FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA CIÊNCIA E DO ENSINO SUPERIOR

PROGRAMA DE FINANCIAMENTO PLURIANUAL DE UNIDADES DE I&D

RELATÓRIO DE ACTIVIDADES DE 2006
E PLANO DE ACTIVIDADES PARA 2007

Nome da Unidade: INESC Porto – Instituto de Engenharia de Sistemas e Computadores do Porto

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Área disciplinar principal[1]: Engenharia Electrotécnica e Informática

Áreas disciplinares secundárias (máximo de três)[1]: Física

Palavras chave: Telecomunicações, Energia, Sistemas de Produção, Sistemas de Informação, Optoelectrónica

Objectivos socio-económicos[2]:

    Indústria:
        Desenvolvimento de Software
        Técnicas de transformação e fabricação
        Equipamento e aparelhos electrónicos
        Investigação de carácter geral

    Energia

    Infraestruturas e Ordenamento do Território

INESC PORTO
INSTITUTO DE ENGENHARIA DE SISTEMAS
E COMPUTADORES DO PORTO

REPORT ON R&D ACTIVITIES IN 2006

SUMMARY

This report summarizes the Research and Development activity of INESC Porto carried out by its research Units during the year 2006. From its analysis one may conclude that the general level of activity was again high, with a performance adequate to expectations in the selected areas that constitute either research domains or integration of research results, technology transfer and advanced training.

One observes a slight contraction in the activity indices in 2006 when compared with 2005 but well above 2004 and previous years. Besides natural fluctuations that occurr, namely in the transition from FP6 to FP7, this may also reflect a delayed effect from the economic crisis in recent years in Portugal.

The analysis of the trend in objective indicators shows a sustained development since 1998 in several axes of performance, such as the number of refereed publications, prototypes and patents, joint publications with researchers form other institutions or the participation in international projects and the number of projects with results directly transferred to companies or the public administration.

These results reflect also the continued concern for quality in management pursued by INESC Porto.

STRUCTURE OF THE REPORT

This report is organized as follows:

A global description of the activity and results during 2006, including main achievements and activity indicators.

Executive summaries of the activity of each Research Unit.

5 technical annexes with details on the activity of each Research Unit, including the list of the relevant scientific publications produced during 2006.

GLOBAL DESCRIPTION

1. Organization

In 2006, INESC Porto maintained its organization around the following main basic activity Units: UTM - Telecommunications and Multimedia; USE - Power Systems; UOSE - Optoelectronics and Electronic Systems; UESP - Manufacturing Systems Engineering; USIC - Information and Communication Systems. Also, a new Unit has been incubated and launched in the end of 2006: UITT – Innovation and Technology Transfer. Because there is no net activity of this Unit in 2006, it will be described only in the Plan for 2007.

Each of these units is managed by a Unit Coordinator or two Co-Coordinators. The first 4 Units develop a mix of Research and Technology Transfer activity while the 5th is centered in a specific mission of Technology Transfer and Consulting in the areas of information systems and communications.

INESC Porto mission is defined as fulfilling the role of an Interface Institution for Research, Development and Technology Transfer. Therefore, each research team at INESC Porto must organize its efforts in multiple perspectives, ranging from advanced research to transfer of technology and to advanced training of human resources. Although the Units are largely asymmetrical in their profiles, the activity, measured globally, must contribute to establishing a bridge between the University drive to research and the practical needs or requirements of industry, services and public administration.

2. Global results

The social and economic climate in Portugal continued to have an effect of damping the activity in 2006. However, we may consider the global results in 2006 positive, with a stabilized global financial income at the average level of the last 5 years. The financial balance was achieved from a careful balance between European and national research projects, direct contracts with economic agents and the public administration, the support of FCT and funding obtained from support programmes such as PRIME, managed by the Ministry of Economy and Innovation. The efforts in the application of strict management rules continued to lead to savings in structural expenses.

The activity was also conditioned by financial difficulties among which one must underline the reduction of the value of overhead percentages and the demand by FCT for an accounting justification for all overhead expenses, a principle that is not followed by European practice, neither at EC funded projects nor in the major countries having institutions similar to INESC Porto in concept (e.g. Germany, Fraunhofer Institute).

Nevertheless, INESC Porto continued its participating in an interesting and diversified set of EU projects, being the research institution in Portugal under FCT with the largest participation in the EU research programmes.

As Associated Laboratory, INESC Porto continued the efforts to attract new researchers and technicians and has continued to support these contracts even when the government agencies did not transfer the contracted funds. The treasury difficulties imposed a careful policing in contracting new researchers after launching an international invitation. INESC Porto benefits from a partial funding from FCT to face this expense, and supports from its own resources the extra cost associated with recruiting high level researchers that enrich the institution environment.

2006 represented the fifth year of contract with the Government as Associated Laboratory and allows one to assess the benefits resulting from that statute. The quantitative indices of scientific activity continued to reveal an increase in research related activity relative to the period before the contract. This sixth year marked a slowing in this increase which is natural after six consecutive years of growth. The tables in the following sections compare the indicators of performance from 2002 to 2006, with relevancy for post-graduation activities. However, this trend was asymmetric among the Units and requires analysis in more detail. On average, one may conclude that the level of performance remained good. However, as in previous years, the profile of the projects developed continues to be unfavorable, resulting in a higher number of projects but of smaller value than desirable. The sources of income were divided as follows (in a total above M€6.6):

Item	2006	(2005)	(2004)	(2003)	(2002)
Direct contracts with industry and other clients	22%	20%	18%	20%	30%
EU R&D	20%	19%	18%	21%	20%
National R&D	29%	35%	39%	34%	30%
Other sources	29%	26%	25%	25%	20%

There are special reasons for the very high levels in 2002 in direct contracts (the special format of a Government program funding companies to subcontract research institutions) and the situation in these years is not comparable with the years that follow. The years of 2003 to 2006 may be seen, instead, as indicators of the "natural" level of contracting by companies that INESC Porto is able to attract when no support exists from the state. These results are, however, possibly contaminated by the slow down in Portuguese economy.

There is also evidence of a saturation level for the activity developed by an institution such as INESC Porto, due to the way research funding is made available. In fact, both at national and European level, income is very directly indexed to labour hours. This not only creates a ceiling of maximum financial input derived from the maximum number of man-months allocatable but also does not give incentives for organizations to promote management efficiency in fulfilling research contracts, because efficiency is noy rewarded.

The distribution of effort, in what concerns researchers at doctor level, may be evaluated from the examination of documented hours of work devoted to activities such as research, technology transfer and management, as well as free research time (hours not formally documented), as follows:

N° of registered PhD at the end of 2006	N	77

Nº of PhD with participation under re-definition	D	10
% of research effort documented (in hours)	A	48%
% of research effort non documented (in hours)	B	40%
% of technology transfer and consultancy (in hours)		5%
% of management effort (in hours)		7%
Nº of equivalent PhD devoted to research	R = (N-D) * (A+B)	59

This information is relevant to put in perspective and assess the productivity of an interface institution with a mix of activities such as INESC Porto.

The researchers whose "participation is under redefinition" refer to PhD fellows registered with INESC Porto but that don't have documented activities either in projects, group or unit management, research contracts or refereed publications, in 2006. This number has increased somewhat when compared to 2004, but this number must be interpreted with caution. The Board has launched in the end of 2006 an internal process of redefinition of the structure of activity of INESC Porto and of the classification of the links that each researchers has with the institution. Hopefully this re-structuring will be approved by the General Assembly in 2007 and will clarify the case for the researchers that for a number of years have been indentified as in a state of "redefinition".

One may conclude that the activity of INESC Porto is maintained at a level consistent with the assessment made by the International Evaluation Panel that has audited the activity of INESC Porto, for the global period of 1996-1999, under the coordination of the Ministry of Science of the Government of Portugal.

MAIN ACHIEVEMENTS

We will summarize the main achievements of INESC Porto in the several areas of activity during 2006:

TYPE OF RESULTS	SOME IMPORTANT ACHIEVEMENTS	AREA
	UNIT: UTM – Telecomunications and Multimedia	
SR, PT	• Method for the automatic equalization of rooms using an innovative technique of accurate insertion of probe signals and that operates in a fully adaptive and transparent way.	Audiovisual Processing
SR, PT	• Automatic Speaker Segmentation using Baysean Information Criterion (BIC).	
SR, PT	• Normalized Cuts for Singing Voice Separation and Melody Extraction.	
SR, PT	• Extension of an image segmentation technique to object-based spatial segmentation of video guided by depth and motion information.	
SR, PT	• Development of an intelligent medical system for the aesthetic evaluation of breast cancer conservative treatment.	
PT	• System that automatically generates 3D models of urban environments from geographic information sources and provides them in mobile platforms.	

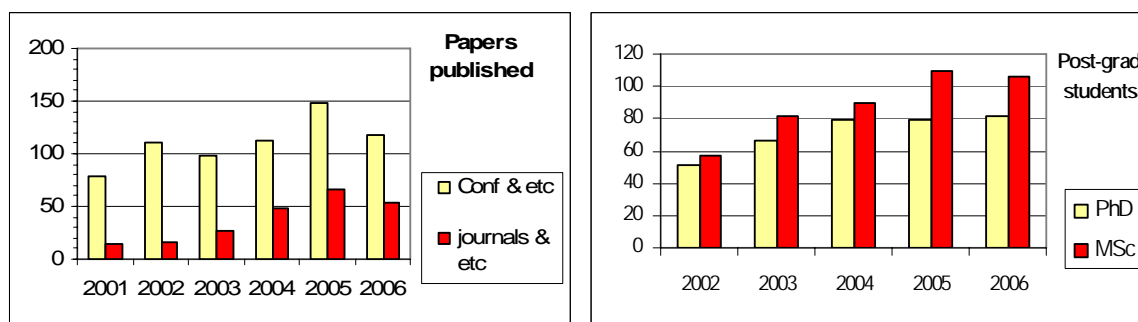| TYPE OF RESULTS	SOME IMPORTANT ACHIEVEMENTS	AREA
PT	• Traffic system aimed at monitoring unicast and multicast sessions in mobile IPv6 networks, using sampling, passive and active techniques.	Network Architectures and Services
PT	• QoS layer aimed at abstracting the QoS of 802.11, 802.16, 802.15, and UMTS wireless access networks, which also addresses concatenated layer 2 networks.	
SR	• Solution for integrating layer 3 ad-hoc networks with infrastructure operator-managed networks, using a mix of advertisement IPv6 messages and ad-hoc routing protocols.	
PT	• Network testbed with support for QoS, mobility and auto-configuration of ad-hoc networks.	
SR	• IP like congestion control techniques for best effort wireless and mesh networks.	
SR	• Solution for supporting the automatic configuration of PANs and for defining the basic connectivity of Ambient Networks, considering heterogeneous wireless technologies.	
SR	• Extensions to 802.21 towards QoS to support QoS-aware vertical handovers.	
SR, PT	• Secure multicast solution enabling the distribution of individual keys in IP multicast groups, applicable to the distribution of TV over cable and ADSL.	
SR, PT	• Context-aware multimedia services platform – final developments, integration and public demonstration.	Multimedia Systems
SR	• Functional specification of a distributed content management system based on peer-to-peer technologies	
SR, PT	• MPEG-21 Digital Items browser based on client/server architecture.	
SR	• Indexing method for multimedia descriptors (BitMatrix) that has flexibility for handling heterogeneous datasets and the incremental nature required in multimedia databases	
SR	• Platform for experimenting with the descriptors in the MetaMedia database, both high-level descriptors and several combinations of the extracted low-level descriptors.	
PT	• Network personalized video recorder (nPVR), including Virtual DVB driver for Linux.	
TT	• Dynamic user profiling for IP TV applications.	
OO	• Completed the installation of the new infrastructure of the Photonics and Microwave Laboratory.	Optical Communications
SR, PT	• Design and implementation of a low-pass filter using two overlapped EBG structures with low sharp-cutoff and low spurious response.	
SR	• Large Signal Analysis of Mach-Zehnder Modulator Intensity Response in a Linear Dispersive Fiber.	
PT	• Simulation of the propagation of an OFDM signal over a single mode fiber and a Mach-Zehnder Modulator.	
SR	• Simulation of a phase diversity receiver, through 2 different methods: polarization splitting and with an 8-port coupler.	
PT	• Tunable optical filter based on a Fibre Bragg Grating with USB interface.	

TYPE OF RESULTS	SOME IMPORTANT ACHIEVEMENTS	AREA
SR SR SR SR	• Study and selection of reduced floating-point data formats for the core computations of a dedicated computer used for Computational Fluid Dynamics (CFD). • Implementation on a commercial FPGA-based reconfigurable platform of the memory and control interface infrastructure of the CFD dedicated computer. • Project of a prototype IC for demonstrating a methodology for the auto-test of a low-noise amplifier • Methodologies for estimation of parameters that characterize the non-linearity of RF power amplifiers and a methodology for estimation and in-circuit correction of non-linearities.	Microelectronics
CS, TT, PT	• Set of projects under contract with PTIN with a focus on the development of prototypes, consulting, technology transfer and advanced training of young researchers to be admitted by PTIN at the end of the projects.	Various
UNIT: UOSE – Optoelectronics and Electronic Systems		
TT	• Acoustic detection system based upon optical fiber technologies for geotechnical applications	Optical fiber sensors
SR	• Phase shift Bragg gratings	Microfabrication
PT	• Optical fiber inclinometer	Optical fiber sensors
UNIT: UESP – Manufacturing Systems Engineering		
PT	• Consolidation of the area of optimization for production planning and scheduling, with a large number of on-going projects. Large experience has been gained both at production aggregate planning and scheduling.	Operations Management
PT	• Conclusion of a system for supporting cooperation in the ship building industry	Enterprise Cooperation Networks
PT	• Conclusion of an integration infrastructure for shoe manufacturers and suppliers, using ShoeNet and ebXML standards.	Enterprise Cooperation Networks
SR	• Conclusion of the definition of Strategic Agendas for manufacturing industries and for ICT in the agrifood industry, at anEuropean Level.	Operations and Advanced Systems
CS	• Start of a large project for the definition and management of technical standards for the construction industry.	Advanced Systems
OO	• Start of a Competence Network for the fashion clusters, with special responsibility in ICT.	Operations Management and Advanced Systems
UNIT: USE – Power Systems		
SR	• Development and instantiation of the "multi microgrids" concept	Distribution Systems
SR	• Small-signal stability analysis in system with large scale wind penetration	Power Systems Analysis
SR	• Fuzzy power flow for transmission adequacy evaluation	Power Systems Planning
SR	• New Mechanisms for Electricity and Ancillary Services Markets	Electricity Markets
SR	• Regulatory support for microgrid development	Distribution Systems
SR	• Development of a control approach to allow for doubly fed induction wind generators to participate in primary frequency control	Wind Power
TT	• New tools for security constrained dispatch of power systems	Power Systems Operation
CS	• Technical support to the portuguese government in the organization of the international public tender for new wind generation connection points	Wind Power Decision Making
CF	• 63rd Meeting of the Multiple Criteria Decision Aid European group	Decision Aid

TYPE OF RESULTS	SOME IMPORTANT ACHIEVEMENTS	AREA
	UNIT: USIC – Information and Communication Systems	
PT	• m-GIS - Development of a technological framework that enables the creation of interoperable GIS products or services for mobile platforms. Developed for Portugal Telecom Inovação.	Location Based Information Systems
PT	• SIGEP – Specific GIS developments for the Oporto's Emergency Management Integrated System for the Oporto's Civil Government (the local representation of the Administration Ministry).	Location Based Information Systems

Type of results: SR – Scientific result; TT – Technology transfer; CS – Consulting and services, PT – Prototypes; CF – Conferences or other meeting; OO – Other

RESULTS IN 2006

The following table and figure condense a number of objective indicators for the activities developed.

