INESCPORTO
INSTITUTO DE ENGENHARIA DE SISTEMAS
E COMPUTADORES DO PORTO
LABORATÓRIO ASSOCIADO

SCIENTIFIC AND TECHNICAL ACTIVITY PLAN

PLAN OF SCIENTIFIC AND TECHNOLOGICAL ACTIVITIES

P1. INTRODUCTION

The transformation of the INESC Porto Associated Laboratory, by establishing an organizational architecture based on Units and Autonomous Groups, has led to the option of elaborating a consolidated Plan for the whole LA and not only for the nuclear institute (the entity that has juridical existence).

Therefore and for the first time, the Plan for the following year is presented as the Plan for the LA and in a format that approximates the new reporting format required by FCT (Foundation for Science and Technology).

The LA, in 2010, will be composed of research Units (U) anchored in the nuclear INESC Porto (the former organization of the LA) and of Autonomous Groups (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 Groups 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 (new group in incubation within the nuclear INESC Porto)
- LIAAD – Laboratory of Artificial Intelligence and Data Analysis (AG)
- CRACS – Center for Research in Advanced Computing Systems (AG)
- UGEI – Management and Industrial Engineering (AG)

All Units present their plans in a common format. This very same format is adopted for the Autonomous Groups in the LA although in this case it may happen that the level of development of the plan is not as detailed or complete as in the case of the Units. This represents their first effort to integrate their activity in the LA and is interpreted as an important first step in the process of acquisition of new management methods and reporting, in the line of what has been successfully consolidated in INESC Porto.

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 Group included in the LA
- The plan of the Scientific Council
- The plan for the supporting activities.

P2. LA THEMATIC RESEARCH LINES

P2.1 SUMMARY

The LA Thematic Research Lines are born, as a concept 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 groups 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 Group, 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.

The year 2009 marked the end of a period of activity of the Associated Laboratory as recognized by FCT and, following the evaluation promoted by this Governmental Foundation, a new contract for a new period of 5 years as LA is expected with confidence, given the performance of the institute as evaluated by its own Scientific Advisory Board.

At this moment, for the following 5 years, one envisions that the LA shall have five main research lines, designed to enhance internal coherence and multi-disciplinary strengthening, maximize external impact and guarantee in Portugal a solid knowledge core in key areas. These lines will be:

1. Networked Multimedia Systems and Services in scenarios of convergence
2. Photonics for Life Sciences: Optical Biochemical Sensing and Imaging
3. Smart Grids for the Development of Sustainable Energy Systems
4. Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks
5. Digital Society - large scale platforms, advanced services, citizen participation and policies

The following description must be seen as the first attempt to define the new scope of activity for the coming 5 years and are not definite. The objectives and text may be re-defined following negotiations with FCT.

P2.2 RESEARCH LINE:

NETWORKED MULTIMEDIA SYSTEMS AND SERVICES IN SCENARIOS OF CONVERGENCE

P2.2.1 GENERAL OBJECTIVES

The ubiquity of the Internet and the web are fostering the convergence of traditional telecom and broadcast services and new interactive multimedia services, in an environment characterized by heterogeneous wired and wireless access networks and a diversity of fixed and mobile terminal devices with rather different capabilities.

Moreover, the traditional roles of customers and providers are also changing. On one hand, the end-user will no more be a mere customer, but rather an active player in emerging community networks and services; on the other hand, a separation of network access and service providers is already occurring. This not only requires new technical solutions but also the exploitation of new business models that take into account new players and business roles.

In order to support advanced audiovisual services and distributed multimedia applications a diversity of digital technologies is required, in particular audio, video and image processing, communication systems and networks, software engineering and location based information systems, distributed systems, metadata and data models.

Research work on the above topics is carried out by groups within the Telecommunications and Multimedia Unit and therefore this research line builds on top of the know-how existing on these groups and goes one step further. In the first place it exploits synergies between these groups, with a focus on the integration of technologies required to develop complex systems and services suitable for emerging and future communications scenarios and environments. Nevertheless, such integration processes include defining and carrying out new research activities; for instance, the development of advanced video-surveillance systems implies not only video processing but also multimodal processing, including joint processing of video, audio and signals of other sensors, supported by high capacity communication systems and networks with good quality of service. Research at this level is thus within the general objectives of this research line, as well.

P2.2.2 UNITS COOPERATING IN THIS LINE

Unit/Group	Coordinator	Name of the Unit/Group
UTM	José Ruela/Augustin Olivier	Telecommunications and Multimedia Unit

P2.2.3 SUMMARY OF ACTIVITY PLAN FOR 2010

Taking into account the objectives of the research line, the main topics to be addressed during 2010 (and the following years) include:

- workflow in digital media production and distribution;
- multimedia information archives, with semantic content search and retrieval (with a possible application to the preservation of the cultural heritage);
- content and context-aware service delivery and ontology-based content adaptation;
- automated multiplatform distribution systems;
- semantic analysis of multimedia information and knowledge extraction from data;
- novel Internet architectures (e.g., mobile Internet, delay tolerant networks, self-spreading networks, etc.)

- community networks and services (both from a technical and a business perspective).

This research plan is tightly coupled with on-going projects and research contracts carried out by the Telecommunications and Multimedia Unit, namely EU funded projects, FCT projects and a set of research projects and contracts recently approved or submitted to the QREN programme. Moreover it is also expected that relevant scientific results will be achieved with contributions from the large number of on-going or newly starting PhD programmes on the above topics.

P2.2.4 EXPECTED ACTIVITIES FOR 2010

Unit/Group	Projects	Publications	Advanced Training Actions	Activities of cooperation or dissemination	Total	Unit's Contribution (%)
UTM	35	94	49	107	285	100,00%
Total	35	94	49	107	**285**	100,00%

P2.3 RESEARCH LINE:

PHOTONICS FOR LIFE SCIENCES: OPTICAL BIOCHEMICAL SENSING AND IMAGING

P2.3.1 GENERAL OBJECTIVES

The medium term objectives for optical biochemical sensing can be split in two main lines of intervention. The first is concerned with the development of generic optical interrogation platforms while the second will be focused on the development of chemical and biosensitive membranes. The ultimate goal is the conjugation of these two research lines to implement new analytical instruments aiming for applications with strategic significance in both global and local contexts. Main target applications include environmental monitoring, food industry and biotechnology.

From the point of view of optical interrogation platforms developments will be pursued taking advantage of technology existing in the Optoelectronics unit. In particular refractometric and interferometric fiber optic and integrated optics (IO) devices with enhanced sensitivity will be developed. On the other hand new IO and fiber optic probes will be designed for fluorescence based detection systems. In addition, following recent developments hybrid electrochemical and optical analysis platforms will be designed in order to attain portable and autonomous sensing tools.

From the point of view of sensitive materials, efforts will focus on developing new indicators and analyte sensitive membranes. Two distinct strategies are being pursued that will be further developed. On one hand, taking advantage of a long term collaboration with the Chemistry Dept. of FCUP, new luminescent indicators are being developed. While very good results have been obtained with pH, and heavy metal sensitive CdTe nanoparticles, efforts for the next years will focus on recent exciting results obtained with biocompatible carbon nanoparticles produced by laser ablation. Further non-toxic sensitive materials will be explored for luminescence based sensing devices.

On the other hand, the development of membranes that experience refractive index changes in the presence of the analyte will be further pursued. Strategies to attain specific responses include the covalent incorporation of specific functional groups and the use of molecular imprinting techniques. Presently, the hydrolysis of silicon alkoxides is being pursued as the immobilization route both for luminescent and refractometric membranes. While this material has considerable advantages; the hydrolytic procedure is very difficult to control and the resulting material have some problems of long-term stability in water. For this reason, further immobilization strategies such as the polymerization of cellulose will be studied as alternative due to the low cost of the raw materials employed in that reaction. Immobilization related developments will allow:

- Development of glass compatible cellulose matrices for fluorescence based sensors.
- Development of colorimetric and refractometric sensors for biological important gases (CO2, H2 and O2).

Finally the combination of the developed interrogation platforms with the adequate sensitive membranes will be used in the development of new sensing tools for specific applications. In this context as a parallel activity the development of signal processing, virtual instrumentation tools, and portable integrated optoelectronic systems will also be pursued.

In terms of imaging, the current interest on the development of new nano and micron-sized tools and evices raises the need to inspect, characterize and image efficiently at these scales. Electron microscopy techniques are well established and provide the needed resolution, but these are expensive, require a larger technical assistance and maintenance. Optical techniques for imaging present nowadays alternatives that allow high spatial resolution imaging techniques allowing three dimensional imaging at spatial resolutions between traditional microscopy and confocal techniques. At UOSE a white light low coherence imaging system is at its final stage of assembly, targeted for 3D imaging of micro-fabricated devices and other structured material. The system is now the basic tool and starting point for the development of alternative optical, contactless, imaging and measurement techniques, valuable for the development of optoelectronic components and also in the development and interrogation of microfluidic devices. Other high resolution optical imaging/measurement systems will be considered in the near future. In particular profiting from some recent in-house developments in the nanoparticles based luminescence imaging, analytical imaging techniques will be further developed.

P2.3.2 UNITS COOPERATING IN THIS LINE

Unit/Group	Coordinator	Name of the Unit/Group
UOSE	Paulo Marques	Optoelectronics and Electronic Systems Unit

P2.3.3 SUMMARY OF ACTIVITY PLAN FOR 2010

Activities in 2010 will give continuity to the work previously developed following the strategies described above and considering the following guidelines:

Development of auxiliary instrumentation:

- An interfeferometric readout system based in fiber optic Mach-Zehnder and a virtual instrumentation setup will be incorporated in a standalone interrogation unit for interferometric sensing heads.
- A LED based portable unit for interrogation of luminescence based biochemical sensors using frequency domain spectroscopy will be developed.
- A miniature cyclic voltammetry device will be integrated for portability and electrochemical interrogation of chemical and biological membranes.
- Development of sensing platforms.
- New refractometric sensing heads based in specialty (microstructured) optical fibers and in fiber microcavities and interferometers will be developed.
- Design and fabrication of miniaturized platforms for lab-on-a-chip purposes (interferometric/colorimetric/luminescence)
- Optical fiber microtips for localized fluorescence based detection of chemical and biological species at the micron scale.
- Development of integrated microfluidics to use in combination with the implemented platforms.

Development of sensitive indicators/membranes.

- Improvement of sensitive membranes developed in 2009 (determination of toxins from bacterial species in water; sensors for acetic acid, ph and heavy metals)
- development of fluorescence and colorimetric sensors for quantification of molecules with biochemical interest (co2, h2 and o2);
- new optical and electric sensors for bacterial and viral recognition, specifically sensors for e-coli detection;

The items described are intended to support the activity in several specific topics in the context of ongoing projects:

Microbiological water quality monitoring: The validation of a sensor for the quantification of a toxin from Cyanobacteria is currently undergoing. The next steps will be the development of techniques for E.coli recognition through interaction with the intracellular medium of the bacteria. A micro-electroporation/reaction system will be developed in order to allow the recognition of glucuronidase, a enzyme that is a marker for E.coli. In another line, RNA specific chemical reactions for rapid viral detection will be pursued. In this case fluorescence or a colorimetric substrate will be used. The kinetics and thermodynamics of the reaction will be studied. Comparison with other sugars will also be made.

Optical technologies for cell studies: Development of hybrid electro-optical chip will be addressed. The goal is to incorporate refractometric/interferometric sensing in fluidic chips traditionally used for cell characterization by impedance spectroscopy. On the other hand photo polimeric luminescent and refractometric microscale tips will be developed for study of celluar processes in combination with traditional microscopy techniques.

Optical sensors for biotechnology: several ongoing projects involve optimization of bioreactors and anaerobic digesters. It is expected that some of the developments described above will enable the initial stages of incorporation of the developed sensing technology in real-time running systems.

A fully pc-controlled white light low coherence imaging system will be operating in the lab, and made available for general use by the scientific community during 2010. This system will perform three different imaging regimes, as a time-domain optical coherence tomography system. With minor upgrades, it will be able to give additional imaging and characterization tools. The time domain system will be also complemented with a spectral detector that will allow Fourier domain imaging. Differential absorption in time domain will be implemented, this being mostly relevant on the imaging of in real time depth concentration resolved imaging of micro- fluidic devices.

P2.3.4 EXPECTED ACTIVITIES FOR 2010

Unit/Group	Projects	Publications	Advanced Training Actions	Activities of cooperation or dissemination	Total	Unit's Contribution (%)
UOSE	19	63	2	211	295	100,00%
Total	19	63	2	211	**295**	100,00%

P2.4 RESEARCH LINE:

SMART GRIDS FOR THE DEVELOPMENT OF SUSTAINABLE ENERGY SYSTEMS

P2.4.1 GENERAL OBJECTIVES

The general objectives in this research line are the following:

- Development of new managing tools and procedures for the dispatch center level, to allow large scale integration of on-shore and off-shore intermittent generation, namely wind power. This means developing effective forecasting tools and identifying and optimizing new balancing schemes, by energy storage, conventional generation or demand-side participation, involving an intensive use of ICT. Also new emergency functionalities need to be identified like participation of wind generation in black start and islanding. In off-shore wind generation, modeling and control of multi-port DC/AC systems, together with control of off-shore wind generation, will be developed to provide ancillary services to the grid.

- Development of new distributed control architectures for active distribution networks, which will be coordinated and integrated into existing central control methodologies, following the concept of Smart Grid. This will allow increasing the deployment of distributed generation and microgeneration and will support the networks at times of stress on the main grid. This will also enable new actors, such as aggregators and virtual power plants, to enter the market to provide balancing services. These developments will involve smart metering architectures to allow monitoring and controlling the LV distribution grid with active loads and microgeneration and serving as an enabler for the full development of the smart grid concept.

- Analysis of the impact on the grid and generation system from a large scale integration of electric vehicles (pure electric vehicles and plug in hybrid vehicles). This will require the development of specific monitoring and control schemes and software tools related with smart charging of the vehicle's batteries and the exploitation of the presence of this distributed storage for ancillary services provision. A strong interaction with ICT is foreseen in order to develop an efficient bidirectional communication system capable to help managing technically and commercially the integration of EV on the grid. Regarding the commercial part, specific billing systems are expected to be developed.

