
- Organize a set of innovative short and medium-size training initiatives for companies -these initiatives should be strongly linked to the Unit's main research areas and show a clear differentiation from those currently available on the market (this offer should include areas such as enterprise integration and collaboration, advanced planning and scheduling systems, decision support systems, methodologies for IT adoption by SME);
- Achieve in three years, a minimum of 40% of direct funding by companies, by increasing the volume of consultancy and technical assistance to companies;
- Consolidate partnerships with software houses and producers of equipments;
- Continue the development of new partnerships with national and international research organizations, leaders in fields near or complementary to the Unit's activity;
- Reinforce the participation of the Unit in European projects, thus increasing its visibility;

- Pursue the efforts in improving the professionalism and quality of services and projects;
- Pursue the work done in standardization and in the improvement of software development methodologies and practices, with impact on productivity, quality and maintenance services;
- Strengthen the institution's image in its main target markets, through some specific actions - special focus will be put on the organization of workshops and discussion panels with local companies and research centres.

P3.1.6 ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	9	12
Papers in National Journals with scientific referees		
Conference Proceedings in events with scientific referee and selection	21	20
Books (author)		1
Chapter/paper in books	2	1
Publications (editor)		1
Other publications (National meetings, local journals, etc.)	5	6
Theses concluded by members of the Unit	4	7
TOTAL	41	48

Journal	Predicted End 2010	2011
Computational Optimization and Applications	1	
European Journal of Operational Research	1	2
Journal of Heuristics	2	1
International Journal of Production Research	1	1
TOP	1	1
Annals of Operations Research	1	1
Robotics and Computer Integrated Manufacturing		1
International Journal of CIM		2
International Journal of Performance Management		1
International Journal of Services and Operations Management	1	
International Journal of Information Management		1
Computers in Industry		1
TOTAL	8	12

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master	20	16	16	52
Doctoral	3	28	1	32
TOTAL	23	44	17	84

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2010	2011
Training for graduation students	4	5
Advanced training	0	1
Professional and Structure R&D Training actions	0	0
TOTAL	4	6

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	3
Other actions	0

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	UESP				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme	261	77	151	450	198%
European Union Programmes	246	425	624	632	1%
Consultancy and R&D Services	286	472	600	376	-37%
Other R&D Services					
Other External Services		2			
Internal					
Total (k€)	793	976	1.375	1.458	6%

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	Cogninet	António Lucas Soares	01-03-2010	29-02-2012
PN-FCT	Coordinator	Ana Viana	14-06-2010	13-10-2012
PN-FCT	EaGLe Nest	António Miguel Gomes	15-04-2010	14-04-2013
PN-QREN	Fadis-1	Luís Carneiro	01-07-2009	30-06-2011
PN-QREN	Minerva	Paula Silva	01-02-2009	31-01-2011
PN-QREN	Mobilizador Calçado	Rui Rebelo	01-01-2011	31-12-2013
PN-QREN	Mobilizador Produtech	Luis Carneiro	01-01-2011	31-12-2013
PN-QREN	Mobilizador Textil	Rui Rebelo	01-01-2011	31-12-2013
PN-QREN	REMObi	Jorge Pinho de Sousa	01-04-2009	31-03-2011
PN-QREN	Shoe-ID	Rui Diogo Rebelo	31-10-2009	31-12-2011

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-QREN	SIBAP	Rui Diogo Rebelo	01-11-2009	30-04-2011
PN-QREN	SysMAP	Luís Carneiro	02-02-2010	01-02-2012
PUE-I&D	Auto-Ebiz	César Toscano	01-01-2010	31-12-2012
PUE-I&D	CORENET	Américo Azevedo	01-06-2010	31-05-2013
PUE-I&D	Fit4U	Rui Diogo Rebelo	01-07-2009	30-06-2012
PUE-I&D	H-Know	António Lucas Soares	01-01-2009	31-12-2011
PUE-I&D	Net-Challenge	Luís Carneiro	01-06-2009	30-11-2011
PUE-I&D	VFF	Américo Azevedo	01-09-2009	28-02-2013
SERV-NAC	CASTOR-IP	António Correia Alves	18-05-2010	15-09-2010
SERV-NAC	Consultoria	Luís Carneiro	01-01-2009	
SERV-NAC	Inovultus	Luís Guardão	01-02-2009	31-07-2011
SERV-NAC	Lucios	António Correia Alves	11-01-2010	10-08-2011
SERV-NAC	Padinho XXI	António Correia Alves	15-11-2010	31-12-2011
SERV-NAC	Parque Escolar	Luís Guardão	01-11-2009	31-10-2012
SERV-NAC	SIAC Calçado	Luís Carneiro	01-01-2011	31-12-2013
SERV-NAC	SIAC Produtech	Luís Carneiro	01-01-2011	31-12-2013
SERV-UE	Izaro Grey	António Correia Alves	01-01-2007	

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

Source		2009	2010 (a)	2011	
Internal HR	R&D	Employees	13	13	14
		University and Polytechnic	14	14	13
		Grant Holders and Trainees (PG)	11	23	27
	<i>Total R&D</i>		<i>38</i>	<i>50</i>	<i>54</i>
Shared Structure (Central and Local)		3	2	2	
<i>Total Internal</i>		<i>41</i>	<i>52</i>	<i>56</i>	
External Collaborators and Invited Researchers		6	4	4	
Students (UG)		2	2	0	
Global Total		49	58	60	

a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P3.2 UOSE - OPTOELECTRONICS AND ELECTRONIC SYSTEMS UNIT

Coordinator: Paulo Marques

P3.2.1 SHORT DESCRIPTION OF THE UNIT

The Unit develops its activity in the areas of Optoelectronics and Electronic Systems Integration, mainly in the domain of optical fibre technology. The Electronics section is essentially oriented towards the process of technology transfer to industrial Portuguese companies, the integration of optoelectronic systems.

The scientific research made by the Unit is directed to the research in the domain of Optoelectronics, particularly the applied research in the fields of optical sensors, imaging, micro fabrication (thin films and integrated optics) and development of photovoltaic cells. In the framework of its activity proportionate the adequate environment to the integration of post-graduate students, mainly coming from the Physics Department of the Sciences Faculty of the University of Porto where it is based. Throughout the years, R&D collaborations have been made with prestigious institutions, national and international (Universities, Institutes or companies), very often within the framework of R&D joint projects. Nowadays, the Unit priorities are to enhance its competences in its areas of activity and to establish crossed fertilization actions among them, beginning with a careful and adequate selection of R&D projects to be submitted. The development of new areas besides the most traditional area of optical fibers sensors for structural monitoring has been supported by the establishment of new institutional links with other organizations, and to provide training of researchers in these areas of activity. The maintenance of the high numbers of PhD students is a priority, as well as the definition of the required infrastructure in order to keep providing and adequate and modern laboratory in optoelectronic technologies. The main vectors of the Unit activity development are:

- Research, development and technology transfer in the area of the optical fibre sensors; these include more conventional sensors for temperature and strain measurement and new chemical sensors
- Research in optical imaging based of low coherence techniques;
- Development of integrated optics solutions for optical telecommunications, sensors, and astronomical interferometry.
- Research and development in photovoltaic cells;
- Research in optical filtering using fused coupler technology, Bragg gratings and long-period gratings;
- Research and development in micro packaging;
- Research in energy harvesting and scavenging for sensing.
- Development and technology transfer in systems integration;

Table of correspondence between know-how and the Industrial Sectors

Know-how	Status(*)	Instrumentation	Telecommunications	Environment	Energy	Health
Scientific Know-how						
Optical fiber sensors	I	X		X	X	X
Microfabrication	I					
Optical fiber sources	I, E		X			
Civil engineering structures modelization	E	X				
Energy networks management	O	X				X
Chemical pollutants detection	E			X		
Biomedicine	E					X

Know-how	Status(*)	Instrumentation	Telecommunications	Environment	Energy	Health
Technology Know-how						
Electronic systems project and development	I	X	X	X	X	X
Electronic systems integration	I	X	X	X	X	X

(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Coverage of the Innovation Process

Activity Area	Research	Development	Consulting	Training	Marketing and Support	Evolutionary Maintenance	Use
Instrumentation	UOSE/Lab. Structures FEUP	UOSE/Lab. Structures FEUP	UOSE/Lab. Structures FEUP	UOSE/Lab. Structures FEUP	FiberSensing	FiberSensing	Civil engineering structures instrumentation
Telecommunications	UOSE, UTM	UOSE, UTM	UOSE, UTM	UOSE, UTM			Optical fiber communication systems
Environment	UOSE Dep. Química FCUP			Pollutants detection and monitoring systems			
Energy	UOSE, USE	UOSE, USE	UOSE, USE	UOSE, USE			Energy networks management systems
Health	UOSE, ITQB	UOSE, ITQB	UOSE, ITQB	UOSE, ITQB			Biomedical sensors

P3.2.2 DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

The Unity is organized around technological and scientific competences. Each one of these competences is coordinated by a PhD who, in close collaboration with the Unit's coordinator, defines strategies and partnerships. The motivation to this organizational scheme is rooted on the crucial relevance of scientific competence as the activity thrust.

In order to organize efficiently the activities and the coordination of the Optoelectronics and Electronics Systems research unit (UOSE), the actual head of UOSE started a restructuring action according to the functional research activity areas. This action is related to all aspects of the Unit activity, ranging from research to post graduation activities; the Unit will be organized in five main areas:

1. SENSORS
2. MICROFABRICATION AND PHOTONICS INTEGRATION
3. OPTICAL IMAGING
4. SYSTEMS INTEGRATION
5. POST-GRADUATION STUDIES COORDINATION AND DISSEMINATION

A coordinator will be nominated for each one of the areas listed above; the coordinators of the functional areas will maintain regular meetings with the head of Unit (every fortnight). In these meetings all the general aspects will be discussed (purchases, paper submissions, project analysis and new submissions, cooperation between functional areas, etc), as well as the elaboration of a short, medium and long term strategic plans.

The creation of the post-graduation studies coordination was born from a different motivation, since all the others were born naturally from the usual research activities. The average number of PhD students is

around 15, together with students developing their MSc projects and other short terms projects associated with the curriculum of other courses in which the research unit provides some sort of technical support.

Therefore, there is the need to organize these activities and also the relation with the universities to which UOSE has some of institutional relations (especially with the Physics and Astronomy Department from Faculty of Sciences of Porto University, where UOSE develops its activity). The first action of this functional area is to develop an advanced lab where a set of experiments will be created and maintained by UOSE researchers (some of those apparatus are usually used in research activities, so all researchers will have open access to this room), but that can be used in some curricular units from master and doctoral programs (as well as specific undergraduated disciplines).

In this moment, the main working rules have been defined and a system that allows recorded access to this room is currently being implemented. After this is completed the first experiments will be installed, comprising: fiber lasers, fiber device components fabrication unit (couplers, tapers, etc), optical tweezers system, Nd:YAG laser and spectroscopy, Z-scan for non-linear coefficients measurements, M-lines for refractive and thickness characterization of optical waveguides and fiber optical sensors general experiments. This set of experiments will allow the unit to spread the knowledge of its research activities amongst the students therefore contributing to increase the number of students in more technological areas of research and helping to ensure a high quality teaching.

P3.2.3 SWOT ANALYSIS

Strengths

- Prestige and image of excellence: as demonstrated by FCT reports and participation in Scientific Committees of International Conferences (example: OFS - Optical Fibre Sensors);
- Connections and partnerships with renowned scientific groups;
- Technological and scientific infrastructure and capability: the Unit has know-how, equipment and laboratorial infrastructure which constitute a competitive resource.
- The balance between basic science and applications development has allowed the development of new partnerships with local industry

The recent contracts made with researchers under the Science 2007 and 2008 programs and the Associated Laboratory contract allowed to cover the gap between academic staff and post-graduation students.

Weaknesses

- High costs regarding infrastructure operation and maintenance;
- Critical mass absence concerning some areas and unbalanced distribution of human resources by qualification levels: the Unit has a high number of post-graduation students and a need for recently graduated people for renewal of the training cycle.
- The low participation in European projects.

Opportunities

- Know-how and technologies potential: the application areas for Unit's technologies are vast and diversified and, consequentially, a larger use can be foreseen.

Threats

- Inadequate framework of reference concerning valorisation of post-graduate training activity: after concluding their degrees, post-graduate students, generally, don't compensate the Unit's financial and human resource effort on their behalf and, in consequence, they don't contribute to

the system; a significant proportion follow college and polytechnic teaching careers or in corporations with few or no connections with Unit's activity;

- Predictable decrease of public funding regarding R&D activities: the supposed and desirable increase of funding of I&D activity by companies doesn't seem easy on the current context.
- The build-up of the technological infrastructure is very expensive and the running costs are large. While small projects ensure the minimum acceptable level for running costs coverage, the purchase of new costly equipments is always difficult and present a major threat to achieve and maintain a state-of-the-art experimental facility.

P3.2.4 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Medium term:

- Strengthening of installed and established scientific and technological capacity;
- Infrastructure re-equipment;
- Recently, and by UOSE initiative, the idea of creating a Micro and nanofabrication facility in Porto University was moulded. Discussions with other research group (IFIMUP), CEMUP and the rectory of Porto University reach the conclusion that this initiative would fit perfectly in the philosophy of CEMUP, and therefore this new facility will be born as a new structure of the existing center. During 2010 an application to QREN funds was done and it was successful. UOSE had a strong role on this process at a technical and administrative level, and it will continue to participate actively to make this infrastructure a reality in the short term. It should be mentioned that UOSE maintain since its origin a small cleanroom completely operational; all the equipment that is resident on this cleanroom and was acquired during the last two decades will be transferred to the new infrastructure, contributing decisively to ensure that the new cleanroom is equipped with the technical equipments very quickly.
- Internal cross fertilization of technological and scientific competences;
- Increase of participation in European projects (7th Framework Program);
- Integration of Unit's R&D interests with medium term objectives of current and potential corporate partners, for synergies and valorisation of Unit's activity;
- Increase of the economical and social impact of R&D results;
- Attraction of new university investigators;
- Internationalization;
- Integrated policy of intellectual property application and valorisation;
- Participation in scientific committees of conferences related to Unit interests;
- Improvement of the publication ratios in the microfabrication area.

Year:

- Increase of integration and development of PhDs in the context of the Associated Laboratory framework;
- Assessment of medium/long term R&D new opportunities: development of new optical sensors based on photonic crystal c; sensor networks; photovoltaic materials and microfluidics;
- Re-equipment investment plan;
- Evaluation of new opportunities in technology transfer, especially in the Framework of FP7 and Portuguese QREN.
- Implement an internal panel for internal proposal evaluation prior to final submission with the aim of increasing proposals quality and approval rate.
- Enhance marketing quality and public awareness of the Unit activities

P3.2.5 ACTION PLAN (GLOBAL)

- International summer course in optical fiber technology and integrated optics;
- Advanced professional training course in the field of optical fiber technologies for technicians;
- Establishment of new and strengthening of already in place industrial partnerships, both national and international;
- Explore synergies between the several areas of knowledge within the research Unit;
- Proposals submission for European projects (7FP);
- Proposals submission for national R&D projects;
- Gradual and progressive internal re-organization.

P3.2.6 ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	34	25
Papers in National Journals with scientific referees		
Conference Proceedings in events with scientific referee and selection	44	15
Books (author)		
Chapter/paper in books		1
Publications (editor)		1
Other publications (National meetings, local journals, etc.)	27	4
Theses concluded by members of the Unit	6	7
TOTAL	111	53

Journal	Predicted End 2010	2011
Sensors and Actuators B-Chemical	5	4
IEEE Photonics Technology Letters	5	4
Applied Optics	3	2
Solid State Phenomena	3	1
Measurement Science & Technology	2	2
Optics Express	2	2
Microwave and Optical Technology Letters	2	2
IEEE Sensors Journal	2	2
Clean Technologies and Environmental Policy	1	
Applied Surface Science	1	
Food Research International - Canadian Institute of Food Science and Technology Journal	1	
Key Engineering Materials	1	1
Optic Letters	1	1
Materials & Design	1	1
Talanta	1	
Fiber and Integrated Optics	1	2
Advanced Engineering Materials	1	1
IEEE Transactions on Power Delivery	1	
TOTAL	34	25

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master	1	0	2	3
Doctoral	6	11	4	21
TOTAL	7	11	6	24

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2010	2011
Training for graduation students	11	8
Advanced training	0	0
Professional and Structure R&D Training actions	1	0
TOTAL	12	8

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	3
Other actions	7

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	UOSE				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme	173	171	325	155	-52%
European Union Programmes	52	25	16	1	-94%
Consultancy and R&D Services	238	194	426	181	-58%
Other R&D Services					
Other External Services	5				
Internal					
Total (k€)	468	390	767	337	-56%

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	Biomotion	Miguel Velhote Correia	02-04-2008	01-04-2011
PN-FCT	Bioswim	Miguel Velhote Correia	01-04-2008	31-01-2011
PN-FCT	Hybrid	Pedro Jorge	01-03-2010	28-02-2013
PN-FCT	MCP	Nandyala Hussain	01-04-2010	31-03-2013
PN-FCT	Microphyte	José Luis Santos	15-01-2010	14-01-2013
PN-FCT	Multiferroicos	Javier Cruz	01-06-2010	31-05-2013
PN-FCT	Nanocrystalline	Paulo Vicente Marques	02-01-2008	01-01-2011
PN-FCT	Oreo2	Paulo Vicente Marques	01-01-2008	31-12-2010
PN-FCT	Retinocortical	Miguel Velhote Correia	01-11-2008	31-10-2011
PN-FCT	SmartCoat	Orlando Frazão	01-05-2010	30-04-2012
PN-QREN	CFC	Javier Cruz	01-06-2009	31-05-2012
PN-QREN	Mobiles-2	Ireneu Dias	30-05-2009	29-05-2011
SERV-NAC	Sens Kanoe	Orlando Frazão	01-09-2009	30-06-2012
SERV-NAC	Wave Tune	Pedro Jorge	01-03-2010	31-12-2010

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

Source		2009	2010 (a)	2011	
Internal HR	R&D	Employees	10	10	10
		University and Polytechnic	14	11	10
		Grant Holders and Trainees (PG)	16	23	27
	Total R&D		40	44	47
	Shared Structure (Central and Local)		4	4	3
Total Internal		44	48	50	
External Collaborators and Invited Researchers		4	6	2	
Students (UG)		15	9	0	
Global Total		63	63	52	

 (a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P3.3 USE - POWER SYSTEMS UNIT

Coordinator: Manuel Matos

P3.3.1 SHORT DESCRIPTION OF THE UNIT

The Power Systems Unit focuses its activity in some of the key (traditional and emerging) areas of the electric sector: regulatory issues and electricity markets, security of supply, integration of distributed generation (namely wind power and other renewable energy sources), technical and economic management of distribution systems, operation and management of transmission grids with large share of renewables, use of GIS and other IT in regional energy planning, wind power forecasting, microgeneration and microgrids and large scale integration of Electric Vehicles. Most of these activities are understood in the framework of the Smart Grid paradigm. The Unit develops research in different topics and integrates the results in models that address high level problems in a suitable way for technology transfer to utilities, system operators, industrial companies and regulators.