RESULTS IN 2006	UTM	UOSE	UESP	USE	USIC	2006	2005	2004	2003	2002
ACTIVITY RESULTS										
Total number of refereed publications	36	38	34	48	14	170	214	160	125	126
Publications in international journals & chp.	9	28	4	10	2	53	66	49	27	16
Total number of publications	47	70	41	57	16	231	261	191	163	162
Prototypes	24	1	8	3	9	45	34	35	32	25
Patents	0	1	0	0	0	1	5	4	4	1
ADVANCED HUMAN RESOURCE TRAINING										
Supervised PhD	35	9	15	16	6	81	79	79	66	51
Supervised MSc	37	4	17	21	27	106	109	90	82	57
INTERNATIONALIZATION AND COOPERATION										
Joint publications with researchers from other institutions	21	33	6	26	0	86	70	75	75	61
Participation in international projects	9	5	9	6	2	31	31	33	30	32
IMPACT IN INDUSTRY, SERVICES AND ADMINISTRATION										
Number of projects with results directly transferred to companies or administration	6	2	7	11	14	40	27	22	18	16

Regarding publications, the most remarkable index relates to the number of papers published in international journals and chapters of books. Globally, this number has grown about four times during the period of contract of Associated Laboratory. This is a visible result of the impact of the policy related with the recognition of such statute to INESC Porto. The number os post-graduation students, namely at the level of PhD studies, has also steadily grown and, of course, it is believed that the two indicators are somehow correlated. Also, the number of joint publications with researchers from other institutions has also steadily grown; if one realizes that this is mainly due to international cooperation, one realizes that yet another objective set by the Associated Laboratory contract – internationalization – is being met. These are seen as good indicators of the correctness of the policy followed, complying with past recommendations of evaluation panels.

This allows one to calculate the per capita publication in international scientific journals and books at an average of 0.9 papers/year per equivalent PhD devoted to research activities (0.77 in 2003 and 1.2 in 2005), while for the total number of publications it is at the average of 3.9 publications/year (4.75 in 2005) per equivalent PhD devoted to research activities. There is a slight reduction in numbers in comparison with 2005 which must be evaluated to assess if it is a result of natural oscillations of denots a shift in activity. The ratio between refereed publications and total publications has remained between 2002 and 2006 steadily in the interval [74%, 84%], which is understood in the context of an institution with a mix of research and of technology transfer activities. As the number of publications in journals has grown by a factor of four, this means that some shift in the publication activity has been witnessed, with growing emphasis on journals, which is seen as also positive.

As previous reports have already underlined, the concept of PhD actively involved in research is used to compensate for the fact that INESC Porto is an institution that develops technology transfer and development in parallel to research, having some of its human resources not devoted to research in full time. The effort devoted to these activities is extracted from the time card records that distinguish among activities in research, in development contracts and in management. Therefore, this number varies from year to year not only due to the growth in thetotal number of PhDs associated in the institution but with the type of activity developed (more or less technology transfer).

RESOURCES

The institute is fully installed in its two sites, named Asprela, inside the new Campus of FEUP, the Faculty of Engineering, and Campo Alegre, inside FCUP, the Faculty of Sciences of the University of Porto. The new building at Asprela offers a total area of about 3.500 m2; the facilities include 1.500 m2 of laboratories, an auditorium, meeting rooms in each floor, an advanced communication network and other supporting infrastructures. At Campo Alegre INESC Porto occupies also an important area in offices and Laboratories, including a clean room, under agreement with FCUP. Each Research Unit has the responsibility over an allocated area that includes offices and laboratories, organized according to the specific activities developed.

COOPERATION AND DISSEMINATION OF THE ACTIVITY RESULTS

The Research Units of INESC Porto developed during 2006 an effort both in cooperation with other institutions and in the dissemination of the activity results, at the same general level as in the previous years. Here are some indicators:

COOPERATION AND DISSEMINATON	2006	(2005)
Conferences with INESC Porto in the Organization	14	*11*
Number of external co-authors of publications of INESC Porto	126	*118*

CONTRIBUTIONS TO THE STRATEGIC OBJECTIVES OF AN ASSOCIATED LABORATORY

In 2002 INESC Porto obtained the statute of Associated Laboratory. One of the major compromises has been to keep and reinforce know how at a level of excellence in a number of areas or thematic lines, identified in the contract established between the institution and FCT. During 2006, the activities continued to be focused in order to satisfy such a compromise and new international calls were launched for post-doc positions. In the Technical Annexes to this report, one may find other specific comments associated to the contribution of each research Unit to the objectives and compromises of the statute of Associate Laboratory.

RE-SHAPING OF THE INSTITUTION

In 2006 INESC Porto admitted two new associates: the Faculty of Sciences of the University of Porto and the Politechnical Institute of Porto (IPP). The first admission was recognition of the de facto strong and ancient relationship that allowed the support and success of UOSE, the Optoelectrocnics and Electronic Systems Unit. The second finds justification in the number of researchers from IPP involved in activities of INESC Porto.

This movement enlarged the academic support base of INESC Porto, which is seen as instrumental to boost the activity in the coming years. This movement is not final and in 2007 one will witness further developments.

3. ABRIDGED CONCLUSION

The activity in INESC Porto, in 2006, continued to suffer for the fourth year in a row from the economic struggling environment in Portugal, leading to contraction in the capacity of economic agents and public administration to grant research contracts to interface institutions. The indices associated with the scientific activity show a net increase from 2002 to 2006, corresponding to the period of the contract of Associated Laboratory. This increase is especially visible in the number of publications in international journals, which is in the end of the period equaled almost 4 times the value in 2002, as well as in the number of MSc and PhD thesis supervised by the members of the institution and the number of patents.

This is clearly a sustained trend and not a transient phenomenon but requires careful coaching in the future. The results in 2006 may indicate that some saturation point has been attained and new management measures will be necessary.

The economic constrained environment had different influence on the research Units. The Power System Unit continued to combine scientific production with high level international consulting but we witnessed a renewing in mixed research/technology transfer activity in other Units. Means of extraordinary financing continue to be essential to the survival of the institution. In an overall assessment, the activity kept the distinctive mark that has been defined as a specific characteristic if the institution: a careful blend of research with technology development and transfer.

Similarly to 2005, one may conclude that:

- The activity has kept a satisfactory compromise among the several strategic objectives, suffering from the environment of economic recession.
- The compromise established with the State through the contract of Associate Laboratory has been respected and the planned actions have been taken.
- The global effort of producing more PhD and MSc denotes a sustained activity, and the number of foreigners in post-graduation continues at high level.
- The number of publications is kept at a high level, taking in account the relative numbers for the scientific areas of activity in engineering, being above 1 paper in international journal per active PhD, and the presence and publication in international conferences kept being large, denoting a strong volume of activity.
- INESC Porto continued to be recognized internationally in a number of areas as an advanced research institution and the number of international conferences organized by the institution as well as their success are a demonstration of such statement
- INESC Porto had a significant *direct and immediate* impact in companies and public administration, through products, prototypes, devices and consulting services provided, as it should be in an Engineering institution.

There has been a strong interaction of INESC Porto with FEUP, the Faculty of Engineering of the University of Porto, in the post-graduation courses and programs and especially in thesis supervision, whose effort forms a relevant part of the post-graduation activity of the School. Also, the interaction with FCUP, the Faculty of Sciences of the University of Porto, has improved and the support to post-graduation in Physics is being highly appreciated.

José Manuel Mendonça
President of INESC Porto

ANNEX - EXECUTIVE SUMMARIES FOR THE ACTIVITY OF EACH RESEARCH UNIT IN INESC PORTO
The following 5 tables summarize the activities of the Research Units of INESC Porto in 2006 and include some objectively verifiable indicators associated with such activities.

Table 1

UNIT	UTM – TELECOMMUNICATIONS AND MULTIMEDIA UNIT			
Main Scientific Area(s)	Audiovisual Processing, Network Architectures and Services, Multimedia Systems, Optical Communications, Microelectronics			
Main strategic activities	**Number** 16	**Description (abridged)**		**Main partners**
	• 3D4LBMS – 3D modeling of virtual urban environments for location based mobile services (PRAXIS/FCT) • TAICAS – Advanced Techniques for the Identification and Correction of Room Acoustics (PRAXIS/FCT) • WANDER – IPv6 Wireless Access Network: Deploying, Evaluating and Re-engineering (PRAXIS/FCT) • IAMA – Implementation of a biologically realistic associative memory in analogue CMOS-VLSI (PRAXIS/FCT) • DOMIR - Dialogs and Ontologies for Multimedia Information Retrieval (PRAXIS/FCT) • EBGCOM - Electromagnetic band gap antennas and components for broadband communications (PRAXIS/FCT) • CFD – Custom Computing Architectures for Computational Fluid Dynamics (PRXIS/FCT) • ENTHRONE / ENTHRONE 2 - End-to-End QoS through Integrated Management of Content, Networks and Terminals (IST/FP6) • DAIDALOS / DAIDALOS 2 - Designing Advanced network Interfaces for the Delivery and Administration of Location independent, Optimised personal Services (IST/FP6) • VISNET II - Networked audiovisual media technologies (IST/FP6) • WWI Ambient Networks 2 (IST/FP6) • Target – Top Amplifier Research Groups in a European Team (IST/FP6) • MOSAICA - Semantically Enhanced, Multifaceted, Collaborative Access to Cultural Heritage (IST/FP6) • UROOF - Photonic Components for Ultra wideband Radio over optical Fiber (IST/FP6)			Alcatel SEL Centre for Integrated Photonics Limited CNRS-IRCOM, EPFL Ericsson, ETH Zurich France Telecom HHI, INRIA, IRT IST, IT Lucent , MiMEG (Univ. Roma) NEC Europe, Nokia NTUA (Nat. Tech. Univ. Athens) Polit. Milano, Polit. Torino PT Inovação Rohde & Schwarz, Siemens Tech. Univ. Berlin Tech. Univ. Wien Technion-Israel Institute of Technology Teledifusion de France Telefonica I+D, Telenor Thales Broadcast & Multimedia Thales Communications S.A. Thales Research & Technology Tilab, T-Systems Univ. Aveiro, Univ. College London Univ. Essex, Univ. Cantabria, Univ. Kassel Univ. Lancaster, Univ. Limerick Univ. Politecnica Catalunya Univ. Politecnica Valencia Univ. Pompeu Fabra, Univ. Surrey
Main development contracts (except consulting)	**Number** 6	**Description (abridged)**		**Main contractors**
	• QoS VoIP • Secure IP multicast • MPEG-21 (management and adaptation of multimedia content) • nPVR (networked Personalized Video Recording) • Castelo da Feira • UPMEDIA			PTIN Comissão de Vigilância do Castelo da Feira Universidade do Porto
Importance of activity in %	National	European		International non European
	38 %	62 %		0 %

Manpower	PhD	28	Theses	Finished 2006	PhD	3
	MSc	12			MSc	8
	Other researchers	22		On-going	PhD	32
	Other personnel	1			MSc	29

Scientific publications	Papers in refereed journals and conferences	33 + 7 (*)		
	Books, papers in books	3 + 1 (*)		
Patents	0	Products, devices developed	24	Consulting	4

Table 2

UNIT	UOSE – OPTOELECTRONICS AND ELECTRONICS SYSTEMS					
Main Scientific Area(s)	Optical fiber sensors Microfabrication and integrated optics Optical fiber sources Micropackaging					
Main strategic activities	Number	5	Description (abridged)		Main partners	
	• URANUS – "Ultrafast Technology for Multicolor Compact High-Power Fiber Systems"				Fianium Netwoptics Ltd., Stratophase Ltd, NKT Research and Innovation AS, Corelase OV	
	• FIDELIO – Fiber laser Development for next generation lidar onboard detection system				ELOP Electrooptics Industries Ltd, Office National d'Études et de Recherches Aeospatiales, Thales Avionics	
	• NextGenPCF				Draka Comteq France, France Telecom, Université de Limoges, University of Bath	
	• ESA ONE – High resolution micro-optic filters for LIDAR applications • EVANESCENTE – Configurações de Campo Evanescente para Sensores de Fibra Óptica					
Main development contracts (except consulting)	Number	1	Description (abridged)		Main contractors	
	FiberSensing - Development of acoustic detection systems based upon optical fiber technologies for geotechnical applications				FiberSensing	
Importance of activity in %	National		European		International non European	
	60%		40%		0	
Manpower	PhD	16	Theses	Finished 2006	PhD	2
	MSc	9			MSc	0
	Other researchers	8		On-going	PhD	7
	Other personnel	2			MSc	4
Scientific publications	Papers in refereed journals and conferences			38		
	Books, papers in books			0		
Patents	1	Products, devices developed	1	Consulting	0	

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Table 3

UNIT	UESP – MANUFACTURING SYSTEMS ENGINEERING					
Main Scientific Area(s)	The main fields of activity are: Enterprise Cooperation Networks, Operations Management and Enterprise Information Systems. The work in these fields is grounded in research activity in the following scientific domains: Inter-organisational networks, Optimisation and Information Systems in Organisations.					
Main strategic activities	Number	10	Description (abridged)		Main partners	
	- IST/Gr: CEC-Made-Shoe - Custom, Environment, and Comfort made shoe - IST: Kobas - Knowledge Based Customized Services for Traditional Manufacturing Sectors by a Network of HighTech SMEs - Innovation: IRC-Portugal - Craft: Knowconstruct – Knowledge Management and Collaboration for Construction SMEs - IST: AMI@Netfood – Strategic Research Agenda on AMI and Collaboration for Agrifood domain - ON: RCED – High Performance Collaborative Enterprise Networks in the Nort of Portugal - Scheduling-Several tools for Scheduling problems - PRONIC - definition and management of technical standards for the construction industry - TECMODA - Competence Network on ICT for the Fashion clusters - FCT - Meta-Sim – Simulation and meta-heuristics hybrid approach to decision support in stochastic environments				CEC(B), ITIA(I), DCB, Codizo, Comelz(I), Preactor(UK), … ITIA(I), Intelliac(CH), CADCamation(CH), Tecniker(E), … ADI, Tecminho ATB(D), Labein(E) Innopole(E),ATB(D), CIMRU(IR), NYHERJI(IS) Digital partners Sift9, i68(E), Sonae Indústria de Revestimentos IC, LNEC CTC, APICAPS, CITEVE, ANIVEC	
Main development contracts (except consulting)	Number	4	Description (abridged)		Main contractors	
	- An optimisation software tool for scheduling problems to be integrated in an ERP system - Online quality control in dycast processes - Design and development of a scheduling system for decorative high pressure laminates - Agregate planning system for Shoe supply networks				Softi9 SONAFI Aerosoles	
Importance of activity in %	National		European		International non European	
	45%		55%		-	

Manpower	PhD	13	Theses	Finished 2006		PhD	2
	MSc	9				MSc	5
	Other researchers	19		On-going		PhD	13
	Other personnel	2				MSc	12