P2.4.2 UNITS COOPERATING IN THIS LINE

Unit/Group	Coordinator	Name of the Unit/Group
USE	Manuel Matos	Power Systems Unit
UTM	José Ruela/Augustin Olivier	Telecommunications and Multimedia Unit

P2.4.3 SUMMARY OF ACTIVITY PLAN FOR 2010

The activities foreseen for 2010 include the participation in European Projects, National Projects and Development and Consulting projects, aligned with the objectives of the research line. All the activities are of interdisciplinary nature, since the competences of the Power Systems Unit needed for the projects include, besides the basic know-how on power system analysis, optimization, control, decision-aid and computational intelligence. In specific projects related with the emergence of Electric Vehicles, the additional competences of the Telecommunications and Multimedia Unit on communications are also mobilized.

Most of the activities correspond to long-term partnerships (EFACEC – advanced tools for EMS and DMS), ongoing international/European projects like Anemos.Plus (managing tools for power systems with high penetration of wind power), Argos (wind energy integration facilitation) or ParaFuzzy (Fuzzy State Estimation), ongoing national projects like Green Island (in the framework of MIT-Portugal programme) or PLASM (Simulation platform for electricity markets), and ongoing development and consulting contracts with the main actors in the electric sector (ENERCON, EDP, ENEOP2, REN, RAVE, GALP). It should be pointed out that these contracts include research and development tasks and provide the opportunity to identify new topics for research. Good examples are the new extensions of INOVGRID (smart metering, microgeneration and active load management) and ASIRP (new tools for selecting investments for loss reduction in distribution systems).

In the new activities scheduled to begin in 2010, European project MERGE (Mobile Energy Resources in Grids of Electricity) must be emphasized, due to its dimension and intensive nature. In the same topic of Electric Vehicles' deployment, the new national project Microgrids+EV makes the necessary connection to the role of microgrids in EV charging.

It is also worth pointing out the new European project TWENTIES (off-shore wind generation), the new national project GEMS (new concepts is state estimation) and a number of development and consulting contracts with research and development tasks, still in negotiation. There is also a possibility of an important financing of the Innovation Fund of the Ministry of Economy to project REIVE, in the topic of Electric Vehicles integration, with a strong participation of some Portuguese companies.

P2.4.4 EXPECTED ACTIVITIES FOR 2010

Unit/Group	Projects	Publications	Advanced Training Actions	Activities of cooperation or dissemination	Total	Unit's Contribution (%)
USE	22	52	5	59	138	99,28%
UTM	1	0	0	0	1	0,72%
Total	23	52	5	59	139	100,00%

P2.5 RESEARCH LINE:

ADVANCED MANUFACTURING MANAGEMENT, INNOVATION AND ENTERPRISE COOPERATION NETWORKS

P2.5.1 GENERAL OBJECTIVES

An enormous interdisciplinary interest has been growing on enterprise networks viewed as a dominant organizing principle. This interest goes along with new and innovative business models and with the design and development of advanced management tools, based on technological platforms that promote collaboration and information sharing.

Most of the research work on the broad domain of Supply Chain Management, Collaborative Networks or related topics, has been concentrated on issues such as distributed information technology infrastructures, novel forms of organizational structures, etc. However, less attention has been paid to important issues related to inter-organizational collaboration or to the roles of the different actors.

Moreover manufacturing environments are becoming more and more sophisticated, strongly dependent on a set of general prevailing principles (e.g. lean, kaizen ...) that create the necessity of completely new planning and management paradigms, and consequently the development of innovative methodologies. This new context asks for the adoption of a more strategic perspective in operations management and in organizational dynamics, requiring the development of new decision support tools, and the recourse to advanced modeling, optimization and simulation methods.. This applies both to manufacturing environments and to services. In particular, we have to face new research challenges in processing and structuring information through statistical models, AI approaches or techniques such as Data Envelopment Analysis, the latter viewed as a powerful instrument for Performance Management and Measurement.

Along with problems in the operations management domain, there are multiple problems in logistics, vehicle routing, or transportation systems, which are regularly addressed in our projects.

Somehow complementary to these activities, we have integrated a research area in robotics and intelligent systems, addressing not only relevant problems in robotics but also applications where technologies used in robotics play an important role, like control, automation, simulation, modeling, intelligent systems, etc. In this area we want to contribute to the improvement of industrial enterprises through R&D projects, consulting, technology transfer and training services.

Our research is intended to cover the above referred gaps and is therefore of a multidisciplinary nature, concentrating in a small set of key areas: a) decision support systems; b) multi-objective heuristic optimization; c) models for cooperative networks and business; d) information knowledge management; e) integration in collaborative networked organizations; f) data mining and statistical methods for decision support; g) Data Envelopment Analysis; g) multi-agent modeling frameworks and simulation; robotics and intelligent systems.

Unlike other research groups, we have adopted an integrated interdisciplinary approach based on competences and know-how from those different domains.

Finally in another but complementary direction, we want to develop and promote research initiatives and innovation management practices, internally and externally, supporting entrepreneurship and technology transfer activities as well as incubation at a seed phase.

P2.5.2 UNITS COOPERATING IN THIS LINE

Unit/Group	Coordinator	Name of the Unit/Group
UESP	Jorge Pinho de Sousa/Luis Carneiro	Manufacturing Systems Engineering Unit
UITT	Alexandra Xavier	Innovation and Technology Transfer Unit
ROBIS	Américo Azevedo/António P. Moreira	Robotics and Intelligent Systems

P2.5.3 SUMMARY OF ACTIVITY PLAN FOR 2010

The co-ordination and optimization of complex and dynamic supply chains (or networks) consisting of independent companies require management approaches and systems able to link the most important business processes and make them inter-operable. By adopting new approaches for supply chain integration and collaboration, companies can significantly improve their performance through improvements of efficiency, higher delivery reliability, better asset and capacity utilization, and faster time to market and responsiveness.

New organizational principles (e.g. lean, kaizen,…) create new challenges for operations management, leading to the need of innovative methodologies and decision support tools. In particular, to correctly address problems, a more strategic or tactical perspective is required.

Operations research methods and techniques of various types will be exploited both in terms of development activities and research projects. This covers a broad range of topics, from multi-objective optimization to simulation, or from statistic modeling to forecasting methods.

Our future research activities will therefore be of a strongly multidisciplinary and interdisciplinary nature, motivated by real complex problems and cases. They will reflect the experience gained in past projects, and explore our competences, focusing on the following themes:

a) Models for cooperative networks and business

This research aims at developing: a global interdisciplinary theory for relationship management in organizational networks; business models and planning tools for creating, managing and dissolving collaborative networks.

b) Integration of collaborative networked organizations, and knowledge management

Research aiming at achieving semantic integration of organizational structures formed by autonomous, independent and heterogeneous entities acting in a dynamic and competitive environment towards an environment of self-forming collaborative networked organizations. Special importance will be given to the social process perspective of knowledge creation and use of collaboration. General research lines: socially constructed socio-technical artifacts; collaborative workspaces for management; applications of networking theories.

c) Decision Support Systems and Combinatorial Optimization

Our research agenda will be centred in topics such as Multi-objective Metaheuristics, Soft Methods in Decision Making; or Creativity in Optimisation. In terms of Optimization, innovative concepts previously developed will be enhanced and extended (e.g. Constraint Oriented Neighbourhoods, or the "scheduler"). Particular focus will be given to applications in problems where we have a considerable experience and track record: production planning; operations scheduling and lot-sizing; cutting and packing problems. Transportation and logistic systems are also a key area of our research.

d) Simulation, Modelling and Optimization using Multi-agent Frameworks

For modelling organizational dynamics multi-agent based systems will be used in simulating firms for specific industries and geographical locations, and observing the interaction among them, with attention to their cooperation (creation of networks) and survival. Optimization models will be used to investigate specific problems in job-shop manufacturing environments.

e) Statistical modelling and Data Envelopment Analysis

For effective and efficient decision-making, huge amounts of unstructured data require more and more sophisticated statistical techniques. Research will be pursued on these techniques, and also in DEA modelling, as a natural follow-up of the considerable experience and successful results achieved in these topics.

f) Robotics and Intelligent Systems,

Research in Robotics and Intelligent Systems will be applied both to industrial companies and service companies. The main activity areas will cover: mobile robotics, marine robotics, industrial manipulators, control algorithms, automation systems integration, and consulting services.

e) Innovation Management, Entrepreneurship, and Technology transfer

In this broad area the focus will be on: developing a medium term strategic plan for scientific and consulting activities; consolidating the offer of consulting services in the R&D+I systems area; attracting high quality researchers in order to increase the critical mass both at scientific and consulting levels; implementing visible and high quality training actions, organizing high quality events that financially support and give visibility to the Unit's scientific and technology resources; enlarging international collaborations; diffusing the 'Open Innovation' paradigm within the Portuguese economy.

P2.5.4 EXPECTED ACTIVITIES FOR 2010

Units	Projects	Publications	Advanced Training Actions	Activities of cooperation or dissemination	Total	Unit's Contribution (%)
ROBIS	14	0	0	0	14	10,29%
UESP	28	33	10	30	101	74,26%
UITT	8	11	0	2	21	15,44%
Total	50	44	10	32	**136**	100,00%

P2.6 RESEARCH LINE:

DIGITAL SOCIETY - LARGE SCALE PLATFORMS, ADVANCED SERVICES, CITIZEN PARTICIPATION AND POLICIES

P2.6.1 GENERAL OBJECTIVES

The general objectives in this research line are the following:

- Research on high-level programming languages and models for scalable computing. We will develop new logic programming frameworks that can integrate probabilistic reasoning and negation, relying on progress in the use of parallelism and tabling to scale on larger applications. We will continue the development of type safe programming languages for distributed environments, such as wireless sensor networks, and investigate using logic programming in this domain. Our research is motivated by application domains such as Web programming and information mining, described below, and our expertise will allow us to continue to contribute in application domains such as scalable peer-to-peer middleware, and parallel algorithms for mining motifs in complex networks.

- Improve and innovate on current software development methodologies with particular emphasis on model-driven development with formal methods, agile and collaborative development methodologies, and software quality assurance based on software testing, verification and certification.

- Continue leading research in information mining, more especially on the integration of data mining in decision support, adaptive classification algorithms for online learning from continuous data streams, algorithms for data mining in complex dynamic systems, and scalable learning algorithms from structured and temporal multi-relational data. This work is motivated by applications such as fraud detection, business intelligence, sensor data streams, medical data, genomics and proteomics. We will also investigate frameworks for information management, retrieval and processing in contexts such as web mining, recommender systems, social web, semantic web, information retrieval, and text mining. This is leading us into the development of innovative systems such as federated libraries of semantically socially-assisted annotated documents, digital cultural heritage portfolios, and e-learning environments and tools. An exciting novel research direction is the design of classifiers based on biologically inspired anomaly detection algorithms, with immediate application to network intrusion detection.

- Develop innovative models, methodologies and architectures for large scale information systems. We focus on systems integration and interoperability, authentication, access authorization, security and auditability mechanisms. Our main application areas are in public administration, healthcare, telecoms and transportation sectors, as well as academic management.

- Research on computer graphics and virtual environments, especially in application to serious games, immersive and interactive urban planning based on virtual environments, visualization of large scenes in immersive environments and mobile devices, and image synthesis.

P2.6.2 UNITS COOPERATING IN THIS LINE

Unit/Group	Coordinator	Name of the Unit/Group
CRACS	Fernando Silva	Center for Research in Advanced Computing Systems
LIAAD	Pavel Brazdil	Laboratory of Artificial Intelligence and Decision Support
UITT	Alexandra Xavier	Innovation and Technology Transfer
USIG	António Gaspar/Fernando Silva	Information and Computer Graphics Systems Unit

Expected activities for 2010 envisage:

Strategic and organizational activities:

- Strengthen internal cohesion
- Further increment scientific research indicators
- Strengthen project proposals
- Achieve sustainable economic performance

Scientific activities:

- **High-Level Programming Languages for Scalable Computing.** Some of the activities planned are: further development the Yap Prolog system and its extensions, namely tabling, multithreading and probabilistic computational models, to serve current research communities in the areas of machine learning, natural language processing and semantic web; continue the development of a type safe programming language and its runtime for wireless sensor networks; continue the research on peer-to-peer middleware to address demanding information systems for transportation systems; and develop scalable algorithms and tools for motifs mining in large complex networks with particular emphasis on applications in neurosciences.

- **Information Mining and Web-based systems**. Some of the activities planned are: devise selection strategies of data mining methods for decision support, adaptive classification algorithms for online learning from continuous data streams with applications, algorithms for data mining in complex dynamic systems taking into consideration spatio-temporal features, and scalable learning algorithms from structured and temporal multi-relational data. This work is motivated by applications such as fraud detection, business intelligence, sensor data streams, medical data, genomics and proteomics. We are also investigating novel frameworks for information management, retrieval and processing in contexts such as web mining, recommender systems, social web, semantic web, information retrieval, and text mining. This is leading us into the development of innovative systems such as federated libraries of semantically socially-assisted annotated documents, digital cultural heritage portfolios, and e-learning environments and tools.

- **Computer Graphics and Virtual Environments.** Some of the activities planned are: develop serious games frameworks integration location-based services for specific application areas, like urban planning and management; devise new methodologies and interaction techniques for augmented/virtual reality applications for open-spaces in urban environments; devise methods to visualize large scenes in immersive environments and mobile devices; explore new visualization and image synthesis techniques for different levels of realism, integrating knowledge from human visual perception.

- **Software Engineering and Information Systems.** Some of the activities planned are: develop methods and strategies to assure software quality, namely through model transformation and code generation based on formal models and specifications, particularly for user interface generation; or by automation and integration of high-maturity development processes; or, also employing agile and collaborative development methodologies, and software quality assurance based on software testing, verification and certification. Extend the OpenID Protocol for user centric identity management on the Internet with more secure token based authentication processes and mechanisms. 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.

P2.6.4 EXPECTED ACTIVITIES FOR 2010

Units	Projects	Publications	Advanced Training Actions	Activities of cooperation or dissemination	Total	Unit's Contribution (%)
CRACS	2	79	1	0	82	45,81%
LIAAD	4	0	0	0	4	2,23%
UITT	2	0	0	0	2	1,12%
USIG	29	50	0	12	91	50,84%
Total	37	129	1	12	179	100,00%

P3. RESEARCH UNITS AND GROUPS

P3.1 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 main competences 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 and Production Planning, Internal Logistics, Optimization of Cutting and Packing, Systems integration, and consulting services.