The researchers develop existing know-how in techniques and methodologies like Artificial Neural Networks, Fuzzy Sets, Machine Learning techniques, Evolutionary Programming, Meta-Heuristics, Optimization, Negotiation and Decision-aid methodologies etc., inside and outside formal projects and contracts. At the same time, MSc and PhD level training remain a major objective, in order to create internal excellence in the salient research areas and to provide the industry with highly qualified professionals, capable of dealing with the challenges of new electricity sector organization. Finally, consulting activities allow the unit to promote the use of modern and efficient methodologies to manage power systems, thus contributing to the dissemination of research and development results, namely in the areas of renewable energy sources, integration of distributed generation and Electric Vehicles deployment.

Table of correspondence between know-how and the Industrial Sectors

Know-how	Status (*)	DMS/EMS	Smart Grids	Electricity Markets and Regulation	Planning and Forecasting	Distribution Systems	Advanced Training
Power System Network Analysis	I	X	X	X	X	X	X
Computational Intelligence	I	X	X		X		X
Optimization and Decision	I+O	X		X	X	X	X
Forecasting	I				X		X
Power Systems Planning and Operation	I	X		X	X	X	X
GIS	I+O				X	X	X
Programming	I+O	X			X		
Internet and Web	I			X	X		

(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Coverage of the Innovation Process

Activity Area	Research	Development	Consulting	Training	Marketing and Support	Evolutionary Maintenance	Use
DMS/EMS	USE	USE		USE	EFACEC	USE EFACEC	Utilities, International market
Smart Grids	USE	USE	USE	USE	(USE)	(USE)	REN, EDP, Manufacturers, Prosumers, International market
Electricity Markets and Regulation	USE		USE	USE			ERSE, DGEG, Utilities
Planning and Forecasting	USE	USE	USE	USE	PreWind International Companies	USE PreWind International Companies	DGEG, REN, EDP, Wind Park Owners, International market
Distribution Systems	USE	USE		USE	(USE)	(USE)	EDP, ERSE
Advanced Training				USE			REN, EDP, International market

P3.3.2 DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

As a result of the organizational restructuring of 2010, the Unit organizes its activity in five Areas, described next. A Unit Coordination Commission was created that includes the unit's coordination and each area's responsible and meets every other week to make strategic and management decisions at the unit's level.

DMS/EMS

Area focused on the development of functionalities to the management and operation of electricity networks in a secure and economical way. These functionalities integrate new or updated algorithms developed by researchers at INESC Porto and can be integrated in DMS/EMS software packages. All these functionalities are programmed in professional code languages and are passed to the industry.

Smart Grids

This Area covers research and development of advanced concepts aiming the consolidation of the emerging power systems operation paradigm, involving integrated management and operation of conventional generation units, renewable power sources, micro-generators, electric vehicles and demand side management strategies.

The activities developed within Smart Grids area are focused on the research and development of innovative solutions and on consultancy activities in the following domains:

- Network analysis, including the development of the associated models, both for steady state and dynamic conditions;
- Identification of control solutions in order to exploit dispersed generation ability for the provision of ancillary services (specially, in what concerns wind power);
- Specification of wind power control centers;
- Identification of grid code requirements for networks with a large share of wind power;
- Technical and functional specification of smart metering solutions, including functionalities for active distribution network management and control;
- Development of functional and operational models for micro-generation and micro-grids

- Identification and development of advanced control solutions for the integration of a large share of electric vehicles in distribution networks, including its participation in the provision of ancillary services.

Distribution Systems

This Area deals with the analysis, monitoring and optimization of Energy Distribution Systems, namely the new challenges originated by the high-efficiency needs, environment concerns and development of the electricity market.

Preferential themes include Power Systems Analysis, Operation Optimization, Load Forecasting, Characterization of Consumers and Networks, analysis of network investments for Loss Reduction, as well as new areas arising from challenges created by the liberalization of energy markets like Conformity Analysis of the market settlement procedures, Load, Losses and Microgeneration Profiles and derivation of Loss Factors.

Electricity Markets and Regulation

This area covers the support of public entities like ERSE, DGGE and similar entities in the Autonomous Regions of Portugal, but also researches on models and methodologies for the different agents of the electric sector, in particular the TSO and DSO, but also generating companies and retailers.

Planning and Forecasting

This Area covers research and development in power systems planning and operation and in forecasting, with a focus on addressing wind power penetration impact and other recent changes in the electric systems paradigms worldwide. The activities by Planning and Forecasting area can be described as:

- Technologic topics
 - Planning and operation of Electric Energy Systems
 - Wind energy forecast
 - Load forecast and energy management
 - Maintenance planning
 - Reliability and Security of Supply
 - Long term impact of electric vehicles in the grid studies
 - Risk analysis
 - Congestion analysis using fuzzy power flow
 - Optimization and Multicriteria analysis
- Computational solutions
 - Decision-aid systems
 - Geographical Information Systems
 - Forecasting systems
 - Monte-Carlo simulation
 - Fuzzy power flow
 - Operational reserve programming

P3.3.3 SWOT ANALYSIS

Strengths

- Stable basis of university researchers, enhanced in the framework of Associated Laboratory contract, and a well defined scientific and technical program that eases the integration of grantees and trainees.
- National and international recognition in the areas of regulation, electricity markets, wind power and other renewable energy integration, wind power forecasting, operational reserve assessment, smart grids and electric vehicles deployment.

- Credibility as an independent and contractually responsible entity.
- Leading research activity in emergent technological areas, like microgeneration, microgrids, smart metering, wind energy integration and electric vehicles.
- European and international activity, with some ability to participate at a strategic level in the European Union.

Weaknesses

- Excessive contractual responsibility for a limited number of researchers.
- Lack of senior elements necessary to deal with a big increase in activity.
- Some lack of diversity in the basic scientific interests.
- Medium-term increase of the fixed costs with human resources due to aging.

Opportunities

- Present and futures changes in the organization of the electric sector, at the national, Iberian (Iberian Market) and European level.
- Emergence of new paradigms for the organization of electric networks.
- Development of wind power and other renewable energy generation in Portugal.
- New industrial developments related with microgeneration, smart metering and demand side integration.
- Electric vehicles integration in electricity grids.
- Increasing internationalization of Portuguese industry.
- Increased activity in Brazil through INESC P&D Brasil.

Threats

- Possible globalization of the consulting activity, increasing competition.
- Increasing competition in European projects.
- Current Portuguese and International economical and financial crises.

P3.3.4 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

- Continuation of a balanced activity regarding high level research and development, technology transference to industry and support to industry and public administration, while contributing to the financial viability of INESC Porto.
- Consolidation of the present scientific and technologic areas of intervention through national and international contracts, supported by the human resources contracted in the framework of Associated Laboratory and Ciência 2008.
- Development of the international scientific partnerships, namely regarding European projects in new areas and specifically in demonstration projects involving pilot systems;
- Intensification of the international exchange of researchers, both by receiving foreign researchers and by motivating the members of the Unit to go abroad.
- Development of stronger links with researchers involved with power electronics, aiming to increase the capability of using the laboratorial infrastructure to be implemented
- Increasing the advanced training activity.
- Extension of the Smart Grid research activities up to the transmission and generation levels of the electric power system through the intensification of scientific partnerships regarding European projects.
- Exploring other INESC Porto units and INESC Porto LA associated groups as possible partners on projects and/or consultancy demands.

- Exploiting the possibility of accessing new markets through the connections made available through INESC P&D Brasil.

The specific objectives of each Area are described next.

DMS/EMS

- Maintain a sustained relation with industry, namely with EFACEC but possibly with other players.
- Develop international scientific partnerships, namely regarding Brazil projects in this area, specifically with P&D projects involving Brazilian utilities and INESC P&D Brasil;
- Develop new methods to deal efficiently with new problems in the networks management related with Smart Grids;
- Develop more efficient algorithms in terms of computing time to deal with significant network dimension increase
- Evaluate the use of semantic concepts, artificial intelligence techniques, mobility and personalization in the future activities

Smart Grids

- Define an action plan in order to have a wider view about smart grids, specially having a more active participation at the transmission system level;
- Participation in the Smart Grid initiatives, by promoting the development and integration the microgrids, multi-microgrids, smart metering, active load management and EV integration concepts;
- Promote a more active participation regarding support actions for the development of industrial and pre-normative solutions for smart distributions grids;
- Define a more active participation within the smart metering activities, namely those occurring at the national level, aiming at the definition of new tools in order to help DSO having a better exploitation of the available information;
- Propose an action plan for the definition of short term framework regarding the inclusion of power electronics research activities within smart grids activities.

Distribution Systems

- Continue the collaboration with the DSO regarding load and microgeneration (wind and solar) profiling, derivation of loss factors and loss profiles.
- Conceptualize and develop a research line on the use of the considerable amount of additional operational information coming from smart metering infrastructures, in order to define research objectives for the next years.

Electricity Markets and Regulation

- Consolidation of the present scientific area of intervention in Portugal, namely continuing and strengthening the collaboration with several players in the electricity sector (for instance, EDP and REN);
- Continuation of the efforts to develop applications to help network providers (both in distribution and in transmission) to plan the expansion/reinforcement of their networks;
- Develop a strong effort to resume the collaboration with the Portuguese Energy Services Regulatory Agency, either regarding the development of studies and consultancy actions or in terms of the analysis or preparation of proposals for regulatory texts;

- Continue the collaboration held in the past with electricity companies of Açores and Madeira, namely on regulatory issues relevant for their activities.

Planning and Forecasting

- Planning and Operating Tools: development of the coded repository on planning and operating tools to deal with new PhD proposals and consultancy demands.
- Forecasting Team: consolidation of the forecasting research area within the Power System Unit in order to increase the scientific production on forecasting processes, mainly offering Master Thesis and PhD Proposals in accordance with forecasting process demands.
- Wind Power Forecasting: exploring the wind power forecasting demands through the national and international industry (LOGICA, ONS, EFACEC, etc).
- Planning Research Area: Development of new methodologies and tools based on risk analysis considering networks expansion linked with Smart Grids concepts;
- Operating Research Area: Development of efficient computational algorithms to deal with huge dimension of transmission network.
- Consolidation of the Planning and Forecasting scientific area of intervention through the international market, mainly exploring the opportunities that come from INESC P&D Brasil

P3.3.5 ACTION PLAN (GLOBAL)

- Continuation of the process of the characterization of the international situation of the Unit, through the identification of similar institutions and benchmarking.
- Review of the Unit's Areas and evaluation of the Unit Coordination Commission activity, in order to confirm or change the present organization of the Unit.
- Evaluation of the software developed internally in the framework of projects and contracts in order to detect opportunities for the conception of innovative software products.
- Formalization of partnerships with utilities and manufacturers to develop standards and innovative products for smart metering and active management of distribution grids with large scale integration of microgeneration and EV integration.
- Identifying ways to promote a better balance between scientific tasks and contract responsibilities.
- Definition of a portfolio for advanced training actions.
- Participation in FP7 proposals.

Specific actions for each Area are described next:

DMS/EMS

- Maintain the relation with EFACEC with new contracts related with new functionalities namely the ones related with EMS
- Increase scientific partnerships with institutions in Brazil, with ANEEL P&D projects involving INESC P&D Brasil
- Improve the efficiency of already implemented algorithms in terms of computing time by changing some functions

Smart Grids

- Commitment to research, development, demonstration and support to innovation in the Electric Vehicles deployment topic.

- Starting the development of a laboratorial infrastructure to test the management and control solutions developed for microgrids and EV.
- Development of concepts, organizational schemes and general specifications for electric vehicles integration, with emphasis on pre-normative actions and on the industrial valorization of results.
- Initiating a process of technology transfer to the utilities and industrial partners, taking into consideration the developments that will take place within the REIVE project.
- Establishing more stable links with researchers from the power electronics area in the framework of smart grid research activities.

Distribution Systems

- Develop contacts with other groups of INESC Porto LA regarding the research line on the use of smart metering information.
- Research on decision aid for loss reduction - optimization of investments in network reinforcement, aiming at reducing energy losses in the most effective way.
- Research on loss studies - characterization of losses in the HV networks, namely in the Portuguese distribution system grid. Determination of typical losses in a variety of scenarios. Analysis of the distributed generation impact in HV losses.

Electricity Markets and Regulation

- Finalize the undergoing projects with the Portuguese Transmission System Operator (REN) and with the Distribution System Operator (EDP Distribuição);
- Resume and increase the contacts with the Portuguese Regulatory Agency;
- Develop tools to help generation and network agents to prepare long term expansion plans;
- Continue the research effort on the integration of uncertainties in several models related with power system operation under competition.

Planning and Forecasting

- Developing new concepts on security of supply involving electric mobility within planning and operating process that can be attractive to the industry.
- Integrating short-term and long-term operational reserve issues in order to explore some scientific opportunities and consolidating the operational reserve subject as the know-how area of Power System Unit.
- Developing a forecasting-based platform in for the integration of different applications based on forecasting process, essentially to deal with recent demands on wind power forecasting requests.
- Maintaining the existing link between INESC Porto and Portuguese and Spanish TSO through the improvements and new developments of tools.

P3.3.6 ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	13	19
Papers in National Journals with scientific referees	2	
Conference Proceedings in events with scientific referee and selection	31	17



Type of publication	Predicted End 2010	2011
Books (author)		
Chapter/paper in books		1
Publications (editor)		
Other publications (National meetings, local journals, etc.)		
Theses concluded by members of the Unit	5	3

Journal	Predicted End 2010	2011
Electric Power Systems Research	3	3
IEEE Transactions on Power Delivery		2
IEEE Transactions on Power Systems	1	5
International Journal of Electrical Power & Energy Systems	1	
International Journal of Production Research	1	
IET GTD	1	
European Transactions on Electric Power	2	6
Proceedings of IEEE		1
Electra	1	1
Wind Energy		1
Energy policy	1	
The Electricity Journal	1	
Intelligent automation and soft computing	1	
TOTAL	13	19

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master			59	59
Doctoral	2	6	3	11
TOTAL	2	6	62	70

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2011
Training for graduation students	4
Advanced training	0
Professional and Structure R&D Training actions	0
TOTAL	4

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	1
Other actions	1

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	USE				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme	62	16	175	132	-25%
European Union Programmes	146	155	427	282	-34%
Consultancy and R&D Services	596	924	803	939	17%
Other R&D Services				415	
Other External Services		17		15	
Internal					
Total (k€)	804	1.112	1.405	1.783	27%

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	DYMONDS	Manuel Matos	01-10-2010	30-09-2013
PN-FCT	GEMS	Vladimiro Miranda	01-04-2010	30-09-2012
PN-FCT	Green Island	Manuel Matos	01-04-2009	31-03-2012
PN-FCT	u+EV	João Peças Lopes	01-01-2011	31-12-2013
PUE-I&D	Anemos.plus	João Peças Lopes	01-01-2007	30-06-2011
PUE-I&D	MERGE	João Peças Lopes	01-01-2010	31-12-2011
PUE-I&D	TWENTIES	Carlos Moreira	01-04-2010	31-03-2013
SERV-INT	Ampla	Cláudio Monteiro	01-09-2010	31-08-2011
SERV-INT	Argos	Vladimiro Miranda	01-12-2008	30-09-2010
SERV-INT	Parafuzzy	Jorge Correia Pereira	01-09-2008	31-08-2010
SERV-INT	SIMULESP	Jorge Pereira	01-01-2011	
SERV-NAC	ASIRP	José Nuno Fidalgo	15-06-2009	14-01-2011
SERV-NAC	Consultoria	Manuel Matos	01-01-2008	
SERV-NAC	Dopf	Jorge Pereira	01-01-2011	
SERV-NAC	EDP-Transf	João Tomé Saraiva	01-07-2010	31-12-2010
SERV-NAC	EEM-Dinamica	Helena Vasconcelos	17-12-2009	16-12-2010
SERV-NAC	EFACEC-DMS	João Peças Lopes	15-04-2001	
SERV-NAC	EFACEC-OPF	Jorge Correia Pereira	01-10-2006	
SERV-NAC	Inov Grid	João Peças Lopes	02-01-2008	01-01-2011
SERV-NAC	INOGRID2	João Peças Lopes	01-06-2010	30-04-2011
SERV-NAC	Martifer-CV (GeSto)	João Peças Lopes	15-04-2010	30-12-2010
SERV-NAC	REN-RECEP	João Peças Lopes	01-10-2007	30-09-2010
SERV-NAC	VVAR	Jorge Pereira	01-01-2011	
OID	REIVE	João Peças Lopes	02-03-2010	01-03-2012
OID	REIVE	João Peças Lopes	02-03-2010	01-03-2012
O	Coord EES-UETP	João Peças Lopes	01-04-2007	

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

		Source	2009	2010 (a)	2011
Internal HR	R&D	Employees	4	3	5
		University and Polytechnic	12	12	12
		Grant Holders and Trainees (PG)	24	31	40
	<i>Total R&D</i>		<i>40</i>	<i>46</i>	<i>57</i>
		Shared Structure (Central and Local)	2	2	2
		<i>Total Internal</i>	<i>42</i>	<i>48</i>	<i>59</i>
		External Collaborators and Invited Researchers	4	6	6
		Students (UG)	6	4	4
		Global Total	52	58	69

a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P3.4 USIG - INFORMATION AND COMPUTER GRAPHIC SYSTEMS

Coordinator: António Gaspar, Fernando Silva

P3.4.1 SHORT DESCRIPTION OF THE UNIT

The Information and Computer Graphic Systems Unit (USIG) is the result of the internal restructuring of INESC Porto R&D internal competences in Computer Graphics, Information Systems and Software Engineering. This restructuring follows the recommendations of INESC Porto's Strategic Advisory Board. This Unit includes researchers from the former Information and Communication Systems Unit and from the Telecommunications and Multimedia Unit, and new researchers that joined INESC Porto during 2009.

Management is performed by two coordinators. Both have previous experience, one in operational management of INESC Porto units and another one in research management. The former is also coordinator of CRACS, an INESC Porto Associated Laboratory Autonomous Group. This insures also a transversal coordination in Computer Science areas inside the Associated Laboratory.