Scientific publications	Papers in refereed journals and conferences	32 + 2(*)		
	Books, papers in books	2		
Patents	-	Products, devices developed	8	Consulting	4

Table 4

UNIT	USE – POWER SYSTEMS					
Main Scientific Area(s)	Power Systems planning and operation. Dynamic security analysis. Integration of embedded generation. Isolated systems. Microgrids. Distribution systems. Control of wind generators. Regulation and Electricity markets. Load modeling. Power Quality. Reliability. Regional energy planning using GIS. Multicriteria Decision Aid. Fuzzy Sets. Evolutionary Programming and Meta-heuristics.					
Main strategic activities	Number	6		Description (abridged)	Main partners	
	• MORE MICRO-GRIDS – Advanced Architectures and Control Concepts for More Microgrids • RISE – Renewables for Isolated Systems - Energy Supply and Waste Water Treatment • MILES – The Impact of the Iberian Electricity Market on the Companies' Performance and Long-Term Security of Supply: A Simulation Analysis • EPSO - Evolutionary Particle Swarm Optimization, a new meta-heuristic variant with application in Power Systems • VENUS – Distributed Energy Sources Economic Value • GENEDIS - Impact Analysis of Small Dispersed Generation Under Different Regulation Directives				NTUA (Greece) ARMINES (France) UMIST (UK) IIT – U.P.Comillas (Spain) ISET (Germany) LABEIN (Spain)	
Main development contracts (except consulting)	Number	5		Description (abridged)	Main contractors	
	• Development of new advanced modules for a DMS/EMS • EDP-CCR – Updating of the load profiles of LV consumers for market operation • Global load forecasting using Artificial Neural Networks for the Portuguese TSO • TSO-Reservas – Evaluation of the security of supply in the long term for the Iberian Pensinsula and operational reserve planning • PrevEol – Development of advanced wind power forecasting tools				EFACEC EDP Distribution Company REN – Portuguese TSO REE – Spanish TSO APREN – Portuguese Association of the Renewable Generation	
Importance of activity in %	National		European		International non European	
	72%		22%		6%	

Manpower	PhD	15	Theses	Finished 2006	PhD	2
	MSc	14			MSc	2
	Other researchers	10		On-going	PhD	14
	Other personnel	2			MSc	19

Scientific publications	Papers in refereed journals and conferences		48		
	Books, papers in books		0		
Patents	0	Products, devices developed	3	Consulting	9

Table 5

UNIT	USIC – INFORMATION AND COMMUNICATIONS SYSTEMS			
Main Scientific Area(s)	Geographic Information Systems Information Systems Business Integration			
Main strategic activities	Number	5	Description (abridged)	Main partners
	• m-GIS - Development of a technological framework that enables the creation of interoperable GIS products or services for mobile platforms. Developed for Portugal Telecom Inovação. • e-ASLA: e-Administration Framework For Small Local Authorities			Portugal Telecom Inovação Univ. Politécnica Madrid; Univ. Castilla-La Mancha; Institucion Ferial Extremadura; Asociación para el desarrollo integral Mancha Júcar-Centro; AMNA – Associação de Municipios do Norte Alentejano; C. M. de Castelo de Paiva; C. M.lMondim de Basto e Município de Alandroal; Aquitaine Europe Communication
	• SIVIDA – Specification of an Information System for AIDS data collection and processing • PROT – Colaborative plataforms for the elaboration of several regional master plans and ICT strategic consulting addressing ICT and regional development. • CoopNAV - Creation of a trans-border distributed infrastructure for business coolaboration in the area of shipbuilding.			Healthcare High Commissioner CCDR-LVT, CCDR-C and CCDR-N Associação das Indústrias Marítimas, Asociación Cluster del Naval Gallego, Universidade de Vigo, Centro de Innovación e Servicios - Deseño e Tecnoloxía, Estaleiros Navais de Viana do Castelo.
Main development contracts (except consulting)	Number	3	Description (abridged)	Main contractors
	• SIGEP – Specific GIS developments for Oporto's Emergency Management Integrated System • SIGCMP – Development of GIS services • GEOFORUM – Georeferenced public discussion forum			Oporto's Civil Government (local representation of the Internal Administration Ministry). Oporto's Municipality Medidata

Importance of activity in %	National		European		International non European
	76%		24%		

Manpower	PhD	6	Theses	Finished 2006	PhD	1
	MSc	4			MSc	4
	Other researchers	12		On-going	PhD	5
	Other personnel	2			MSc	23

Scientific publications	Papers in refereed journals and conferences	13	
	Books, papers in books	1	
Patents	0	Products, devices developed	9	Consulting	9

() NOTE

(*) Publications to be counted in other units (according to their main author affiliation).

TECHNICAL ANNEX A

A1. UNIT: UTM – TELECOMMUNICATIONS AND MULTIMEDIA

A1.1 SHORT DESCRIPTION OF THE UNIT

The Telecommunications and Multimedia Unit carries out research and development, consulting and technology transfer in scientific and technological areas that lay the foundation of the modern communications networks and services.

The Unit is organized in three main Areas. Each Area addresses a number of specific but related research topics, under a common strategy and goals that are mainly determined by the market sector it covers:

- Network Architectures and Services: IP Networks, Network Monitoring and Test Systems, QoS and Resource Management, Wireless and Mobile Communications.
- Multimedia Technologies and Systems: Audio Signal Analysis, Image and Video Processing, Digital Television, Multimedia Services.
- Optical and Electronics Technologies: Optical Communications and Microwaves, Microelectronics, Micro-optics Technologies.

The R&D groups that constitute the Unit perform basic and applied research in the above areas and promote advanced training of his members. Coordination between these groups allows the exploitation of their specific competences in information, communications and signal processing technologies as well as the synergies necessary to design, develop and integrate complex systems that cover a broad range of application fields.

An important part of the activity of the Unit has been oriented towards the international market and carried out under contract and in partnership with network operators and service providers, television broadcasters and manufacturers of communications systems and test equipment. In this context, the successful participation in projects funded by European R&D programmes has a high strategic value, since it allows scientific and technical co-operation with leading R&D institutions, continuous progress and updated knowledge and experience in state-of-the-art technologies and research topics, and liaison with standards bodies.

A1.2 ACTIVITIES DEVELOPED IN 2006

A1.2.1 National programmes

The national research projects carried out in 2006 were funded by FCT under the PRAXIS XXI programme. Three of these projects (TAICAS, 3D4LBMS and WANDER) finished during 2006 and the other four (IAMA, DOMIR, EBGCOM and CFD) will continue in 2007.

Under "Programa Nacional de Re-equipamento Científico", FCT funded the upgrade and reinforcement of the R&D infrastructure in communications and optical technologies at INESC Porto, which was completed in 2006. This allowed setting up a new Photonics and Microwave laboratory and opening a new research area in "Fibre Supported Microwave/Radio Systems".

The main goals and results achieved on each project are briefly described next.

TAICAS (Advanced Techniques for the Identification and Correction of Room Acoustics) aimed at the development and implementation of a real-time digital signal processing platform able to perform room equalization in a transparent, adaptive and automatic way. The main results achieved during 2006 were:
- Implementation of the real-time room equalizer on a DSP platform using the TMS320C6713 Texas Instruments DSP.
- Implementation of a real-time data exchange communication between host (a PC) and target (DSP platform).
- Design and implementation of a real-time GUI interface for real-time control and graphical monitoring of the equalization process.

The main goal of 3D4LBMS (3D modeling of virtual urban environments for location based mobile services) was the development of procedures to create tri-dimensional models of virtual urban

environments, which can be used in services and applications that provide users with a hypermedia virtual environment of the surrounding area. During 2006, the following tasks were completed:

- Virtual urban environment segmentation that uses topological information contained in a GIS database to optimize the size of the scene maintaining the same level of visual quality.
- Building of a new prototype system that automatically generates 3D models of urban environments from geographic information sources and provides them in mobile platforms. Two client applications were developed, one for PocketPC and another for PC (laptop).
- Test and evaluation of the system using real urban data.

WANDER (IPv6 Wireless Access Network: Deploying, Evaluating and Re-engineering) had as main goals the specification, development and deployment of a testbed of a wireless local area network based on the IEEE 802.11 family of standards. The infrastructure includes access networks of different technologies interconnected by an MPLS based wired core network, different types of fixed and mobile terminal devices and a control network for configuration and maintenance purposes. Functional tests and evaluation of the supported mechanisms (QoS, mobility and auto-configuration of ad-hoc networks) were carried out in two versions of the testbed, deployed at the premises of INESC Porto and PT Inovação, in Aveiro. The project concluded successfully and the infrastructure that was created will continue to be used to support further research activities in the above topics.

The main objective of IAMA (Implementation of a biologically realistic associative memory in analogue CMOS-VLSI) is the analogue implementation of a set of coupled oscillators for memory association. During 2006 an IC circuit was tested successfully, and other cells were designed, namely current averaging circuit, two quadrant multiplier, current memories and low-pass filter. The fundamental blocks of the project were designed and a multiplexing technique was studied and tested.

DOMIR (Dialogs and Ontologies for Multimedia Information Retrieval) aims at exploring three essential topics in information retrieval: the organization and analysis of multimedia documents, the construction of ontologies from textual documents and the use of dialogues in the interaction with the user and in the processing of answer sets. During 2006, work on a multimedia database portal has pursued, including new functionalities and the treatment of data from a documentation center. The search functionalities have been experimented with the "Terra de Santa Maria" documentation center. The multimedia prototype has evolved so as to organize the multimedia information but also the large amounts of metadata produced in the feature extraction phase and in the test phase. The new retrieval algorithm is complemented by a series of search devices, including form based retrieval of contextual metadata and full text indexing on parts of the descriptors. Several experimental methods for searching using the low-level features are being integrated into the MetaMedia portal.

EBGCOM (Electromagnetic band-gap antennas and components for broadband communications) has the main objective of designing, developing and implementing novel RF/microwave components, based on EBG technology, whic find applications in wireless and optical communication systems. During 2006, the following activities were carried out:

- Study of mathematical models for the description of EBG structures in microstrip technology.
- Development of methodologies for the design of EBG components, specifically filters, for communications.
- Simulation in HFSS of these components focusing on the advantages of the EBG technique: characterization of the transmission and reflection response as well as the radiation characteristics.
- Implementation and experimental characterization of a low-pass filter using two overlapped EBG structures with low sharp-cutoff and low spurious response.

The main goal of CFD (Custom Computing Architectures for Computational Fluid Dynamics) is to develop a dedicated computer to execute, in an efficient way, calculus applications in fluid dynamics. In 2006, a major task was completed; it aimed at identifying custom floating-point data formats for the core computations of the CFD code being targeted. These results will allow the utilization of smaller and faster floating-point operators in the final core data path, when compared to the IEEE single precision format. The development of the basic memory and control infrastructure on a commercial reconfigurable platform has already started; it will later accommodate the final custom processing unit.

A1.2.2 European programmes

Nine research projects funded by the European Commission under the IST programme (FP6) were active in 2006. Four of them (ENTHRONE 2, DAIDALOS 2, WWI AN P2 and VISNET II) were the continuation of previous projects, two of which did complete their activities during the first quarter of 2006 (ENTHRONE and DAIDALOS). One project continued its activities (TARGET) and two new projects started (MOSAICA and UROOF). A brief description of goals and results of each project follows.

ENTHRONE (End-to-End QoS through Integrated Management of Content, Networks and Terminals) aimed at the development of tools to provide end-to-end Quality of Service, over heterogeneous networks, to audiovisual services adapted to the utilization context, the capabilities of the terminal devices and the profile or preferences of the user. The project concluded its activities at the end of the first quarter of 2006 and the final period was mainly devoted to integration of the software components that had been developed for the context-aware content management and distribution platform; context-aware application scenarios were also developed and, accordingly, new content was generated with appropriate content and context metadata. A new demonstrator architecture was designed and deployed at INESC Porto premises, but integrating remote components developed by other partners. Public demonstrations of context-aware multimedia services using the ENTHRONE technology were carried out.

The second phase of the project (ENTHRONE 2) started in September 2006. The main goals for this phase consist in extending the capabilities of the context-aware content management and distribution platform developed in the first phase. It is planned to have a larger support of the MPEG-21 specifications, a considerable support for context metadata and the development of applications and services especially targeted to portable, thin clients such as PDAs and mobile phones. Anticipating these new goals, the design and development of a new version of the MPEG-21 Digital Item browser was carried out.

The main goal of DAIDALOS (Designing Advanced network Interfaces for the Delivery and Administration of Location independent, Optimised personal Services) was the integration of heterogeneous network technologies to ensure optimal inter-working between different networks. INESC Porto has developed a communications layer that abstracts the QoS functions made available by different communications technologies, a solution for interconnection ad-hoc and infrastructure networks using mobile IPv6, and a monitoring system usable by call admission control mechanisms.

DAIDALOS 2 aims at validating the results of DAIDALOS and modifying them towards confidentiality aspects and inter-domain communications. INESC Porto continues working in the same topics as before as well as in new business models for 4G networks.

The Ambient Networks project is developing innovative mobile network solutions capable of solving the problems of future networks characterized by a multitude of access technologies, network operators and business actors. The concept of dynamic composition of networks was proposed as the basis for the establishment of inter-network agreements. While phase 1 devised the overall approach and developed the main concepts, phase 2 (AN P2) aims at proving feasibility through implementation, integration and performance evaluation. INESC Porto participates in two work packages ("Connectivity and Dynamic Internetworking" and "Network Composition and Connectivity"). During 2006 work focused on aspects related with "Basic Connectivity" (concept, specification and prototyping), autoconfiguration in IP networks, performance optimization of Transport protocols, Intra-AN communications issues (scope, requirements and framework) and support for Discovery and Advertisement functions.

VISNET II is the continuation of VISNET (Networked audiovisual media technologies), a Network of Excellence (NOE) aimed at creating a sustainable world force of leading research groups in the field of networked audiovisual (AV) media technologies. VISNET II adopted a new organization, based on three major thematic areas (Video Coding, Audiovisual Media Processing and Security), each divided in work packages. The main focus of INESC Porto activities is on Audiovisual Media Processing (in particular Content Adaptation and Audiovisual Analysis) and Security (mainly Content Protection based on DRM), as well as on integration activities at work package and theme level. The project started in July 2006 and the first period was mainly devoted to planning and organizing joint research and integration activities.

TARGET (Top Amplifier Research Groups in a European Team) is a Network of Excellence that aims at integrating different European research groups in the field of microwave amplifiers. In the context of the project, INESC Porto organized an online tutorial, under the subject "Power amplifier

characterization and testing", with more than forty attendees from different European countries. Moreover, the following results were achieved:

- Project of a prototype IC, on 0.35 μm technology, to demonstrate a methodology for auto-test of a low-noise amplifier, based on oscillation and cross-correlation of output voltage and supply current.
- Development of methodologies for the estimation of parameters that characterize the non-linearity of RF power amplifiers, based on polynomial approximation, and a methodology for estimation and in-circuit correction of non-linearities.
- Study of fault models of transistors for power amplifiers in MOS technology.

MOSAICA (Semantically Enhanced, Multifaceted, Collaborative Access to Cultural Heritage) is a new IST FP6 project that started in June 2006. It addresses the presentation and discovery of distributed cultural heritage objects and allows different groups of users to develop and share innovative and creative user experiences under the form of virtual expeditions, by integrating and combining multiple, distributed virtual cultural objects. INESC Porto already contributed to the functional specification of the MOSAICA distributed content management system based on peer-to-peer technologies.