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

- Cooperative Enterprise Networks Management: Build-to-Order strategies for complexity and variety, dynamic capacity management, early warning management, operations co-ordination in dynamic supply networks, 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, collaborative processes in organizational networks, information and knowledge management in organizational networks.

- Operations Management and Production Planning: structuring of decision processes; optimization methods; Combinatorial Optimization and meta-heuristics; optimization for planning and scheduling problems; Simulation; Decision Support Systems.

- Optimization of Cutting and Packing: 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 meta-heuristic techniques, often in their multi-objective versions, hybridization of meta-heuristics and exact methods.

- The Unit promotes and participates in applied research projects, in partnership with software houses and equipment producers, aiming at the development of innovative products, and provides consulting services to industrial companies. Consulting services include the analysis and optimization of business processes, requirements analysis of IT systems, selection of IT systems (ERP and others), change management and support in the implementation phase. 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 plays also a role in the promotion of the utilization of advanced technologies by industrial enterprises through dissemination, training and consulting actions, aiming at creating awareness of the advantages and limitations 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 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	UESP	UESP	Sistrade, Oficina de Soluções	Sistrade Oficina de Soluções	Footwear Metalworking Cork Automobile
Logistics	UESP	UESP LIREL CEI	UESP	UESP LIREL	LIREL	UESP LIREL	Footwear Metalworking Furniture
DDS and Planning	UESP	UESP, Softi9, Oficina de Soluções, PHC	UESP	UESP	Softi9, I68, CPC	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

Description of the Unit's organizational structure

The Manufacturing Systems Engineering Unit coordination is jointly assumed 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 and Cutting and Packing. Consulting services are structured and provided by a specific group in the Unit.

P3.1.2 SWOT ANALYSIS

Strengths

- Good technical and scientific background;
- Considerable experience in structuring complex, real problems;
- Good relationships with enterprise associations and technological centres from several industrial sectors;
- Trust relations with a significant number of companies;
- 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 and some lack of focus;
- Insufficient commercial effort.

Opportunities

- Companies are aware of the need to innovate and improve productivity;
- The 7th European RTD framework is fully operational;
- Due to the economical crisis funding programs to support RTD and innovation activities in companies have been enlarged;
- Good relationships with many foreign entities and researchers.

Threats

- Reduced number of technology base 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.

P3.1.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Medium term objectives and management principles include:

- Increase scientific excellence by focusing activities in some 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;
- Assure critical mass in the Unit's main activity areas;
- 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 more 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;
- Reinforce cooperation with other RTD organisations at international level;
- Improve the balance between the income related with national projects, European projects and company projects, through an increase in the RTD and consulting 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 courses, increasing the total income of the Unit, and creating a powerful marketing instrument.

P3.1.4 ACTION PLAN (GLOBAL)

For 2010 a number of structural actions are planned, including:

- Continue the consolidation of the scientific activity in the areas of enterprise cooperation networks, multi-objective meta-heuristics, cutting and packing, and pursue the development of the areas of internal logistics, simulation, and forecasting;
- Consolidate the growth achieved last year. During 2010 growth will be promoted in the above key areas, especially through European projects and contract with companies. Internal management structures will be reinforced to cope with this significant growth;
- Maintain strong participation in industrial and academic networks like European Technology Platforms and IMS programme;
- Pursue the internal discussion on research opportunities and on the set-up and organization of new research projects;
- Promote a pragmatic application of the concepts and tools in enterprise cooperation networks for the companies of the region;
- Organize a set of innovative short and medium-size training initiatives for companies. These courses should be strongly linked to the Unit's main research areas and have 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 SMEs.
- Increase the volume of consultancy and technical assistance to companies, contributing to achieve a minimum of 40% of direct funding by companies in three years;
- Develop new partnerships with national and international research organizations, leaders in fields near or complementary to the Unit's activity;
- Increase the participation and the visibility in European projects;
- Consolidate partnerships with software houses and producers of equipments;
- Continue improvement of 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;
- Develop specific actions to strengthen the institution's image in its main target markets. Special focus will be put on the organization of workshops and discussion panels with local companies and research centres.

P3.1.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	11	6		896.100
D - Development	2			22.500
C - Consulting	5	1		360.000
A - Advanced training				
T - Technology Transfer	2	1		122.500
O - Other				
TOTAL	20	8		1.401.100

Summary of the percentage distribution of budgetary revenue

Financing (3)	Status (4)			Total Income (€)
	OG - On-going	G - Guaranteed	E - Expected	
NP – National Programmes	5,86%	2,14%	5,71%	192.100
EP – European Programmes	40,61%		2,14%	599.000
CS – Consulting and services	31,76%	2,85%	8,92%	610.000
O – Other R&D sources				
OS – Other sources				
Total	78,23%	5,00%	16,77%	1.401.100

Summary of projects to be developed in 2010

Name of the project	Respons.	Type proj. (1)	Degree of intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
AC/DC	J.P. De Sousa	R	E	EP	IST	10-2006	09-2010	OG	4
IZARO GREY	Luís Guardão	D	N	CS	-	01-2007	12-2012	OG	4
PMCOLNET	A. Soares	R	N	NP	FCT	10-2007	07-2010	OG	4
CROME	J. S. Ferreira	R	N	NP	FCT	11-2007	10-2010	OG	4
AGILPLAN	César Toscano	R	N	NP	I&D Coop.	09-2008	03-2010	OG	4
Enabler-plan	Luís Carneiro	R	N	CS	I&D Ind.	12-2008	03-2010	OG	4
H-know	A. Soares	R	E	EP	IST	01-2009	12-2011	OG	4
Vales IDT	Luís Carneiro	R	N	CS	Vales IDT	01-2009	Several contracts	OG	4
Vales Inov	A. C. Alves	C	N	CS	Vales Inov.	01-2009	Several contracts	OG	4
Dinamic	A. C. Alves	T	E	EP	Intereg	03-2009	09-2012	OG	4
Parque Escolar	Luís Guardão	T	N	CS	-	04-2009	02-2010	OG	4
Net-Challenge	Luís Carneiro	R	E	EP	NMP	06-2009	11-2011	OG	4
FIT4U	Rui Diogo	R	E	EP	NMP	06-2009	05-2012	OG	4
VFF	Américo Azevedo	R	E	EP	NMP	06-2009	05-2013	OG	4
Inovultos	Luís Guardão	R	N	CS	QREN	09-2009	03-2011	OG	4

Name of the project	Respons.	Type proj. (1)	Degree of intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
				Type (3)	Prog.				
Fadis-UESP	Luís Carneiro	R	N	NP	QREN	09-2009	08-2011	OG	4
Primavera Maint	Paula Silva	R	N	NP	QREN	11-2009	04-2011	G	4
SIBAP	Rui Diogo	R	N	NP	I&D Coop.	03-2010	09-2011	E	4
Produtech	Rui Diogo	C	N	CS	Polos	03-2010	03-2013	E	4
Vales - New	A. C. Alves	C	N	CS	Vales Inov.	04-2010	04-2011	E	4
Auto-ebiz	César Toscano	C	E	CS	-	04-2010	03-2012	G	4
Foreva	Rui Diogo	R	N	NP	QREN	06-2010	06-2012	E	4
Ifacos	César Toscano	R	N	NP	EuroStars	06-2010	06-2012	E	4
Pronic 2	Luís Guardão	C	N	CS	-	06-2010	06-2012	E	4
FOF PPP	Luís Carneiro	R	E	EP	FP7	09-2010	09-2014	E	4
LIREL	Rui Diogo	T	N	CS	-	-	Renewable	OG	4
SONAFI	Paula Silva	D	N	CS	-	-	Renewable	OG	4
Consultoria	A. C. Alves	C	N	CS	-	-	Several contracts	OG	4

(1) Type of Project: R – Research; D – Development; C – Consulting; A – Advanced Training; T – Technology Transfer; O – Other

(2) Degree of internationalization: N – National; E – European; I – International (Select one)

(3) Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources

(4) Status: <u>OG – On-going</u>: starting before 2009; <u>G – Guaranteed</u>: activity with a firmly agreed contract, starting in 2010; <u>E – Expected</u>: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.

(5) Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Publications**

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the unit				4		
Books (author)						
Chapter/paper in books						
Publications (editor)				3		
Papers in International Journals with scientific referees				12		
Papers in National Journals with scientific referees						
Conference Proceedings in events with scientific referee and selection				10		
Other publications (National meetings, local journals, etc.)				4		
Total	0	0	0	33	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Post-graduation activities**

Summary of theses supervised by members of the unit in 2010

Type	Starting	On-going	Concluded	Total
Master	20	7	15	42
Doctoral	6	12	5	23
Total	26	19	20	65

- **Advanced Training Actions**

Summary of Advanced Training Actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*				6		
Training for others *(estágios extra-curriculares)*				2		
Professional training actions *(estágios profissionais)*				2		
Other actions						
Total	0	0	0	10	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Cooperation or dissemination**

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings				3		
Collaboration in papers authored by INESC Porto researchers				15		
External persons directly involved in actions organized by INESC Porto				12		

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Human resources in 2010**

Summary of Unit personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	12	6	2		20	+1
INESC Porto Grant Holders	1	7	2		10	+1
Other Grant Holders		3			3	+1
Employees	2	3	8	2	15	+1
Trainees			2	4	6	0
Other						
Administrative			2		2	0
Total	**15**	**19**	**16**	**6**	**56**	**+4**

(*) Relative to 2009, in absolute numbers.

P3.2 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
Telecommunica-tions	**UOSE**, UTM	**UOSE**, UTM	**UOSE**, UTM	**UOSE**, UTM			Optical fiber communication systems
Environment	**UOSE**/Dep. Química FCUP	**UOSE**/Dep. Química FCUP	**UOSE**/Dep. Química FCUP	**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

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.

P3.2.2 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.

P3.2.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Medium term:
- Strengthening of installed and established scientific and technological capacity;
- Infrastructure re-equipment;
- 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

P3.2.4 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.

P3.2.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	18	1		231.322
D - Development	5			151.368
C - Consulting				
A – Advanced training				
T – Technology Transfer	6			227.123
O - Other		1	2	123.000
TOTAL	29	2	2	732.813

Summary of the percentage distribution of budgetary revenue

Financing (3	Status (4)			Total Income (€)
	OG - On-going	G – Guaranteed	E - Expected	
NP – National Programmes	9,83%		29,64%	289.232
EP – European Programmes	0,55%		5,59%	45.000
CS – Consulting and services	21,70%		30,99%	386.173
O – Other R&D sources				
OS – Other sources			1,69%	12.408
Total	32,08%	0,00%	67,92%	732.813

Summary of projects to be developed in 2010

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
				Type (3)	Prog.				
OPTIC-ALGAE	J. M. Baptista	R	N	NP	FCT	06-2007	05-2010	OG	2
BIOPELVIC	L. A. Ferreira	R	N	NP	FCT	07-2007	06-2010	OG	2
MOTION	O. Frazão	R	N	NP	FCT	11-2007	05-2010	OG	6
CostActions	J. L. Santos	O	E	EP	7PQ	01-2008	12-2010	OG	2
EWOFS2010	J. L. Santos	O	I	CS		01-2008	12-2010	OG	2
GRICES	J. L. Santos	O	I	NP	FCT	01-2008	12-2010	OG	2

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
Nanocrystalline	M. J. Marques	R	N	NP	FCT	01-2008	12-2010	OG	6
OREO2	P. V. Marques	R	N	NP	FCT	01-2008	12-2010	OG	6
SENROS	P. Jorge	R	N	NP	FCT	01-2008	12-2010	OG	2
BIOSWIM	M. Correia	R	N	NP	FCT	04-2008	09-2010	OG	2
Biomotion	M. Correia	R	N	NP	FCT	04-2008	03-2011	OG	2
Retinocortical	M. Correia	R	N	NP	FCT	11-2008	10-2011	OG	2
Memimetria	C. Rosa	D	N	NP	QREN	01-2009	12-2010	OG	2
SensKanoe	O. Frazão	D	N	CS		07-2009	12-2011	OG	6
Aenor	O. Frazão	T	N	CS		01-2010	12-2010	E	6
Cachapuz	O. Frazão	T	N	CS		01-2010	12-2010	E	6
CFC	J. de La Cruz	D	N	NP	QREN	01-2010	12-2010	E	6
CFC-FCUP	J. de La Cruz	D	N	OS		01-2010	12-2010	E	6
Defesa	P. Jorge	R	N	NP		01-2010	12-2010	E	2
Fences	S. Mendonça	T	N	CS		01-2010	12-2010	E	6
FiberSensing	J. L. Santos	T	N	CS		01-2010	12-2010	E	2
Mobiles	I. Dias	D	N	NP	QREN	01-2010	12-2010	E	6
Projectos Interdisciplinares	J. L. Santos	R	N	NP		01-2010	12-2010	E	2
Seebeck	I. Dias	T	N	CS		01-2010	12-2010	E	6
Wavetune	P. Jorge	T	N	CS		01-2010	12-2010	E	2
Fibdose	C. Rosa	R	N	NP	FCT	01-2010	12-2011	E	2
Hybrid	P. Jorge	R	N	NP	FCT	01-2010	12-2011	E	2
INNOSENSOR	P. Jorge	R	N	NP	QREN	01-2010	12-2011	E	2
MicroPhyte	J. L. Santos	R	N	NP	FCT	01-2010	12-2011	E	2
Multiferroics	J. de La Cruz	R	N	NP	FCT	01-2010	12-2011	E	6
SensEFil	O. Frazão	R	N	NP	FCT	01-2010	12-2011	E	6
SmartCoat	O. Frazão	R	N	NP	FCT	01-2010	12-2011	E	6
Omnidiag	P. Jorge	R	E	EP	FP7	01-2010	12-2012	E	2

(1) Type of Project: R – Research; D – Development; C – Consulting; A – Advanced Training; T – Technology Transfer; O – Other

(2) Degree of internationalization: N – National; E – European; I – International (Select one)

(3) Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources

(4) Status: _OG – On-going_: starting before 2009; _G – Guaranteed_: activity with a firmly agreed contract, starting in 2010; _E – Expected_: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.