The Unit objectives encompass several types of activities, namely: research, development, technology transfer, consulting, auditing and advanced training. These activities are anchored on three main research areas: Information Management and Systems, Software Engineering and Computer Graphics and Virtual Environments. Research is closely matched with application areas in which the Unit has large experience and established successful partnerships. The main applications areas are: public administration (local, regional and central government), healthcare, telecommunications, transport and industry, commerce and services sectors. It is expected that eGovernment will be a major application area in the near future.

The Unit is composed by a heterogeneous team, composed by 60 collaborators, a combination of researchers, professionals and post-graduate students with skills in diversified areas: information systems, information management, computer graphics, visualization, simulation, computer systems, office automation, telecommunications, computing sciences, software engineering and geographic engineering.

Our challenge is to link emerging market needs with research objectives, creating innovative solutions based on excellent research results, producing societal impact and contributing to the modernization of enterprises and institutions.

Table of correspondence between know-how and the Industrial Sectors

Know-how	Status (*)	Public Admin	Healthcare	Education	Telecom	Transport	Software	Industry, Commerce and Services
Information Systems	I	X	X	X	X			X
Information Retrieval	I				X			
Digital Repositories and Preservation	I	X						
Virtual Environments	I	X		X	X		X	
Geospatial Systems	I	X			X	X		
Image Synthesis and Visual Perception	I				X		X	
Software Architecture and Design	I	X					X	
Collaborative Environments	I			X				X
Software Quality	I						X	
Strategic IT Consulting	I	X	X	X	X	X	X	X

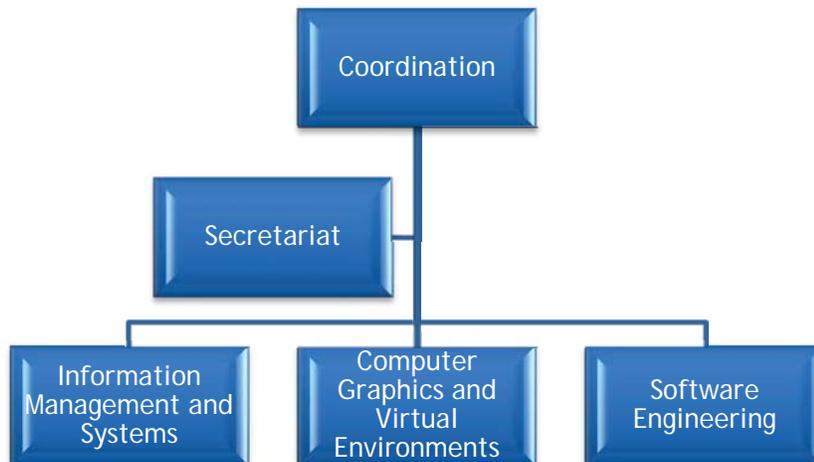
(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Coverage of the Innovation Process

Activity Area	Research	Develop	Consulting	Training	Marketing and Support	Evolutionary Maintenance	Use
Public Admin.	USIG	USIG	USIG	USIG MEDIDATA PH Informatics	MEDIDATA PH Informatics	MEDIDATA PH Informatics	Local, Regional and Central Public Admin
Healthcare	USIG	USIG	USIG	USIG			Ministry of Health Caretakers
e-Education	USIG	USIG	Aveiro University	USIG NAUTILUS Tecla Colorida	NAUTILUS Tecla Colorida	NAUTILUS Tecla Colorida	Ministry of Education
Telecom.	UTM	USIG	USIG	USIG PT IN	PT IN	PT IN	PT Group
Transport		USIG	USIG	USIG			Operators Central Public Admin

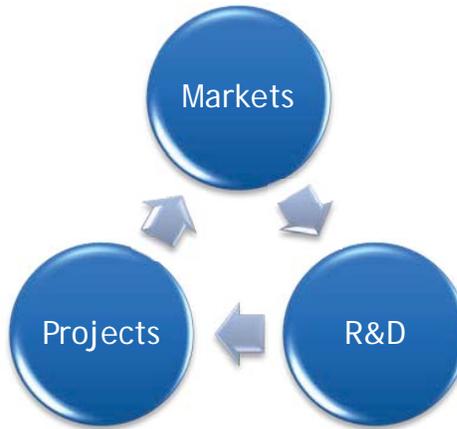
P3.4.2 DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

The Unit is structured into coordination, secretarial support and three scientific areas (Information Management and Systems, Software Engineering and Computer Graphics and Virtual Environments).



USIG's structure.

Specific projects are linked to any of the scientific areas or directly to the coordination.



USIG's positioning: implementing the innovation cycle.

P3.4.3 SWOT ANALYSIS

Strengths

- Large experience in ICT consulting, development and project management activities, ranging from Contracted Services to R&D&TT projects in European and National funding programs.
- Integrated and encompassing offer of consulting services, development, demonstration and technology transfer in the area of ICT.
- Scientific competences in Computer Graphics, Information Management, Information Systems and Software Engineering.
- e-Government domain knowledge.
- Membership of LIAAD and CRACS R&D groups in INESC Porto LA

Weaknesses

- Limited partnerships.
- Short projects.
- Limited marketing activity.
- Limited cooperation with national software industry.
- Unbalanced economic situation.
- Low scientific indicators.
- Team geographical dispersion.
- Dependence of funded projects.

Opportunities

- Various funding opportunities, at national and international level, with QREN, FP7 and improved national economic situation.
- Increased use of ICT due to modernization need of institutions and enterprises.
- Growing national software industry.

- Existing International Research Cooperation programs, e.g. CMU-Portugal, UT-Austin.
- Participation in several Clusters and Associations (DANOTEC, CEDT, ITS Portugal, TICE.PT, AIFF, OCEANOS)

Threats

- Dependence on grants mindset.
- Increased competition in funding programs, particularly European.
- Economic crisis.

P3.4.4 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

The two main strategic objectives for 2011 and for the next few years are:

- Strengthen Unit's cohesion by promoting internal communication based on regular seminars;
- Increase the Unit's scientific publications;
- Achieve a sustainable balanced economic performance.

P3.4.5 ACTION PLAN (GLOBAL)

- Take advantage of various funding opportunities, at national and international level, and of large experience in consulting, development and project management to submit diversified proposals to different programs and partners, in cooperation with other Units, LIAAD and CRACS groups, and involving national software industry.
- New projects should be based on key competences, to guarantee differentiation regarding other Units, R&D groups and enterprises, as well as guaranteeing added value to partners.
- Use eGovernment domain knowledge and track record to promote USIG's activities and create new partnerships.
- Involve private companies in consortia, taking advantage of new funding opportunities for the private sector.
- Proposal submission in diversified funding programs, selecting partners with successful track records.
- Use key competences in proposals to guarantee added value and ROI for partners.
- Leverage academic core team, in proposals submission, with internal and external scientific partnerships, like other Units, LIAAD, CRACS and Hillside Group.
- Use funding opportunities to diversify partnerships, internally and externally, with institutions and enterprises, particularly software houses, focusing in medium and long term projects.
- Increase number of direct contracts, to diversify funding sources.
- Develop website, focusing on success stories, key competences and their added value, particularly for the software industry. Approach software houses using funding opportunities or through service contracts with added value proposals.

P3.4.6 ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	5	11
Papers in National Journals with scientific referees	1	2
Conference Proceedings in events with scientific referee and selection	40	20
Books (author)	1	1
Chapter/paper in books	1	2
Publications (editor)	2	2
Other publications (National meetings, local journals, etc.)		3
Theses concluded by members of the Unit		
TOTAL	50	41

Journal	Predicted End 2010	2011
Computer Graphics and Application		1
International Journal on Advances in Software	1	2
Computers Graphics Forum	1	2
Revista Educação, Formação e Tecnologias	1	
Reviews in the Neurosciences	1	
Journal of Virtual Worlds Research	1	
IEEE Revista Iberoamericana de Tecnologias del Aprendizage	1	
Logic Journal of the IGPL	1	
Journal of Ambient Intelligence and Smart Environments	1	
TOTAL	8	5

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master	22	18	34	74
Doctoral	6	6	4	16
TOTAL	28	24	38	90

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2010	2011
Training for graduation students		
Advanced training		
Professional and Structure R&D Training actions		
TOTAL		

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	1
Other Actions	5

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	USIG				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme	75	242	478	405	-15%
European Union Programmes	138	39	240	320	33%
Consultancy and R&D Services	490	590	208	235	13%
Other R&D Services					
Other External Services	2				
Internal					
Total (k€)	705	871	926	960	4%

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	3DWikiU	António Augusto Sousa	01-04-2010	30-09-2012
PN-FCT	ERAS	António Augusto Sousa	01-01-2011	30-06-2013
PN-QREN	AAL4ALL	Angelo Martins	01-01-2011	
PN-QREN	CNG	António Gaspar	01-01-2011	
PN-QREN	CompanyDocs	Rui Barros	01-01-2011	30-06-2013
PN-QREN	D4I	Rui Barros	01-09-2010	31-08-2012
PN-QREN	ECOPLANNER	José Correia	01-01-2011	31-12-2012
PN-QREN	Mobiles-1	José Correia	30-05-2009	29-05-2011
PN-QREN	Palco3.0	António Gaspar	03-12-2008	30-11-2011
PN-QREN	Portal Douro	António Coelho	01-04-2009	31-03-2011
PN-QREN	Robot Vigil-2	António Coelho	01-01-2010	31-12-2011
PN-QREN	TICE.Mobilidade	José Correia	01-01-2011	31-12-2013
PUE-I&D	ICT4 Depression	Mário Ricardo Henriques	01-01-2010	31-12-2012
PUE-DIV	ADD-ME	Rui Barros	01-11-2009	31-10-2011
PUE-DIV	CEMSDI	Rui Barros	01-06-2010	31-05-2012
PUE-DIV	eCAALYX	Angelo Martins	01-05-2009	30-04-2012
PUE-DIV	RAIA	Artur Rocha	01-01-2009	31-12-2011
SERV-NAC	CCDRN-EA	António Gaspar	01-01-2011	31-12-2015
SERV-NAC	MNRF-TT	António Gaspar	18-11-2010	30-11-2011
SERV-NAC	RAIA.co	Artur Rocha	01-01-2011	31-12-2013

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

		Source	2009	2010 (a)	2011
Internal HR	R&D	Employees	10	8	8
		University and Polytechnic	11	11	11
		Grant Holders and Trainees (PG)	10	24	25
	<i>Total R&D</i>		<i>31</i>	<i>43</i>	<i>44</i>
	Shared Structure (Central and Local)		1	1	1
		<i>Total Internal</i>	<i>32</i>	<i>44</i>	<i>45</i>
		External Collaborators and Invited Researchers	6	6	6
		Students (UG)	9	9	0
		Global Total	47	59	51

a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P3.5 UTM - TELECOMMUNICATIONS AND MULTIMEDIA

Coordinators: José Ruela, Augustin Olivier

P3.5.1. SHORT DESCRIPTION OF THE UNIT

The Telecommunications and Multimedia Unit carries out research and development, consulting, technology transfer and advanced training in scientific and technological areas that fostered the convergence between the traditional telecom and broadcast worlds, the Internet and multimedia.

It has a multi and interdisciplinary nature and, for this reason, it is internally organized in Areas, for management and scientific purposes. Each Area carries out basic and applied research in related topics, under a common strategy and goals determined by the market sector it covers:

- Multimedia Technologies and Systems: media processing (music, audio, video and image), content management, advanced multimedia services.
- Wireless Networks: advanced network architectures and protocols, mesh and ad-hoc networks, multicast and mobility management, quality of service, security, cross-layer optimization.
- Optical and Electronics Technologies: microwave and optical communications, and microelectronics.

Coordination at Unit level allows the exploitation of complementary technical and scientific skills developed by each Area as well as the synergies necessary to design solutions and to develop and integrate HW/SW components in networked multimedia systems and services, suitable for dynamic and heterogeneous environments characterized by:

- the need of end-users to access multimedia content, anytime, anywhere;
- the increased mobility of end-users and devices;
- heterogeneous access networks;
- high-speed transmission systems;
- new networking paradigms;
- new business roles played both by traditional customers and providers, as well as by new (Internet) stakeholders.

The Unit pursues a high-level of scientific excellence, with international recognition. Most of its activities, both at national and international level, are carried out under contract and in partnership with telecom and network operators, service providers, broadcasters, content producers and providers, equipment manufacturers, software houses, system integrators, universities and research institutions.

The exploitation of results is carried out by means of R&D contracts, technology transfer and consulting and plays an important role in the incubation of start-up companies.

Table of correspondence between know-how and target customers

Know-how	Status (*)	Category						
		User		Access / Core		Services		
		Customers						
		Vendors	Communities	Vendors	Operators	ASPs	Virtual operators	ISPs
Transmission systems	I	X	X	X	X			X
Modulation and coding	I	X	X	X	X			X
Radio resource management	E		X	X	X			
Signal Processing	I	X	X	X	X	X		
Design and test of	I	X	X	X	X			

Know-how	Status (*)	Category						
		User		Access / Core		Services		
		Customers						
		Vendors	Communities	Vendors	Operators	ASPs	Virtual operators	ISPs
electronic systems								
Reconfigurable systems	I	X	X	X	X			
Microwave and RF circuit design	I	X	X	X	X			X
Cognitive radio	E	X	X	X	X		X	
Cooperative networking	I	X	X	X	X		X	X
Wireless technologies	I		x	x	x	x		x
Radio-aware networking	I		x	x	x	x		
Cross-layer design	I		x	x	x	x		
Mesh networks	I		x	x	x	x		x
Mobility management	I		x	x	x	x		x
Network security	I		x	x	x	x		x
Traffic monitoring	I		x	x	x	x		
Overlay networks	I		x	x		x		x
Audiovisual analysis	I	X	X			X	X	
Machine learning	I	X	X			x	x	
Multimedia processing	I	X	X			X	X	
Distributed technologies	I					X	X	X
Information systems and metadata	I	x	X			X	X	X
Ontological reasoning	I	X	X			X	X	

(*) I - Internal; O - Existent in another Unit of INESC Porto; E - External; C - To be created

P3.5.2. DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

The Telecommunications and Multimedia Unit is currently organized in three Areas, as a result of a process that has been matured during the last years, but still needs to be consolidated in the future.

The Multimedia Technologies and Systems Area was created to integrate and coordinate well established R&D activities in Media Processing (Audio, Video and Image) and Multimedia Distributed Systems. This was mainly driven by the need to allow a broader and unified scope of intervention in all aspects related with multimedia content value chains, namely generation, description, manipulation, adaptation, transmission and distribution of multimedia content over heterogeneous platforms. The active and successful participation in projects funded by EC programmes, together with post-graduate research programmes, helped consolidating know-how in this area, which is now also being exploited in national partnerships.

The Wireless Networks (WiN) Area has for the past years focused its research activity on mobile networks and addresses innovative architectural solutions (e.g., Quality of Service, mobility, security) required by these networks, as well as new communications paradigms that they make possible. This activity has been strengthened with the participation in projects funded by EC and national programmes and constitutes a natural framework for post-graduate students to carry out their research work (mainly at PhD level).

The Optical and Electronics Technologies Area was created with the main goal of defining and pursuing a strategy that could leverage existing and promising R&D activities with a technological intensive basis, namely in Optical Communications and Microwaves, and Microelectronics. An important asset for research work in this Area is a Photonics and Microwaves laboratory, which allows supporting basic research and

academic work at PhD level, as well as the development of pre-industrial prototypes for different application fields.

The former Internet Architectures and Networking (IAN) Area has been extinguished, since its leaders and most of its researchers left INESC Porto; however, some of the research topics carried out by this Area (namely advanced Internet architectures and community networking) are still being covered by researchers in the Wireless Networks (WiN) Area.

Although each Area has its own strategy and plan of activities (detailed in a separate section), synergies between them have been and will continue to be exploited, when possible and necessary. Similarly, there are examples of successful collaboration with other Units that are expected to continue and be reinforced in the coming years.

The recent changes in the Unit coordination (with two coordinators, since the end of 2009), the need to consolidate and reinforce R&D activities at national level (boosted by the participation in a large number of projects funded by the QREN programme) and to increase the participation in European projects to former levels, justified reanalyzing the current organization of the Unit. A set of objectives and actions have been identified and are already being implemented, as detailed in another section.

P3.5.3. SWOT ANALYSIS

Strengths

- Good environment for work (administrative efficiency)
- Solid and diverse scientific expertise (flexibility and adaptability)
- Experience in international projects, with relevant companies
- Ease to integrate and to participate in multi disciplinary projects
- Size of the Unit in terms of researchers
- Proximity to other R&D groups
- Scientific merit of many of the elements of the Unit
- Enhancer of teaching careers

Weaknesses

- Lack of national and international recognition for leadership in one or more scientific areas (low external visibility)
- Lack of active participation of "more senior" members in decision-making at national and European level
- Lack of information on the work and activities of other groups and Units (mechanisms of communication within the Unit rather formal)
- Deficient knowledge of the Portuguese industry to identify research challenges and opportunities (gap between scientific expertise related to research activity and the actual needs of companies)
- Lack of partnerships with foreign companies
- Absence of strategy in the multimedia area as an aggregator
- Absence of a clear separation between management activities and scientific coordination
- Lack of critical mass in some areas
- Dispersion of activities without common strategy decided at Unit level
- Absence of more visible results in terms of products / prototypes
- Lack of motivation for the valorisation of knowledge

Opportunities

- Exploitation of results and consolidation of partnerships set-up in projects funded by QREN programme
- Very fast technological development in most domains covered by the Unit
- Increasing importance of communications, applications and services and their roles and in horizontal activities
- Availability of critical mass in the associates of INESC Porto and capability to extend current activity
- Work done by MSc and PhD students as a potential source of valorisation and transfer of technology
- Transport market with growing needs to add services
- Availability of national and international young researchers
- PCT (*Pólo de Competitivade e Tecnologia*) OCEANO XXI (research in underwater communications)
- Existence of a large contact list of international partners
- SMARTGRID market
- Development of applications for smartphones

Threats

- End at the short-term of funding programs and reduced funding opportunities due to economic crisis
- Absence of strategic industry partners
- Increasing lack of external visibility of INESC Porto and FEUP in the Telecommunications area
- European programs very competitive and loss of influence of the Unit in FP7
- Lack of PhD students in technological fields and reduced interest of students in Telecommunications
- Relocation of businesses to other markets

P3.5.4. MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

As previously mentioned, a reorganization of the Unit is currently taking place with the involvement of senior researchers who participate in the Unit council.

Following the SWOT analysis, a set of strategic objectives were identified and classified along the following axes:

- Unit organisation
- Human resources strategy
- Scientific positioning strategy
- Strategy for enhancement of scientific knowledge and technology transfer
- Communication strategy and image

These strategic objectives will be detailed in the last section (Action Plan) since they are tightly coupled with a set of lines of action that will be pursued to reach them.