The key goal of UROOF (Photonic components for Ultra-Wideband radio over optical fiber) is to investigate building blocks for enabling the delivery of Ultra-wideband (UWB) radio signals over low-cost optical fiber, which find application in low-cost wireless personal area networks (WPAN). The main tasks of INESC Porto are modeling the wireless and fiber channels and assessing the impact of device nonlinear distortion on the "UWB over fiber" system performance. The project started in July 2006 and during the first six months INESC Porto contributed to the analysis of system performance and the linearity requirements of devices; moreover, the different blocks for the simulation of the transmission of an OFDM signal through the optical fiber, including a Mach-Zehnder modulator, were developed and a large Signal Analysis of Mach-Zehnder Modulator Intensity Response in a Linear Dispersive Fiber was performed.

A1.2.3 Other programmes, consulting, services

Four projects under contract with PT Inovação (PTIN) were active and completed during 2006. Three had started in 2005 - "QoS VoIP", "Secure IP Multicast of Video Channels" and "MPEG-21 - management and adaptation of multimedia content"; the fourth started in 2006 - "nPVR – networked Personalized Video Recording". Besides their specific goals, a common goal of these projects was to give advanced training to young researchers who would join PTIN at the end of the projects.

The project "QoS VoIP" had the main goal of evaluating the use of information carried by protocols that support the VoIP service in the negotiation of Service Level Agreements (SLA), taking into account objective QoS criteria. The study analysed protocols both in the data and control planes (RTP, RTCP and its extension RTCPXR, SIP, SDP, MGCP, etc.), operations models and key performance and quality indicators in the perspective of the VoIP service and evaluated available software packages to be integrated in a test network.

The project "Secure IP Multicast of Video Channels" had the main goal of building a prototype of a system to demonstrate the feasibility of multicasting, in a secure way, multiple video channels over IP. Besides the specification of the system architecture, a prototype has been developed and demonstrated.

The project "MPEG-21 – Management and Universal Adaptation of multimedia content" was finalized in March 2006. The objectives of technology transfer and knowledge acquisition were fully achieved; in particular, including a public demonstration of context-aware multimedia services using the MPEG-21 based platform, where the same multimedia source content was delivered to different terminal devices (laptop and PDA), adapted to their characteristics in a transparent way.

The fourth project, "nPVR - networked Personalized Vídeo Recording", addressed the topic of TV content recommendation to users and its application based on a networked personal digital video recording system. For this purpose, the architecture of the system was specified and implemented; its main components may be used to support this type of advanced TV services in the future. One important result was the development of a virtual DVB driver for the Linux kernel, which allows receiving MPEG-2 TS DVB data from any source, by emulating a hardware card.

Besides these contracts with PTIN, another two completed during 2006.

The contract with "Comissão de Vigilância do Castelo de Santa Maria da Feira" was aimed at developing and giving support to a medieval documentation center, with the assistance of a team of archivists and historians. The system was conceived as a digital archive and is intended to be a reference portal in the Internet. It includes a multimedia database and facilities for loading archival descriptors, annotation, search and retrieval. The project concluded with a workshop and demonstration of the system.

Finally, a contract was signed with the University of Porto (UP) to develop a prototype of a corporate TV system for the UPMEDIA channel. The prototype demonstrated the feasibility of distributing multimedia content on wireless networks, based on a peer-to-peer model, as well as the flexibility of a hybrid solution based on principles of information systems and multimedia systems. The prototype was demonstrated with success in March 2006, during the UP day.

Besides all the above R&D activities carried out under contract it is also worth mentioning other research activities linked with PhD and MSC work as well as final year projects by BSc students. Important results were achieved in the areas of audio analysis and video segmentation techniques, and the integration of audiovisual processing modules in an open source framework (Marsyas), which will be used, in particular, to support research activities in the area of multimodal analysis.

A1.3   SUMMARY OF RESULTS OF THE RESEARCH ACTIVITIES OF THE TEAM MEMBERS

- Projects

Summary of projects developed in 2006

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	7	9		393.900
D - Development	5			110.200
C - Consulting	1			1.300
A – Advanced training				
T – Technology Transfer				
O - Other				
TOTAL	13	9		505.400

Summary of relative distribution ofsources of income

Financing (3)	Status (4)			Total Income (€)
	S - Started	OG– On-going	C - Concluded	
NP – National Programmes		9,08%	7,30%	82.800
EP – European Programmes	50,71%	2,83%	8,01%	311.100
CS – Consulting and services			22,06%	111.500
O – Other R&D sources				
OS – Other sources				
Total	50,71%	11,91%	37,38%	505.400

Summary of projects developed in 2006

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)
Daidalos	M. Ricardo	R	E	EP	6PQ	11-2003	04-2006	F
3D4LBMS	A. A. Sousa	R	N	NP	FCT	11-2003	07-2006	F
Enthrone	T. Andrade	R	E	EP	6PQ	12-2003	03-2006	F
TAICAS	A. J. Ferreira	R	N	NP	FCT	01-2004	06-2006	F
Target	V. Tavares	R	E	EP	6PQ	01-2004	06-2007	OG
WANDER	J. Ruela	R	N	NP	FCT	03-2004	06-2006	F
IAMA	V. Tavares	R	N	NP	FCT	06-2004	05-2007	OG
DOMIR	C. Ribeiro	R	N	NP	FCT	03-2005	03-2007	OG
Multicast IP	M. Ricardo	D, C	N	CS	-	03-2005	06-2006	F
MPEG21	T. Andrade	D, C	N	CS	-	04-2005	03-2006	F
VoIP	J. Ruela	C	N	CS	-	04-2005	01-2006	F
C. Feira	G. David	D	N	CS	-	05-2005	12-2006	F
CFD	J. C. Alves	R	N	NP	FCT	05-2005	11-2007	OG
EBGCOM	H. Salgado	R	N	NP	FCT	09-2005	08-2007	OG
DAIDALOS 2	M. Ricardo	R	E	EP	6PQ	01-2006	06-2008	S
WWI AN 2	J. Ruela	R	E	EP	6PQ	01-2006	12-2007	S
nPVR	S. Macedo	D, C	N	CS	-	04-2006	12-2006	F
UPMEDIA	S. Macedo	D	N	CS	-	04-2006	12-2006	F
MOSAICA	M.T. Andrade	R	E	EP	6PQ	06-2006	11-2008	S

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)
				Type (3)	Prog.			
UROOF	H. Salgado	R	E	EP	6PQ	07-2006	12-2008	S
VISNET II	J. Ruela	R	E	EP	6PQ	07-2006	12-2007	S
ENTHRONE 2	M.T. Andrade	R	E	EP	6PQ	09-2006	08-2008	S

(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: S – Starting: activities initiated in 2006 and continuing in 2007; OG – On-going: activities started earlier than 2006 and continuing in 2007; F – Finished: activities ending in 2006.

- **Summary of publications**

Summary of publications in 2006

Type of publication	Number
Theses concluded in 2006 by members of the unit	6
Books (author)	
Chapter/paper in books	3 + 1 (*)
Publications (editor)	
Papers in International Journals with scientific referees	6 + 5 (*)
Papers in National Journals with scientific referees	
Conference Proceedings in events with scientific referee and selection	27 + 2 (*)
Other publications (National meetings, local journals, etc.)	5 + 5 (*)
Total	47 + 13 (*)

(*)   papers co-authored with researchers of other Units

- **Summary of post-graduation activities**

Summary of theses supervised by members of the unit in 2006

Type	Starting	On-going	Concluded	Total
Master	5	24	8	37
Doctoral	13	19	3	35
Total	18	43	11	72

- **Summary of Advanced Training Actions**

Summary of Advanced Training Actions organized for external trainees in 2006

Type	Number
Training for graduation students *(estágios curriculares)*	13
Training for others *(estágios extra-curriculares)*	1
Professional training actions *(estágios profissionais)*	1
Other actions	
Total	15

- **Summary of activities of cooperation or dissemination**

Summary of items

Type	Number
Organizing conferences or meetings	10
Colaboration in papers authored by INESC Porto researchers	30
External persons directly involved in actions organized by INESC Porto	

- **Human resources in 2006**

Summary of Unit personel at the end of 2006

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Politechnic Staff	27	6			33	+2
INESC Porto Fellows			7		7	-2
Other Fellows	1	5	14		20	+3
Employees		1	1		2	-2
Trainees						
Other						
Administrative				1	1	
Total	28	12	22	1	63	+1

(*)   Relative to 2005, in absolute numbers.

A1.4 LIST OF PUBLICATIONS

A1.4.1 Theses concluded in 2006 by members of the unit

COELHO, A., "Modelação Expedita de Ambiente Urbanos Virtuais Baseada em Interoperabilidade e Contextualização Geoespacial ", July 2006, PhD Thesis, FEUP.

MORLA, R., "Towards interference-free deployment of ubicomp systems", June 2006, PhD Thesis, Univ. Lancaster.

SANTOS CARDOSO, J., "Metadata Assisted Image Segmentation", May 2006, PhD Thesis, FEUP.

DUARTE, F., "Processador dedicado para o teste em-circuito de blocos analógico-digitais em microssistemas integrados ", March 2006, MSc Thesis, FEUP.

CARNEIRO, G.J., "QoS Abstraction Layer in 4G Access Networks", March 2006, MSc Thesis, FEUP.

PINHO, A., "Metodologias de teste e projecto para a testabilidade de circuitos de radiofrequência", February 2006, MSc Thesis, FEUP.

A1.4.2 Books (Author)

Blank.

A1.4.3 Chapter/paper in Books

LOPES, C., DAVID, G., "Higher Education Web Information System Usage Analysis with a Data Webhouse", Lecture Notes on Computer Science, May 2006, vol.3983, p.78-87.

CALISTRU, C.M., RIBEIRO, C., DAVID, G., "Multidimensional Descriptor Indexing: Exploring the BitMatrix", Lecture Notes on Computer Science 2006, vol.4071, p.401-410.

FONSECA, B., CARRAPATOSO, E., "SAGA: A Web Services Architecture for Groupware Applications", Lecture Notes on Computer Science 2006, vol.4154, p.246-261.

CARVALHO, A., RIBEIRO, C., DE SOUSA, A.A., "A Spatio-Temporal Database System Based on TimeDB and Oracle Spatial", September 2006, IFIP International Federation for Information Processing, Springer, vol. 205. (*)

A1.4.4 Publications (Editor)

Blank.

A1.4.5 International Journals with scientific referees

FONSECA, B., CARRAPATOSO, E., "Coview: A Cooperative Architecture for Digital Video Editing", SMPTE Motion Imaging Journal, December 2006, p.482-491.

L. SILVA, M., CANAS FERREIRA, J., "Support for Partial Run-Time Reconfiguration of Platform FPGAs", Journal of Systems Architecture, December 2006, vol.52, no.12, p.709-726.

SANTOS CARDOSO, J., CORTE REAL, L., "A Measure for Mutual Refinements of Image Segmentations", IEEE Transactions on Image Processing, August 2006, vol.15, no.8, p.2358-2363.

OYARZABAL, J., JIMENO, J., RUELA, J., ENGLER, A., HARDT, C., "Agent based Micro Grid Management System", International Journal of Distributed Energy Resources, July 2006, vol.2, no.3, p.195-210.

LAMEIRO ABRANTES, F., PEREIRA RICARDO, M., "XCP for shared-access multi-rate media", ACM SIGCOMM Computer Communication Review, July 2006, vol.36, no.3, p.27-38.

CARDOSO, M.J., SANTOS CARDOSO, J., et al., "Interobserver agreement and consensus over the esthetic evaluation of conservative treatment for breast cancer", The Breast, February 2006, vol.15, no.1, p.52-57.

REGO, G.M.D., SALGADO, H.M.D.C.F., SANTOS, J.L.C.D.O., "Interrogation of a Fiber Bragg Grating using a Mechanically Induced Long-Period Fiber Grating", IEEE Sensors Journal, December 2006, vol.6, p.1592-1595. (*)

CARVALHO, J., FRAZÃO, O., MUÑIZ, R., MARQUES, M.J., SALGADO, H., "Fibre Bragg grating switching behaviour using high-power pump laser diodes", Microwave and Optical Technology Letters, August 2006, vol.48, no.8, p.1538-1540. (*)

REGO, G., SANTOS, J.L., SALGADO, H., "Polarization dependent loss of arc-induced long-period fibre gratings", OPTICS COMMUNICATIONS, June 2006, vol.262, no.2, p.152-156. (*)

REGO, G., MARQUES, P., SANTOS, J.L., SALGADO, H., "Estimation of the fibre temperature during the inscription of arc-induced long-period gratings", OPTICS COMMUNICATIONS, March 2006, vol.259, no.2, p.620-625. (*)

REGO, G., SANTOS, J.L., SALGADO, H., "Refractive index measurement with long-period gratings arc-induced in pure-silica-core fibres", OPTICS COMMUNICATIONS, March 2006, vol.259, no.2, p.598-602. (*)

A1.4.6 National Journals with scientific referees

Blank.

A1.4.7 Conference Proceedings with scientific referees

CABRAL, J., ROCHA, J., NEVES, J., RUELA, J., "Scheduling Algorithms to support QoS and Service Integration in Sensor and Actuator Networks", *ICIT 2006 - IEEE International Conference on Industrial Technology*, December 2006, Mumbai, India.

CARDOSO, M.J., SANTOS CARDOSO, J., "Towards a computer-aided medical system for the aesthetic evaluation of breast cancer conservative treatment", *SABCS - 29th San Antonio Breast Cancer Symposium*, December 2006, San Antonio, USA.

MACHADO DA SILVA, J., PINHO, G., MOTA, P., "A BIST Scheme for RF Power Amplifiers", *DCIS 2006 - XXI Conference on Design of Circuits and Integrated Systems*, November 2006, Barcelona, Spain.

GRADE, V., TABARCE, S., C. PRINCIPE, J., GUEDES DE OLIVEIRA, P., "DSP Validation of an Olfactory Bulb Oscillator Implemented in Analogue CMOS-VLSI", *DCIS 2006 - XXI Conference on Design of Circuits and Integrated Systems*, November 2006, Barcelona, Spain.

MOREIRA, P., REIS, L.P., DE SOUSA, A.A., "Best Multiple-View Selection: Application to the Visualization of Urban Rescue Simulations", *CompIMAGE 2006 - Computational Modelling of Objects Represented in Images: Fundamentals, Methods and Applications*, October 2006, Coimbra, Portugal.

MACHADO DA SILVA, J., "A Low-Power Oscillation Based LNA BIST Scheme", *DTIS 2006 - International Conference on Integrated System Design and Test of Integrated Systems in Nanoscale Technology*, September 2006, Tunis, Tunisia.

BORCOCI, E., ASGARI, A., ANDRADE, M.T., BRETILLON, P., AHMED, T., "An Integrated Approach for End-to-End Quality of Service Offering in Multi-domain Heterogeneous Environment", *MobiMedia 2006 - European Symposium on Mobile Media Delivery*, September 2006, Alghero, Sardinia, Italy.

ANDRADE, M.T., CASTRO, H., CARVALHO, P.M., SOUTO, P., BRETILLON, P., FEITEN, B., "Context-aware content adaptation: a systems approach", *MobiMedia 2006 - European Symposium on Mobile Media Delivery*, September 2006, Alghero, Sardinia, Italy.