(5) Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Publications**

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the unit		8				
Books (author)		0				
Chapter/paper in books		0				
Publications (editor)		0				
Papers in International Journals with scientific referees		20				
Papers in National Journals with scientific referees		0				
Conference Proceedings in events with scientific referee and selection		30				
Other publications (National meetings, local journals, etc.)		5				
Total	0	59	0	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Post-graduation activities**

Summary of theses supervised by members of the unit in 2010

Type	Starting	On-going	Concluded	Total
Master			2	2
Doctoral	1	8	7	16
Total	1	8	9	18

- **Advanced Training Actions**

Summary of Advanced Training Actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*		2				
Training for others *(estágios extra-curriculares)*						
Professional training actions *(estágios profissionais)*						
Other actions						
Total	0	2	0	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Cooperation or dissemination

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings		1				
Collaboration in papers authored by INESC Porto researchers		10				
External persons directly involved in actions organized by INESC Porto		200				

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Human resources in 2010

Summary of Unit personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	13	1			14	-1
INESC Porto Grant Holders			9		9	+1
Other Grant Holders			9		9	-6
Employees	6		3		9	-1
Trainees			5		5	-2
Other	5				5	+2
Administrative				1	1	0
Total	24	1	26	1	52	-7

(*)   Relative to 2009, in absolute numbers.

P3.3 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 (emerging) areas of the electric sector: regulatory issues and electricity markets, integration of distributed generation (namely wind power and other renewable energy sources), technical and economic management of distribution systems, use of GIS and other IT in regional energy planning, microgeneration and microgrids. 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 way suitable 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, 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 (*)	Network Management Systems	GIS Energy Planning	Electricity Markets and Regulation	Wind Power integration	Microgrids and EV	Advanced Training
Static and dynamic network analysis	I	X		X	X	X	X
Soft computing	I	X	X				X
Optimization and decision	I+O	X	X	X	X		X
Forecasting	I		X				X
Electric energy systems	I	X		X	X	X	
GIS	I+O		X				X
Programming	I	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
Network Management Systems	USE	USE		USE	EFACEC	USE EFACEC	Utilities
GIS Energy Planning	USE	USE		USE	(USE)	(USE)	Energy Agencies, Planners
Electricity Markets and Regulation	USE		USE	USE			ERSE, DGGE, Utilities

Activity Area	Research	Development	Consulting	Training	Marketing and Support	Evolutionary Maintenance	Use
Wind Power integration	USE		USE	USE			DGGE, REN, EDP, Promoters
Microgrids and EV	USE	USE		USE	(USE)	(USE)	EDP, Manufacturers
Advanced Training				USE			REN, EDP, International market

Description of the Unit's Organizational Structure

The Unit organizes its activity in projects, under the direct supervision of the unit's leadership. It is possible to cluster the activities in the following areas.

- *Development of advanced modules for DMS and EMS* – the Unit has been committed to working in this area in the last decade, namely in a successful partnership with EFACEC, but also in European projects. Software development has been a drive to new research.

- *Wind power and DG integration* – besides the analysis of the local and global impact of DG integration, this area covers research on wind power forecasting, ancillary services provision, virtual power plants and other emerging topics.

- *Micro-generation, micro-grids and electric vehicles integration* – this is an emerging and fast growing area, where the Unit has a leading role, in the framework of the Smart Grid concept. Related topics like smart metering and laboratorial infrastructures are also included here

- *Electricity Markets, Regulation and System Operation* – area that covers the support of public entities like ERSE, DGGE and similar entities in the Autonomous Regions of Portugal, but also research on models and methodologies for the different agents of the electric sector, in particular the TSO and DSO.

- *Advanced Training* – horizontal area where the Unit and its members are recognized at an international level (EES-UETP consortium, tutorials in conferences, TEMPUS projects, training projects in Latin America).

This informal structure is now being reviewed, and a more formalized organization will be developed and implemented in the beginning of 2010.

P3.3.2 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.

- Strong recognition in Portugal in the areas of regulation, electricity markets, renewable energy integration, in particular regarding wind power, 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 of a reduced 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 and other renewable energy generation in Portugal.
- New industrial developments related with microgeneration and smart metering.
- Electric vehicles emergence and development.

Threats
- Possible globalization of the consulting activity, increasing competition.
- Increasing competition in European projects.

P3.3.3 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.
- 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.
- Participation in the Smart Grid initiatives, through the promotion of the development and integration of the concepts of microgrids, multi-microgrids, smart metering and active load management, and the development of related industrial solutions.
- 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.
- Increasing the advanced training activity.

P3.3.3 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.
- Analysis of the Unit's areas of activity, in order to define clusters that could correspond to a formal structure that integrates more elements in the managing responsibilities.
- Definition of specific targets regarding the development of decision-aid tools in the area of Electricity Markets
- 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.

- Establishment of more stable 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.

- Development of concepts, organizational schemes and general specifications for electric vehicles integration, in the framework of the new projects approved for 2010, with emphasis on the industrial valorization of results.

- Definition of a portfolio for advanced training actions.

P3.3.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	4	2	1	746.010
D - Development	4			206.200
C - Consulting	8		1	379.000
A – Advanced training			1	49.500
T – Technology Transfer			1	30.000
O - Other	2		1	408.572
TOTAL	18	2	5	1.819.282

Summary of the percentage distribution of budgetary revenue

Financing (3)	Status (4)			Total Income (€)
	OG - On-going	G - Guaranteed	E - Expected	
NP – National Programmes	4,12%	24,74%		262.401
EP – European Programmes	1,48%		2,81%	427.000
CS – Consulting and services	18,92%	1,37%	7,85%	615.200
O – Other R&D sources				
OS – Other sources	9,12%		29,58%	514.681
Total	33,64%	26,11%	40,24%	1.819.282

Summary of projects to be developed in 2010

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
				Type (3)	Prog.				
EFACEC	J. Pereira	D	N	CS	-	1997	-	OG	3
Coord. EES	J. P. Lopes	O	I	OS	-	2007	2010	OG	3
ENERCON	C. Moreira	C	N	CS	-	2007	2010	OG	3
InovGrid	J. P. Lopes	D	N	CS	-	2007	2010	OG	3
PLASM	G. Sheblé	R	N	NP	FCT	2007	2010	OG	3
RAVE	J. P. Lopes	C	N	CS	-	2007	2010	OG	3
REN-Recep	T. Saraiva	D	N	CS	-	2007	2010	OG	3
Anemos.Plus	M. Matos	R	E	EP	TREN	2007	2011	OG	3
Argos	V. Miranda	R	I	OS	-	2008	2010	OG	3
ENEOP2	J. P. Lopes	C	N	CS	-	2008	2010	OG	3

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
ASIRP	J. N. Fidalgo	D	N	CS	-	2009	2010	OG	3
EEM-Dinamica	J. P. Lopes	C	N	CS	-	2009	2010	G	3
GALP Venezuela	J. P. Lopes	C	I	CS	-	2009	2010	OG	3
UPinvest	C. Monteiro	C	N	CS	-	2009	2010	OG	
ParaFuzzy	J. Pereira	T	I	CS	-	2009	2011	OG	3
Green Island	J .P. Lopes	R	N	NP	FCT	2009	2012	OG	3
CONSULTORIA	J. P. Lopes	C	N	CS	-	2010	2010	E	3
EES-UETP	J. P.Lopes	A	I	OS	-	2010	2010	E	3
ENERGIA	M. Matos	O	N	OS	-	2010	2010	E	
P. Negociação	M. Matos	C	N	CS	-	2010	2010	E	3
Plurianual	M. Matos	O	N	NP	Plurianual	2010	2010	G	
GEMS	V. Miranda	R	N	NP	FCT	2010	2012	G	3
MERGE	J. P. Lopes	R	E	EP		2010	2012	E	3
Microgrids+EV	J. P. Lopes	R	N	NP	FCT	2010	2013	G	3
TWENTIES	J. P. Lopes	R	E	EP		2010	2013	E	3

(1) Type of Project: R – Research; D – Development; C – Consulting; A – Advanced Training; T – Technology Transfer; O – Other

(2) Degree of internationalization: N – National; E – European; I – International (Select one)

(3) Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources

(4) Status: _OG – On-going_: starting before 2009; _G – Guaranteed_: activity with a firmly agreed contract, starting in 2010; _E – Expected_: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.

(5) Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Publications**

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the unit			2			
Books (author)						
Chapter/paper in books						
Publications (editor)						
Papers in International Journals with scientific referees			20			
Papers in National Journals with scientific referees						
Conference Proceedings in events with scientific referee and selection			30			
Other publications (National meetings, local journals, etc.)						
Total	0	0	52	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 -Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4- Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Post-graduation activities**

Summary of theses supervised by members of the unit in 2010

Type	Starting	On-going	Concluded	Total
Master	40			40
Doctoral	3	9	5	17
Total	43	9	5	57

- **Advanced Training Actions**

Summary of advanced training actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*			5			
Training for others *(estágios extra-curriculares)*			0			
Professional training actions *(estágios profissionais)*			0			
Other actions						
Total	0	0	5	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Cooperation or dissemination**

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings			2			
Collaboration in papers authored by INESC Porto researchers			45			
External persons directly involved in actions organized by INESC Porto			12			

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Human resources in 2010**

Summary of Unit personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	11	1			12	0
INESC Porto Grant Holders	2	12	6	3	23	+11
Other Grant Holders		6	5		11	0
Employees	4	2		1	7	+2
Trainees			2		2	0
Other	3	1			4	0
Administrative				1	1	0
Total	20	22	13	5	60	+13

(*) Relative to 2009, in absolute numbers.

P3.4 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. The new 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 will be 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 will insure 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 will be 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 49 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

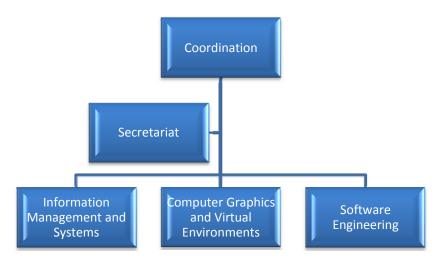(*) I – Internal; O – Existing in another Unit of INESC Porto; E – External; C – To be created

Coverage of the Innovation Process

Activity Area	Research	Develop	Consulting	Training	Marketing and Support	Evolutionary Maintenance	Use
Public Admin.	USIG	USIG	USIG	USIG MEDIATA PH Informatics	MEDIATA PH Informatics	MEDIATA 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

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.

P3.4.2 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.

P3.4.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

The two main strategic objectives for 2010 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.

P3.4.4 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.
- 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.

P3.4.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	9	8		448.151
D - Development	15			255.807
C - Consulting	11			242.676
A – Advanced training				
T – Technology Transfer				
O - Other				
TOTAL	35	8		946.634

Summary of the percentage distribution of budgetary revenue

Financing (3)	Status (4)			Total Income (€)
	OG - On-going	G - Guaranteed	E - Expected	
NP – National Programmes	34,69%	3,19%	13,13%	482.882
EP – European Programmes	8,58%		16,98%	241.938
CS – Consulting and services	3,91%		19,52%	221.814
O – Other R&D sources				
OS – Other sources				
Total	47,18%	3,19%	49,62%	946.634

Summary of projects to be developed in 2010

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
Consultadoria	P. Monteiro	C	N	CS		01-2006		OG	6
IVDP	A.Gaspar	C	N	CS	IVDP	01-2007	06-2010	E	6
EOLOS	A. Gaspar	C	N	CS	ENEOP2	09-2007	12-2010	E	6
DBPreserve	Gabriel David	R	N	NP	FCT	10-2007	07-2010	OG	5
SIVIDA II	José Correia	C	N	CS	ACS	12-2007	06-2010	E	6
URBIS	Augusto Sousa	R	N	NP	FCT	02-2008	07-2010	OG	5
EI- Nautilus	Rui Barros	D	N	NP	Nautilus	06-2008	06-2011	OG	5
Palco Principal	A.Gaspar	R	N	NP	SI-IDT	12-2008	11-2011	OG	5
RAIA	Artur Rocha	R	E	EP	Interreg-IVB	01-2009	12-2011	OG	5
Portal Douro	A.Coelho	C	N	NP	CCDRN	04-2009	12-2010	OG	5
MOBILES	José Correia	D	N	NP	SI-IDT	05-2009	05-2011	OG	5
eCAALYX	A. Martins	R	E	EP	169- AAL	05-2009	04-2012	OG	5
SIGFREG	Rui Barros	C	N	CS	Anafre	06-2009	07-2010	OG	6
NIDT Forum	A.Gaspar	C	N	CS	Forum	06-2009	05-2011	OG	6
CCDRN	A.Gaspar	C	N	CS	CCDRN	06-2009	12-2011	E	6
PLEGG	Artur Rocha	R	E	EP	7º PQ	06-2009	06-2012	E	5
NIDTProc.Net	A.Gaspar	C	N	CS	Process.Net	07-2009	06-2011	OG	6
ADDME	Rui Barros	R	E	EP	7º PQ	11-2009	10-2011	OG	5
Web Reports	Pascoal Faria	D	N	NP	SI-IDT	12-2009	06-2010	OG	5
GENERG	A.Gaspar	C	N	CS	Generg	12-2009	12-2010	E	6
Logica CMG	A.Gaspar	D	N	CS	Logica	12-2009	12-2010	E	6
3DWikiU	Augusto Sousa	R	N	NP	FCT	01-2010	12-2011	G	5
Autonomia	A.Gaspar	D	N	NP	SI-IDT	01-2010	12-2011	E	5
CAALYX-MV	Augusto Sousa	R	E	EP	CIP-PSP	01-2010	12-2011	E	5
CEMSDI	Rui Barros	R	E	EP	CIP-PSP	01-2010	12-2011	E	5
CNG	A. Coelho	R	N	NP	SI-IDT	01-2010	12-2011	E	5
Escolinhas c/Fibra	A. Aguiar	D	N	CS	Tecla Colorida	01-2010	12-2011	E	6
iPortal+	Rui Barros	D	N	CS	SI-IDT	01-2010	12-2011	E	6

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
NetCouncil	Rui Barros	R	E	EP	CIP-PSP	01-2010	12-2011	E	5
Robot Vigilante	A.Gaspar	R	N	NP	SI-IDT	01-2010	12-2011	E	5
ICT4Depression	Artur Rocha	R	E	EP	7º PQ	01-2010	12-2012	E	5
SONAECOM	A.Gaspar	C	N	CS	Sonaecom	06-2010	12-2010	E	6
AMACC	Rui Barros	D	N	NP	SI-IDT	06-2010	06-2011	E	5
ANAFRE II	Rui Barros	D	N	NP	SI-IDT	06-2010	06-2011	E	5
ANO	Rui Barros	D	N	NP	SI-IDT	06-2010	06-2011	E	5
Ecoplanner	J.Correia	D	N	NP	SI-IDT	06-2010	06-2011	E	5
Mesas Nautilus	Rui Barros	D	N	NP	SI-IDT	06-2010	06-2011	E	5
MultiCert	Rui Barros	D	N	CS	Multicert	06-2010	06-2011	E	6
UPTV	Rui Barros	D	N	NP	SI-IDT	06-2010	06-2011	E	5
Wikis4SE	Ademar Aguiar	R	N	NP	SI-IDT	06-2010	12-2011	E	5
Ang	A. Coelho	R	N	NP	SI-IDT	06-2010	06-2012	E	5
Sw House Autq	Rui Barros	D	N	NP	SI-IDT	06-2010	06-2012	E	5
AA4ALL	Augusto Sousa	R	N	NP	SI-IDT	06-2010	12-2012	E	5