The content of this section is therefore oriented to short term scientific objectives that will be pursued during 2011, in particular those that are specific of each Area.

The Unit will continue to host MSc and PhD students and post-doc researchers, with active involvement in research projects. On the one hand this is already occurring in the framework of PhD programs jointly

offered by the Universities of Minho, Aveiro and Porto in Telecommunications and Informatics (MAP-Tele and MAP-i, respectively), as well as in the Doctoral Programme in Electrical and Computer Engineering of the University of Porto. On the other hand, a number of R&D projects have been submitted to programs funded by FCT, with CMU and the University of Texas at Austin, which include support for PhD scholarships and stays at those US universities.

Scientific and technical results will be exploited in research contracts with the industry, in particular in the framework of QREN (*Quadro de Referência Estratégico Nacional*). Moreover, the Unit is involved in the preparation of a number of EC funded projects (FP7 programme).

The Unit will continue to encourage and help the incubation of new start-up companies and to reinforce the cooperation with former ones.

The specific objectives of each Area are detailed next.

Multimedia Technologies and Systems

This Area encompasses two main axes of research, namely distributed multimedia systems and media processing.

Along the first axe, the main goal is to develop systems that facilitate the access to distributed multimedia resources in heterogeneous environments to any user in a seamless, adaptable and personalised way. In the pursuit of this objective, researchers are addressing the following scientific and technological challenges:

- Low-level context acquisition and representation;
- Context analysis and inference of additional high-level knowledge;
- Acquisition and profiling of user preferences;
- Content recommendation;
- Adaptation decision;
- Efficient distribution, storage and retrieval of multimedia resources.

These aspects are being tackled through the use of metadata specifications, ontologies and reasoning mechanisms; machine learning and rate-distortion techniques; peer-to-peer, publish-subscribe and service-oriented paradigms. Areas of application include entertainment, culture, tourism and mobile multimedia Internet. The area has been working since the past few years towards the development of context-aware distributed multimedia applications and has recently initiated research concerning advanced content recommendation and metadata for 3D and user generated content. This was mainly driven by the need to allow a broader and unified scope of intervention in all aspects related with multimedia content value chains, namely generation, description, manipulation, adaptation, transmission and distribution, analysis and use of multimedia content over heterogeneous platforms.

Along the second axe of research, media processing, the aim is to develop intelligent automatic or semi-automatic audiovisual applications that enhance people's life across different dimensions. Towards that goal, researchers are investigating techniques for efficient automatic extraction of high-level features of video, audio and image signals and the generation of additional knowledge and rich models from the extracted data. These aspects are being addressed through the joint use of signal processing and machine learning techniques for features extraction and model design.

Areas of application include video surveillance, assisted living and medical applications, where the analysis of video, audio and image and inference of additional knowledge in an automatic way can help developing applications that improve the life of citizens and also deliver powerful tools for clinical diagnosis. Creative and innovative social experiences are also one of the target application areas, where important research work has already been developed in the field of music analysis and recommendations. The area of application of video surveillance is gaining more emphasis inside the group, with significant efforts being invested on the development of efficient image segmentation, object detection and body tracking algorithms.

The area of assisted living is also gaining momentum with important partnerships recently established with external research groups.

These research objectives are being pursued with the support of externally funded projects, notably from the Framework Programme 7 of the European Community and also from national programmes. The area has currently running one important FP7 project and several national projects partially funded through the QREN and FCT programmes. The latter includes projects approved under the Portugal-Austin agreement in addition to individual projects. Research is also being conducted in projects directly funded from the industry, namely under the PT Innovation Programme 2010-2011. The area has also a number of researchers holding PhD grants from FCT.

New project proposals have been prepared and submitted to the FCT and other proposals are being prepared for submission to FP7 and to QREN, the latter arising from local initiatives with the industry. The following initiatives are underway:

- preparation of five project proposals to be submitted to call 7 of FP7;
- contacts established with Portuguese industry to launch new projects to submit to QREN;
- several project proposals submitted to the FCT programme and awaiting approval decision.

Wireless Networks (WiN)

This Area (<http://win.inescporto.pt>) is focused on the design of Wireless Networks with the purpose of extending-infrastructure networks and enabling the emergence of networks of “things”. Research activities are aimed at providing PhD level training in this field, transferring know-how to national and regional players, and enabling the creation of new companies.

Most of the research problems are addressed as PhD theses and the following topics will continue to be addressed in 2011:

- dynamic radio channel allocation combined with cross layer techniques to implement adaptive radio-aware networks;
- scalable and traffic aware routing techniques;
- auto-configuration of systems and networks;
- efficient and secure support of new types of traffic (IPTV, peer-to-peer applications, Web-based services).
- The main results expected in 2011 include:
- a network mobility solution for vehicular mesh networks;
- a solution for the dynamic and distributed allocation of radio channels in IEEE mesh wireless LANs;
- a solution for controlling the beam of directional antennas;
- optimal deployment of peer-to-peer video services over wireless networks;
- mechanisms for enabling auto-configurable secure communications.

Optical and Electronics Technologies

This Area has been created to merge the research activities of two groups, “Microwave and Optical Communications” and “CAD and Microelectronics”. Both groups have joined efforts in an EU project of the Marie Curie Initial Training Network programme, “ACEOLE - Data Acquisition, Electronics, and Optoelectronics for LHC Experiments”, with CERN as the leading partner. The application to renew this action - ACEOLE II - is being prepared for submission in 2011. The application of FPGAs for the implementation of dispersion algorithms in coherent optical systems is another example of planned joint activities. Collaboration with other areas of activity within UTM is also in course, mainly in the framework of QREN and FCT programmes.

The activity in Microelectronics is organized in three main domains: dynamic configurable logic and custom computing hardware; analogue and RF circuits design; test and design-for-testability of analogue, mixed-signal and RF circuits.

- Research on dynamic reconfigurable logic (DRL) will continue to address the area of application development support. Current work on run-time assembly of reconfigurable modules has produced interesting results and will be expanded. In particular, automatic generation of hardware from running programs will be targeted. The application of DRL to interconnect fabrics for many-core

RSoCs (reconfigurable systems-on-chip) will also be addressed. Research efforts to improve the exploitation of DRL from standard programming languages (like C) have been started and will be expanded.

- In the domain of analogue, mixed-signal, and RF test and design for testability, one foresees for 2011 the conclusion of a PhD thesis on test and adaptive functionality of RF power amplifiers. An MSc dissertation will be carried-out on accurate estimation of output power of RF power amplifiers.
- The CERN mono-cite Marie-Curie ITN ACEOLE project continues with the development of a low-phase noise low-bandwidth Phase-Locked Loop (PLL) to synthesize clocks with high spectral purity. Activities in 2011 will be devoted to conclude the design and fabrication of a prototype chip. INESC Porto will host a short course on soft skills (research management and applications writing) for all researchers/students involved in ACEOLE.
- The activity on design and test of circuits and systems for medical applications is being pursued within project ProLimb. On the other hand, an application is being prepared to organize an Intensive Program course.
- The group is currently involved in the consortium of an European project to be submitted to the IST-ICT 7th Framework programme.

The activity in Microwave and Optical Communications involves the following research activities:

- The research area known as radio-over-fiber in 2011 is being supported by EU and FCT projects, DAPHNE-“Developing aircraft photonic networks” and WOWi-“Wireless-optical-wireless interfaces for picocellular access networks” respectively, and through PhD programmes.
- In the microwave field work is under way to investigate the development of small size microstrip antennas suitable for multiband operation in wireless applications, based on fractal geometries combined with EBG (Electromagnetic Band-Gap) techniques. Two PhD students are currently doing their postgraduate studies in this field.
- In this area collaboration with the local industry is expected to take place specifically in the design of anti-theft RF tags (antennas) printed in plastic bags.
- The use of highly-nonlinear fibers for optical signal processing in optical communication systems is currently being investigated under the FCT project “OSP-HNLF - Optical Signal Processing Using Highly Nonlinear Fibers”. Both photonic crystal fibers and tapered fibers will be considered, and issues like beam propagation and dispersion optimization will be addressed. Moreover, the generation of supercontinuum using these fibers will also be studied.
- In the DAPHNE project, the group is actively engaged in the evaluation of ROF technology for the transmission of wireless signals in airplanes over a PON network using subcarrier multiplexing techniques. This includes communication between the plane and earth as well as the provision of wireless services to the passengers.
- A new area of research within the group is being addressed which is expected to continue during 2011. This area investigates “Single Photon Counter” techniques based on avalanche photodiodes. This area finds applications in next-generation optical time domain reflectometer (OTDRs) for fault monitoring in passive optical access networks.
- The nonlinear dynamics governed by the cubic-quintic complex Ginzburg-Landau (CGLE) equation with higher-order effects will be studied. In particular, a linear stability analysis will be carried out to understand the elimination of the explosions in the erupting region of the CGLE provided by intrapulse Raman scattering. Other higher-order effects such as third-order dispersion and self-steepening will also be investigated.
- Under the FCT project “Steering of light in nonlinear waveguides with resonant interactions”, the propagation of light in nonlinear systems exhibiting resonant coupling between light and material excitation will be investigated. Among the systems to be studied are hollow-core photonic crystal fibers filled with gases of multi-level atom and waveguides formed by microstructured.

P3.5.5. ACTION PLAN (GLOBAL)

The main strategic objectives were previously outlined and classified at a very high level and will now be presented in detail in connection with the associated actions that will be carried out in 2011 and continued in the following years in order to fulfil them. Accomplishment of some specific objectives may require a combination of actions. For the set of objectives under the same class (classification axe), the lines of action and the specific target objectives are presented (as bullets).

Organization

Structuring the organization of the Unit

- Clarify the areas of intervention of groups and their competencies (groups positioning)
- Involve the most senior researchers in management activities
- Assume Multimedia as a “proposal machine” (calls seeker)
- Capacity to launch various projects with reduced administrative tasks for researchers

Continuous improvement

- Increase efficiency for harnessing the self-assessment of the Unit
- Setting targets for each area (e.g., publications, PhD theses, R&D projects and contracts)

Human resources strategy

Identification and classification of existing personnel

- Increase the research potential
- Fill potential gaps
- Facilitate planning of a research or academic career

Promote intra-Unit joint actions

- Exploit and increase intra-Unit synergies
- Identify and launch multidisciplinary challenges

Increase critical mass

- Leverage the scientific areas with greatest potential
- Set policy for post-doc activities (e.g., publications)
- Increase the offer of PhD student positions (leverage publications)
- Participation in international doctoral programmes (CMU, MIT, Austin, etc.)
- Develop attractive themes (life cycle) associated with projects

Integration of key people

- Attract and select the best elements of other institutions
- Leverage the areas with greatest potential
- Leverage networking actions

Scientific positioning strategy

Using known contacts to speed up new projects

- Structuring the network of contacts / contact database (CRM - Customer Relationship Management)
- Leverage opportunities for projects and exchange of researchers
- Participation in international networking meetings (e.g., infodays)

- Collaboration with the elements of INESC Porto / UTM that represent the institution (as all levels)
- Accessing alternative funding sources

Identify strategic areas for research

- Clarify the areas of intervention of groups and their competencies (groups positioning)
- Identification of novel concepts, without immediate market applications (high risk)
- Focus on areas of research that leverage transversal applications
- Identification and mapping of areas of interest to researchers in strategic areas of the Unit
- Creation of synergies and cohesion in areas of interest
- Participation in international doctoral programmes (CMU, MIT, Austin, etc.)
- Setting targets for each area (e.g., publications, PhD theses, R&D projects and contracts)
- Set-up a line of research and / or adapt results for Smartphone applications

Establish strategic partnerships

- Strengthen collaboration with USE
- Define proposals for sea applications
- Establish partnerships with the R & D Units of the institution (e.g., ROBIS)
- Participate in the PCTs (*Pólos de Competitivade e Tecnologia*) to identify new lines of research
- Create a more dedicated partnership with companies (training, new lines of research, etc.)
- Increase the offer of PhD student positions (leverage publications)
- Accessing alternative funding sources

Strategy for enhancement of scientific knowledge and technology transfer

Proactive actions with companies

- Establish UTM's offer and its benefits (to prepare an integrated offering)
- Target more adequately the needs of industry
- Open the researchers to the industry world, participate in external meetings with industrial companies, attend meetings of the PCTs (*Pólos de Competitivade e Tecnologia*)
- Undertake inter-Unit projects with Units closer to industry and utilities (UESP, ROBIS, USE)
- Identify companies with financial resources and growth potential
- Seek to strengthen a partnership with (at least) a company
- Build partnerships with more dedicated goals (training, new lines of business)
- Identify the requirements for future needs (taking into account the life cycle of ideas)
- Accessing alternative funding sources

Internal innovation

- Encourage internal innovation and promote the culture of prototyping
- Breaking the current logic, implementing the concept of life cycle, participating in meetings with industrial partners in PCTs (*Pólos de Competitivade e Tecnologia*)
- Focus on research areas with transversal applications
- Identification of internal lines of research that are valued by the market
- Publicize the policy of financial exploitation of knowledge inside the Unit

Explore new areas and market segments

- Develop an offer oriented to the sea applications
- Greater proactivity with the PCT (*Pólo de Competitivade e Tecnologia*) OCEANO XXI
- Adapting results for smartphone applications
- Explore applications oriented to electric vehicles and smart grids
- Internationalization - priority to Brazil
- Support the institution in seeking / selecting new markets
- Accessing alternative funding sources

Communication strategy and image

Changes to website

- Highlight and reformulate the areas of intervention
- Show the degree of innovation
- Fostering better approach to companies (common language)
- Publicize the success of contracts and R & D projects
- Attract researchers

Participate in international networking / concertation meetings

- Promote institution and working groups
- Establish contacts
- Leveraging new opportunities

Establish the model of internal communication

- Disseminate internal information
- Create internal and inter-Unit synergies
- Dissemination of project opportunities and PhD working plans

P3.5.6. ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	20	22
Papers in National Journals with scientific referees	0	0
Conference Proceedings in events with scientific referee and selection	45	48
Books (author)	0	0
Chapter/paper in books	2	2
Publications (editor)	0	2
Other publications (National meetings, local journals, etc.)	13	15
Theses concluded by members of the Unit	7	10
TOTAL	87	99

Journal	Predicted End 2010	2011
IEEE Transactions on Image Processing		1
Wireless Communications and Mobile Computing		1
Journal of Network and Computer Applications		1
Artificial Intelligence		1
Journal of New Music Research		2
Signal Processing		1
Journal of Experimental Psychology: Human Perception and Performance		1
TOTAL		8

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master	5	0	30	35
Doctoral	9	32	12	53
TOTAL	14	32	42	88

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2010	2011
Training for graduation students	13	30
Advanced training	1	2
Professional and Structure R&D Training actions	1	3
TOTAL	15	35

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	8
Other Actions	4

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	UTM				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme	106	398	498	485	-3%
European Union Programmes	558	178	196	268	37%
Consultancy and R&D Services	43	105	186	73	-61%
Other R&D Services				80	
Other External Services		33			
Internal					
Total (k€)	707	714	880	906	3%

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	ImTV	Paula Viana	01-09-2010	28-02-2013
PN-FCT	KINETIC	Carlos Guedes	01-04-2009	31-03-2011
PN-FCT	MuMoMgt	José Ruela	01-02-2009	31-01-2012
PN-FCT	NeTS	Ricardo Morla	01-01-2011	31-12-2013
PN-FCT	OSP	Maria Inês Carvalho	01-05-2010	07-04-2013
PN-FCT	Pro Limb	José Machado da Silva	05-04-2010	04-04-2013
PN-FCT	SELF-PVP	Vítor Grade Tavares	01-09-2010	31-08-2013
PN-FCT	SHH	Ricardo Morla	01-05-2010	31-10-2012
PN-FCT	SUM	Ricardo Morla	01-01-2011	31-12-2013
PN-FCT	WIWO	Henrique Salgado	01-11-2010	31-12-2012
PN-QREN	Hotel3.0	Rute Sofia	01-01-2010	31-12-2011
PN-QREN	LUL	Luís Corte Real	02-01-2010	01-01-2012
PN-QREN	Mobiles	José Ruela	30-05-2009	29-05-2011
PN-QREN	P3.net	Ricardo Morla	02-02-2010	31-12-2012
PN-QREN	Palco3.0-1	Fabien Gouyon	03-12-2008	30-11-2011
PN-QREN	ReCoop	José Ruela	01-01-2009	31-12-2011
PN-QREN	Robot Vigil-1	José Ruela	01-01-2010	31-12-2011
PN-QREN	Semantic PACS	Jaime Cardoso	01-01-2009	30-06-2011
PN-QREN	SITMe	Manuel Ricardo	01-06-2009	24-10-2011
PUE-I&D	Alicante	Manuel Ricardo	01-03-2010	28-02-2013
PUE-I&D	Convergence	Maria Teresa Andrade	01-06-2010	28-02-2013
PUE-I&D	Daphne	Henrique Salgado	01-09-2009	31-08-2012
SERV-NAC	Context Aware	Maria Teresa Andrade	05-03-2010	04-04-2011
SERV-NAC	SWIOP	Manuel Ricardo	01-09-2009	31-05-2011
SERV-NAC	User-Tracking2.0	Ricardo Morla	01-10-2010	30-09-2011
OID	REIVE-1		02-03-2010	01-03-2012

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

Source		2009	2010 (a)	2011
Internal HR	R&D			
	Employees	5	3	
	University and Polytechnic	25	27	
	Grant Holders and Trainees (PG)	47	54	
<i>Total R&D</i>		<i>77</i>	<i>84</i>	<i>0</i>
Shared Structure (Central and Local)		1	1	
<i>Total Internal</i>		<i>78</i>	<i>85</i>	<i>0</i>
External Collaborators and Invited Researchers		14	13	
Students (UG)		13	13	
Global Total		105	111	0

a) Information at the time of the elaboration of the document Plano e Orçamento para 2011

P3.6 UI TT - INNOVATION AND TECHNOLOGY TRANSFER

Coordinator: Alexandra Xavier, João Claro

P3.6.1 SHORT DESCRIPTION OF THE UNIT

R&D Institutions that intend to take advantage of the economic opportunities of their R&D programmes should leverage their innovation potential through appropriate strategies and management processes which might allow them to manage and promote their R&D results outside the organization, in order to create economic value.

The purpose of the Unit is to take responsibility and leadership of the process of knowledge valorisation.

In this context, the main goal of the UI TT is to develop and promote innovation management practices, internally and externally, supporting entrepreneurship and technology transfer activities as well as incubation at seed phase.