AKHTAR, N., LOPES CAMPOS, R., et al., "GANS: A Signalling Framework for Dynamic Interworking between Heterogeneous Networks", *VTC 2006 - 64th IEEE Vehicular Technology Conference*, September 2006, Montréal, Canada.

CABRAL, J., ROCHA, J., NEVES, J., RUELA, J., "A System Architecture for Low Bit Rate Traffic Aggregation in Control Applications", *ISIE 2006 - International Symposium on Industrial Electronics*, July 2006, Montréal, Canada.

KOTTI, M., MARTINS, L.G., BENETOS, E., SANTOS CARDOSO, J., KOTROPOULOS, C., "Automatic Speaker Segmentation Using Multiple Features and Distance Measures: A Comparison of Three Approaches", *Proceedings of ICME 2006 - IEEE 2006 International Conference on Multimedia & Expo*, July 2006, Toronto, Canadá.

LOPES CAMPOS, R., PEREIRA RICARDO, M., "Dynamic and Automatic Connection of Personal Area Networks to the Global Internet", *IWCMC 2006 - International Wireless Communications and Mobile Computing Conference*, July 2006, Vancouver, Canada.

COELHO, A., BESSA, M., DE SOUSA, A.A., FERREIRA, F.N., "Expeditious Modelling of Virtual Urban Environments with Geospatial L-systems", *SIACG 2006 - Ibero American Symposium in Computer Graphics*, July 2006, Santiago de Compostela, Spain.

MOREIRA, P., REIS, L.P., DE SOUSA, A.A., "A Survey on Interactive Rendering Techniques", *SIACG 2006 - Ibero American Symposium in Computer Graphics*, July 2006, Santiago de Compostela, Spain.

MACHADO DA SILVA, J., MOTA, P.M., PINHO, G., "A Built-In Self Test Approach for RF Power Amplifiers", *IMSTW'06 - International Mixed-Signals Testing Workshop*, June 2006, Edinburgh, UK.

LOPES CAMPOS, R., et al., "On the Evaluation of the Extended Generic Internet Signalling Transport Protocol", *15th IST Summit - 15th Mobile & Wireless Communications Summit*, June 2006, Myconos, Greece.

ROCHA, A.F., LEITE, A., PINTO, F., FERREIRA, A., "Adaptive Audio Equalization of Rooms based on a Technique of Transparent Insertion of Acoustic Probe Signals", *AES 2006 - 120th Convention of the Audio Engineering Society*, May 2006, Paris, France.

ANDRADE, M.T., SOUTO, P., CARVALHO, P.M., CASTRO, H., CIOBANU, L., FEITEN, B., "Dynamic service management in heterogeneous environments using MPEG-21 DIA for multimedia content adaptation", *Networking 2006 - International Workshop "Next Generation Networking Middleware"*, May 2006, Coimbra, Portugal.

ANDRÉS-COLÁS, J., PINHO, C., MENDES, P., WANG, Y., RUELA, J., "Inter-network Quality of Service Agreements among Ambient Networks", *Networking 2006 - International Workshop "Towards the QoS Internet" To-QoS'2006*, May 2006, Coimbra, Portugal.

PAAKKONEN, P., AKHTAR, N., LOPES, R., et al. , "Scalability of Name Resolution for Ambient Networks", *WWIC 2006 - 4th International Conference on Wired/Wireless Internet Communications*, May 2006, Bern, Switzerland.

ANDRADE, M.T., SOUTO, P., CARVALHO, P.M., CIOBANU, L., "Content Adaptation Decision to Enhance the Access to Networked Multimedia Content", *WIAMIS 2006 - 7th International Workshop on Image Analysis for Multimedia Interactive Services*, April 2006, Seoul, Korea.

TEIXEIRA, L.F., "Integrated Multimedia Authoring and Description Framework", *WIAMIS 2006 - 7th International Workshop on Image Analysis for Multimedia Interactive Services*, April 2006, Seoul, Korea.

POYHONEN, P., LOPES CAMPOS, R., et al., "DEEP - A Generic Name Resolution Protocol for Heterogeneous Networks", *ICTTA'06 - 2nd IEEE International Conference on Information & Communication Technologies: from Theory to Applications*, April 2006, Damascus, Syria.

L. SILVA, M., CANAS FERREIRA, J., "Exploiting dynamic reconfiguration of platform FPGAs: Implementation issues", *RAW 2006 - 13th Reconfigurable Architectures Workshop*, April 2006, Rhodes, Greece.

MORLA, R., DAVIES, N., "A Framework for Describing Interference in Ubiquitous Computing Environments", *PerCom'06 - Fourth Annual IEEE International Conference on Pervasive Computing and Communications*, March 2006, Pisa, Italy.

KOTTI, M., BENETOS, E., KOTROPOULOS, C., P. M. MARTINS, L.G., "Speaker Change Detection using BIC: A comparison on two datasets.", *ISCCSP 2006 - 2006 Second International Symposium Communications, Control and Signal Processing*, March 2006, Marrakech, Morocco.

MORLA, R., "Sentient Future Competition: Vision of Congestion-Free Road Traffic and Cooperating Objects", *EWSN'06 - European Workshop on Wireless Sensor Networks*, February 2006, Zurich, Switzerland.

HATZIARGYRIOU, N., JENKINS, N., STRBAC, G., LOPES, P., RUELA, J., ENGLER, A., OYARZABAL, J., KARINIOTAKIS, G., AMORIM, A., "MICROGRIDS – Large Scale Integration of Microgeneration to Low Voltage Grids", *CIGRE 2006 - International Council on Large Electric Systems*, August 2006, Paris, France. (*)

CARVALHO, A., RIBEIRO, C., DE SOUSA, A.A., "Spatial TimeDB - Valid Time Support in Spatial DBMS", *IADC 2006 - 2nd International Advanced Database Conference* 2006, San Diego, USA (*).

A1.4.8 Other Publications

MACHADO DA SILVA, J., MOTA, P.M., PINHO, G., "A Polynomial Fitting Based BIST Approach for RF PAs", *TARGET - TARGET Days - TARGET Meets Industry Workshop*, October 16-18, 2006, Rome, Italy.

FERNANDES, D., PESSOA, L.M., SALGADO, H., "Tuneable optical filter based on a Fibre Bragg Grating with USB interface", *SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors*, June 2006, Porto, Portugal.

L. SILVA, M., CANAS FERREIRA, J., "A Comparison of Two Dynamically Reconfigurable System Implementations on Platform FPGA", *REC 2006 - II Jornadas sobre Sistemas Reconfiguráveis*, February 2006, Porto, Portugal.

GOMES, M., ROCHA, A.J.D.S., COELHO, A.C., SOUSA, A.A., "Acesso Interoperável a Informação Geográfica Distribuída para Disponibilização de Modelos Urbanos 3D em Dispositivos Móveis", *XATA'2006 XML - Aplicações e Tecnologias Associadas*, February 2006, Portalegre, Portugal.

BARBOSA, A., TORCATO DAVID, G., RIBEIRO, M.C., "XML Annotation of Historic Documents for Automatic Indexing", *XATA'2006 XML - Aplicações e Tecnologias Associadas*, February 2006, Portalegre, Portugal.

REGO, G., CALDAS, P., SALGADO, H., SANTOS, J.L., "Bandpass filters based on arcdischarges", *Física 2006*, Aveiro, Portugal. (*)

CARVALHO, J., FRAZÃO, O., MUÑIZ, R., MARQUES, M.J., SALGADO, H., "Fibre gratings switching behaviour based on high power laser diodes", *Física 2006*, Aveiro, Portugal. (*)

REGO, G., CALDAS, P., SALGADO, H., SANTOS, J.L., "Gain flattening of EDFAS", *Física 2006*, Aveiro, Portugal. (*)

REGO, G., SCHRÖDER, B., FARIA, L., MARQUES, P., SALGADO, H., SANTOS, J.L., "Measurement of the temperature attained by a fibre during an arc discharge", *Física 2006*, Aveiro, Portugal. (*)

CARVALHO, J., FRAZÃO, O., MUÑIZ, R., MARQUES, M.J., SALGADO, H., "Fibre Bragg grating switch based on thermal changes induced by high power laser diodes", *SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors* 2006, Porto, Portugal. (*)

(*) Publications counted in other units (according to their main author affiliation).

A1.5 LIST OF JOURNALS

Journal	Number of papers
ACM SIGCOMM Computer Communication Review	1
IEEE Transactions on Image Processing	1
International Journal of Distributed Energy Resources	1
Journal of Systems Architecture	1
SMPTE Motion Imaging Journal	1
The Breast	1
TOTAL	6

A1.6 LIST OF PATENTS

Blank.

A1.7 LIST OF PROTOTYPES

Real-time equalization of rooms in a fully automatic, adaptive and transparent way
Developed under TAICAS
Demo Place: INESC Porto
Development Period: January 2004 – June 2006

Marsyas Editor
(Graphical, multithreaded and multiplatform user interface for the C++ open source framework Marsyas)
Developed under internal project
Demo Place: INESC Porto
Development Period: January 2006 – December 2006

SoundCut: a command line tool for the separation of audio sources
Developed under internal project
Demo Place: INESC Porto
Development Period: January 2006 – December 2006

Spatial video segmentation tool assisted by depth and motion information
Developed under internal project
Demo Place: INESC Porto
Development Period: January 2005 – June 2006

Workstation for the evaluation of the aesthetic result of the Breast Cancer Conservative Treatment
Developed under internal project
Demo Place: INESC Porto
Development Period: January – December 2006

3D modeling of virtual urban environments for location based mobile services
Developed under 3D4lBMS
Demo Place: INESC Porto
Development Period: September 2005 - June 2006

Network testbed with support for QoS, mobility and auto-configuration of ad-hoc networks
Developed under WANDER
Demo Place: INESC Porto
Development Period: February 2004 – June 2006

Passive traffic monitoring system for supporting multipoint measurements
Developed under DAIDALOS
Demo Place: INESC Porto
Development Period: December 2005 – March 2006

Enhanced Abstraction Layer for QoS support in heterogeneous networks
Developed under DAIDALOS 2
Demo Place: INESC Porto
Development Period: April 2006 – December 2006

Application for working meetings assistance
Developed under internal project
Demo Place: INESC Porto
Development Period: February 2006 – July 2006

Secure IP multicast
Developed under contract with PTIN
Demo Place: INESC Porto and PTIN
Development Period: April 2005 – June 2006

GateBox – multiservice residential gateway
Developed under internal project
Demo Place: INESC Porto
Development Period: February 2006 – December 2006

Autoconfiguration mechanism for IP connectivity in Ambient Networks
Developed under AMBIENT NETWORKS 2 and internal project
Demo Place: INESC Porto
Development Period: January 2006 – December 2006

NS-2 based simulator for header compression evaluation in wireless networks
Developed under internal project
Demo Place: INESC Porto
Development Period: January 2006 – December 2006

Context-aware multimedia services platform
Developed under ENTHRONE
Demo Place: INESC Porto
Development Period: March 2005 – March 2006

MPEG21 Digital Items Browser with client/server architecture suitable for portable devices
Developed under ENTHRONE 2 and internal project
Demo Place: INESC Porto
Development Period: January – December 2006

MPEG21 based demonstrator for multimedia applications adapted to the user environment
Developed under contract with PTIN
Demo Place: INESC Porto
Development Period: April 2005 – March 2006

Network personalized video recorder (nPVR), including Virtual DVB driver for Linux
Developed under contract with PTIN
Demo Place: INESC Porto and PTIN
Development Period: March 2006 – December 2006

UPMedia corporate TV platform
Developed under contract with UP (University of Porto)
Demo Place: INESC Porto and UP
Development Period: November 2005 – March 2006

Documentation Centre (multimedia database, archival descriptor, annotation and search facilities)
Developed under DOMIR and contract with Castelo da Feira
Demo Place: INESC Porto and Castelo da Feira
Development Period: March 2005 – September 2006

Low-pass filter using two overlapped EBG structures with low sharp-cutoff and low spurious response
Developed under EBGCOM
Demo Place: INESC Porto
Development Period: August 2006 – December 2006

Matlab code for simulating the propagation of OFDM signals over SM fiber and a Mach-Zehnder Modulator
Developed under UROOF
Demo Place: INESC Porto
Development Period: July - December 2006

Tuneable optical filter based on a Fibre Bragg Grating with USB interface
Developed under internal project
Demo Place: INESC Porto
Development Period: February - July 2006

Bio-inspired circuit blocks (simulation stage)
Developed under IAMA
Demo Place: INESC Porto
Development Period: January – December 2006

A1.8 LIST OF THESES SUPERVISED BY MEMBERS OF THE UNIT DURING 2006

PhD Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
António Fernando Castro Coelho	FEUP	F. N. Ferreira A. A. Sousa	FEUP INESC Porto/FEUP	Fast Modeling of Three-dimensional Scenes for Virtual Reality	2006
Gaspar Rego	FEUP	H. Salgado José Luís Santos	INESC Porto/FEUP	Arc-Induced Long-Period Fibre Gratings. Fabrication and their Applications in Optical Communications and Sensing	2006
Jaime dos Santos Cardoso	FEUP	Luís Corte-Real	INESC Porto/FEUP	Image segmentation based on depth maps	2006
Catalin Calistru	FEUP	Gabriel David M. Cristina Ribeiro	INESC Porto/FEUP	Data organization and search in multimedia databases	2007
Luís Gustavo Martins	FEUP	Aníbal Ferreira	INESC Porto/FEUP	Analysis and recognition of audio oriented to music applications	2007
Luís Miguel Teixeira	FEUP	Artur P. Alves Luís Corte-Real	INESC Porto/FEUP	Joint Source Video Coding	2007
Paula Viana	FEUP	Artur P. Alves	INESC Porto/FEUP	Digital Television Archives	2007
Pedro Miguel do Vale Moreira	FEUP	A. A. Sousa	INESC Porto/FEUP	Management and Visualization of Very Complex 3D Models and Scenes	2007
Teresa Andrade	FEUP	Artur P. Alves	INESC Porto/FEUP	Quality of service multiplexing and transmission of digital video	2007
Vítor Gonçalves	FEUP	E. Carrapatoso	INESC Porto/FEUP	Semantic Web in the educational context	2007
Alexandre Carvalho	FEUP	A. A. Sousa	INESC Porto/FEUP	Visualization of Spatiotemporal Database Systems	2008
Filipe Lameiro Abrantes	FEUP	Manuel Ricardo	INESC Porto/FEUP	Congestion control in 4G heterogeneous networks	2008
Luís Filipe Teixeira	FEUP	Luís Corte-Real Aníbal Ferreira	INESC Porto/FEUP	Automatic description of video based on multimodal analysis	2008
Miguel Magalhães Silva	FEUP	João C. Ferreira José Carlos Alves	INESC Porto/FEUP	Management of dynamically reconfigurable resources in CPU/FPGA systems	2008
Rui Campos	FEUP	Manuel Ricardo	INESC Porto/FEUP	Creation and composition of Ambient Networks	2008
Tânia Calçada	FEUP	Manuel Ricardo	INESC Porto/FEUP	Integration of ad-hoc with infrastructured networks	2008
António C. Martins	FEUP	E. Carrapatoso	INESC Porto/FEUP	Adaptive Hypermedia Systems	2009
Jaime Sousa Dias	FEUP	Manuel Ricardo	INESC Porto/FEUP	Security in Mobile IP Networks with Multicast Traffic	2009
João Manuel Barbosa de Oliveira	FEUP	H. Salgado	INESC Porto/FEUP	Design and Optimisation of DWDM Millimetre-Wave Fibre Radio Systems	2009
João Paulo Sousa	UTAD	E. Carrapatoso	INESC Porto/FEUP	Dynamic Composition of Services	2009
José Fernando Martins	FEUP	A. A. Sousa	INESC Porto/FEUP	3D Modeling in Augmented Reality Environments	2009
Pedro Manuel Marques	FEUP	Sílvio Abrantes	INESC Porto/FEUP	MIMO Transmission Techniques in 4G Systems	2009