(1) Type of Project: R – Research; D – Development; C – Consulting; A – Advanced Training; T – Technology Transfer; O - Other

(2) *Degree of internationalization: N – National; E – European; I – International (Select one)*

(3) *Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources*

(4) *Status: <u>OG – On-going</u>: starting before 2009; <u>G – Guaranteed</u>: activity with a firmly agreed contract, starting in 2010; <u>E – Expected</u>: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.*

(5) *Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.*

- **Publications**

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the unit					2	
Books (author)					2	
Chapter/paper in books					1	
Publications (editor)						
Papers in International Journals with scientific referees					12	
Papers in National Journals with scientific referees					3	
Conference Proceedings in events with scientific referee and selection					25	
Other publications (National meetings, local journals, etc.)					5	
Total	0	0	0	0	50	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a

Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Post-graduation activities**

Summary of theses supervised by members of the unit in 2010

Type	Starting	On-going	Concluded	Total
Master	8	10	28	46
Doctoral	5	9	4	18
Total	13	19	32	64

- **Advanced Training Actions**

Summary of advanced training actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*						
Training for others *(estágios extra-curriculares)*						
Professional training actions *(estágios profissionais)*						
Other actions						
Total	0	0	0	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Cooperation or dissemination**

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings					6	
Collaboration in papers authored by INESC Porto researchers					4	
External persons directly involved in actions organized by INESC Porto					2	

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Human resources in 2010**

Summary of Unit personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	14	1	1		**16**	+7
INESC Porto Grant Holders		5	6	9	**20**	+16
Other Grant Holders						
Employees		5	6		**11**	0
Trainees						
Other			1		**1**	0
Administrative			1		**1**	0
Total	**14**	**11**	**15**	**9**	**49**	**+23**

(*) Relative to 2009, in absolute numbers.

P3.5 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 four 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 (mUSIGG, audio, video and image), content management, advanced multimedia services.
- Wireless and Mobile Networks: multicast and mobility management, quality of service, mesh and ad-hoc networks, cross-layer optimization.
- Internet Architectures and Networking: novel Internet architectures, community networking design, disruptive communication models.
- 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

Know-how	Status (*)	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 electronic systems	I	X	X	X	X			
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
Grassroots trust management	I	X	X	X	X		X	X
Distributed path computation algorithms	I			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

Description of the Unit's organizational structure

The Telecommunications and Multimedia Unit is organized in four 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 in now also being exploited in national partnerships.

The *Wireless and Mobile Networks* (WiMobNet) 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 *Internet Architectures and Networking* (IAN) Area is focused on the analysis and development of disruptive Internet paradigms. IAN's vision relates to user-centric trends that are emerging in several fields of *Information and Communication Technology (ICT)*. IAN's vision relates to a simple and at a first glance disruptive approach: nomadic people become the center of the networking system. Users on the move are part of communities and will not only be consumers of information but also active providers of different Internet services, such as coordination of connectivity to different access networks.

Based on its vision, IAN has as mission to assist in demonstrating that user empowerment in the quality of micro-provider (be it of a specific networking service or even of experience) is a trend that should be looked into from a global architecture perspective. In such mission, IAN's main goals are:

- **To assist the adoption of user-centric networking architectures**. Consider the end-user as a provider of Internet services (e.g., of a community local-loop), investigating how this impacts current stakeholders and Internet users as well as which business opportunities it may give rise to.

- **To assist the access operator in reducing OPEX/CAPEX**. By relying on the dual end-user role of consumer and provider, strengthen and expand the applications of ICT to assist the regular day-to-day living, based on specific community needs and grassroots movements. Simplification of services (network and user services) is therefore a key aspect to be considered.

- **To strengthen ICT intertwining with society**. Mass media are normally considered a tool for social alienation. On the other hand, wireless technologies can aid in increasing social interaction by means of new cooperative communication models that have into consideration not only adequate filtering of information but also the nomadic lifestyle and mobility patterns of Internet users. This is a central topic to IAN, namely, to develop user-centric networking models.

The research developed in IAN follows a two-fold scientific-technologic methodology. Having a long-range (10 year) perspective, IAN explores new technologies and advanced architectures, as well as disruptive communication models. On a short-range perspective (1-3 years) IAN fosters synergies with industry and relevant international research entities. The balanced coordination of industry awareness and exploitation of new technologies with devising disruptive Internet architectures aims at opening new horizons in scientific and technological fields: disruptive technologies are normally left aside by industry due to the high risk they embody, but nonetheless are crucial in what concerns opening new market fronts and impacting the way technology is perceived (and applied) by society.

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 recently equipped 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.

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 (now with two coordinators) and the reinforcement of R&D activities at national level (especially fostered by the approval of new projects in the framework of QREN and good expectations as far as other projects already submitted and contracts under negotiation) may determine the need to reanalyze the current organization, in particular to promote stronger links and cooperation between the Areas.

P3.5.2 SWOT ANALYSIS

Strengths

- Existing know-how and practical experience in a broad scope of scientific and technological domains (signal processing, networks and services, multimedia systems and applications, optical and electronics technologies, etc.).
- Capability to apply know-how and to integrate technologies in the design of new systems and applications, from conception to prototype development.
- Capacity to attract young researchers and to engage them in research projects and contracts.
- Strong connection to several academic partners, resulting in the possibility to diversify man power.

Weaknesses

- Difficulty to present to the outside a global perspective and the mission of the Unit as a whole.
- Absence of active involvement of researchers at all levels in the process of negotiation and acquisition of R&D projects and contracts.
- Lack of a methodology for seeking and establishing new partnerships.

Opportunities

- Establishment of a 5 years strategy plan, including the selection of important research lines in terms of their impact on the international community (long term research) and on selected industrial partners (medium term results).
- Exploitation of partnerships at national level in the framework of QREN (*Quadro de Referência Estratégico Nacional*).
- Increasing number of spin-off and start-up companies.
- Exploitation of synergies with other Units, in particular with USE in the area of intelligent power networks (*smart grids*) and electrical vehicles.

Threats

- Difficulty in answering short-term requirements from potential customers.

P3.5.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Some general and common goals will be pursued at Unit level:

- improving management and sharing of resources;
- planning and assessment of R&D productivity;
- reinforcing cohesion and exploiting synergies between Areas;
- strengthening management and leadership skills at all levels;
- achieving a high-level of scientific excellence, measured by means of objective indicators;
- establishing strategic partnerships, based on existing scientific and technical know-how;
- seeking for new sources of funding and reinforcement of research contracts with industry.

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). 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 (decision is pending).

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*). Some contracts have already been signed and started in 2009 and others submitted during 2009 are still pending decision. On the other hand, three proposals have been submitted to the Innovation Plan of the Portugal Telecom (PT) Group (decision is also pending).

Moreover, the Unit was involved in the preparation of a reasonable number of EC projects which will allow the Unit to strengthen its financial standpoint in 2010.

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

Research efforts in this Area continue to be motivated by the increasingly widespread acceptance of the on-line paradigm and the present heterogeneity-convergence phenomena. In this context, they are aimed at building knowledge and developing solutions to simplify the creation of intelligent automatic applications and innovative multimedia services, especially targeting mobile platforms, engaging the user in new multimedia experiences. The goal is to enable the access to multimedia content to any user in an adaptable and personalised way, fulfilling his/her requirements and preferences in the most seamless way. Areas of application include video surveillance, entertainment and culture. Also of interest is the area of assisting living and medical applications, where the analysis of audio and video can help to develop applications that are able to 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.

Research topics that are being addressed embrace aspects closely related with the audiovisual (A/V) content itself and the creation and delivery of the A/V service. Accordingly, algorithms are being investigated for A/V media analysis using content knowledge techniques, as well as approaches for context-awareness and QoS support of multimedia services in heterogeneous and distributed environments. In this last research axe, extensive use is made of metadata, distributed technologies and, more recently, semantic concepts. In the first axe, algorithms are being studied to extract in the most efficient and automatic way, low-level knowledge from raw audio and video signals. This low-level data is further processed using machine learning techniques and statistical methods, inferring high-level information and enabling the development of intelligent automatic or semi-automatic audiovisual applications.

Accordingly, it is planned to continue research in the topics that are already being addressed, with the emphasis on the use of semantic concepts, artificial intelligence techniques, mobility and personalisation.

These research objectives have been pursued and have evolved during the last years, with the support of externally funded projects, notably from European Community RTD programmes, but also through national projects, in particular with grants from FCT and PhD scholarships. At present the Area has only nationally-funded projects (QREN and FCT) but new project proposals have been prepared and submitted to several programmes as well as in local initiatives with the industry.

Research work is then expected to continue along these lines. Funding support for this research, given that previous European-funded projects have been finalised during 2009, is now being pursued through new channels as mentioned above:

- three FCT funded projects (one in the framework of the programme with the University of Texas at Austin) and two QREN projects already running;
- new project proposals have been submitted to call 5 of FP7;
- preparation of project proposals and collaborations in the context of the programmes with CMU and University of Texas at Austin;
- several project proposals submitted to the QREN programme and awaiting approval decision (research projects in consortium as well as direct contracts);
- submission of one proposal to the "Innovation Programme 2010-2011" of the Portugal Telecom group, concerning context-aware multimedia services.

WiMobNets: Wireless and Mobile Networks

This Area is focused on the design of Wireless and Mobile Networks (WiMobNets) 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 2010:

- the mobility of networks and terminals in large and multi-technology mesh networks;
- the usage of dynamic radio channel allocation, smart antennas, and cross layer techniques to implement adaptive radio-aware networks;
- scalable routing techniques, aware of network congestion, adequate for WiMobNets;
- auto-configuration in WiMobNets;
- efficient and secure support of new types of traffic (IPTV, peer-to-peer applications, Web-based services) in WiMobNets.

The main results expected in 2010 include:

- a network mobility solution for vehicular mesh networks, including a multi-technology mobile router;
- a solution for the dynamic and distributed allocation of radio channels in IEEE mesh wireless LANs;
- a solution for controlling the beam of directional antenna;
- optimal deployment of P2P video services over mobile mesh networks in scenarios where peers and network elements are co-located;mechanisms for enabling auto-configurable secure communications;
- characterization of traffic in emerging WiMobNets;
-

These activities will be supported by a set of projects, including:

- a QREN project (Sitme) aimed at developing a metropolitan multi-technology wireless network and its mobile equipment, for public transportation systems, in collaboration with the STCP bus company and a P2P video distribution company and one research contract with the latter also in the framework of QREN;
- an European project (Alicante) aimed at developing secure video transmission solutions and a research contract in the framework of QREN (SWIOP) aimed at developing secure communication services;
- a QREN project (Mobiles) aimed at developing a system capable of managing information, power and events in electrical vehicles, as well as the communications network for the exchange of data between the vehicles and the infrastructure (and charging points);
- a QREN project (Robot Vigilante) aimed at the development of autonomous and cooperative robots for surveillance applications, involving another INESC Porto group;
- a project in cooperation with the state of Pará-Brazil (Enredo) aimed at developing a scalable authentication and accounting system defined for enabling new business models in WiMobNets (approved, signature of contract pending).

Other projects and research contracts are still under negotiation or waiting for a decision:

- a set of FCT projects (2) and FCT proposals (7), made in partnership with Portuguese companies or USA universities (CMU), aimed at exploring new research topics related to mobility, traffic characterization, and networks of "things";
- a project (SegMBMS) submitted to the "Innovation Programme" of the Portugal Telecom group aimed at integrating a security component into the Multimedia Broadcast Multicast Service specified by 3GPP;

- a project (FAROL) submitted to QREN with the purpose of developing new Friend to Friend services enabled and audited by the Telecom operator, and their integration with secure IP multicast techniques developed for the Integrated Multimedia Subsystem (IMS) platform;
- a project (REIVE) led by the Power Systems Unit, with the participation of Portuguese companies, aiming at the study, development and test of solutions and pre-industrial prototypes for the active and intelligent management of electrical networks with a large penetration of micro-generation and electrical vehicles.

Two papers are expected to be accepted for publication in relevant international journals or magazines; papers will also be submitted to major international conferences.

IAN: Internet Architectures and Networking

IAN is focused on the analysis and development of disruptive Internet paradigms, namely, novel Internet architectures and functionality where the user is an active player and a provider of services, assuming as starting point the current Internet architectures and user requirements. Hence and for 2010, three main R&D tracks are considered in IAN, being the topics within such tracks addressed from an OSI Layer 2 and 3 perspective: **disruptive Internet paradigms**, **cooperative networking**, **advanced routing**.

The main R&D track in IAN is disruptive Internet paradigms, out of which branch cooperative networking and advanced routing.

- **Disruptive Internet paradigms.** The first R&D track includes topics related to the design of scalable low-cost architectures, as well as autonomic user-provided network integration in multi-access environments.
- **Cooperative networking.** In cooperative networking IAN addresses user-centric networking models that are emerging and includes several sub-topics, namely: cooperative relaying; trust management; mobility management and modeling; dynamic management of wireless resources.
- **Advanced routing.** In advanced routing IAN focuses on advanced distributed path computation mechanisms having in mind to provide more flexibility to the architectures being developed. Sub-topics considered for 2010 are opportunistic routing, energy-efficient routing, information-centric routing, as well as mobility impact on routing.

Regarding 2010, IAN expects to set a series of activities which are described next:

- **National Activities**

  o Submission of 2 NSRF proposals together with industry partners (both sub-hiring and in consortium), and involving other areas and/or units of INESC Porto.

  o Acquisition of 2 NSRF projects, approximate total of 700k Euros.

  o Acquisition of a consulting project (industry oriented, sub-hiring).

  o 2 PhD courses (MAP-TELE) lecturing and 2 PhD seminars.

  o Supervision of 2 MSc students and 7 PhD students.

  o 2 cooperations with national institutions, namely, Instituto Superior Técnico (IST) and Universidade de Aveiro/IEETA, in the tracks of Disruptive Internet paradigms and Cooperative networking, respectively.

  o Development of a national activity involving several partners from industry and from academia within the R&D track of Disruptive Internet Paradigms.

  o Organization/hosting of 2 national workshops.