The Unit also plays a role in the creation and increase of knowledge in the scientific area of Innovation Management, Technology Transfer and Entrepreneurship. Thus, advanced training - MSc and PhD level training - also constitutes an objective aiming at creating internal excellence in the relevant research areas and to provide the industry with highly qualified professionals, capable of dealing with the challenges of entrepreneurial innovation.

The Unit main Research and Development areas and activities are:

- The Innovation Management:
 - Act directly in the internal innovation process and practices, by developing, in collaboration with other R&D Units, processes and tools that enable an efficient management of R&D projects results in order to maximize the valorisation opportunities.
 - Provide consulting services to companies, concerning the implementation of R&D+I management systems according to NP 4457:2007. These services follow a proprietary methodology, developed in the context of COTEC Portugal project.
 - Provide training to companies in order to increase awareness and knowledge concerning Innovation management systems and methodologies.
 - Development research projects in order to increase emergent knowledge that supports internal and external activities.
- Enabling the Fuzzy Front End of Innovation
 - The innovation process may be divided into three areas: the fuzzy front end (FFE), the new product development (NPD) process, and commercialization. In this research area we will put our effort and focus in the Fuzzy Front End of Innovation, namely in the multidisciplinary methods and tools, that enable the unfolding of the so-called New Concept Development phase. Examples of research topics include & combine (but are not restricted to) issues such: Network Enabled Organizations; Collaborative Innovation Networks; Enterprise Integration; The role of IT, Supporting Technologies and Interoperability; Roadmapping and Foresight; Negotiation; Cultural Issues; Quantitative and Qualitative Research Methods applied to the FEE (e.g.: Quick Ethnography)
- Technology Management
 - Technology Management links engineering, science, and management disciplines to plan, develop, and implement technological capabilities to shape and accomplish the strategic and operational objectives of an organization.
 - Technology Strategy, and its interaction with Operations Strategy, are currently the key focus areas within Technology Management. Examples of research topics include: the joint evolution of technology and operations strategy in high-tech start-ups; the interactions between the complexity of a technology system and the complexity of the adopter's operations; the strategic inclusion of flexibility in the technology and operations components of engineering systems to improve their performance in contexts of uncertainty.

- Entrepreneurship:
 - Promote an entrepreneurship culture behind academic researchers
 - Create entrepreneurial awareness through the organization of training actions, development of tools, and giving direct support to promoters in the process of turning ideas into business.
 - Supply of incubation services through the incubator LET-IN.

Table of correspondence between know-how and External and Internal application

Know-how	Status (*)	Internal Units	Companies	Entrepreneurs
NPD	I/E	X	X	X
Enterprise Integration	I	X		
Narrative & Business Narrative Modelling and Analysis	I	X		
Innovation Management System	I	X	X	
Creativity	E	X	X	X
Business Concept Development	I/E	X		X
Business Plan Development	I/O/E	X		X
Management of "proof of concept" projects	I	X	X	X
Commercial Feasibility studies	I	X		X
Technology Feasibility studies	O	X	X	X
Technology Transfer	C	X	X	X
Innovation Metrics	I/E	X	X	
Open Innovation	I/E	X	X	X
Technology Management	I/O/E	X	X	X

(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Potential Coverage of the Innovation Process application

Activity Area	Research	Development	Consulting	Training	Internal Use
Development of R&D + innovation management tools		X	X	X	X
Implementation of innovation management systems			X	X	X
Business Plan methodologies and tools		X	X	x	X
Definition and development of methodologies to diagnosis and evaluate R&D+I management systems		X	X	X	X
Technology Feasibility studies			X	X	X
Commercial Feasibility studies			X	X	X
Open Innovation	X			X	X
Technology Roadmaps	X	X	X		
Technology Management	X	X		X	X

P3.6.2 DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

The Unit's management is assumed by Alexandra Xavier and João Claro with direct support of the Board of Direction.

The Unit is focused on the areas: Innovation Management, Business Development and Entrepreneurship, Technology Management and Technology Transfer.

The main activities are:

- Training actions;
- Consulting services for companies in order to increase their potential for Innovation;
- Helping entrepreneurs in the process of evaluation of opportunities and in the development of "Commercial Feasibility Studies" and "Business Plans";
- Implementing process and tools for an efficient management of R&D and Innovation projects. Development of R&D activities in order to increase Knowledge and sustain the overall activity.

The Unit works in collaboration with the others R&D Units, with the Board of Directors, and with entrepreneurs.

P3.6.3 SWOT ANALYSIS

Strengths

- Past experience in the implementation of processes and tools concerning innovation process.
- Competences in the area of Innovation management systems.
- Experience and competence concerning business development process.
- Experience and competence in advanced training in the area of innovation and entrepreneurship.
- Good relationship between the Unit and researchers.
- Good relationships between the Unit and some entrepreneurship advanced training courses.
- Good relationships between the Unit and pilot companies that implemented the certification on innovation management (NP 4457:2007).

Weaknesses

- Incipient international networking for the development of R&D projects.
- Inefficient commercial approach and lack of adequate staff to meet the expected increase of consulting activities in the area of innovation management systems.

Opportunities

- Collaboration with other International Research Unit in European Projects (Lappeenranta University of Technology, Texas Austin University, IC2, WIFO), which will foster the Unit scientific output.
- Increasing awareness by public (Portuguese Government - QREN) and private (COTEC and Portuguese largest firms) entities of the need of innovation and R&D+I management training and certification.

Threats

- Relative scarcity of entrepreneurial culture and empowerment of Portuguese economic agents in general and researchers in particular.
- Increasing competition in the area of R&D+I related training and consulting.

P3.6.4 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

The main strategic objectives for 2011 are:

- Develop an internal document containing an explicit and formal scientific policy.
- Consolidate our offer of consulting services in the R&D+I area through a careful selection process of key clients.
- Attract high quality MSc and PhD researchers in order to increase our critical mass both at scientific and consulting levels.
- Implement visible and high quality training actions in the area of Innovation Management.
- Organize high quality events that financially support and give visibility to the Unit's scientific and technology resources.
- Enlarge our international collaborations through the participation in EU (and other international) projects.
- To diffuse the 'Open Innovation' paradigm within the Portuguese economy.

P3.6.5 ACTION PLAN (GLOBAL)

- Reinforcing the scientific activity of the Unit.
- Continue to implement of the training action plan in the areas of Innovation Management and Technology Transfer.
- Continue to implement of training actions concerning the dissemination of an entrepreneurial culture among researchers.
- Identification and development of strategic collaborations and formal partnerships that might seem important to the development of the main areas of activities.
- To become a privilege consulting partner of Portuguese companies in the implementation of Innovation management systems.
- To become a nationally and internationally renowned unit in the Technology and Innovation Management area.

P3.6.6 ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	19	19
Papers in National Journals with scientific referees	5	5
Conference Proceedings in events with scientific referee and selection	10	
Books (author)	2	
Chapter/paper in books	1	
Publications (editor)	3	2
Other publications (National meetings, local journals, etc.)		1
Theses concluded by members of the Unit	2	10
TOTAL	42	37

Journal	Predicted End 2010	2011
Ecological Economics		1
Acta Oeconomica		1

Journal	Predicted End 2010	2011
Industrial and Corporate Change		1
Research Policy	1	
Regional Studies	1	
Higher Education	1	
Journal of Academic Ethics	2	
Industry and Higher Education	1	
Portuguese Journal of Management Studies	1	
TOTAL	7	3

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master	15		12	27
Doctoral	9	11		20
TOTAL	24	11	12	47

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2010	2011
Training for graduation students		
Advanced training		
Professional and Structure R&D Training actions		
TOTAL		

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	
Other Actions	

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	UITT				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme	30	28	79	149	89%
European Union Programmes					
Consultancy and R&D Services	169	70	89	89	0%
Other R&D Services					
Other External Services		8			

Internal					
<i>Total (k€)</i>	<i>199</i>	<i>106</i>	<i>168</i>	<i>238</i>	<i>42%</i>

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	Fire_Engine	João Claro	01-09-2010	31-08-2013
PN-FCT	NODES	João Claro	01-01-2011	31-03-2013
PN-QREN	Fadis	Alexandra Xavier	01-07-2009	30-06-2011
PN-QREN	PINC	Alexandra Xavier	01-09-2010	30-08-2012
PN-QREN	TEC-EMPREENDE	Alexandra Xavier	01-09-2010	30-08-2012
SERV-NAC	Consultoria	Alexandra Xavier	01-01-2008	
SERV-NAC	Formacao COTEC	Alexandra Xavier	01-01-2008	
SERV-NAC	SGIDI Mar Kayaks	Alexandra Xavier	01-09-2009	30-06-2012
SERV-NAC	SGIDI Shortcut	Alexandra Xavier	01-10-2009	31-12-2012
SERV-NAC	SGIDI_FLUPOL	Alexandra Xavier	01-02-2011	30-07-2011
SERV-NAC	SIFIDE_MNRF	Alexandra Xavier	01-01-2011	30-03-2011
SERV-NAC	UPIN-SIAC	Alexandra Xavier	15-04-2010	31-10-2010
PN-FCT	Fire_Engine	João Claro	01-09-2010	31-08-2013
PN-FCT	NODES	João Claro	01-01-2011	31-03-2013
PN-QREN	Fadis	Alexandra Xavier	01-07-2009	30-06-2011

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

		Source	2009	2010 (a)	2011
Internal UR	R&D	Employees	1	1	2
		University and Polytechnic	1	5	6
		Grant Holders and Trainees (PG)	1	2	5
		<i>Total R&D</i>	<i>3</i>	<i>8</i>	<i>13</i>
		Shared Structure (Central and Local)	1	1	0
	<i>Total Internal</i>	<i>4</i>	<i>9</i>	<i>13</i>	
	External Collaborators and Invited Researchers	4	2	1	
	Students (UG)	0	0	0	
	Global Total	8	11	14	

a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P3.7 ROBIS - ROBOTICS AND INTELIGENT SYSTEMS

Coordinator: António Paulo Moreira, Eduardo Silva

P3.7.1. SHORT DESCRIPTION OF THE UNIT

The main goal of the Robotics and Intelligent Systems Unit (ROBIS) is the development of innovative robotic solutions and intelligent systems for different application areas where standard platforms are not optimal. Research activities address not only relevant problems in robotics but also application areas where technologies used in robotics play an important role, like control, automation, simulation, modelling, intelligent systems, etc.

The Unit wants to contribute to the deployment of robotic solutions both in traditional and in emerging application areas. The Unit also wants to contribute to the improvement of industrial enterprises through R&D projects, consulting, technology transfer and training services.

The Unit main competences are related to Robotics and Intelligent Systems applied to industrial companies and service companies. The Unit main activity areas include: Mobile Robotics, Marine Robotics, Industrial Manipulators, Control Algorithms, Automation Systems integration, and Consulting Services.

The Unit's activity is grounded in research in the following scientific domains:

- Mobile Robotics: Robotic platform architectures; Control of mobile platforms; Smart and Low-Cost AGVs.
- Marine Robotics: Design of surface and underwater autonomous vehicles; underwater positioning and navigation, multiple platform systems, supervision of autonomous platforms, robotic based environment monitoring.
- Cooperative robotics: Warehouses and Logistics applications.
- Industrial Manipulators: Rapid teaching and programming interfaces; Hyper-flexible cells.
- Intelligent sensors: Smart sensors and image processing; Applications in robotics and automation; adaptive sampling strategies in environment monitoring.
- Intelligent control and simulation: control algorithms for complex dynamics systems. Simulation applications for complex dynamic electro/mechanical systems

ROBIS Mission

The ROBIS Unit is engaged in discovering and developing fundamental scientific principles and practices, such as perception, control and planning, which are applicable to intelligent robot systems and other complex dynamic systems. In addition, it is the goal of this Unit to facilitate technology transfer of its research results to yield solutions to real world problems for a wide range of application domains, namely, robots that navigate through complex indoor and outdoor spaces and advanced flexible manufacturing support systems.

Target applications and Domains

The Unit promotes and participates in applied research projects, in partnership with several industries and equipment producers, aiming at the development of innovative products, and provides consulting services to industrial companies. The Unit has also a large experience in the fields of advanced automation systems integration.

The Unit plays also a role in the promotion of the utilization of advanced technologies by industrial enterprises, aiming at creating awareness of the advantages of new technological solutions, identifying new requirements, and supporting their implementation. The Unit provides R&D services to develop innovative products to technology suppliers, software houses, systems integrators and producers of manufacturing equipment.

Table of correspondence between know-how and External and Internal application

Know-how	Status (*)	Internal Units	Companies	Entrepreneurs
Simulation (Robotics/Automation)	I	X	X	
Communications	I/O	X	X	
Automation	i/E	X	X	
Control	I	x	X	
Mobile robotics	I	x	X	
Marine robotics	I	x	X	
Modelling mobile vehicles	I	x	x	
Intelligent sensors	I	x		
Technology Feasibility studies	I/O	X	X	X
Technology Transfer	C	X	X	

(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Potential Coverage of the Innovation Process

Activity Area	Research	Development	Consulting	Training	Internal Use
Development of R&D + innovation management systems	X	X	X	X	X
Technology Feasibility studies			X	X	X
Technology transfer Practices	X	X		X	X

P3.7.2. DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

The Robotics and Intelligent Systems Unit (ROBIS) coordination is jointly assumed by António Paulo Moreira and Eduardo Silva.

The Unit will have Council with five permanent members:

- António Paulo Moreira (FEUP)
- Anibal Matos (FEUP)
- Paulo Costa (FEUP)
- Eduardo Silva (ISEP)
- José Miguel (ISEP)

and two substitute members:

- Nuno Cruz (FEUP)
- Alfredo Martins (ISEP)

The Unit Council meets every two weeks in synchronization with the INESC-Porto Units Meeting and will help the Coordinators in the main strategies and important decisions.

To combat the isolation of the Units, monthly we will have a general meeting of the Unit where we can discuss strategies, present R&D developments, identify synergies and so on.

P3.7.3. SWOT ANALYSIS

Strengths

- Training capacity, ability to attract students (MSC / PHD), access to various resources (ISEP and FEUP);
- High implementation capacity associated with a consolidated experience in robotics / high expertise and multidisciplinary;

- Existence of several functional robotic platforms;
- Trust relationship with a significant number of companies and use of industry common language;
- Modern and quality facilities;
- Broad areas of competencies (land, sea, ...) and mastery of various technologies from the perspective of the use and integration;
- Spirit of sharing and internal communication which increases the synergy and internal flexibility.

Weaknesses

- Scarcity of publications in international journals;
- Lack of technical support, lack of secretariat;
- Model of unit management and work methods to define in the context of merger;
- Poor communication and sharing between areas and Units (FEUP, ISEP, ...) and an interpersonal technical cooperation very clustered (isolation of the Units);
- Need to clarify / identify the areas that are leaders (national / global);
- Previous attempt to merge the teams used to work independently;
- Presence of Units with "overlap" in the areas of development;
- Greater dispersal of researcher (does everything);
- Difficulty of transforming academic solutions in products;

Opportunities

- Existence of INESC Brazil, a facilitator in setting up projects and seeks partners;
- Polo PRODUTECH, industrial equipment market;
- Several sources of funding available (FP7, FCT, QREN,...);
- Favourable external environment with focus on the economy of the sea. INESC Porto is a cluster membership of the Sea;
- Internationalisation, support of INESC Porto;
- Networks of international contacts to explore;
- Recognition of a unit capable of performing scientific and industrial projects successfully. Reputation in the industry;
- FP7 Call "capacities";
- Access to various R & D units in INESC Porto;
- Possibility of creating spin-offs;
- Need for innovation / optimization for companies;
- Growth in demand for solutions based on robotics;
- Access to foreign students;
- Will expressed to merge laboratories;
- Creating a cluster of industries around the robotics.

Threats

- High cost of testing / development robotics solutions;
- Existence of solutions off the shelf ever cheaper and smarter;
- Conflict of interest of institutions and Units. Own requirements for national recognition;
- Legislation non-existent on autonomous systems or at the beginning;
- Competition of many Units of robotics for domestic funds;
- Finalization of the FP7. Unknown future;
- Low interactivity and little relationship with partners and international teams;

- Consequences of the crisis in the national industry;
- Competition from other Units with superior marketing capability;
- Industry Portuguese unsophisticated and lack of technology makers;
- Hostility arising from the merger of the Units. Antibodies generated by the creation of the new unit;
- Current high dependence on third parties to carry out doctoral (ISEP);
- Human Resources needed to expand the unit requested by the market;

P3.7.4. MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Concerning organization, the definition of the governance model, the concentration of research in creating value and a clear perception of lines of research to be followed, will be the immediate (I) objectives for the year 2011. In a short term (CP) the joint research activities and the internal model communication. Joint (ISEP, FEUP and other INESC-Porto Units) projects, MSC and PhDs orientations and publications will be strongly encouraged.

- **Organization**

Lines of actions to implement	Objectives to reach	Deadline for completion
Definition of the governance model	Establish the organizational structure	I
Define the needs for human resources support and equipment	Facilitate the concentration of researchers in creating value	I
Define and classify research areas of the groups	Clear perception of lines of research followed Allow to reduce overlap, to facilitate a specialization in favor of creating value Create of interdependence between groups with the possibility to exchange of researchers	I
Enhance value creation in the FEUP and ISEP	Create synergy in the Unit Facilitator for joint research activities, including thesis of MSC and PhDs Promoting attainment of PhDs at the pole of ISEP. Facilitator of publications	CP
Internal model communication	<u>Model of communication intra-Unit:</u> Create a flow of communication and transfer of knowledge. Reduce the likelihood of overlap. Encourage discussion and interaction <u>Model of communication inter-Units:</u> Enable mutual understanding of competencies and work Facilitator of projects, joint activities and publications	CP

Concerning Human Resources the major priority will be to allow enrichment of the Researchers CVs, taking into account the criteria of the respective institutions of provenience. Also a clear criteria for engagement will be defined.