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Pedro Mota	FEUP	J. Machado Silva	INESC Porto/FEUP	In-circuit testing of adaptive RF front-end circuits	2009
Ricardo Sousa	FEUP	Aníbal Ferreira	INESC Porto/FEUP	Audio signal processing applied to speech rehabilitation	2009
António Abel Castro	FEUP	E. Carrapatoso Carlos V. Carvalho	INESC Porto/FEUP ISEP/IPP	Use of multimedia learning objects with a semantic context for the Health area	2010
António Alberto Santos Pinto	FEUP	Manuel Ricardo	INESC Porto/FEUP	Definition of an Application-layer Architecture for The Support of Secure and Adaptive Multicast Services	2010
António Pedro Fortuna Santos	FEUP	Manuel Ricardo	INESC Porto/FEUP	Mobility management architecture for 4G mobile communications networks	2010
Daniel Oancea (*)	FEUP	João C. Lopes Rui Moreira	INESC Porto/FEUP INESC Porto/UFP	Adaptive multimedia components in distributed environments	2010
Gustavo Carneiro	FEUP	Manuel Ricardo	INESC Porto/FEUP	QoS abstraction in 4G heterogeneous networks	2010
Hélder Castro	FEUP	Artur P. Alves	INESC Porto/FEUP	Peer-to-peer strategies for secure TV content distribution	2010
Hermes Irineu Del Monego	FEUP	José Oliveira Manuel Ricardo	INESC Porto/FEP INESC Porto/FEUP	Modeling Practices for Creating and Assessing the Viability and the Sustainability of New Business Models Appeared in the Context of Disruptive Technologies	2010
Isabel S. Azevedo	FEUP	E. Carrapatoso Carlos V. Carvalho	INESC Porto/FEUP ISEP/IPP	Semantic contextualization of educational objects	2010
Lucian Ciobanu	FEUP	Luís Corte-Real	INESC Porto/FEUP	Distributed video coding for systems with multiple cameras	2010
Luis Manuel de Sousa Pessoa	FEUP	H. Salgado	INESC Porto/FEUP	Compensation of Fibre Impairments in Coherent Optical Systems	2010
Mário Rui Silveira Pereira	FEUP	H. Salgado	INESC Porto/FEUP	Electromagnetic Bandgap Antennas and Components for Broadband Communications	2010
Paulo Alexandre Duarte Ferreira	FEUP	José Carlos Alves João C. Ferreira	INESC Porto/FEUP	Computational systems based on hetrogeneous parllel architectures	2010
1	*2*	*3*	*4*	*5*	*6*

1 – Name of the post-graduation student
2 – Institution where the thesis is submitted; if the host institution for the student is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester
3 – Name of supervisor or supervisors
4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid
5 – Title of the thesis
6 – Predicted year of conclusion and delivery – will be taken in account in summary tables
(*) Thesis to be counted in USIC.

MSc Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
António Gabriel Pinho	FEUP	José Machado Silva	INESC Porto/FEUP	Test methodologies and project for the testability of RF circuits	2006
Atilano Suarez	FEUP	E. Carrapatoso	INESC Porto/FEUP	Design of a multimedia virtual tour – a tool to support corporate communication	2006
Francisco Duarte	FEUP	José Machado Silva José Carlos Alves	INESC Porto/FEUP	Dedicated processor for in-circuit test of A/D blocks in integrated microsystems	2006
Gustavo Carneiro	FEUP	Manuel Ricardo	INESC Porto/FEUP	QoS in heterogeneous networks	2006
Joana Gomes Rocha	FEUP	A. A. Sousa	INESC Porto/FEUP	Segmentation of Virtual Urban Environments for location-based Mobile Services	2006
Júlio Pinto	FEUP	E. Carrapatoso	INESC Porto/FEUP	The interface of a multimedia content portal used in Engineering projects	2006

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Miguel Melo (*)	FEUP	Paulo Marques H. Salgado	INESC Porto/FCUP INESC Porto/FEUP	Bragg gratings for applications in optical communications systems and sensors	2006
Mourylise Heymer	FEUP	E. Carrapatoso	INESC Porto/FEUP	Graphical interfaces in multimodal interaction systems	2006
Vítor Calçada	FEUP	Manuel Ricardo	INESC Porto/FEUP	Traffic characterization in a mobile operator	2006
Altino Sampaio	FEUP	Manuel Ricardo	INESC Porto/FEUP	Interligação de redes ad-hoc com redes estruturadas.	2007
Ana Cristina Santos	FEUP	A. A. Sousa	INESC Porto/FEUP	Realistic Animation of Human Models	2007
Ana Raquel Faria	FEUP	Manuel Ricardo	INESC Porto/FEUP	Robust header compression in IEEE 802 networks	2007
António Fonseca	FEUP	E. Carrapatoso	INESC Porto/FEUP	Usability in digital multimedia libraries	2007
António Pedro Fortuna Santos	FEUP	Manuel Ricardo	INESC Porto/FEUP	Robust Header Compression in 4G Networks	2007
Carlos Pinho	FEUP	J. Ruela J. M. Mendonça	INESC Porto/FEUP	Application of wireless sensor networks to intelligent games	2007
Daniel Ramos	FEUP	J. Ruela	INESC Porto/FEUP	Quality of Service in MPLS / DiffServ networks	2007
Gil Coutinho	FEUP	José Ruela	INESC Porto/FEUP	Virtual private LAN services in metropolitan area networks	2007
Giorgiana Ciobanu	FEUP	E. Carrapatoso	INESC Porto/FEUP	MPEG-21 DI Browser, an MPEG-21 based Architecture for the Consumption of Digital Items	2007
Joel Pedro Carvalho	FEUP	Henrique Salgado	INESC Porto/FEUP	Optical Switching	2007
Luís Miguel Leite	FEUP	Aníbal Ferreira	INESC Porto/FEUP	Audio driven cartoon production	2007
Luís Miguel Marques	FEUP	Luís Pinho José Ruela	ISEP INESC Porto/FEUP	Simulation of temporal behavior of routing protocols in PLC based networks	2007
M. Raquel Patrício	FEUP	E. Carrapatoso	INESC Porto/FEUP	Evaluation of the usability of a child's portal – a new interactive multimedia application	2007
Manuel M. Gomes	FEUP	A. A. Sousa	INESC Porto/FEUP	Temporal support for interoperability in GIS	2007
Miguel Gata	FEUP	E. Carrapatoso	INESC Porto/FEUP	Virtual Reality	2007
Nelson Américo Eira	FEUP	Henrique Salgado A. Lobo	INESC Porto/FEUP UFP	Wavelength conversion in optical networks	2007
Olinda Figueiredo	FEUP	E. Carrapatoso	INESC Porto/FEUP	A distance learning system with a strong ludicrous component	2007
Paulo Almeida	FEUP	Manuel Ricardo	INESC Porto/FEUP	Mobile networks	2007
Paulo Jorge Monteiro	FEUP	E. Carrapatoso	INESC Porto/FEUP	Integration of Learning Objects in a Learning Management System	2007
Pedro Miguel Alves	FEUP	João C. Ferreira	INESC Porto/FEUP	Flexible programmable cores for SOC applications	2007
Pedro Miguel Silva	FEUP	José Carlos Alves	INESC Porto/FEUP	Synthesis of complex digital functions for DSP	2007
Pedro Vieira	FEUP	Luís Corte-Real	INESC Porto/FEUP	Scaleable video and interoperability in multimedia networks	2007
Ricardo Jorge Duarte	FEUP	J. Ruela	INESC Porto/FEUP	End-to-end Quality of Service for heterogeneous, wireless access networks	2007
Rui F. Vaz	FEUP	J. Ruela	INESC Porto/FEUP	Service Level Agreements In VoIP services	2007
Sérgio Martins	FEUP	José Carlos Alves	INESC Porto/FEUP	Automatic generation of RTL code for real-time image acquisition and processing systems	2007
Suzana Leitão	FEUP	Teresa Restivo E. Carrapatoso	FEUP INESC Porto/FEUP	Design and implementation of a remote laboratory	2007
Vera Moitinho de Almeida	FEUP	A. A. Sousa	INESC Porto/FEUP	Application of Information and Communication Technologies to a Museum Space	2007
Vítor Alves	FEUP	E. Carrapatoso	INESC Porto/FEUP	Teaching course in Visual and Technological Education for children with special educational needs	2007

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Vítor Barbosa	FEUP	Henrique Salgado	INESC Porto/FEUP	EBG components for broadband communications systems	2007
1	*2*	*3*	*4*	*5*	*6*

1 – Name of the post-graduation student
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3 – Name of supervisor or supervisors
4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid
5 – Title of the thesis
6 – Predicted year of conclusion and delivery – will be taken in account in summary tables
(*) Thesis to be counted in USIC.

A1.9 ORGANISATION OF INTERNATIONAL SCIENTIFIC EVENTS

XATA2006 — XML: Aplicações e Tecnologias Associadas
Portalegre, Portugal
February 9-10, 2006
Gabriel David, Maria Cristina Ribeiro - members of Steering Committee and Scientific Committee
(*) In collaboration with USIC

ICT 2006 – 13th International Conference on Telecommunications
Funchal, Portugal
May 9-12, 2006
José Ruela – member of Technical Committee

EGPGV 06 - EUROGRAPHICS Symposium on Parallel Graphics and Visualization
Braga, Portugal
May 11-12, 2006
A. Augusto de Sousa - member of Local Organizing Committee

Networking 2006 - 5th IFIP TC6 Networking Conference
Coimbra, Portugal
May 15-19, 2006
José Ruela, Manuel Ricardo – members of Technical Program Committee

SEON 2006 – IV Symposium on Enabling Optical Networks and Sensors
Porto, Portugal
June 16, 2006
Henrique Salgado – Conference Chair
(*) In collaboration with UOSE

4th RTCM Seminar (Thematic Network on Mobile Communications)
Porto, Portugal
July 21, 2006
Manuel Ricardo, Filipe Sousa – local organisation

ICIAR 2006 – International Conference on Image Analysis and Recognition

Póvoa de Varzim, Portugal
September 18-20, 2006
Luis Corte-Real – member of Local Organizing Committee / Program Committee

GAMES 2006, iDiG - International Digital Games Conference
Portalegre, Portugal
September 26-30, 2006
A. Augusto de Sousa – member of Program Committee

VISNET 2 (FP6 Network of Excellence) - General Meeting
Porto, Portugal
November 20-22, 2006
José Ruela, Maria Teresa Andrade – local organisation

DCIS 2006 - XXI Conference on Design of Circuits and Integrated Systems
Barcelona, Spain
November 22-24, 2006
José Silva Matos – member of Steering Committee

A1.10 ADVANCED TRAINING

The research projects that were carried out under contract with PT Inovação (PTIN) had, besides their specific goals, a common goal of giving advanced training to young researchers who would join PTIN at the end of the projects. This objective was reached and during 2006 three researchers joined PTIN at the end of the respective projects - "Secure IP Multicast of Video Channels", "MPEG-21 - management and adaptation of multimedia content" and "nPVR – networked Personalized Video Recorder".

A1.11 OTHER CONTRIBUTIONS TO THE OBJECTIVES OF ASSOCIATE LABORATORY

UNIT: UTM – TELECCOMUNICATIONS AND MULTIMEDIA	Thematic Line
Consolidation of research work in "wireless and mobile communications" and in "advanced services for universal access to multimedia content"; these activities were mainly carried out in the framework of research projects funded by FP6 (in the thematic areas *Mobile and wireless systems beyond 3G* and *Networked audiovisual systems and home platforms*) and national programmes, were supported by on-going and newly started PhD and MSC theses in related topics, and gave rise to a large number of prototypes and demonstrators. Strengthening the research work in "Fiber Supported Microwave/Radio Systems" supported by a Photonics and Microwave laboratory setup during 2005 and 2006. Continuation of research activities in audiovisual processing, namely audio semantic analysis, image and video segmentation techniques and multimodal analysis. Execution of R&D contracts (with PTIN), covering consultancy, development, technology transfer and advanced training activities.	Support technologies for networked audiovisual applications

A1.12 ANALYSIS AND ASSESSMENT OF DEVIATIONS RELATIVE TO FORMER PLANNING

A1.12.1 Comparison with strategic actions or policy lines defined in the plan of the previous year

The activity of the Unit in 2006 was carried out according to the plan, without any significant deviations. The main performance indices (projects, publications, theses and scientific results) were achieved, thus confirming the level already attained in 2005.

European projects continue to play an important role in reaching a high level of scientific excellence and gaining expertise in advanced and emerging technologies as well as in establishing strategic partnerships. They provide a very rich environment for training young researchers, in particular in

association with MSc and PhD programmes, leading to an increase in the critical mass of the research teams.

The fact that the Unit is involved in phase 2 of all FP6/IST projects that completed their phase 1 activities in 2005 or early 2006 (DAIDALOS, WWI AN, ENTHRONE and VISNET) is a recognition by the respective consortia of the quality of the research carried out and of the contributions produced. Two new projects (MOSAICA and UROOF) started in 2006, as well, thus confirming the high level of participation in this EC programme.

The new research area in "Fiber Supported Microwave/Radio Systems", supported by a Photonics and Microwave laboratory setup during 2005 and 2006 with funding from FCT under "Programa Nacional de Re-equipamento Científico", started to produce the first results and attracted new PhD students.

Researchers of the Unit continued active in promoting the National Thematic Network in the area of Mobile Communications (RTCM), contributing with technical presentations in workshops organized by the network; one of these meetings was organized by the Unit and took place at INESC Porto premises.

Regular open meetings, organized at the Unit or Area level, continued to take place and were mainly used to present results of on-going research projects, MSc and PhD theses, or results being published in journals or conferences, as well as to discuss scientific issues that cross different areas and thus require the active participation of different research groups.

All R&D contracts signed with PT Inovação (PTIN) and active in 2006, which aimed at consultancy, development, technology transfer and advanced training, completed with success.

The Unit was very active in preparing and submitting proposals for new research projects. Over twenty proposals were submitted to the call launched by FCT (*Fundação para a Ciência e a Tecnologia*), most of them with the leadership of senior researchers of the Unit and, in many cases, in partnership with academic and research institutions, industrial companies and other Units of INESC Porto. Similarly, five new projects were submitted to PTIN in the framework of a call to the *Plano de Inovação do Grupo PT 2007-2009*; two of these projects were approved and will be carried out during 2007.

Finally, the process of incubation of two spin-off companies started in 2006, and it is expected that they will be concluded, with success, in 2007.

A1.12.2 Cases of success, problems met, internal and external conditioning factors

The cases of success were already pointed out in the previous section. At a global level the scientific results were rather positive, as proven by various performance indices.

The INESC Porto teams that participated in FP6/IST projects made important contributions at various levels – specification, development, integration and test of prototype systems and demonstrators, technical reports, deliverables and scientific papers.