- **International Activities**

  o EU FP7 coordination and participation. IAN has submitted three proposals to EU FP7 call5 (two scientifically coordinated by IAN).

  o EST Cost Action participation, being the start expected to the third trimester of 2010.

  o Organization/hosting of 1 international workshop and/or conference.

  o Participation in at least one international fair.

o *4 international cooperations established.* IAN has an informal cooperation agreement with Columbia University USA (Prof. Henning Schulzrinne), with Pennsylvania University (Prof. Roch Guérin) USA, with Lakeside Labs, Austria (Prof. Christian Bettstetter), as well as with FORTH Greece (Prof. Maria Papadopouli). Expected results relate to the joint development of publications and technology as well as to missions for researchers of the IAN team.

In what concerns results quantification, IAN has the following (minimum) expectations: 4 international journal papers; 10 international conference papers; acquisition of 5 projects (3 national, 2 international); 1 European patent (jointly developed); 2 MSc theses; organization of 1 workshop; active participation in 2 technology platforms (eMobility and EIFFEL); participation in an International technology fair (CeBit 2010); participation in standardization bodies.

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 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 (including CMU-Portugal).

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 (including on-line routing) will be expanded. The work in this area will reach important milestone with completion of a PhD thesis. Current activities will be expanded to address the problem of targeting DRL-based systems from higher-level languages. The third year of the research project DR-VidS (funded by FCT) will continue to investigate ways of applying and extending the expertise in DRL-based systems to real-time video segmentation (involving another group of the Unit). The successful work on the physical implementation of irregular reconfigurable fabrics for SoCs will be expanded.

- The line of research on reconfigurable and custom computing will conclude two R&D projects started in 2008 (VECTOR and AHRS). The main objective of VECTOR (funded by FCT) is to integrate the functional blocks and synthesis tools developed by INESC Porto with the code analysis and compilation tools created by INESC-ID, to assemble a complete design framework for the design of custom vector processors from MatLab programs. As far as AHRS (funded by QREN), it is planned to build and evaluate a prototype of a FPGA-based AHRS (Attitude-Heading Reference System). Recent opportunities for new application projects on high-performance embedded computing for autonomous vehicles will foster the setup of new research activities. A new FCT funded project ("INSTEAD – Intelligent system for fault detection in multidimensional processes") has been recently approved but there are no planned activities of the INESC Porto team during 2010.

- The main research effort on analogue and RF circuits design is focused on the design of effective low power and area circuits for signal processing systems. Research activities carried out in AHRS (previously mentioned) will conclude in 2010. Another project was recently proposed to the CMU-Portugal programme, contemplating signal processing and RF systems for an optimization process.

- In the domain of analogue, mixed-signal, and RF test and design for testability, the on-going activity addressing the development of an adaptive scheme to evaluate and correct RF amplifiers' nonlinearities is expected to rendering the conclusion of a PhD thesis. This work is now entering its final stage with the development of a demonstration prototype. Another prototype is under development to demonstrate an on-chip distortion detector based on the cross-correlation between the output voltage and power supply current using a chip designed in the past year and recently received from the foundry.

- 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.

The radiation-hard ADC started last year and is expected to be fabricated and demonstrated in the next semester.

- With the approval of the ProLimb (FCT) project a new area of activity will start on the design and test of microelectronic systems for bio-medical applications.

- The group participates in the ICTTSC project consortium. This project was recently submitted in the framework of the European ICT call, and addresses thermo-electrical energy harvesting technologies for ICT devices.

- The WiseGrid project proposal, which addresses the application of wireless sensor networks towards smarter power-grids was resubmitted in the framework of the CMU-Portugal programme and is expected to be approved in 2010. The WiMobNets group of the Unit also participates in this project; besides CMU, it also includes Univ. Minho and two Portuguese companies (EFACEC Sistemas de Electrónica and FiberSensing).

The activity in Microwave and Optical Communications embraces the following topics:

- The radio-over-fiber topic of research has been a strategic objective for the past two years and has been supported by EU and FCT projects, UROOF and ROFWDM respectively, and through PhD programmes. In this area, another FCT project ("WOWi - Wireless-optical-wireless interfaces for picocellular access networks") has been approved but activities of this group will only start in 2011.

- In the microwave field work is under way to investigate fractal geometries combined with EBG (Electromagnetic Band-Gap) techniques for the development of small size microstrip antennas suitable for multiband operation in wireless applications. Two PhD students are currently doing their postgraduate studies in this field.

- Signal processing techniques in optical communication systems is being the object of a PhD thesis. An FCT project" OSP-HNLF - Optical Signal Processing Using Highly Nonlinear Fibers" will start in 2010 and it is expected to attract young researchers to this area.

- DAPHNE, an EU funded project that started in September 2009, addresses "fiber-optics in future avionic systems" and opens up a new area of application for optical networks. The optical communications group participates actively in this project for the next three years.

- Two senior researchers have joined the group in 2009 (one under Ciência 2008 programme, as planned). As a result new research interests have arisen, namely passive optical networks (PONs) in the access network and modeling of surface plasmon resonance in optical fibers. The aim is not so much to open new areas by themselves but integrating these topics in current ongoing work. As far as the former topic (PONs) the aim is to use this technology to integrate fixed and wireless services in the access network using radio-over-fiber techniques. The second topicst addresses modeling of new devices for signal processing in optical communications.

P3.5.4 ACTION PLAN (GLOBAL)

The main strategic objectives previously outlined, both at Unit and Area level, will be pursued during 2010, as explained, and therefore the associated actions are only briefly summarised here:

- Preparation and submission in partnership with industrial companies of new projects in the framework of QREN (*Quadro de Referência Estratégico Nacional*).

- Participation in the elaboration and submission of new projects to the *7th Framework Programme*.

- Negotiation of new research contracts, as a result of contacts already established or planned.

- Creation of conditions for a stronger cooperation between the Areas (at scientific, technical and management level).

- Planning and assessment of R&D productivity.

- Reinforcement of cooperation with other Units, especially with USE, in the area of intelligent power networks (*smart grids*) and electric vehicles.

- Support to MSc and PhD theses in progress and to new ones starting in 2010.

- Support to the incubation of spin-off companies and engagement in joint projects and actions.

The current practice of organizing regular internal sessions (Lab Meetings) for presenting and discussing ongoing research work and results (associated to theses, projects, published papers, etc.) will be kept; these sessions are widely announced and open to external participants.

The results of research activity will be presented by the usual means: in events organized by the Unit (workshops, demo sessions, etc.), publications in journals and magazines, presentations in international conferences, as well as in ordinary meetings of projects.

P3.5.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	20	8	3	924.850
D - Development	7			125.300
C - Consulting	7			119.850
A – Advanced training		1		
T – Technology Transfer				
O - Other				
TOTAL	34	9	3	1.170.000

Summary of the percentage distribution of budgetary revenue

Financing (3)	Status (4)			Total Income (€)
	OG - On-going	G - Guaranteed	E - Expected	
NP – National Programmes	45,21%	8,25%	17,31%	827.950
EP – European Programmes	6,15%	7,31%	2,82%	190.550
CS – Consulting and services	3,59%		8,72%	144.000
O – Other R&D sources				
OS – Other sources		0,64%		7.500
Total	54,95%	16,20%	28,85%	1.170.000

Summary of projects to be developed in 2010

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
				Type (3)	Prog.				
ROFWDM	H. Salgado	R	N	NP	FCT	10-2007	07-2010	OG	
BCCT	J. Cardoso	R	N	NP	FCT	10-2007	10-2010	OG	
OMR	J. Cardoso	R	N	NP	FCT	10-2007	10-2010	OG	
DR-VidS	J. C. Ferreira	R	N	NP	FCT	11-2007	05-2010	OG	1
VECTOR	J. C. Alves	R	N	NP	FCT	11-2007	11-2010	OG	
AHRS	V. Tavares	R	N	NP	QREN	10-2008	04-2010	OG	
ACEOLE	J.M. Silva	A	E	EP	M.Curie	10-2008	09-2012	OG	
Palco3.0	F. Gouyon	R	N	NP	QREN	12-2008	11-2011	OG	1
Semantic PACS	J. Cardoso	R	N	NP	QREN	01-2009	06-2011	OG	1

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
				Type (3)	Prog.				
ReCoop	P. Mendes	D	N	NP	QREN	01-2009	12-2011	OG	1
MuMoMgt	J. Ruela	R	N	NP	FCT	02-2009	01-2012	OG	1
ASP	M. Ricardo	D	N	CS		02-2009	02-2010	OG	1
KINETIC	C. Guedes	R	I	NP	UTA-PT	04-2009	03-2011	OG	1
MOBILES	J. Ruela	R	N	NP	QREN	06-2009	05-2011	OG	1
SitMe	M. Ricardo	R	N	NP	QREN	09-2009	12-2011	OG	1
DAPHNE	H. Salgado	R	E	EP	FP7	09-2009	08-2012	OG	1
SWIOP	M. Ricardo	C	N	CS		11-2009	06-2011	OG	1
VI-N2Y	J. Ruela	C	N	NP	QREN	11-2009	06-2010	OG	1
VI-XV	M. Ricardo	C	N	NP	QREN	11-2009	06-2010	OG	1
AuditServe2.0	R. Morla	C	N	CS		01-2010	12-2010	E	1
VSAT2	H. Salgado	D	N	CS		01-2010	12-2010	E	
Farol	J. Ruela	R	N	NP	QREN	01-2010	12-2011	E	1
REIVE	J. Ruela	R	N	NP	F.Inov.	01-2010	12-2011	E	3
RobotVigil		R	N	NP	QREN	01-2010	12-2011	E	1
SHHealth	R. Morla	R	N	NP	FCT	01-2010	06-2012	G	1
OSP	Inês Carvalho	R	N	NP	FCT	01-2010	12-2012	G	
UCR	Paulo Mendes	R	N	NP	FCT	01-2010	12-2012	G	1
UMM	Rute Sofia	R	N	NP	FCT	01-2010	12-2012	G	1
Prolimb	J.M. Silva	R	N	NP	FCT	01-2010	12-2012	G	
PTIN-MM	M.T. Andrade	D	N	CS		03-2010	02-2012	E	1
PTIN-PON	H. Salgado	D	N	CS		03-2010	02-2012	E	1
PTIN-SMBMS	M. Ricardo	D	N	CS		03-2010	02-2012	E	1
Alicante	M. Ricardo	R	E	EP	FP7	03-2010	02-2013	G	1
CGN	M.T. Andrade	R	N	NP	QREN	04-2010	03-2012	E	1
Hotel3.0	Rute Sofia	D	N	NP	QREN	04-2010	03-2012	E	1
ICIS	M.T. Andrade	C	N	CS		04-2010	03-2012	E	1
RCA	M.T. Andrade	C	N	CS		04-2010	03-2012	E	1
CASA10	Rute Sofia	C	N	CS		05-2010	04-2011	E	1
WiseGrid	J.M. Silva	R	I	NP	CMU-PT	05-2010	04-2013	E	1
WiNeMo	Paulo Mendes	R	E	EP	FP7	07-2010	06-2014	G	1
DAG	Paulo Mendes	R	I	OS		09-2010	09-2010	G	1
Convergence	M.T. Andrade	R	E	EP	FP7	09-2010	02-2013	E	1
COCOWIN	Rute Sofia	R	E	EP	FP7	09-2010	08-2013	E	1
I4MEO	Paulo Mendes	R	E	EP	FP7	09-2010	08-2013	E	1
ULOOP	Rute Sofia	R	E	EP	FP7	09-2010	08-2013	E	1
ICTTSC	J.M. Silva	R	E	EP	ICT	09-2010	08-2013	E	

(1)   Type of Project: R - Research; D - Development; C - Consulting; A - Advanced Training; T - Technology Transfer; O - Other

(2)   Degree of internationalization: N - National; E - European; I - International (Select one)

(3)   Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources

(4)   Status: <u>OG – On-going</u>: starting before 2009; <u>G – Guaranteed</u>: activity with a firmly agreed contract, starting in 2010; <u>E – Expected</u>: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.

- Publications

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the unit	8					
Books (author)	0					
Chapter/paper in books	4					
Publications (editor)						
Papers in International Journals with scientific referees	16					
Papers in National Journals with scientific referees	1					
Conference Proceedings in events with scientific referee and selection	50					
Other publications (National meetings, local journals, etc.)	15					
Total	94	0	0	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 -Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4- Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Post-graduation activities

Summary of theses supervised by members of the unit in 2010

Type	Starting	On-going	Concluded	Total
Master	10	0	36	46
Doctoral	12	25	15	52
Total	22	25	51	98

- Advanced Training Actions

Summary of Advanced Training Actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*	40					
Training for others *(estágios extra-curriculares)*	2					
Professional training actions *(estágios profissionais)*	3					
Other actions	4					
Total	49	0	0	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Cooperation or dissemination

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings	8					
Collaboration in papers authored by INESC Porto researchers	> 50					
External persons directly involved in actions organized by INESC Porto	50					

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Human resources in 2010

Summary of Unit personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	25				25	+1
INESC Porto Grant Holders	1	2	1		4	0
Other Grant Holders	2	33	8		43	+2
Employees	5	1			6	0
Trainees			10		10	0
Other						
Administrative				1	1	0
Total	33	36	19	1	89	+3

(*)   Relative to 2009, in absolute numbers.

P3.6 INNOVATION AND TECHNOLOGY TRANSFER

Coordinator: Alexandra Xavier

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 UITT 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:
  - o 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.
  - o 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.
  - o Provide training to companies in order to increase awareness and knowledge concerning the NP R&D+I management systems and methodologies.
  - o Development research projects in order to increase emergent knowledge that supports internal and external activities.
- Entrepreneurship:
  - o Promote an entrepreneurship culture behind academic researchers
  - o 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.
  - o Supply of incubation services through the recently created 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
R&D + Innovation Management System	I	X	X	
Creativity	E	X		X
Business Concept Development	I/E	X	X	X
Business Plan Development	I/O/E	X		X
Management of "proof of concept" projects	I	X	X	X

Know-how	Status (*)	Internal Units	Companies	Entrepreneurs
Commercial Feasibility studies	I	X		X
Technology Feasibility studies	O	X	X	X
Technology Transfer	C	X	X	
Innovation Metrics	I/E	X	X	
Open Innovation	I/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

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 analyse and protect R&D results		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 transfer Practices	X	X		X	X

Description of the Unit's organizational structure

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

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

The main activities are:

- Training actions;
- Consulting services for companies in order to increase their potential for Innovation;
- Helping entrepreneurs and R&D Units 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 projects concerning IP protection, evaluation and technology transfer
- 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.