- Human Resources Strategy

Lines of actions to implement	Objectives to reach	Deadline for completion
Increased critical mass of Researchers	Strengthening the most promising scientific areas / competencies to enable to have a sustainable approach in scientific terms (eg, publications of articles) and in the application areas oriented for recovery and transfer of technology. Clear criteria for engagement (appreciation of skills, ability to publish, ability to work with industry...).	CP
Enhance career plans for Researchers	Offer the best conditions to allow enrich the CVs of the Researchers. Taking into account the criteria of the respective institutions of provenience.	CP
Retaining the best students	Be Interesting in scientific and financial terms to be attractive and select best students to doing MSC and PhD Using this as a means of sustainable growth and renewal. Participate in international doctoral programs (CMU, MIT ,...) as a means to cover other student profiles. Having a range of training attractive	I
Undergraduate research	Augment the recruitment bases	I

The scientific positioning strategy is resumed in the following table:

Lines of actions to implement	Objectives to reach
Positioning activities	Identification of areas of excellence to facilitate specialization. Implement the concept of life cycle and follow up on the ideas (the idea to the transfer of technology). Forecast for reinforcements in the areas of excellence
Publications	Encourage publications in international journals, establishing a policy of publication (eg participation in a conference involves the drafting of an article). Keep aware of the impact of publications in the Researcher career. Disclose the policy of prizes. Rise in the ranking of scientific classifications
International Partnerships	Allow to give international visibility to the Unit, using: The support given by INESC Brazil to join a choice of potential partners and projects. Structure the network of international contacts known to create opportunities. Participate in international doctoral programs (CMU, MIT ,...). Identify strategic scientific partners in order to leap frog fast (exchange of experience).
Cooperation Inter-Units	Harnessing the synergy of INESC Porto to create innovative joint projects with the potential for technology transfer, using the existing technological base in order to monetize the asset and is leading to new lines of application. Strengthen the wording of publications and holding of joint MSC and PhD theses.

The strategy for enhancement of scientific knowledge and technology transfer is resumed in the following table:

Lines of actions to implement	Objectives to reach
Dialogue and proactivity	Establish a plan of visits to companies identified as potential partners. Planning scientific activities with potential application. Participate in associations where INESC Porto is an active member. Use of INESC Porto (eg: DNN, partnerships already established ,...). Structured network of contacts national and international business based on existing knowledge. Using the former members of INESC Porto placed abroad. Leverage existing work to strengthen collaboration with other units and thus increase the range of offer.
National market	Active participation in PCTs with the aim of guiding lines for research and solutions to transfer to the partners. Encourage the creation of spin-offs of the solutions with possibility of success and without company interested. Focusing at short-term on OCEANO XXI (applications at medium / long term), and on PRODUTECH (applications at short / medium term). Have an observer position in the other poles and follow the evolution of the Robotic PCT planned.
International Market	Support the efforts of the institution in pursuit of internationalization. Create opportunities with international contacts network INESC BRAZIL: Betting on the network developed in Brazil and participate proactively in future work.

The Communication and image strategy is resumed in the following table:

Lines of actions to implement	Objectives to reach	Deadline for completion
Communication Plan	Disseminate successes to create a lever, use the reference made to the industry, make the positioning the unit on its strengths. Focus the image and communication to the market of robotics where the Unit has a range of solutions with recognized value. Focusing on the double bond of Researchers for the creation of value in basic institutions.	CP
Decision to set up unit	Disclosing the decisions of the institutions realize a common unit. First merger of two laboratories from different institutions. Optimization of resources and creation of scientific critical mass.	I
Attractivity of the best students	To attract and select the best students in view to perform MSC and PHD. Offering visibility into the home institutions Participate in scientific recreational projects	CP

Medium term objectives and management principles also include:

- Improve the alignment between basic research, applied research and consultancy;
- Maximise the impact of the Unit's activity in the companies, and promote the valorisation of results;
- Establish strategic partnerships with software houses and producers of manufacturing equipments, allowing the alignment of the research activities with future industrial projects, for a better valorisation of the developed intellectual property;
- Improve internal competences by:
 - developing the competences and motivation of human resources;
 - creating conditions for attracting high level national and international researchers;

- Improve the Unit's external visibility, through the organisation and participation in key national and international scientific and industrial events;

Future research:

- To port the previously gathered knowledge in robotic systems and real time vision systems to civil society activities such as tracking of humans in indoor sports. An FCT project is planned to help achieve this goal. The scientific goal of the project will aim at sports teaching (advanced team play analysis) and referee education.
- Autonomous marine vehicles: natural landmark navigation for AUVs; unconventional acoustic navigation networks; coordinated control of heterogeneous teams; vision based AUV guidance; modelling and control of autonomous sailboats; low bandwidth control of AUV teams.
- Control of mobile platforms: methodologies for automatic generation of mission plans; supervision of autonomous platform operations; cooperative operation of multiple platforms.
- Concerning vision based real time sensors: perception systems as a sensor for on board sensing; real time stereo sensing for mapping and self localization; low latency and robust feature extraction in semi controlled environments.
- In the land robotics field: modelling and control of mobile robots; fast team coordination and global path planning; navigation and localization in semi structured environments (using natural and artificial landmarks); Soccer robotics will continue to be a major test bed for the scientific results in this area.
- Industrial robotic manipulators: vision and manipulator coordination; advanced sensing; measurements and testing of features; rapid teaching and programming interfaces; hiper-flexible cells; development of a universal language with translators to different manipulators.
- Intelligent control and smart sensors: control algorithms for complex dynamic systems, adaptive sampling strategies for environment monitoring.

P3.7.5. ACTION PLAN (GLOBAL)

For 2011 a number of structural actions are planned, including:

- Continue the consolidation of the scientific activity in the areas of activity
- Disseminate doctoral programmes.
- Promote an internal regular discussion on research opportunities and project organization.
- Develop new partnerships with national and international research organizations, leaders in fields near or complementary to the Unit's activity.
- Increase the UNIT participation and the visibility in European projects.
- Consolidate partnerships with software houses and producers of equipments.
- Continue direct contact with large number of companies, in Portugal and abroad.
- Continue improvement of the professionalism and quality of services and projects.
- Define plans for the valorisation of the intellectual property of the Unit.
- Preparation of QREN proposals related to the following applications of marine robots: bathymetric surveys and search and rescue operations
- Development and implementation of strategies for the coordinated operation of multiple vehicles

- Sources of funding

Lines of actions to implement	Objectives to reach	Deadline for completion
Participation to the call "Capacities - Research Potential"	Consolidate activities and implementing the strategies defined in the SWOT	CP
Diversify funding sources	Submit applications to the European - FP7. Prepare projects for Brazil. Leverage other opportunities. Consulting of scientific high level	I

P3.7.6. ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	1	8
Papers in National Journals with scientific referees		
Conference Proceedings in events with scientific referee and selection	27	20
Books (author)		
Chapter/paper in books	1	2
Publications (editor)		
Other publications (National meetings, local journals, etc.)		
Theses concluded by members of the Unit	1	4
TOTAL	30	34

Journal	Predicted End 2010	2011
Emerald Industrial Robot	1	
Journal of Rehabilitation Research & Development		1
IEEE Transactions on Education		1
International Journal of Humanoid Robotics		1
IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS		1
Journal of Anesthesia		1
Artificial Intelligence - An International Journal		1
Journal of Field Robotics		1
Journal of Robotics and Mechatronics		1
International Journal of Computer Vision		1

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master	11	11	11	33
Doctoral	4	21	4	29
TOTAL	15	32	15	62

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2010	2011
Training for graduation students		6
Advanced training		8
Professional and Structure R&D Training actions		0
TOTAL		14

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	1
Other Actions	1

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	ROBIS				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme			54	77	43%
European Union Programmes			28		-100%
Consultancy and R&D Services			165	326	98%
Other R&D Services					
Other External Services					
Internal					
<i>Total (k€)</i>			<i>247</i>	<i>403</i>	<i>63%</i>

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	CRO	Paulo Moreira	01-01-2010	31-12-2012
PN-FCT	WWECO	Patrícia Ramos	01-11-2009	31-03-2011
PN-QREN	Robot Vigil	Paulo Moreira	01-01-2010	31-12-2011
PN-QREN	SIARI	Paulo Moreira	01-09-2010	31-08-2012
SERV-INT	LAJEADO	Anibal Matos	01-10-2010	30-09-2013
SERV-INT	TRIMARES	Anibal Matos	16-08-2010	15-12-2010
SERV-NAC	EDA	Anibal Matos	01-01-2011	31-12-2012
SERV-NAC	SIARI	Paulo Moreira	01-09-2010	31-08-2012

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

		Source	2009	2010 (a)	2011
Internal HR	R&D	Employees	0	0	0
		University and Polytechnic	9	9	20
		Grant Holders and Trainees (PG)	2	11	22
	<i>Total R&D</i>		<i>11</i>	<i>20</i>	<i>42</i>
		Shared Structure (Central and Local)	0	0	2
		<i>Total Internal</i>	<i>11</i>	<i>20</i>	<i>44</i>
		External Collaborators and Invited Researchers	0	0	1
		Students (UG)	1	1	3
		Global Total	12	21	48

 a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P3.8 LIAAD - LABORATORY OF ARTIFICIAL INTELLIGENCE AND DECISION SUPPORT

Coordinator: Pavel Brazdil

JUSTIFICATION

Because the integration of LIAAD in INESC Porto LA has not yet been recognized by FCT, this Unit of the National Scientific and Technological System remains as an independent Unit. Therefore, it is not appropriate to present in this report a Plan for 2011, for LIAAD, at the level of detail of the other Units and Groups.

The following sections largely reproduce the description of LIAAD included in the 2010 document.

P3.8.1. SHORT DESCRIPTION OF THE GROUP

LIAAD was created in 2007 from one of the groups (NIAAD) of LIACC, Laboratory of Artificial Intelligence and Computer Science. LIACC (and its groups, including NIAAD) was created in 1988 and so some researchers of LIAAD have 20 years experience in R&D. In 2007 LIAAD has initiated the process of integration within INESC Porto L.A. This process took some time to formalized, although the approval of FCT has not arrived yet. In practical terms, it is fully operational now.

The integration of LIAAD within INESC is seen as an excellent opportunity for both sides to exploit common synergies. Besides, it provides LIAAD with an opportunity to exploit the existing infrastructures of INESC Porto LA that has great experience in running large projects and transferring know-how to outside academia.

Members:

At the end of 2010 LIAAD included 55 members. This number includes 23 members with Ph.D's. A great majority of the others are Ph.D. students. Many of the members have a lecturing post at the Faculty of Economics of UP. However, the Group includes also members of other academic or professional institutions, including the Faculty of Science (FCUP), Faculty of Engineering (FEUP), Univ. of Beira Interior, National Institute of Statistics (INE) etc.

General Objectives:

LIAAD continues the tradition of conducting high quality research, both fundamental and applied, in the 3 major areas shown below:

- Data Mining (DM) for Decision Support
- Data Analysis and Statistical Methods for Decision Support
- Modeling and Optimization for Decision Support

Data Mining (DM) for Decision Support includes the following lines of research:

Data Mining:

- Data Mining and Decision Support : Aid the User in Selecting an Appropriate ML / Data Mining Method: Exploit past information to determine which ML/DM algorithm is likely to produce better results on a new task. Integrate Data Mining in Decision Support, while trying to resolve real problems.
- Learning from Data Streams: The goal of this research area is to study, develop and analyze all aspects of Machine Learning (e.g. algorithms for summarization, change detection, classification, regression or clustering), in problems involving continuously flow data in dynamic environments. The models need to "adapt" to changing information.
- Modeling Dynamic Systems: Develop / enhance methods for modeling complex dynamic systems. Data mining tasks include numeric prediction (regression) models, monitoring for unusual events

(e.g. extreme values), visualization, modeling using networked data with spatio-temporal features, etc..

- Metalearning and Planning to Learn: Aid the User in Selecting an Appropriate ML / Data Mining Method: Exploit past information to determine which ML/DM algorithm is likely to produce better results on a new task.

Data Mining from Structured Data:

- Distributed ILP for Data Mining: Take advantage of parallel, distributed and Grid Computing to run ILP systems on large data bases.
- Web mining and Web intelligence: Automation of web site reconfiguration / maintenance of contents.
- Text Mining: Document Classification - classifying documents into categories, using e.g. words as features; Information Extraction - extraction of specific information about a domain (e.g. economic data, etc.) or tables from business reports; Opinion mining: The aim is to design automatic methods that enable to attribute positive / negative sentiment to a give text.

Data Analysis and Statistical Methods for Decision Support includes the following lines of research:

- Symbolic data extend the classical tabular model: Each variable can take multiple, possibly weighted, values.

Modeling and Optimization for Decision Support includes the following lines of research:

- Simulation, Modeling and Optimization - Investigate problems in job-shop manufacturing environments, where a large number of different products are produced according to customer specification.
- Modeling using Multi-agent Framework: Modeling Organizational Dynamics: Use a Multi-Agent Based System to simulate firms for a specific industries and geographical locations and observe the interaction among them, with attention to their cooperation (creation of networks) and survival. Adjust the parameters of the model using a GA (Genetic Algorithm)-like approach, to approximate the behavior to the given data.
- Dynamical Systems, game theory and mathematical finances.

Table of correspondence between know-how and External and Internal application

Know-how	Status (*)	Internal Units	Companies	Entrepreneurs
Know-how	Status (*)	Internal Units	Companies	Entrepreneurs
NPD				NPD
R&D + Innovation Management System	I/E	X	X	R&D + Innovation Management System
Creativity				Creativity
Business Concept Development				Business Concept Development
Business Plan Development				Business Plan Development
Management of "proof of concept" projects				Management of "proof of concept" projects
Commercial Feasibility studies				Commercial Feasibility studies
Technology Feasibility studies				Technology Feasibility studies

Know-how	Status (*)	Internal Units	Companies	Entrepreneurs
Technology Transfer				Technology Transfer
Innovation Metrics				Innovation Metrics

(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Potential Coverage of the Innovation Process

Activity Area	Research	Development	Consulting	Training	Internal Use
Development of R&D + innovation management systems	X	X		X	X
Implementation of innovation processes					
Business Plan methodologies and tools					
Definition and development of methodologies to analyse and protect R&D results					
Definition and development of methodologies to analyse and control R&D+I management systems					
Technology Feasibility studies					
Commercial Feasibility studies					
Innovation Metrics					
Open Innovation					
Technology transfer Practices					

P3.8.2. DESCRIPTION OF THE GROUP'S ORGANIZATIONAL STRUCTURE

MANAGEMENT SCHEME:

Regulation: The functioning of the Unit is carried in accordance with its Internal Regulations ("Estatutos"). These have been elaborated in 2010 by the coordinating committee.

Coordinator / Director: LIAAD is managed by the coordinator / director, who is responsible for coordinating both scientific and administrative matters. According to LIAAD's Internal Regulations ("Estatutos"), the coordinator is elected by the members of the Scientific Council. The last election took place 21 May 2010. The current coordinator / director is Prof. Pavel Brazdil.

Coordinating Committee: The task of this committee is to alleviate the work of the coordinator / director, by taking over some of the management tasks. According to LIAAD's Internal Regulations ("Estatutos") the members of this committee are suggested by the coordinator / director, having heard everyone's suggestions. It was agreed that this committee will have, apart from the coordinator / director, 4 other members: These are Prof. Alipio Jorge, Prof. João Gama, Prof. Alberto Pinto, Prof. Dalila Fontes.

Scientific Council: Important issues are discussed at meetings of Scientific Council that includes all Ph.D. members of the Unit.

Associations: Apart from LIAAD's association with INESC Porto L.A. LIAAD also is associated to FEP and FCUP.

Advisory Board: LIAAD has at its disposal Advisory Board that includes researchers of renowned merit working at foreign institutions. These members form part of a larger Advisory Board of INESC Porto L.A.

RESPONSIBILITY FOR ADMINISTRATIVE/FINANCIAL MATTERS:

In 2010 these tasks were carried out by the University of Porto (the Rectorate). The integration of LIAAD to INESC Porto L.A. is still awaiting approval by FCT. If this went ahead, it is foreseen that in future (possibly in 2011) the administrative/financial matters including signing contracts, elaborating financial reports etc. would be carried out by INESC.

Technical / administrative Support: Technical support is provided on a part-time basis by Lic. Rodolfo Matos. Administrative Support is provided again on a part-time basis by Pedro Almeida.

P3.8.3. SWOT ANALYSIS

Strengths

- LIAAD has achieved an international recognition in several areas of activity related to Machine Learning, Data Mining, Data Analysis etc. They have a working contact with about 30 Universities worldwide.
- Members of LIAAD are good at exploiting interdisciplinary areas, by bringing in the know-how where they are strong and applying it to new problem areas.
- As the members of LIAAD work at several different Faculties and often share the information available to them, they are abreast of others, who are more enclosed.

Weaknesses

- One problem that has to be born in mind is how to maintain the cohesion of the Unit and its R&D activities, as the members work at several geographical locations.
 - ✓ Some researchers tend to work at LIAAD's central location at Rua de Ceuta. This includes about 8 Ph.D members and most of the visitors and post-graduate students.
 - ✓ Other researchers, mainly those that have teaching duties at FEP, FCUP and FEUP tend to use the offices at their faculties to conduct research.
- One of the aims of LIAAD is to apply ML/DM methods to various other areas, promoting thus interdisciplinary research. The main activities are mentioned below.

Opportunities

One of the aims of LIAAD is to apply ML/DM methods to various other areas, promoting thus interdisciplinary research. The main activities are mentioned below.

Use of Data Mining in Decision Support

The work is motivated by real business problems and counts with collaboration of institutes and companies:

- Forecasting bus travel time for controlling personnel costs (company STCP);
- Customer segmentation (large bank); - On-line recommendation for marketing (Introduxi, AEIOU);
- Autonomous Trading Systems;
- Analysis of investment decisions under uncertainty;
- Detection of fiscal fraud;
- Applications of ILP to Intrusion Detection Systems;
- Modeling organizational dynamics and study of the process of creation of networks;

- Network flow problems;
- Job shop problems

Applications of ML/DM to Ecology

Development of models for ecological modeling - this activity involves the analysis of ecological data, namely water quality parameter data, with the aim of developing models for forecasting and monitoring the quality of water used in public distribution networks. This research is supported by an FCT project and includes the collaboration with a company (Águas do Douro e Paiva, SA). The work is integrated within a broader goal of using data mining techniques in the field of Ecology where relevant data analysis tasks abound.

Applications of ILP in Bioinformatics:

Use ILP methods to predict Protein Folding Rules, to detect complex patterns in Protein Unfolding simulations and discovery of Structure-Activity Relationship problems in drug design. DNA sequence analysis.

Applications of ML/DM to Health Care

Investigate classification methods suitable for health-care. Try to minimize overall costs, including costs of miss-classification, and costs of obtaining new information about the patient. Collaboration continues with Faculty of Medicine (FMUP).

Applications of ML/DM to text / web and human language engineering

Document Classification: Classifying documents into categories (classes), using words as features and various transformations with the help of ML methods.

Opinion mining: The aim is to design automatic methods that enable to attribute positive / negative sentiment to a give text.

In text mining we have collaboration with the members of CLUP, Center of Linguistics of F. of Humanities (Letras) of UP; one Unit of Fac. of Psychology and Education Science, UP ; one Unit of Univ. of Beira Interior.