The participation and results achieved in National and European research projects constitute the major cases of success, to which it is possible to add the partnership with PTIN in R&D contracts and the strengthening of research activities in optical communications and microwaves.

The main problems met by the Unit lie in the difficulties in establishing stable partnerships and R&D contracts with the industry and operators, either for consulting, development or technology transfer. This is mainly due to external factors rather than to the lack of expertise or know-how within the Unit.

A2. UNIT: UOSE – OPTOELECTRONICS AND ELECTRONICS SYSTEMS

A2.1 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 fiber 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 optical fiber sources, optical communications, optical fiber sensors and microfabrication (thin films and integrated optics). In the framework of its activity it proportionates the adequated environment to the integration of post-graduate students, mainly coming from the Physics Department of the Sciences Faculty of the University of Porto and the Electrotechnical and Computer Engineering Department of the Engineering Faculty of the same University. 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: strengthen its competences in its areas of activity, through crossed fertilization actions among them beginning with a careful and adequated selection of R&D projects to be submitted, as well as institutional links with other organizations, to develop actions in order to maintain a minimum number of PhD researchers able to frame all the Unit R&D activity, to define the process of equipment renewal of the Unit with the goal of keeping a modern laboratory in optoelectronic technologies.

The main vectors of the Unit activity development are presented:

- Research, development and technology transfer in the area of the optical fiber sensors;
- Development and technology transfer in systems integration;
- Research in sol-gel technology;
- Research in optical filtering using fused coupler technology, Bragg gratings and long-period gratings;
- Research in the techniques of PZT films deposition in optical fibres;
- Research in optical coherent tomography for medical applications;
- Research and development in multi-axis optical fiber accelerometer;
- Research and development in micropackaging.

A2.2 ACTIVITIES DEVELOPED IN 2006

A2.2.1 National programmes

During 2006, the Unit was involved in nine R&D projects. Two of these projects dealt with microfabrication issues, five were concerned with optical fibre sensors principles and applications, one is the re-equipment program of the technological infrastructure and the other one is a first step in the area of micro-packaging of optical devices. Microfabrication projects developed fundamental technology for sensors and communications devices in optical fiber and integrated optics that will enable further developments in these areas. Namely, add-drop multiplexers for optical communications, piezoelectric films in optical fibers for sensing and actuation and other novel devices were developed. The microfluidics range of devices and the feasibility of manufacturing them in-house are being evaluated. The sensors projects were dedicated to applications in acoustic emission detection by optical fibers, evanescent field and fluorescence sensors for chemical species detection and structural health monitoring in civil engineering. The Optopack project is oriented towards know-how acquisition in micropackaging technology for optical fiber devices.

The Unit was also involved in 2 technology transfer projects. One is related to micropackaging of optoelectronic components with FiberSensing and the other was developed in collaboration with Continental Mabor, the Portuguese subsidiary of Continental AG. This last one concerned a system system that enables the monitoring and automatic control of the tolerance in splice overlap of textile ply and resulted in a national (PT20020102835) and a PCT patent application (some related patent

applications: WO2004022323 (A1), EP1545866 (A1), EP1545866 (A0), CN1705556 (A), AU2003253527 (A1)), owned by the company.

A2.2.2 European programmes

The Unit took part in three European projects during 2006. URANUS is concerned with ultrafast technology for multicolor high power systems and the Unit participation is related to advanced optical fiber Bragg gratings fabrication and characterization. Another project, FIDELIO, intends to develop the next generation of lidar onboard detection systems for aeronautics and the Unit works in fundamental issues of nonlinear optics. The project NextGenPCF arises from the observation that progress and continuing technological development in many fields will depend on new ways of producing and guiding light, and mastering its interaction with the environment. Photonic Crystal Fibre (PCF) technology has the potential to become an enabling optical component. This project integrates the key European industrial and academic groups, from raw material developers to final users. It aims at being the incubator of key devices in three fields of applications that corresponds to three IST strategic fields: Biomedical, Telecom and Sensors. The Unit contribution will be in the design and realization of the optical source for gas sensing, sensing head and full sensing system.

A2.2.3 Other programmes, consulting, services

The Unit delivered a novel Bragg grating writing equipment to the Tampere University of Technology, fulfilling the first R&D international service project outside EU projects. This project has begun the previous year.

The Unit continued the contract with Fibersensing in the framework of its incubation at INESC Porto premises. Several sensing heads for geotechnical and civil engineering applications were developed and tested as well as a range of interrogation units, both laboratory and portable, were designed and characterized. Specially an acoustic detection systems based upon optical fiber technologies for geotechnical applications was developed and tested.

In the framework of the European Space Agency, specifically Flight Hardware Activities and Long-Term Research and Development, the Unit managed to get a contract R&D project, on a competitive basis (ESA Announcement of Opportunity 1-4669/05/NL/HE). The ESA-ONE project is dedicated to technology development for integrated micro-optic filter to address optical signal detection in LIDAR applications. The research program will target future development of spaceborne LIDAR systems, thus providing a compact rugged integrated package with minimal size, weight, and power requirements but still fulfilling mechanical and thermal constrains for space applications. The primary goal of the proposed research program is to demonstrate and characterize the performance of an ultra narrowband optical fiber Bragg grating filter at 1600 nm, which corresponds to the CO_2 vapor lines of interest for space-based DIAL measurements.

A2.3 SUMMARY OF RESULTS OF THE RESEARCH ACTIVITIES OF THE TEAM MEMBERS

- Projects

Summary of projects developed in 2006

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	9	4		268.611
D - Development				
C - Consulting				
A – Advanced training				
T – Technology Transfer	3	1		142.549
O - Other				
TOTAL	12	5		411.160

Summary of relative distribution ofsources of income

Financing (3)	Status (4)			Total Income (€)
	S - Started	OG– On-going	C - Concluded	
NP – National Programmes	1,71%	22,32%	11,24%	145.015
EP – European Programmes	7,39%	26,91%		141.002
CS – Consulting and services		24,34%	6,10%	125.143
O – Other R&D sources				
OS – Other sources				
Total	9,10%	73,57%	17,33%	411.160

Summary of projects developed in 2006

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)
URANUS	F. Araújo	R	E	EP	6PQ	07-2004	07-2007	OG
CORDVISION	I. Dias	T	N	NP	IDEIA	09-2004	08-2006	F
FIDELIO	M. J. Marques	R	E	EP	6PQ	12-2004	12-2007	OG
NODA	J. L. Santos	R	N	NP	FCT	01-2005	12-2006	F
CUTINSHEAR	F. Araújo	R	N	NP	FCT	03-2005	02-2007	OG
EVANESCENTE	J. L. Santos	R	N	NP	FCT	05-2005	04-2008	OG
OPTOPACK	F. Araújo	R	N	NP	FCT	05-2005	04-2007	OG
KAISER	L. A. Ferreira	R	N	NP	FCT	09-2005	08-2008	OG
WORKSTATION	F. Araújo	T	E	CS	PS	09-2005	12-2006	F
ESA-ONE	F. Araújo	R	E	EP	ESA	01-2006	12-2007	OG
Fibersensing	J. L. Santos	T	N	CS	PS	01-2006	12-2006	OG
IPF	O. Frazão	R	N	NP	FCT	01-2006	12-2006	F
MICROPACK	F. Araújo	T	N	NP	IDEIA	01-2006	12-2008	OG
NEXTGENPCF	L. A. Ferreira	R	E	EP	6PQ	01-2006	12-2008	S
OREO	P. V. Marques	R	N	NP	FCT	01-2006	03-2007	OG
OXIGÉNIO	J. L. Santos	R	N	NP	FCT	01-2006	12-2007	OG
CEMICRO	Paulo Marques	R	N	NP	AdI	07-2006	06-2008	S

(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: S – Starting: activities initiated in 2006 and continuing in 2007; OG – On-going: activities started earlier than 2006 and continuing in 2007; F – Finished: activities ending in 2006.

- **Summary of publications**

Summary of publications in 2006

Type of publication	Number
Theses concluded in 2006 by members of the unit	5
Books (author)	
Chapter/paper in books	
Publications (editor)	
Papers in International Journals with scientific referees	28
Papers in National Journals with scientific referees	
Conference Proceedings in events with scientific referee and selection	10
Other publications (National meetings, local journals, etc.)	27
Total	70

- **Summary of post-graduation activities**

Summary of theses supervised by members of the unit in 2006

Type	Starting	On-going	Concluded	Total
Master	3	1	0	4
Doctoral	3	4	2	9
Total	6	5	2	13

- **Summary of Advanced Training Actions**

Summary of Advanced Training Actions organized for external trainees in 2006

Type	Number
Training for graduation students *(estágios curriculares)*	2
Training for others *(estágios extra-curriculares)*	
Professional training actions *(estágios profissionais)*	1
Other actions	
Total	3

- **Summary of activities of cooperation or dissemination**

Summary of items

Type	Number
Organizing conferences or meetings	1
Colaboration in papers authored by INESC Porto researchers	54
External persons directly involved in actions organized by INESC Porto	15

- **Human resources in 2006**

Summary of Unit personel at the end of 2006

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Politechnic Staff	11	3			14	-1
INESC Porto Fellows			6		6	+5
Other Fellows	2	6			8	0
Employees	3		2	1	6	+2
Trainees					0	0
Other					0	0
Administrative				1	1	0
Total	16	9	8	2	35	+6

(*)   Relative to 2005, in absolute numbers.

A2.4 LIST OF PUBLICATIONS

A2.4.1 Theses concluded in 2006 by members of the unit

JORGE, Pedro A.S., "Luminescence based optical fiber systems for biochemical sensing applications", November 2006, PhD Thesis, FCUP.

MELO, Miguel A.R., "Implementation and Development of a System for the Fabrication of Bragg Gratings with Special Characteristics", July 2006, MSc Thesis, FEUP.

REGO, Gaspar M., "Arc-Induced Long-Period Fibre Gratings. Fabrication and Their Applications in Optical Communications and Sensing", July 2006, PhD Thesis, FEUP.

VIEGAS, Diana C.N., "Sound Wave Processing for Precise Positioning", April 2006, MSc Thesis, FEUP.

MOREIRA, Paulo J.B., "Integrated Optics in Hybrid Sol-Gel Technology", March 2006, PhD Thesis, FCUP.

A2.4.2 Books (Author)

Blank.

A2.4.3 Chapter/paper in Books

Blank.

A2.4.4 Publications (Editor)

Blank.

A2.4.5 International Journals with scientific referees

SILVA, S.O., FRAZÃO, O., SANTOS, J.L., ARAÚJO, F., FERREIRA, L.A., "Discrimination of Temperature, Strain and Transverse Load using Fibre Bragg Gratings in a Twisted Configuration", IEEE Sensors Journal, December 2006, vol.6, no.6, p.1609-1613.

REGO, G.M.D., SALGADO, H.M.D.C.F., SANTOS, J.L.C.D.O., "Interrogation of a Fiber Bragg Grating using a Mechanically Induced Long-Period Fiber Grating", IEEE Sensors Journal, December 2006, vol.6, p.1592-1595.(*)

SAVU, R., JOANNI, E., "Low-temperature, self-nucleated growth of indium-tin oxide nanostructures by pulsed laser deposition on amorphous substrates", SCRIPTA MATERIALIA, December 2006, vol.55, no.11, p.979-981.

FRAZÃO, O., MARQUES, L.M., BAPTISTA, J.M., "Fibre Bragg grating interrogation based on high-birefringence fibre loop mirror for strain-temperature discrimination", Microwave and Optical Technology Letters , November 2006, vol.48, no.11, p.2326-2328.

FRAZÃO, O., MARQUES, L.M., SANTOS, S., BAPTISTA, J.M., SANTOS, J.L., "Simultaneous measurement for strain and temperature based on a long period grating combined with a high-birefringence fibre loop mirror", Photonics Technology Letters, November 2006, vol.18, no.22, p.2407-2409.

REGO, G., IVANOV, O., MARQUES, P., "Demonstration of Coupling to Symmetric and Antisymmetric Cladding modes in Arc-Induced Long-Period Fiber Gratings", OPTICS EXPRESS, October 2006, vol.21, p.9594-9599.

FRAZÃO, O., FALATE, R., FABRIS, J.L., SANTOS, J.L., FERREIRA, L.A., ARAÚJO, F., "Optical inclinometer based on a single long-period fiber grating combined with a fused taper", OPTICS LETTERS, October 2006, vol.31, no.20, p.2960-2962.

TEDIM, J., PATRICIO, S., BESSADA, R., MORAIS, R., SOUSA, C., MARQUES, M.J., FREIRE, C., "Third-Order Nonlinear Optical Properties of DA-salen-Type Nickel(II) and Copper(II) Complexes", European Journal of Inorganic Chemistry, September 2006, no.17, p.3425-3433.

CARVALHO, J., FRAZÃO, O., MUÑIZ, R., MARQUES, M.J., SALGADO, H., "Fibre Bragg grating switching behaviour using high-power pump laser diodes", Microwave and Optical Technology Letters , August 2006, vol.48, no.8, p.1538-1540.(*)

PINTO, N., FRAZÃO, O., BAPTISTA, J.M., SANTOS, J.L., "Quasi-distributed displacement sensor for structural monitoring using a commercial OTDR", Optics and Laser in Engineering, August 2006, vol.44, no.8, p.771-778.

FALATE, R., FRAZÃO, O., REGO, G., FABRIS, J.L., SANTOS, J.L., "Refractometric sensor based on a phase-shifted long-period fiber grating", APPLIED OPTICS , July 2006, vol.45, no.21, p.5066-5072.

JORGE, P., MAYEH, M., BENRASHID, R., CALDAS, P., SANTOS, J.L., FARAHI, F., "Applications of quantum dots in optical fiber luminescent oxygen sensors", APPLIED OPTICS, June 2006, vol.45, no.16, p.3760-3767.

ABE, I., FRAZÃO, O., SCHILLER, M.W., NOGUEIRA, R., KALINOWSKI, H., LEMOS PINTO, J., "Bragg gratings in normal and reduced diameter high birefringence fibre optics", Journal of Measurement Science and Technology, June 2006, vol.17, no.6, p.1477-1484.

REGO, G., SANTOS, J.L., SALGADO, H., "Polarization dependent loss of arc-induced long-period fibre gratings", OPTICS COMMUNICATIONS, June 2006, vol.262, no.2, p.152-156.(*)

JORGE, P., MAYEH, M., BENRASHID, R., CALDAS, P., SANTOS, J.L., FARAHI, F., "Quantum dots as self-referenced optical fibre temperature probes for luminescent chemical sensors", Journal of Measurement Science and Technology, May 2006, vol.17, no.5, p.1032-1038.

BAPTISTA, J.M., SANTOS, S., REGO, G., FRAZÃO, O., SANTOS, J.L., "Micro-displacement or bending measurement using a long-period fibre grating in a self-referenced fibre optic intensity sensor", OPTICS COMMUNICATIONS, April 2006, vol.260, no.1, p.8-11.

REGO, G., MARQUES, P., SANTOS, J.L., SALGADO, H., "Estimation of the fibre temperature during the inscription of arc-induced long-period gratings", OPTICS COMMUNICATIONS, March 2006, vol.259, no.2, p.620-625.(*)

REGO, G., SANTOS, J.L., SALGADO, H., "Refractive index measurement with long-period gratings arc-induced in pure-silica-core fibres", OPTICS COMMUNICATIONS, March 2006, vol.259, no.2, p.598-602.(*)

REGO, G., DURR, F., MARQUES, P., LIMBERGER, H.G., "Strong asymmetric stresses arc-induced in pre-annealed nitrogen-doped fibres", ELECTRONICS LETTERS, March 2006, vol.42, no.6, p.334-335.