P3.6.2 SWOT ANALYSIS

Strengths

- Past experience in the implementation of processes and tools concerning innovation process.
- Competences in the area of IP and technology transfer process.
- Competences in the area of R&D + Innovation management systems.
- Experience and competence concerning business development process.
- Experience and competence in advanced training in the area of innovation, technology transference 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.

P3.6.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

The main strategic objectives for 2008 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, namely by initiating a North-Galiza network, in order to reinforce and create competences to sustain Unit's future activity.
- 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.

P3.6.4 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 and certification of Innovation management systems.
- To become a nationally and internationally renowned unit in the R&D+I Management area.

P3.6.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research				
D - Development	3		1	179.859
C - Consulting	5			101.458
A – Advanced training	1			2.400
T – Technology Transfer				
O - Other	1			8.400
TOTAL	10		1	292.117

Summary of the percentage distribution of budgetary revenue

Financing (3)	Status (4)			Total Income (€)
	OG - On-going	G - Guaranteed	E - Expected	
NP – National Programmes	19,88%	4,58%	22,47%	137.098
EP – European Programmes				
CS – Consulting and services	18,10%	19,31%	15,66%	155.019
O – Other R&D sources				
OS – Other sources				
Total	37,98%	23,89%	38,14%	292.117

Summary of projects to be developed in 2010

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
				Type (3)	Prog.				
El-Nautilus	Alex. Xavier	C	N	NP	QREN	15.239	5.239	01-2009	06-2010
Formação Executivos	Alex. Xavier	A	N	CS	-	2.400	2.400	03-2009	12-2009
FADIS	Alex. Xavier	D	I	NP	QREN	129.680	52.836	07-2009	02-2011
CONSULTORIA -	Alex. Xavier	C	N	CS	QREN	41.213	31.514	09-2009	08-2009

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
				Type (3)	Prog.				
Núcleos de IDT									
Vale Inovação - SC	Alex. Xavier	C	N	CS	QREN	16.345	6.445	10-2009	03-2010
JoEmpreendedor	Alex. Xavier	D	N	NP	QREN	13.381	13.381	01-2010	10-2010
Planos de negócio	Alex. Xavier	C	N	CS	-	12.500	12.500	01-2010	12-2010
LET-In (incubação seed)	Alex. Xavier	O	N	CS	-	8.400	8.400	01-2010	
SGIDI-Calçado	Alex. Xavier	D	N	CS	QREN	48.000	48.000	02-2010	09-2010
Novos Núcleos de IDT	Alex. Xavier	C	N	CS	QREN	45.760	45.760	03-2010	03-2010
PINC	Alex. Xavier	D	N	NP	QREN	215.249	65.642	04-2010	04-2012

(1) Type of Project: R – Research; D – Development; C – Consulting; A – Advanced Training; T – Technology Transfer; O – Other

(2) Degree of internationalization: N – National; E – European; I – International (Select one)

(3) Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources

(4) Status: OG – On-going: starting before 2009; G – Guaranteed: activity with a firmly agreed contract, starting in 2010; E – Expected: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.

(5) Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Publications

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the unit						
Books (author)						
Chapter/paper in books						
Publications (editor)						
Papers in International Journals with scientific referees				10		
Papers in National Journals with scientific referees						
Conference Proceedings in events with scientific referee and selection				1		
Other publications (National meetings, local journals, etc.)						
Total	0	0	0	11	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 -Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4- Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Post-graduation activities

Summary of theses supervised by members of the unit in 2010

Type	Starting	On-going	Concluded	Total
Master			1	1
Doctoral				
Total			1	1

- Advanced Training Actions

Summary of Advanced Training Actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*						
Training for others *(estágios extra-curriculares)*						
Professional training actions *(estágios profissionais)*						
Other actions						
Total	0	0	0	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 -Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4- Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Cooperation or dissemination

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings						
Collaboration in papers authored by INESC Porto researchers						
External persons directly involved in actions organized by INESC Porto				2		

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Human resources in 2010**

Summary of Unit personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	2	1			3	+1
INESC Porto Grant Holders			1		1	0
Other Grant Holders						
Employees		1	1		2	0
Trainees						-1
Other						-1
Administrative						
Total	2	2	2		6	-1

(*)   Relative to 2009, in absolute numbers.

P3.7 ROBOTICS AND INTELIGENT SYSTEMS

Coordinator: Américo Azevedo, António Paulo Moreira

P3.7.1 SHORT DESCRIPTION OF THE GROUP

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

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

The Group'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 Group 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 group 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 Group 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 Group has also a large experience in the fields of advanced automation systems integration.

The Group 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 Group 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

Description of the Group's organizational structure

The Robotics and Intelligent Systems Group (ROBIS) coordination is jointly assumed by Américo Azevedo and António Paulo Moreira

P3.7.2 SWOT ANALYSIS

Strengths
- Relevant technical and scientific background;
- Technological competence proven by previous technological feats like World Class Robotic Soccer tournaments;
- Successful field testing of autonomous underwater and surface vehicles;
- Multidisciplinary experience in structuring complex, real problems;
- Trust relations with a significant number of companies;
- Good network of contacts at the Europe, USA and Brasil.

Weaknesses
- Wide activity scope;
- Insufficient commercial effort.
- Reduced size of research team.

Opportunities
- Companies are aware of the need to innovate and improve productivity;
- Increasing demand for robotic solutions, including autonomous ones, in multiple application areas (industry, services, defence, homeland security, …);

- The 7th European RTD framework;
- Good relationships with many foreign entities and researchers.

Threats

- Reduced number of technology base Portuguese companies, with own products;
- Foreseen future reduction of structural funds for Portugal;
- Dependency of Portuguese companies from structural funds to perform RTD projects.

P3.7.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

Medium term objectives and management principles include:

- Definition of key scientific areas;
- Increase scientific excellence by focusing activities in some 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;
- Assure critical mass in the Group's main activity areas;
- Improve the alignment between basic research, applied research and consultancy;
- Maximise the impact of the Group'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 cooperation between researchers of the group;
- Improve cooperation with researchers from other units of INESC Porto;
- Improve internal competences by:
    - developing the competences and motivation of human resources;
    - creating conditions for attracting high level national and international researchers;
- Improve the Group'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.

P3.7.4 ACTION PLAN (GLOBAL)

For 2010 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 Group's activity.
- Increase the GROUP 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 Group.

P3.7.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	3		5	392.769
D - Development	3		2	774.811
C - Consulting				
A - Advanced training				
T – Technology Transfer				
O - Other	1			
TOTAL	7		7	1.167.580

Summary of the percentage distribution of budgetary revenue

Financing (3)	Status (4)			Total Income (€)
	OG- On-going	G - Guaranteed	E - Expected	
NP – National Programmes	1,44%	2,56%	36,90%	477.580
EP – European Programmes			23,98%	280.000
CS – Consulting and services				
O – Other R&D sources				
OS – Other sources			35,12%	410.000
Total	1,44%	2,56%	95,99%	1.167.580

Summary of projects to be developed in 2010

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
Futebol Robótico	Paulo Moreira	O	N	OS		01-1998	12-2050	OG	4
FCT-PTDC/EEA-CRO	Paulo Moreira	R	N	NP	FCT	01-2010	12-2012	G	4
Brasil EDP	Anibal Matos	D	I	OS	LAJEADO	04-2010	03-2012	E	4
Robot Vigilante	Paulo Moreira	D	N	NP	QREN	07-2010	06-2012	E	4
FLUPOL-Paint	Paulo Moreira	D	N	NP	QREN	07-2010	06-2012	E	4
Corkband	Américo Azevedo	D	N	NP	QREN	07-2010	06-2012	E	4
MIT-CONTINENTAL	Paulo Costa	R	I	OS	MIT	07-2010	06-2012	E	4
ADILOS	Américo Azevedo	R	I	EP	EUREKA	07-2010	06-2012	E	4
SAVEWATE	Anibal Matos	D	I	NP	EDA	07-2010	06-2012	E	4
INTELLMANIP	Paulo Moreira	R	I	EP	ECHORD	07-2010	06-2012	E	4
LOGFLEX_AGV	Paulo Moreira	R	I	EP	ECHORD	07-2010	06-2012	E	4
WWECO	Patricia Ramos	R	N	NP	FCT	10-2008	03-2011	OG	4
ESTETICH	Armando Sousa	R	I	NP	FCT-MIT	01-2010	12-2012	E	4
TISA	Armando Sousa	R	N	NP	FCT	07-2010	06-2013	E	4

(1) Type of Project: R - Research; D - Development; C - Consulting; A - Advanced Training; T - Technology Transfer; O - Other

(2) Degree of internationalization: N - National; E - European; I - International (Select one)

(3) Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources

(4) Status: OG - On-going: starting before 2009; G - Guaranteed: activity with a firmly agreed contract, starting in 2010; E - Expected: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.

(5) Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Publications**

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the Group						2
Books (author)						
Chapter/paper in books						
Publications (editor)						
Papers in International Journals with scientific referees						7
Papers in National Journals with scientific referees						
Conference Proceedings in events with scientific referee and selection						16
Other publications (National meetings, local journals, etc.)						
Total	0	0	0	0	0	27

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a

Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Post-graduation activities

Summary of theses supervised by members of the Group in 2010

Type	Starting	On-going	Concluded	Total
Master	8	0	2	10
Doctoral	2	9	2	12
Total	10	9	4	23

- Advanced Training Actions

Summary of Advanced Training Actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*						
Training for others *(estágios extra-curriculares)*						
Professional training actions *(estágios profissionais)*						
Other actions						
Total	0	0	0	0	0	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Cooperation or dissemination

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings						
Collaboration in papers authored by INESC Porto researchers						
External persons directly involved in actions organized by INESC Porto						

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- Human resources in 2010

Summary of Group personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	8	1	1		10	
INESC Porto Grant Holders	1	6			7	
Other Grant Holders		1			1	
Employees						
Trainees						
Other						
Administrative						
Total	9	8	1		18	

(*) Relative to 2009, in absolute numbers.

P3.8 LABORATORY OF ARTIFICIAL INTELLIGENCE AND DECISION SUPPORT

Coordinator: Pavel Brazdil

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, but in 2009 is virtually complete.

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

Members:
At the end of 2008 LIAAD included 36 members. This number includes 18 members with Ph.D's, 18 others, of which 13 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 inteligence: 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.

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

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
Technology Transfer				Technology Transfer
Innovation Metrics				Innovation Metrics
Open Innovation				Open Innovation

(*) 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					

Description of the Group's organizational structure

Management scheme:

Regulation: The functioning of the Group is carried in accordance with its Internal Regulations. These have been drafted recently, but its approval has not yet been formalized.

Coordinator: The Group is run by the coordinator who is responsible for coordinating both scientific and administrative matters. According to its Internal Regulations, the coordinator is elected by the members of the Scientific Council. It is foreseen that the next election will take place at the beginning of 2010.

Vice-coordinators: The Group will have 2-3 vice-coordinators that will be appointed by the coordinator and whose task is to take over some of the management tasks. As the statutes have not been approved yet, some members have offered help with some tasks on an informal level. It is foreseen that the formalization of these posts will be done at the beginning of 2010.

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

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:

It is foreseen that in 2010 all administrative/financial matters including signing contracts, elaborating financial reports etc. all these tasks will be carried out by INESC. In 2009 these tasks were carried out by the University of Porto (The Rectorate).

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. Now and then other people are recruited for specific tasks if a need arises. This solution is used whenever urgent tasks need to be completed on a short notice.

P3.8.2 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 group and its R&D activities, as the members work at several geographical locations.
  - o 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.
  - o Other researchers, mainly those that have teaching duties at FEP, tend to use the offices at FEP to conduct research. This includes about 7 Ph.D members, although many participants from the first group 8 (about 5 members) also teach at FEP, so some contacts taje place there too.
  - o The remaining Ph.D. members, some of whom come occasionally to the central location, teach at FCUP (2 Ph.D members) and FEUP (2 Ph.D members).

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 group of Fac. of Psychology and Education Science, UP ; one group 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.

P3.8.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

LIAAD has several strategic aims:

- Maintain cohesion of the group 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 group has achieved an international recognition. This includes various lines of research including:
    o Learning from data streams
    o Meta-learning,
    o Simulation, Modeling and Optimization

- Continue to advance the research in all areas, while taking care that the goals are "up-to-date":
    o metalearning --> planning to learn,
    o learning from static data --> learning from data streams,
    o web mining --> web mining + social networks etc.

- Exploit all potential *synergies* between different lines within our Group and the Units of INESC Porto, where our Group 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.

P3.8.4   ACTION PLAN (GLOBAL)

- Operationalize the strategic objectives mentioned above.

P3.8.5 ACTIVITIES EXPECTED FOR 2010

In this first version of a Plan for the LA, a simple approach is made.

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)

The 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 group to make it compatible with the rest of the LA.

P3.9 CENTER FOR RESEARCH IN ADVANCED COMPUTING SYSTEMS

Coordinator: Fernando Silva

P3.9.1 SHORT DESCRIPTION OF THE GROUP

The Center for Research in Advanced Computing Systems (CRACS) general goals are: develop fundamental and applied original research with international impact, promote national and international cooperation, train highly qualified young researchers, and actively establish partnerships with industry to promote, disseminate and transfer research and technology results. The research directions pursued by CRACS encompass a broad number of issues related to scalable computing in two major research areas: "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 scalable computing as well as for advanced system architectures such as multi-core microprocessors and wireless sensor networks. 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 40 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 at 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	

Description of the Group'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 holding of CRACS and one of its functions is to elect the Coordinator. The Coordination Committee is composed by the Coordinator, which represents the Group, 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 Group.

P3.9.2 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 groups
- 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.

Threats

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

P3.9.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

CRACS main strategic objectives are organized around the following initiatives:

- Strengthen group'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 UTAustin.
- Increase partnerships with industry.

P3.9.4 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 group.

Scientific:

1. Computational Models and Languages for Scalable Computing

- Keep our group 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 Khatholieke 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 Group, 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 Salzburgh 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.