Web / Content Management Automation: Automation of web site reconfiguration / maintenance (changes of structure and contents). Use of recommended systems for Web portals.

Threats

Members of LIAAD could get involved in too many activities, which only promotes dispersion and hinders resolution of fundamental and technically difficult issues.

P3.8.4. MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

LIAAD has several strategic aims:

- Maintain cohesion of the Unit by orienting all R&D activities to provide solutions for decision support.
- Continue the activity in Data Mining and Decision support with particular focus on real-world applications, collaborations with companies
- Maintain the advance in research in the areas where the Unit has achieved an international recognition. This includes various lines of research including:
 - ✓ Learning from data streams
 - ✓ Meta-learning,
 - ✓ Simulation, Modeling and Optimization

- Continue to advance the research in all areas, while taking care that the goals are “up-to-date”:
 - ✓ metalearning --> planning to learn,
 - ✓ learning from static data --> learning from data streams,
 - ✓ web mining --> web mining + social networks etc.
- Exploit all potential *synergies* between different lines within our unit and the units of INESC Porto, where our unit is integrated. This process was initiated by creating so called LAI's (Lines of Action).
- Continue collaboration with other areas of science, fomenting thus interdisciplinary research (e.g. bioinformatics). This enables to identify a potential for new research goals and provide the solutions that are innovative in the original area.
- Create new Master and Doctoral courses to attract new researchers to the new interdisciplinary topics.

P3.8.5. ACTION PLAN (GLOBAL)

- Operationalize the strategic objectives mentioned above.

P3.8.6. ACTIVITIES EXPECTED FOR 2011

In this version of a Plan for the LA, a simple approach is made, because LIAAD is still not formally recognized as integrated in the INESC Porto Associate Laboratory.

The activities will be centered in the following axes:

- Continuing the projects contracted with FCT
- Cooperating with INESC Porto, namely in the Transversal Inter-Unit Actions
- Reinforcing the activity in direct contracts with third parties
- Reinforcing the scientific production (namely, papers in journals)

LIAAD will develop an organizational effort in order to be able to produce regular activity plans according to the model of INESC Porto LA, and will enhance the management efficiency of the Unit to make it compatible with the rest of the LA.

P3.9 CRACS - CENTER FOR RESEARCH IN ADVANCED COMPUTING SYSTEMS

Coordinator: Fernando Silva

P3.9.1 SHORT DESCRIPTION OF THE UNIT

The Center for Research in Advanced Computing Systems (CRACS), was founded by a Unit of senior researchers that had common interests in the broader area of distributed systems. The general goals of the Unit are: to develop fundamental and applied original research with international impact, to promote national and international cooperation, to train highly qualified young researchers, and to actively establish partnerships with industry to promote, disseminate and transfer research and technology results. CRACS pursues two main research directions related to scalable computing: "Computational Models and Languages for Scalable Computing" and "Information Mining and Web-based Systems". Research in the former focuses on the development of programming languages, compilers, run-times and middleware frameworks for advanced system architectures such as multi-core microprocessors and wireless sensor networks, with a strong focus on scalability. In the latter area, research focuses on information mining applications in areas with massive amounts of data and high demand for processing such as genomics, proteomics, medicine, biological and social networks, and web-based systems for enhanced e-Learning and e-Science and on frameworks for service oriented architectures.

CRACS is currently composed by a team of around 50 members of which 10 are senior researchers with a PhD degree. CRACS is currently physically based at the Computer Science Department at the Faculty of Sciences of the University of Porto.

Table of correspondence between know-how and External and Internal application

Know-how	Status (*)	Internal Units	Companies	Entrepreneurs
NPD	I	X	X	
R&D + Innovation Management System	I	X	X	
Creativity	I/O	X	X	
Business Concept Development	I/O	X	X	
Business Plan Development	I	X	X	
Management of "proof of concept" projects	I	X	X	
Commercial Feasibility studies	I/O	X		
Technology Feasibility studies	I		X	X
Technology Transfer	I		X	X
Innovation Metrics	I/O/E		X	X
Open Innovation	I/O	X	X	X

(*) I - Internal; O - Existing in another Unit of INESC Porto; E - External; C - To be created

Potential Coverage of the Innovation Process

Activity Area	Research	Development	Consulting	Training	Internal Use
e-Science	X	X	X	X	X
e-Learning	X	X	X	X	
e-Health	X	X	X	X	
Telecom.	X		X	X	
Transport	X	X	X	X	

P3.9.2 DESCRIPTION OF THE UNIT'S ORGANIZATIONAL STRUCTURE

The organizational structure of CRACS includes a Coordination Committee, a Scientific Committee, Area Coordinators and Secretarial support. The Scientific Committee is composed by all effective members of CRACS holding a PhD and one of its functions is to elect the Coordinator. The Coordination Committee is composed by the Coordinator, which represents the Unit, and one or two other nominated members. Each scientific area has a coordinator that organizes the activity plans and reports. Specific projects are normally headed by senior researchers or by the coordination of the Unit.

P3.9.3 SWOT ANALYSIS

Strengths

- Extensive research experience by the team with strong scientific indicators in the major areas of CRACS
- Strong and diversified links with international research Units
- Large experience in training young researchers
- Scientific and technical knowledge of systems security and identity management.

Weaknesses

- Limited experience in technology transfer
- Lack of funded European projects
- Limited marketing activity

Opportunities

- Explore recent funding opportunities at national and international level with QREN and FP7.
- Explore synergies and opportunities to cooperate with other units of INESC Porto Associated Lab, in particular, taking advantage of the Inter-Unit Lines of Action (LAIs).

Threats

- Increased competition in funding programs
- Dispersion of the team among many topical areas

P3.9.4 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

CRACS main strategic objectives are organized around the following initiatives:

- Strengthen Unit's cohesion by selecting common key areas and by increasing internal communication through more regular seminars.
- Attract more senior researchers in the core areas of CRACS to augment our critical mass.
- Maintain or even increase the involvement of young researchers and their training.
- Increase involvement in international projects, in particular European, but also taking advantage of the partnerships with CMU and UT Austin.
- Increase partnerships with industry.

P3.9.5 ACTION PLAN

The action plan for CRACS includes the following lines of activity:

Strategic and Organizational:

- Motivate researchers to take advantage of the various calls for projects both nationally and internationally. Each senior research should be responsible for at least one research project and be team member in at least another research project.

- Take advantage of the competences in many complementary areas existent within INESC-Porto LA. One first step is to actively take part in the newly proposed "inter-units research lines" .
- Prepare the secretarial support to free researchers from tasks not relevant for research.
- Develop the CRACS website so that it serves as a good data repository to serve report purposes and avoid frequent requests to researchers. The website must be dynamic, decentralized in content management and provide up to date information on events and success stories of the Unit.

Scientific:

1. Computational Models and Languages for Scalable Computing

- Keep our Unit in the leading edge on the implementation of Logic Programming (LP), YAP Prolog being its flagship system and Logtalk the "de facto" standard in object oriented logic programming languages.
- Continue work on the development of a computational model for type-safe programming of wireless sensor networks and a full specification of an associated programming language and virtual machine.
- Continue work on the design and implementation of a simulation bench for testing peer-to-peer middleware frameworks with support for real-time computing and fault-tolerance. We envision that such frameworks will form the core of the next generation of high-performance middleware platforms.
- Develop a generic conceptual model to describe semantics preserving, dynamic code-patching of applications.
- Develop specialized and efficient parallel algorithms for motifs discovery in complex networks with emphasis on applications to neuroscience data.
- Design and implementation load balancing algorithms to distribute work in large scale systems.
- Develop a framework for autonomic computing based on a circulatory model.

2. Information Mining and Web-based Systems.

- Continue fruitful collaborations established with IBMC, IPATIMUP and Chemistry Department in application areas such as genomics, proteomics, medicine, and social networks. These applications have motivated successful systems such as RPS and LogCHEM, and have been well received by the community.
- Develop and implement novel algorithms for inductive logic programming, statistical relational learning, and biological inspired computing, with a focus on large scale applications.
- Develop and implement novel algorithms for learning from data streams generated by sensor networks.
- Develop and implement novel algorithms for learning from temporal multi-relational data, such as medical records.
- Development of a biologically inspired anomaly detection framework based on the TAT model for the behavior of immune T-cells. Apply the framework within the context of network intrusion detection.
- Extend the OpenID Protocol for user centric identity management on the Internet with more secure token based authentication processes and mechanisms.
- Development of frameworks for creating and managing semantic digital libraries based on a coupling between automatic and social classification. Redesign and extend our digital portfolio system to cope with collaborative work to be used in e-science.
- Continue work on e-learning systems and environments, namely on repositories of specialized learning objects, tools to automatically characterize on-line interactions, services and interoperability.

Internacionalization:

Further develop existing international cooperation links and increment the joint publications and involvement in research projects:

- Angelika Kimmig, Luc de Raedt, Bart Demoen, Hendrik Blockeel, Tom Schrijvers and Theofrastos Mantadelis from Katholieke Universiteit Leven, Belgium, in areas of language implementation, probabilistic logic programming and inductive logic programming.
- David Page and Jude Shavlik from the University of Wisconsin, Madison, USA, on Machine Learning and Inductive Logic Programming.
- Markus Kaiser and Jennifer Simonotto at Newcastle University, UK, in pattern mining in brain networks.
- Chris Mitchell e Jason Crampton do Information Security Unit, Royal Holloway, University of London, UK
- Priya Narasimhan, Frank Pfenning and Seth Goldstein from Carnegie Mellon University, US, on fault-tolerance and real-time middleware and language implementation.
- Felipe França, Gerson Zaverucha, Bernard Marechal and Diego Carvalho from Universidade Federal do Rio de Janeiro, on machine learning and parallel and distributed computing.
- Christoph Kirsch from Salzburg University, Austria, on Run-time patching. Kirsch
- Miguel Revilla from Universidad de Valladolid, Spain, on Competitive e-Learning.
- P. Chico, M. Carro and M. Hermenegildo from Universidad Politécnica de Madrid, Spain, on Tabling in Logic Programming.

Outreach Activities:

- Participate in the organization of programming contests for high-school and university students, helping them to develop team work skills as well as professional competences.
- Propose short summer activities within the Junior University at UP, thus helping in encouraging talented high school students in pursuing science and technology studies.
- Collaborate with Latin America in reducing the technological gap, through common projects such as EELA on building a common grid infrastructure between Europe and Latin America.
- Propose doctoral-level courses and engage in the organization of doctoral programs such as the Joint Doctoral Program in Computer Science of the Universities of Minho, Aveiro and Porto.
- Propose courses and research proposals for dissertations for Master degrees in which members of CRACS are also involved as lecturers.

P3.9.6 ACTIVITIES EXPECTED FOR 2011

A) SUMMARY OF PUBLICATIONS

Type of publication	Predicted End 2010	2011
Papers in International Journals with scientific referees	6	8
Papers in National Journals with scientific referees	0	0
Conference Proceedings in events with scientific referee and selection	37	35
Books (author)	1	0
Chapter/paper in books	6	4
Publications (editor)	0	1
Other publications (National meetings, local journals, etc.)	5	6
Theses concluded by members of the Unit	9	12
TOTAL	64	66

B) SUMMARY OF POST-GRADUATION THESES TO BE SUPERVISED BY MEMBERS OF THE UNIT

Type	Starting	On-going	Concluded	Total
Master	9	8	13	30
Doctoral	7	11	2	20
TOTAL	16	19	15	50

C) SUMMARY OF ADVANCED TRAINING ACTIONS

Type	2010	2011
Training for graduation students		
Advanced training		
Professional and Structure R&D Training actions		
TOTAL	0	0

D) SUMMARY OF ACTIVITIES OF COOPERATION OR DISSEMINATION

Type	Number
Conferences with INESC Porto in the organization (in the organizing committee or chairing technical committees)	0
Other Actions	0

E) SUMMARY OF PROJECTS TO BE DEVELOPED IN 2011

Source	CRACS				
	2008	2009	2010 (Budget)	2011 (Plan)	Variation 2010 - 2011
National Programme			68	161	137%
European Union Programmes					
Consultancy and R&D Services			10	10	0%
Other R&D Services					
Other External Services					
Internal					
<i>Total (k€)</i>			<i>78</i>	<i>171</i>	<i>119%</i>

F) LIST OF PROJECTS

Funding Source	Short Name	Leader	Starting Date	Ending Date (planned)
PN-FCT	Breadcrumbs	Álvaro Figueira	20-09-2010	19-09-2012
PN-FCT	DIGISCOPE	Inês Dutra	01-02-2010	31-01-2013
PN-FCT	Horus	Vitor Santos Costa	01-04-2010	31-03-2013
PN-FCT	Leap	Ricardo Rocha	01-01-2011	
PN-FCT	MACAW	Luís Lopes	01-01-2011	
PN-FCT	Ofelia	Manuel Eduardo Correia	05-04-2010	04-04-2013
PN-QREN	Palco3.0-3	José Paulo Leal	03-12-2008	30-11-2011
SERV-NAC	Consultancy	Fernando Silva	01-01-2011	

Source:

PN-FCT: National Programme - FCT

PN-QREN: National Programme - QREN

PUE-I&D: European Union Programmes - R&D

PUE-DIV: European Union Programmes - Others

SERV-NAC: Consultancy and R&D Services - National

SERV-UE: Consultancy and R&D Services - European Union

SERV-INT: Consultancy and R&D Services - International

OID: Other R&D Services

O - Other External Services

INT - Internal

G) HUMAN RESOURCES IN 2011

		Source	2009	2010 (a)	2011
Internal HR	R&D	Employees	1	1	1
		University and Polytechnic	10	9	9
		Grant Holders and Trainees (PG)	1	6	11
		<i>Total R&D</i>	<i>12</i>	<i>16</i>	<i>21</i>
		Shared Structure (Central and Local)	1	1	1
		<i>Total Internal</i>	<i>13</i>	<i>17</i>	<i>22</i>
		External Collaborators and Invited Researchers	0	0	0
		Students (UG)	2	1	0
		Global Total	15	18	22

a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P3.10 UGEI - INDUSTRIAL MANAGEMENT AND ENGINEERING UNIT

Coordinator: Sarsfield Cabral

JUSTIFICATION

Because the integration of UGEI in INESC Porto LA has not yet been recognized by FCT, this Unit of the National Scientific and Technological System remains affiliated with another organization. Therefore, it is not appropriate to present in this report a Plan for 2011, for UGEI, at the level of detail of the other Units and Units.

The following section reproduces an analysis of the opportunities and challenges related to an association of UGEI with INESC Porto LA in the future.

P3.10.1 SHORT DESCRIPTION OF THE UNIT

UGEI is an engineering and industrial management research unit that seeks to specify and develop novel systems that operate in an efficient and reliable manner. The typical problems, always motivated by real scenarios, are found in operations management, operational research and information systems. The UGEI ultimate goal is to achieve national and international recognition for the creation of knowledge in the intersection of industrial engineering, management and social sciences, and in its delivery for the target organizations.

Joining INESC Porto LA may represent an excellent opportunity to amplify and synergistically integrate the work being independently developed by the Unit and by INESC Porto. This judgment is supported by the following arguments:

1. It addresses the scale problem. In fact, UGEI is a small unit, without critical mass to address even medium size problems. Since UGEI research foot print overlaps some of INESC Porto LA units, the scale problem will be addressed very effectively.
2. On the other hand, UGEI researchers will effectively complement the expertise and man power deficiencies in some INESC Porto LA areas.
3. UGEI will benefit from the organizational infrastructure of INESC Porto LA that has well recognized abilities to find and secure and manage medium and large scale research projects.
4. There is an increased likelihood of participating and winning national and European projects.
5. Joining INESC Porto LA will also bring high standards of productivity and scholarly publication, which are harder to comply in smaller research units.

The competence areas of UGEI, together with UESP, can be identified as:

- Operations Research; Decision Support Systems; Combinatorial Optimization; Heuristics and meta-heuristics (Simulated Annealing, Taboo Search, GRASP, Genetic Algorithms); Multi-objective Optimization and Mathematical Programming; Simulation; Forecasting Methods; Statistics; Data Mining; Data Envelopment Analysis.
- Information and knowledge management; Semantic web technologies; Socio-technical analysis;
- Web-based systems and interfaces; Human-Computer Interaction; Software Engineering; Service System Design.

The main application areas are:

- Operations Management; Advanced automation and internal logistic systems; Production Planning and Operations Scheduling, Cutting and Packing Problems.
- Logistics; Supply-Chain Management; Layout design; Distribution Problems; Vehicle Routing.

- Planning and management of Transportation Systems; mobility; vehicle routing and crew scheduling.
- Applied Statistics: Design of Experiments; Statistical Process Control; Applied Statistics.
- Enterprise Cooperation Networks; collaborative processes; Information Management and Knowledge in Collaborative Networks.

P3.11 CISTER - RESEARCH CENTRE IN REAL-TIME COMPUTING SYSTEMS

Coordinator: Eduardo Tovar

JUSTIFICATION

Because the integration of CISTER (Research Centre in Real-Time Computing Systems) in INESC Porto LA has not yet been proposed and accepted by FCT, this Unit of the National Scientific and Technological System remains as an independent Unit. Therefore, it is not appropriate to present in this report a Plan for 2011, for CISTER, at the level of detail of the other Units and Units.

The following section reproduces the description of CISTER found in its web site.

P3.11.1. SHORT DESCRIPTION OF THE UNIT

CISTER (Research Centre in Real-Time Computing Systems) is a top-ranked Research Unit based at the School of Engineering (ISEP) of the Polytechnic Institute of Porto (IPP), Portugal.

This research unit focuses its activity in the analysis, design and implementation of real-time and embedded computing systems.

CISTER was, in the 2004 evaluation process, the only research unit in Portugal, in the areas of electrical engineering and computer science and engineering, to be awarded the level of Excellent. This excellent rating was confirmed in the last evaluation process (2007), in which only one other research unit in these areas received this rating.

Since it was created, the unit grown to become one of the leading European research units in the area, contributing with seminal research works in a number of subjects, such as:

- real-time communication networks and protocols;
- wireless sensor networks (WSN);
- real-time programming paradigms and operating systems;
- distributed embedded real-time systems;
- cooperative computing and QoS-aware applications;
- scheduling and schedulability analysis (including multiprocessor systems);
- cyber-physical systems (CPS)

This is a sufficiently broad spectrum of strategic research topics, which we will keep pursuing in the coming years.

Currently, the CISTER research unit is an active member of a number of international networks of research excellence: ArtistDesign; CONET and PT-CMU. The unit has also been involved in a number of international (RECOMP, EMMON, R-Fieldbus, REMPLI) and national R&D projects (REHEAT, RESCORE, CooperatES, REFLECT, etc.).