3.9.5 ACTIVITIES EXPECTED FOR 2010

- **Projects**

Summary of the projects to be developed in 2010

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	3			41.015
D - Development				
C - Consulting				
A – Advanced training				
T – Technology Transfer				
O - Other				
TOTAL	3			41.015

Summary of the percentage distribution of budgetary revenue

Financing (3)	Status (4)			Total Income (€)
	OG- On-going	G - Guaranteed	E - Expected	
NP – National Programmes		100,00%		41.015
EP – European Programmes				
CS – Consulting and services				
O – Other R&D sources				
OS – Other sources				
Total	0,00%	100,00%	0,00%	41.015

Summary of projects to be developed in 2010

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)	Research Line (5)
HORUS	Vítor Santos Costa	R	N	NP		01-2010	12-2012	G	5
OFÉLIA	Manuel Eduardo Correia	R	N	NP		01-2010	12-2012	G	5
DIGISCOPE	Inês Dutra	R	N	NP	FCT	09-2010	12-2010	G	6

(1) Type of Project: R – Research; D – Development; C – Consulting; A – Advanced Training; T – Technology Transfer; O - Other

(2) Degree of internationalization: N – National; E – European; I – International (Select one)

(3) Source of financing: NP – National Programmes; EP – European Programmes; CS – Consulting and services; O – Other R&D financing sources; OS – Other sources

(4) Status: <u>OG – On-going</u>: starting before 2009; <u>G – Guaranteed</u>: activity with a firmly agreed contract, starting in 2010; <u>E – Expected</u>: Activity with expected achievement, corresponding to a level of achievement proposed as a goal by the Unit.

(5) Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Publications**

Summary of the publications expected for 2010

Type of publication	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Theses concluded in 2010 by members of the unit					26	
Books (author)						
Chapter/paper in books					3	
Publications (editor)					0	
Papers in International Journals with scientific referees					8	
Papers in National Journals with scientific referees					0	
Conference Proceedings in events with scientific referee and selection					40	
Other publications (National meetings, local journals, etc.)					2	
Total	0	0	0	0	79	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 -Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4- Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Post-graduation activities**

Summary of theses supervised by members of the Group in 2010

Type	Starting	On-going	Concluded	Total
Master	15		21	36
Doctoral	4	10	5	19
Total	19	10	26	55

- **Advanced Training Actions**

Summary of Advanced Training Actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Training for graduation students *(estágios curriculares)*						
Training for others *(estágios extra-curriculares)*						
Professional training actions *(estágios profissionais)*					1	
Other actions						
Total	0	0	0	0	1	0

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 -Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4- Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Cooperation or dissemination**

Summary of cooperation and dissemination actions expected for 2010

Type	Research Line 1	Research Line 2	Research Line 3	Research Line 4	Research Line 5	Other Research Lines
Organizing conferences or meetings						
Collaboration in papers authored by INESC Porto researchers						
External persons directly involved in actions organized by INESC Porto						

Research Line 1 - Networked Multimedia Systems and Services in scenarios of convergence; Research Line 2 - Photonics for Life Sciences: Optical Biochemical Sensing and Imaging; Research Line 3 - Sustainable Energy Systems - bulk and distributed systems in a Market environment; Research Line 4 - Advanced Manufacturing Management, Innovation and Enterprise Cooperation Networks; Research Line 5 - Digital Society - large Scale platforms, advanced services, citizen participation and policies.

- **Human resources in 2010**

Summary of Group personnel at the end of 2010

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff	9	4			13	
INESC Porto Grant Holders	3			6	9	
Other Grant Holders		7	8		15	
Employees						
Trainees						
Other						
Administrative			1		1	
Total	12	11	9	6	38	

(*)   Relative to 2009, in absolute numbers.

P3.10 INDUSTRIAL MANAGEMENT AND ENGINEERING UNIT

Coordinator: Sarsfield Cabral

P3.10.1 SHORT DESCRIPTION OF THE GROUP

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 represents an excellent opportunity to amplify and synergistically integrate the work being independently developed by the Group 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 wining 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.

Description of the Group's organizational structure

The Group is small, with only 6 PhDs at present. It's internal organization depends on the Coordinator action.

P3.10.2 ACTION PLAN (GLOBAL)

Because the integration of UGEI in INESC Porto LA is extremely recent and, in fact, no approval has yet been granted by FCT, it is not possible to present in this report a Plan for 2010, for UGEI, at the level of detail of the other Units and Groups.

The basic strategic axis will be the full integration in the LA, with the establishment of joint activities and projects and the absorption of the science management culture at a steady pace.

A second axis will be the reinforcement of the Group in terms of manpower, namely with the establishment of stronger and orderly ties with the Department of Management and Industrial Engineering at FEUP.

The third main axis is the maintenance and improvement of the scientific level of the Group, translated by objective indices such as the ones related to publications.

In 2010, if the integration is successful, UGEI will go through a process of progressively relying on INESC Porto structure and support services to assist its scientific and technological development.

P4. PLAN FOR THE SCIENTIFIC COUNCIL

President: Manuel Matos

The Scientific Council will continue in 2010 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 requested from the Board of Directors.

In the framework of the Associated Laboratory, the Council will also develop efforts to promote and support the launching of inter-units action lines, understood as virtual organizations of researchers of different units, with a focus on a specific theme or scientific domain and able to exploit synergies. 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 conjunction 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 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.

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 October 2004, there has been a change in the Responsibility for the Human Resources Area, which has been assumed directly by the Department's manager. This change demanded the reinforcement of the now called "General Coordination" of the department, with the allocation of a person to support the coordination functions. Since January 2007, the General Coordination took also charge of the organization of the Board of Directors' meetings, dispatch and follow-up of its decisions. Since January 2009, the logistic support was transferred to the Infrastructures Management Service. This way, the Department concentrates more 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 temporary increase of workload in this area, a new person, who has been in INESC Porto as a trainee, will be 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, will be 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 financed projects and administrative, economical and financial management of these projects. Due to the increase of workload in this area, a new person, who has been in INESC Porto as a trainee, was hired in April 2009 with a fixed-term contract.

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 previous functions as Unit's secretary.

P5.1.2 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.

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 three autonomous research groups to INESC Porto Associated Laboratory, will certainly take much time and energy of several persons in the department.
- The unavailability to take the opportunities that may arise, due to above mentioned increase of workload;

P5.1.3 MEDIUM TERM STRATEGIC OBJECTIVES AND OBJECTIVES FOR THE YEAR

<u>Involvement in the several aspects and strategic guidelines:</u> 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;

- *Relation with the economic and social environment:* The area of Management Control intends to collaborate in the definition of sectoral strategies and in the definition of a coherent image in the market as well as to improve the monitoring of the degree of compliance with those strategic objectives; in collaboration with the Board of Directors, the area of Accountancy and Finance will seek strategic partnerships with Financial Institutions for the provision of audit services in the different technological areas of INESC Porto;

- *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 financing 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 financing 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:

    o <u>Promotion of the inter-units articulation:</u> 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.

    o <u>Simplification and automation of processes:</u> 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;

    o <u>Creation of an integrated information system:</u> DIL proposes to actively collaborate in the specification of a system that satisfies INESC Porto's needs and that may be also applicable to institutions of the same kind.

- Acquirement of 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 Groups that have adhered to the Associated Laboratory, without prejudice of their autonomy (LIAAD, CRACS and UGEI). Organization of the INESC Porto-LA Coordinator Council's meetings and follow-up of its decisions.

P5.1.4 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 in the framework of QREN, that may be adequate to INESC Porto needs;
- Reviewing and enriching of the information and documentation published by DIL in the new Intranet and Internet sites: improve accessibility and the organization of the information, within the general reforming of Intranet and Internet process, managed by SIG;
- Participation in the definition of an integrated information system for INESC Porto;
- 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
- Redefinition of the status of the several categories of collaborators;
- Extension of the automated process of Recruitment, Selection and hiring of human resources to other categories of collaborators and other stages of the process;
- Improvement of the processes of collection, integration and processing of the information with the purpose of the Social Report/Balance 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 ;
- Collaboration in the specification of an automated process of Collaborators' Admission, that ensures the automatic collection and registration of data in the Personnel Database;
- Revision of the sources of recruitment, in order to optimise the announcement process.

Accountancy and Finance Area
- Integration of the process of Publishing Awards in SACA, in collaboration with SIG;
- Promotion of the establishment of partnerships with Financial Institutions, in the technological areas, in articulation with the Board of Directors;
- Update of the handbook on procedures of the accountancy and Finance Area;
- Implementation and adaptation to the new accounting standards that will be in force from the 1st January 2010 on (creation of the accounts' codes and financial statements);
- Integration of the process of Travel workflow in SAP.

Management Control Area

- Implementation of an automatic process of Time-Cards recording;
- Creation and development of an Internal Audit Plan;
- Maintenance of a repository of rules and procedures for funded projects;
- Development of the activities of National Contact Point for ICT theme under FP7, through a contract with FCT.

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):
  o definition of the policy and approval and application of the Regulation of Intellectual Property;
  o Revision of contracts with collaborators and creation of new drafts;
  o creation of drafts for several kinds of agreements/contracts with the purpose of defending INESC Porto's rights;
  o Articulation with the external company of intellectual property in the handling of real cases of protection of intellectual property, centralization, follow-up and filing of the processes.
- Legal support to the Business Incubation Projects, new Spin-offs of INESC Porto and other participations of INESC Porto in companies and associations;
- Legal support to the institution's internationalization projects, namely the creation of INESC P&D Brasil;
- Study and advice on the legal issues of the Seventh R&D Framework Programme and other European or International Programmes;
- Reviewing drafts of frequently asked documents (contracts, declarations, etc.), relevant legislation, updating of the frequently asked questions, as well as relevant institutional documentation.

Secretarial Coordination

- Verify and support the use of intranet applications such as ULTIMUS, SACA and other process management applications by the secretaries, suggesting changes and improvements, namely integrating the Intranet reservations process of services and equipment, allowing multiple requests and confirmations (namely with Plone interface);
- Implementation of an organised and effective procedure in order to welcome new collaborators within the Units;
- Continuous finding of possible integrations of the management application processes to the secretarial daily tasks;
- Continuous planning of the Secretaries' training:

  o Proposals for single individual participations;
  o Proposals for the group's training based on the assessment of lacunas

- Formulation of a chart that compares the tasks performed by the several secretaries as a way to evidence the different types of use of these human resources in the different Units and make the coordinators aware of a more efficient use of them.

Human resources of the Department

Summary of Department personnel at the end of 2010 (estimate)

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Polytechnic Staff						
INESC Porto Grant Holders						
Other Grant Holders						
Employees						
Trainees						
Other						
Administrative						
Employees		2	12[1]	4	18	+3
Trainees		0	0	0	0	-2
Total		2	12	4	18	+1

(*) Relative to 2009, in absolute numbers.

(1) The person that guarantees the function of Secretarial Coordination is allocated to the Department only by 25% of her working time.

P5.2 SUPPORT SERVICES

P5.2.1 COMMUNICATIONS AND COMPUTER SUPPORT SERVICE

Summary of actions expected for 2010

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 Quarter
IPv6	Conclusion of the IPv6 infrastructure implementation.	First Semester
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
	Specialized consulting in Network Design and Management	

P5.2.2 MANAGEMENT INFORMATION SUPPORT SERVICE

Summary of actions expected for 2010

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 3.	First semester
	Support of new website design.	
	Enhanced performance, authentication, security and redundancy.	Whole year
Collaboration in the development of the Units' projects and conferences websites	Collaborative Platform for projects	First trimester
	Support to the units and services in the creation of the necessary websites	Whole year
	Support to EWOFS 2010 conference website.	
Development of databases and applications to support internal management functions	Definition of an integrated data model for INESC Porto projects	First semester
	Implementation of a simple Customer Relationship Management (CRM) system	First trimester
	Redesign of human resources database	
	Re-structuring SACA in a way to integrate with internal CMS and with FEUP's database	Second 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

Summary of actions expected for 2010

Action	Description	Schedule
Intensification of external communication: news and opinion articles in the most relevant newspapers, radio and television.	The aim is to guarantee the publication or release of (at least) one news item per month regarding the activities in INESC Porto.	The whole year
Development of a Common Strategy in order to promote Communication with the Rectory of the University of Porto and associated Faculties and Institutes.	Promoting several initiatives which result from combining efforts and benchmarking activities from several institutions belonging to this work group.	The whole year
Search for opportunities to carry out new projects that will promote the dissemination of INESC Porto's scientific activities.	Elaboration of applications for the development of new projects related to the dissemination of our scientific and technological activities, both at national and international levels. These projects should be coordinated and co-coordinated by INESC Porto.	The whole year
Promote other initiatives to young people in the area of Science Communication.	Looking for opportunities to establish relationships of cooperation with other high schools in order to develop initiatives related to Science and New Technologies which are appealing to students.	The whole year
Preparing the celebrations for INESC Porto's 25th anniversary	Creating a task force, planning several initiatives and calculating the costs for the celebrations of INESC Porto's 25th anniversary that will take place in 2010.	First semester
Dynamization of INESC Porto's new website in Portuguese and in English.	Translation and inclusion of news on projects and events as well as clippings on the website. Daily update.	The whole year
Production of INESC Porto's new institutional video.	Collection of images and script writing in order to update INESC Porto's institutional video. English version for subtitling.	First quarter
Organization of the institution's internal and external communication activities.	Includes organization of events, participation in Exhibitions, and propaganda of initiatives, among others.	The whole year
Production of BIP – INESC Porto's Bulletin.	Collecting and processing information and images to include in BIP. Production of 11 editions in Portuguese and 4 in English.	The whole year
Production of a bilingual communication piece to present INESC Porto's activities.	Coordinating the production of an e-book that introduces INESC Porto and promotes its image, its activities and its innovative projects.	First quarter
Photo and video coverage of events.	Photo and video coverage of internal and external events, at the Units' request.	The whole year
Updating and offering of a photo and video archive.	Updating of the historical footage archive and multimedia in the intranet and its advertisement to all the collaborators.	The whole year
Organization of visits to INESC Porto.	Supporting visits from students who are interested in our areas of activity.	The whole year

P5.2.4 INFRASTRUCTURE MAINTENANCE SUPPORT SERVICE

Summary of actions expected for 2010

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

P5.2.5 LIBRARY AND DOCUMENTATION SUPPORT SERVICE

Summary of actions expected for 2010

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