Researchers of CISTER research unit have been, consistently and throughout the past years, participating in the most reputed scientific events in the concerned research areas, as PC Chairs, General Chairs, Track Chairs or PC members. Notably, the research unit has hosted and organized in Porto WFCS'00, ECRTS'03, IRTAW'03 and Ada-Europe'06.

This Unit includes presently 16 researchers holding a PhD degree.

P4. PLAN FOR THE SCIENTIFIC COUNCIL

President: Manuel Matos

The Scientific Council will continue in 2011 to fulfill its statutory duties, regarding:

- analysis and opinion on annual reports and plans prepared by the Board of Directors;
- support to the process of issuing awards to the authors of papers published in scientific journals;
- analysis of other matters under request from the Board of Directors.

In the framework of the Associated Laboratory, the Council will also watch the activity of the present inter-unit action line (OIL) and support the launching of additional inter-units action lines. The Council will be responsible for the validation, coordination, monitoring and evaluation of such entities, following the rules defined by the Board of Directors.

The Council will continue its effort to establish mechanisms to monitor the scientific production of the institution in terms of publications and MSc and PhD theses, in coordination with the Scientific Committees of the Units.

New efforts will also be made towards the organization of a series of seminars to promote the exchange of information about the activities of the different units, in order to strengthen the cohesion of the institution and favor synergies, namely in the framework of the Associated Laboratory.

P5. PLAN FOR THE SUPPORTING ACTIVITIES

P5.1 DEPARTMENT OF INFORMATION AND LOGISTICS

Coordinator: Maria da Graça Barbosa

P5.1.1 SHORT DESCRIPTION OF THE DEPARTMENT

The main objective of the Department of Information and Logistics (DIL) is to assure, in an integrated way, the information, administrative and organizational support necessary to INESC Porto's good functioning. Comprehending the majority of the support functions and combining administrative/executive functions with research, specialized analysis and advice, DIL strongly contributes to the preparation and substantiation of the decisions made by the authorized bodies.

Currently, DIL seeks to take full advantage of the Intranet's potentialities, aiming to offer more complete and updated information of relevance to the institution, as well as making available the rules and procedures in force.

It is also DIL's objective to increase the efficiency of the services rendered upon the simplification and automation of the processes.

P5.1.2 DESCRIPTION OF THE DEPARTMENT'S ORGANIZATIONAL STRUCTURE

The current structure has been reasonably stable for years, corresponding to the functions required by the type of activity that has been carried out by INESC Porto. Since January 2009, the logistic support was transferred to the Infrastructures Management Service. This way, the Department focuses on information, organizational and management support, which is its main purpose.

Thus, apart from General Coordination, DIL covers five main functional areas: Human Resources, Accountancy and Finance, Management Control, Legal Support and Secretarial Coordination, with the following specific missions:

Human Resources: Coordination and execution of all activities concerning administrative management of human resources, including the electronic submission of applications in the framework of funding programmes for recruitment of PhD and grant holders, as well as the actions necessary to the fulfilment of the legal and budgetary obligations. Follow-up and management of INESC Porto's insurances related to people, namely Health Insurance, Personal Accidents and Work Accidents, as well as the follow-up and control of the services rendered by the hired company in the area of Health, Hygiene and Occupational Safety. Due to the increase of workload in this area, a new person, who has been in INESC Porto as a trainee, was hired in December 2009 with a fixed-term contract.

Manager: Maria da Graça Barbosa

Accountancy and Finance: Coordination and execution of the activities of general accountancy and financial management, as well as the necessary actions to the fulfilment of the tax obligations. Due to need to replace a person who resigned in November 2008, a new person, who has been in INESC Porto as a trainee, was hired in December 2009 with a fixed-term contract.

Manager: Paula Faria

Management Control: Coordination and execution of the activities regarding planning and budgetary control and management information. Support to the submission of applications of funded projects and administrative, economical and financial management of these projects. Due to the increase of workload in this area, it is foreseen the possibility of admitting a new person in 2011.

Manager: Marta Barbas

Legal Support: Juridical support to the institution, in terms of information, advice, prevention and solving of problems and verification of the legal and statutory conformity of acts and contracts, maintenance and update of the institutional documentation. It also supports the functioning of the associative bodies of INESC Porto, particularly the Board of Directors and the General Council. Due to the increasing work in this area, a new person was hired in February 2009 with a fixed term contract.

Manager: Maria da Graça Barbosa

Secretarial Coordination: Coordination of the Units', Support Services' and Departments' Secretaries, in order to guarantee the coherence of the typical procedures of those functions, as well as to ensure homogeneity and control the compliance with the internal rules and procedures. The person in charge of these functions is allocated to it in part-time, maintaining her main functions as Board of Directors' secretary.

P5.1.3 SWOT ANALYSIS

Strengths

- Integrated and interdisciplinary services under a common coordination has proved to enable a more coherent, informed and effective response;
- The engagement in the continuous improvement of the key-elements' work methods, as well as the investment in training, whether professional or post-graduate directly related with the function, enables a global increase of DIL's response capacity, reducing the need to resort to external advisory to the minimum;
- The fine organization of information and its adaptation to several purposes has been recognized even as a of best practice model.

Weaknesses

- Some difficulties in identifying, conceiving and implementing measures of rationalization and automation of processes;
- Some discrepancies in terms of qualifications and capacity of response and, consequently, in terms of amount of work and level of responsibility assigned to each employee;
- Difficulty in improving fruitful collaboration between areas.

Opportunities

- The exploitation of partnerships with external entities, from which improvements in procedures and implementation of best practices may result. Furthermore, the institution itself may become a reference of good practices in certain areas;
- The possibility of including DIL's services and competences in the array of services and competences offered by the institution to its stakeholders and, consequently, be an additional source of revenue.
- Support INESC Porto in its participation in the actions to be proposed in the ambit of the Europe 2020 Flagship Initiative "Innovation Union".

Threats

- The increasing complexity and burden of the management of funded projects, may consume too much time and energy of several persons in the department, deviating them from their value-added core functions.
- The added administrative and control work resulting from the adhesion of the autonomous research Units to INESC Porto Associated Laboratory and from the institution's growth is proving to be a significant overload of work for the actual size of DIL's structure;

- The unavailability to take the opportunities that may arise, due to above mentioned increase of workload;
- The current structure and control methods and tools may not be appropriate to a larger institution.

P5.1.4 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Involvement in the several aspects and strategic guidelines: due to its positioning in the organizational structure and its knowledge and specific competences, DIL is capable of collaborating, in a small or large scale, in the following strategic aspects:

- Economic value of knowledge: the Legal Support area intends to intensify its intervention, mainly in the technology transfer processes, advanced training and protection of intellectual property, in close articulation with UITT;
- Internationalization: According to its specific competences, DIL proposes to collaborate in the initiatives that may be developed; in the scope of Secretarial Coordination, DIL also hopes to collaborate in the organization of international congresses;
- Institutional Positioning: DIL proposes to collaborate in the creation or development of institutional partnerships, stressing the external offer of internal competences that have been created (namely in project management and information management), that may place INESC Porto as a reference institution;
- Definition of the policies and funding sources: The areas of Management Control and Accountancy and Finance in particular, propose to intensify their contribution to the search and diversification of INESC Porto's funding sources;
- Management of Human Resources: the area of Human Resources proposes to study the ways of carrying out the diagnosis of INESC Porto's factors of attraction for the several types of collaborators, as well as to contribute to the redefinition of the collaborators' regulation;
- Internal Organization: within this strategic aspect, DIL will maintain the achievement of objectives defined previously. They are:
 - Promotion of the inter-units articulation: DIL aims to promote initiatives involving unit and area managers, with the objective of fomenting the articulation between the several productive units, concerning the issues of the department's competence.
 - Simplification and automation of processes: DIL intends to identify, propose and implement effective measures of simplification and active collaboration in the automation of processes, as a way of obtaining efficiency gains, without control or rationality loss and ensuring the compliance with the applicable laws;
- Obtaining new competences: DIL is constantly updating knowledge and adapting its competences to the institution's evolution, in a way as to maintain or increase the capacity of response to new problems and situations, by means of research, adequate training, benchmarking etc.
- Collaboration in the management of the enlargement process of INESC Porto - Associated Laboratory, in terms of articulation of scientific and contractual activities, budgets and accountability, procedures, human resources, etc. between INESC Porto and the Units that have adhered to the Associated Laboratory, or intend to adhere. Organization of the INESC Porto-LA Coordinator Council's meetings and follow-up of its decisions.

P5.1.5 DEPARTMENT ACTION PLANS

All the actions mentioned below, most of which already started, aim to contribute to a better management and valorisation of resources (human, material, financial and intellectual) and to a greater efficiency of the processes, as well as to the carrying out of the strategic guidelines established by the Board of Directors.

General (in general coordination or involving one or more areas)

- Search for new opportunities of funding of continuous training, that may be adequate to INESC Porto needs;
- Reviewing and enriching of the information and documentation published by DIL in the Intranet and Internet sites: improve accessibility and the organization of the information, within the general reforming of Intranet and Internet process, managed by SIG;
- Continuing the participation in the internal project of automation of processes (collection and modelling of processes and specification of test and validation scenarios);
- Provide training or information sessions, periodically or whenever it is necessary, whether for the project managers or for the secretaries;
- Collaboration in the development and implementation of a Balanced Scorecard for INESC Porto that enables the monitoring of the strategy's execution.

Human Resources Area

- Extension of the automated process of Recruitment, Selection and hiring of human resources to other categories of collaborators and other stages of the process;
- Collaboration in the specification of an automated process of Collaborators' Admission, that ensures the automatic collection and registration of data in the Personnel Database;
- Improvement of the processes of collection, integration and processing of the information for the purpose of the Single Social Report, compliance with the New Contributory Code and, in general, facilitating the supply of information for several purposes;
- Creation of a section in the intranet containing information, forms and FAQ related with health insurance and other forms of protection of INESC Porto's collaborators in case of disease occurring during business trips;
- Collaboration in the specification of an automated process for managing the Complementary Payments;

Accountancy and Finance Area

- Promotion of the establishment of partnerships with Financial Institutions, in the technological areas, in articulation with the Board of Directors and the research Units;
- Update of the handbook on procedures of the accountancy and Finance Area;
- Consolidation of framework reports of the new accounting standards that became in force on the 1st January 2010;
- Update of payment procedures by bank transfer of personal expenses, in order to integrate Human Resource's framework.
- Implementation of a new procedure for payment to goods and services' suppliers by bank transfer.

Management Control Area

- Creation and development of an Internal Audit Plan;
- Maintenance of a repository of rules and procedures for funded projects; Feed intranet with proper contents;
- Development of the activities of National Contact Point for ICT theme under FP7, through a contract with FCT.
- Study and implementation of a more efficient overhead rate applied to funded projects.

Legal Support Area

- Collaboration in the implementation of the Handbook on Intellectual Property, written by an external specialized company, in articulation with the Innovation and Technology Transfer Unit (UITT);
- Legal support to the participation of INESC Porto in companies and associations;
- Legal support to the institution's internationalization projects, namely the creation of INESC P&D Brasil;
- Reviewing drafts of frequently asked documents (contracts, declarations, etc.), relevant legislation, updating of the frequently asked questions, as well as relevant institutional documentation;
- Launching and accompanying of several public procurement procedures.

Secretarial Coordination

- Verify and support the use of intranet applications such as ULTIMUS Workflow, SACA and other process management applications by the secretaries, suggesting changes and improvements, namely in what concerns the combination of the Intranet reservations process of services and equipment, allowing multiple requests and confirmations (namely with Plone interface which is still in progress);
- Coordination and Implementation of an effective procedure regarding admission of new collaborators within the Units;
- Suggest secretarial daily tasks that may be object of a management application processes, in order to create more efficiency within the Unit;
- Continuous planning of the Secretaries' training:
 - Proposals for single individual participations;
 - Proposals for the Unit's training based on the assessment of lacunas
- Production of a chart/map that states the tasks that are performed by the several secretaries as a way to compare the different usage of these human resources in the different Units and make the coordinators aware of a more efficient use of them.

P5.1.6 HUMAN RESOURCES OF THE DEPARTMENT

Source		2009	2010 (a)	2011
Internal HR	R&D	Employees		
		University and Polytechnic		
		Grant Holders and Trainees (PG)	0	0
	<i>Total R&D</i>	<i>0</i>	<i>0</i>	<i>1</i>
	Shared Structure (Central and Local)	17	17	17
<i>Total Internal</i>		<i>17</i>	<i>17</i>	<i>18</i>
External Collaborators and Invited Researchers		0	0	0
Students (UG)		0	0	0
Global Total		17	17	18

a) Information at the time of the elaboration of the document *Plano e Orçamento para 2011*

P5.2 SUPPORT SERVICES

P5.2.1 COMMUNICATIONS AND COMPUTER SUPPORT SERVICE

Action	Description	Schedule
AAA service	Development, configuration, installation and deployment of an integrated Authentication, Authorization and Accounting service. Deploy the infrastructure for a Single Sign On service.	Annual Task
VoIP	Conclusion of the VoIP systems and services implementation.	First Semester
IPv6	Migration to full IPv6 infrastructure support.	Third Quarter
Electronic mail (E-mail)	Introduction of new engines for SPAM filtering.	Annual Task
	Reorganization and refinement of the mail servers' management tools and procedures.	
	Development, configuration, installation and deployment of new services in INESC Porto network.	
Calendar and Agendas Management service	Start exploitation phase of the new calendar and agendas management service.	First Semester
New network services	Restructuring of the Wi-Fi network infrastructure and introduction of new access service for INESC Porto visitors.	Annual Task
Systems Backup	Support services (help-desk) for all INESC Porto users.	Annual Task
Users support	Technical support service for internal IT purchase processes.	Annual Task
	Development of a new version of the Communications and Computer Service web site, supporting more user interactivity and facilities to access the software and network databases.	
	IT infrastructure management and maintenance and related services.	
IT infrastructure management and maintenance	Maintenance and support contract management, covering the IT infrastructure and software applications.	Annual Task
	Periodic auditing of systems installed software and network access.	
	Consulting services and tasks, by request of external entities or in cooperation with other Units.	
Specialized consulting services	Organization of short term training actions and traineeships.	Sporadic Tasks

P5.2.2 MANAGEMENT INFORMATION SUPPORT SERVICE

Action	Description	Schedule
Development of business workflow solutions	Conversion of the existing forms to electronic format (continuation).	Whole year
	Identification and specification of critical business processes in INESC Porto, with the purpose of its electronic support.	
	Automation of selected procedures in the workflow system.	
Enhanced of INESC Porto Website	Migration of Content Management System to Plone 4.	First semester
	Support of new website design.	Whole year
	Enhanced performance, authentication, security and redundancy.	
Collaboration in the development of the Units' projects and conferences websites	Enhanced collaborative Platform for projects	First trimester
	Support to the units and services in the creation of the necessary websites	Whole year
Development of databases and applications to support internal management functions	Implementation of an database for INESC Porto projects	First semester
	Implementation of a simple Customer Relationship Management (CRM) system	First trimester
	Implementation of services based on human resources database	
	Re-structuring SACA in a way to integrate with internal CMS and with FEUP's database	Second semester
	Integration of CMS (human resources and project databases) and SAP	First semester
Maintenance of management applications, integration of information among applications, etc.	Maintenance of the Website, Ultimus, Workflow, SACA, PHC Personal, etc.	Whole year
Collaboration in specific projects	As required by Units	Whole year

P5.2.3 COMMUNICATION SUPPORT SERVICE

Action	Description	Schedule
Intensification of external communication: news and opinion articles in the most relevant media (newspapers, radio and television).	The aim is to guarantee the publication or release of (at least) one news item per month on the activities of INESC Porto.	The whole year
Production and dynamization of INESC Porto's new website in Portuguese and in English.	Development of a new image for the website. Reorganization of the contents so as to make them more effective.	The whole year
Organization of the institution's external communication activities.	The activities include the organization of events, participation in exhibitions, and initiative propaganda, among others.	The whole year
Provide support to the R&D Units in the dissemination of national and European projects.	Produce contents and create a graphic image for communication supports developed within R&D projects.	The whole year
Development of initiatives to support the communication strategy for the new building "Centre of Knowledge on Sustainable Energy".	The initiatives include press releases to provide information on the new building and its mission; development of a corporate image, website, electronic newsletter, institutional DVD, advertisements and leaflets.	The whole year
Development of initiatives to support the communication strategy involving the launching of INESC P&D Brasil.	The initiatives include the development of a strategy to disseminate information on the new institution to the media, partners and clients.	The whole year
Production of bilingual communication tools to present INESC Porto's activities.	Coordination of the development of an e-book and other printed materials that introduce INESC Porto and promote its image, activities and innovative projects.	First semester
Organization of Media Training sessions for INESC Porto LA's researchers.	The training provided to the researchers will make it easier for them to communicate with the media more effectively. A part of the session will be taught by the Communication Service, while the other will be taught by an invited journalist.	First semester
Affirmation of INESC Porto in the social networks.	Creation of a Facebook page for INESC Porto. The main objective is to attract high quality human resources. Contents and images will be updated daily.	First quarter
Organization of internal communication activities for the INESC Porto LA community.	The initiatives include the organization of sports, interaction and leisure events, art and cultural exhibitions, among other initiatives that promote an institutional culture and the integration of most recent Units, such as ROBIS - Robotics and Intelligent Systems Unit.	The whole year
Production of BIP - INESC Porto's Bulletin.	Collection and processing of information and images to include in BIP. Production of 11 editions in Portuguese and 4 in English.	The whole year
Photo and video coverage of events.	Photo and video coverage of internal and external events, upon request by the Units.	The whole year
Organization of visits to INESC Porto.	Promotion of visits to INESC Porto for students who are interested in our areas of activity.	The whole year

P5.2.4 INFRASTRUCTURE MAINTENANCE SUPPORT SERVICE

Action	Description	Schedule
Buildings' management and maintenance	Management of the provision of services associated with the operation and maintenance of the buildings. Buildings maintenance	The whole year
Support to the Units' electronic production activities	Offering of infrastructures and material for the electronic production (in collaboration with UOSE)	The whole year
Support the construction of the new building	Construction management, monitoring and control	The whole year

P5.2.5 LIBRARY AND DOCUMENTATION SUPPORT SERVICE

Action	Description	Schedule
Management and deployment of the interface with FEUP's library.	Support to the deployment of the agreement between INESC Porto and FEUP for the management of the library and documentation services.	The whole year
Inventory of INESC Porto's documental heritage	Cataloguing of the institution's publications including books, magazines, theses and multimedia material.	The whole year