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VYSHATKO, N.P., JOANNI, E., FERNANDES, J.R., SAVU, R., VILARINHO, P.M., KHOLKIN, A.L., "Deposition and characterization of thick Pb(Zr,Ti)O-3 films on optical fibers", FERROELECTRICS 2006, vol.338, p.1497-1504.

OLIVEIRA, R., FRAZÃO, O.J.D.R., SANTOS, J.L.C.D.O., MARQUES, A.T., "Development of an optic fibre sensor system for acoustic emission sensing in FRP", Materials Science Forum 2006, vol.514, p.794-798.

MARDARE, C., MARDARE, A., SAVU, R., "Effect of deposition and processing conditions for LaNiO3 bottom electrodes on the properties of Pb(Zr,Ti)O-3 thin film capacitors made by RF magnetron sputtering", Materials Science Forum 2006, vol.514, p.1343-1347.

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MARDARE, C., TAVARES, P.B., MARDARE, A., SAVU, R., "Synthesis of BiFeO3 ceramic targets and thin film deposition by laser ablation", Materials Science Forum 2006, vol.514, p.328-332.

RAMOS, C., FRAZÃO, O.J.D.R., DIAS, I.M.S., MARQUES, A.T., "The signal characteristics of the spectral response of Bragg grating sensor embedded in composite laminated after the cure process", Materials Science Forum 2006, vol.514, p.629-632.

(*) Co-authored with UTM researchers.

A2.4.6 National Journals with scientific referees

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A2.4.7 Conference Proceedings with scientific referees

FALATE, R., FRAZÃO, O., REGO, G., IVANOV, O., KALINOWSKI, H.J., FABRIS, J.L., SANTOS, J.L., "Bend Sensing with Arc-Induced Phase-Shifted Long-Period Fiber Grating", OFS-18 - 18th International Conference on Optical Fiber Sensors, October 2006, Cancun, México.

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PINTO, N., FRAZÃO, O., ROMERO, R., COSTA, A., "PMD Emulator/Compensator Device Combine FBGs Written in Two Different Types of Optical Fibers", ICTON 2006 - 8th International Conference on Transparent Optical Networks , June 2006, We.P.3, Nottingham, United Kingdom, p.221-224.

SILVEIRA, T., FONSECA, D., FERREIRA, A., MORAIS, R., MADUREIRA, M., TEIXEIRA, A., MONTEIRO, P., "40 Gb/s All-Optical Vestigial-Sideband Generation using SOA", ECOC 2006 - European Conference on Optical Communication 2006, Cannes, França.

MUÑIZ, R., ARAÚJO, F., FERREIRA, L.A., "Absorption-Line-Locked Fiber Transmission Filter fo Gas Sensing Applicationa", OFS-18 - 18th International Conference on Optical Fiber Sensors 2006, Cancun, México.

FRAZÃO, O., MARQUES, J.A., SANTOS, J.L., MARQUES, M.J., BAPTISTA, J.M., "Brillouin Fibre Laser Sensor for Strain an Temperature Discrimination", OFS-18 - 18th International Conference on Optical Fiber Sensors 2006, Cancun, México.

BAPTISTA, J.M., MARQUES, J.A., FRAZÃO, O., SANTOS, J.L., et al. , "Optical Fibre Intensity Sensor Referenced by Stimulated Brillouin Scattering", OFS-18 - 18th International Conference on Optical Fiber Sensors 2006, Cancun, México.

A2.4.8 Other Publications

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CARVALHO, J., MARQUES, M.J., "Aumento do limiar do espalhamento estimulado de Brillouin em fibra por modulação da temperatura ", Física 2006 - Física 2006 2006, Aveiro, Portugal.

REGO, G., CALDAS, P., SALGADO, H., SANTOS, J.L., "Bandpass filters based on arcdischarges", Física 2006 - Física 2006 2006, Aveiro, Portugal.(*)

VIEGAS, D., PINTO, N., MUÑIZ, R., FRAZÃO, O., COSTA, A., "Birefringence effect in uniform fibre Bragg gratings", Física 2006 - Física 2006 2006, Aveiro, Portugal.

MARQUES, J.A., FRAZÃO, O., SANTOS, J.L., MARQUES, M.J., BAPTISTA, J.M., "Brillouin Fibre Laser Sensor", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

VIEGAS, D., PINTO, N., MUÑIZ, R., FRAZÃO, O., COSTA, A., "Differential group delay induced in uniform fibre Bragg gratings", Física 2006 - Física 2006 2006, Aveiro, Portugal.

REGO, G., IVANOV, O., "Effect of Fiber Microdeformation on the Formation of Gratings Induced by Arc Discharges", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

MARQUES, J.A., FRAZÃO, O., SANTOS, J.L., MARQUES, M.J., BAPTISTA, J.M., "Espalhamento estimulado de brillouin sem e com realimentação ", Física 2006 - Física 2006 2006, Aveiro, Portugal.

SILVA, S.O., FRAZÃO, O., FERREIRA, L.A., ARAÚJO, F., SANTOS, J.L., "Fabry-Perot cavities using fibre Bragg gratings ", Física 2006 - Física 2006 2006, Aveiro, Portugal.

CARVALHO, J., FRAZÃO, O., MUÑIZ, R., MARQUES, M.J., SALGADO, H., "Fibre Bragg grating switch based on thermal changes induced by high power laser diodes", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.(*)

CARVALHO, J., FRAZÃO, O., MUÑIZ, R., MARQUES, M.J., SALGADO, H., "Fibre gratings switshing behaviour based on high power laser diodes", Física 2006 - Física 2006 2006, Aveiro, Portugal.(*)

REGO, G., CALDAS, P., SALGADO, H., SANTOS, J.L., "Gain flattening of EDFAS", Física 2006 - Física 2006 2006, Aveiro, Portugal.(*)

MARQUES, L.M., FRAZÃO, O., SANTOS, S., BAPTISTA, J.M., "High-birefringence fibre loop mirrors combined with grating technology and their application as sensors", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

ALEXANDRE, D., MARQUES, P., BRITES, C.A., LEITE, A., MOREIRA, P., GHASEMPOUR, A., GARCIA, P., SANTOS, J.L., "Integrated Optics for Astronomical Interferometry", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

FRAZÃO, O., FALATE, R., SANTOS, J.L., FERREIRA, L.A., ARAÚJO, F., "Interferometers based on long period fibre gratings", Física 2006 - Física 2006 2006, Aveiro, Portugal.

MELEIRO, R., MORAIS, R., MONTEIRO, P., CASTRO, J., MARQUES, P., ANDRÉ, P., "Laser Multi-Comprimento de Onda com Auto-Estabilização Devido a Mistura de 4 Ondas em Fibra Altamente Não Linear de Bi2O3", Física 2006 - Física 2006 2006, Aveiro, Portugal.

REGO, G., SCHRÖDER, B., FARIA, L., MARQUES, P., SALGADO, H., SANTOS, J.L., "Measurement of the temperature attained by a fibre during an arc discharge", Física 2006 - Física 2006 2006, Aveiro, Portugal.(*)

ROSA, C.S., "Measuring and Imaging with White Light Interferometry and Optical CoherenceTomography", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

IVANOV, O., "Optimization Technique for Determination of Optical Fiber Parameters from Transmission Spectra of Long-Period Gratings", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

DE, J., JOANNI, E., VILARINHO, P., KHOLKIN, A., "Piezoresponse and Piezoelectric Properties on Ferroelectric Thin Films: Thickness Effect", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

TEDIM, J., PATRÍCIO, S., BESSADA, R., FONSECA, J., FREIRE, C., "Propriedades ópticas não-lineares de terceira ordem de complexos do tipo Schiff", Física 2006 - Física 2006 2006, Aveiro, Portugal.

MARQUES, L.M., FRAZÃO, O., BAPTISTA, J.M., SANTOS, J.L., "Sensor de fibra óptica baseado numa rede período longo e espelho em anel.", Física 2006 - Física 2006 2006, Aveiro, Portugal.

SILVA, C., SILVA, S.O., CALDAS, P., FRAZÃO, O., COELHO, J., SANTOS, J.L., "Sensor óptico para medição de índice de refracção em líquidos usando redes de periodo longo", Física 2006 - Física 2006 2006, Aveiro, Portugal.

JORGE, P., SILVA, J., PINHEIRO, P., SANTOS, J.L., "Sensores de pH em fibra óptica com emissão no infravermelho e detecção no domínio das frequências", Física 2006 - Física 2006 2006, Aveiro, Portugal.

MORAIS, R., MONTEIRO, P., MARQUES, P., "Simple Technique for Measuring Chromatic Dispersion and Attenuation in a Bismuth Based Optical Fibre", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

SILVA, J., FRAZÃO, O., CRESPO, H., BERNARDO, L., "Supercontinuum generation and frequency conversion in photonic crystal fibers near a zero dispersion wavelength", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

PINTO, N., FRAZÃO, O., MUÑIZ, R., COSTA, A., "Tunable PMD Emulator/Compensator Scheme Combining a Hi-Bi FBG and a Stress Induced Birefringence FBG", SEON 2006 - IV Symposium on Enabling Optical Networks and Sensors 2006, Porto, Portugal.

(*) Co-authored with UTM researchers.

A2.5 LIST OF JOURNALS

Journal	Number of papers
Applied Optics	2
Electronics Letters	1
European Journal of Inorganic Chemistry	1
Ferroelectrics 2006	1
IEEE Sensors Journal	2
Journal of Lightwave Technology	1
Journal of Measurement Science and Technology	2
Materials Science Forum 2006	7
Microwave and Optical Technology Letters	2
Optics Communications	4
Optics Express	1
Optics Letters	1
Optics and Laser in Engineering	1
Photonics Technology Letters	1
Scripta Materialia	1
TOTAL	28

A2.6 LIST OF PATENTS

<u>Dispositivo em Fibra Óptica baseado numa Rede de Bragg configurada numa Geometria em Anel</u>

Developed under (Project Name): N/A

Demo Place: N/A

Development Period: N/A

Type (National or International): National

Submission Date: 18th of March 2004

Granting Date: 22nd of March 2006

A2.7 LIST OF PROTOTYPES

<u>Optical fiber inclinometer</u>

Developed under (Project Name): N/A

Demo Place: UOSE/INESC Porto

Development Period: January 2006 to December 2006

A2.8 LIST OF THESES SUPERVISED BY MEMBERS OF THE UNIT DURING 2006

PhD Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Gaspar Mendes Rego (*)	FEUP	Henrique Salgado José Luís Santos	INESC Porto/FEUP INESC Porto/FCUP	Arc-Induced Long-Period Fibre Gratings. Fabrication and Their Applications in Optical Communications and Sensing	2006
Paulo Moreira	FCUP	Paulo Marques	INESC Porto/FCUP	Integrated Optics in hybrid sol-gel technology	2006
Pedro Jorge	FCUP	José Luís Santos	INESC Porto/FCUP	Luminescence based optical fiber systems for biochemical sensing applications	2006
Daniel Alexandre	FCUP	Paulo Marques	INESC Porto/FCUP	Fabrication of integrated optics devices by laser direct writing	2007
Dionísio Pereira	FCUP	Manuel J. Marques	INESC Porto/FCUP	Optical fiber technologies	2007
Jaime Ribeiro Viegas	FCUP	Paulo Marques	INESC Porto/FCUP	Integrated optics	2007
Rui Pedro Morais	FCUP	Paulo Marques Henrique Salgado	INESC Porto/FCUP INESC Porto/FEUP	Optical fiber technology	2007
Orlando Frazão	FCUP	José Luís Santos	INESC Porto/FCUP	Optical fiber sensors	2008
Michael Leitner	FCUP	Carla Rosa	INESC Porto/FCUP	Optical coherence tomography	2009
Sanderson Emanuel Uchôa de Lima	FCUP	José Luís Santos Vladimiro Miranda	INESC Porto/FCUP INESC Porto/FEUP	Optical fiber sensors	2009
1	2	3	4	5	6

1 – Name of the post-graduation student

2 – Institution where the thesis is submitted; if the host institution for the student is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester

3 – Name of supervisor or supervisors

4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid

5 – Title of the thesis

6 – Predicted year of conclusion and delivery – will be taken in account in summary tables

(*) Thesis to be counted in UTM.

MSc Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Miguel Alexandre Ramos de Melo (*)	FEUP	Henrique Salgado Paulo Marques	INESC Porto/FEUP INESC Porto/FCUP	Implementation and Development of a System for the Fabrication of Bragg Gratings with Special Characteristics	2006
Susana F. O. Silva	FCUP	José Luís Santos	INESC Porto/FCUP	Pi-phase shift fiber Bragg gratings	2007
Catarina Silva	FCUP	José Luís Santos	INESC Porto/FCUP	Long period grating sensors	2007
António Valente	FCUP	Pedro Jorge	INESC Porto/FCUP	Optical fiber sensors	2007
Carla Domingues	FCUP	Carla Rosa	INESC Porto/FCUP	Optical coherence tomography	2008
1	2	3	4	5	6

1 – Name of the post-graduation student
2 – Institution holding the course where this student in enrolled in; if the host institution is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester
3 – Name of supervisor or supervisors
4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid
5 – Title of the thesis
6 – Predicted year of conclusion and delivery – will be taken in account in summary tables
(*) Thesis to be counted in UTM.

A2.9 ORGANISATION OF INTERNATIONAL SCIENTIFIC EVENTS

SEON 2006 – IV Symposium on Enabling Optical Networks and Sensors

Porto, Portugal

June 16, 2006

José Luís Santos, Manuel Joaquim Marques, Paulo Marques, Abel Costa - Members of the Scientific Committee.

Ireneu Dias, Joel Carvalho, Luís Marques, Orlando Frazão - Members of the Organizing Committee.

(*) In collaboration with UTM.

A2.10 ADVANCED TRAINING

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A2.11 OTHER CONTRIBUTIONS TO THE OBJECTIVES OF ASSOCIATE LABORATORY

UNIT: UOSE – OPTOELECTRONICS AND ELECTRONICS SYSTEMS	Thematic Line
Consolidation and reinforcement of research activities in: • Optical fiber sensors relevant to bio-chemical measurands; • Novel devices. Reinforcement of the research team: selection and recruitment (to become effective in 2007) of 2 new post-doc researchers to work in bio-chemical sensors and novel thin films devices. Co-organization of a symposium concerning optical fiber technologies, SEON 2006.	Fiber Optic Devices and Networks for Multi-Parameter Sensing

A2.12 ANALYSIS AND ASSESSMENT OF DEVIATIONS RELATIVE TO FORMER PLANNING

A2.12.1 Comparison with strategic actions or policy lines defined in the plan of the previous year

The perspective of reinforcement of the technological and scientific capability of the Unit was increased with the procurement of dry-etching and PECVD equipment that will enable novel developments in terms of integrated optics devices. This equipment was approved in 2004 and during 2006 suppliers selection and qualification were carried out in order to make a technically sound and budget compatible decision. This took place in early 2006 and the installation was implemented in the second part of the year.

The services component of the activity of the Unit reached interesting values due to research under contract with Fibersensing, INESC Porto spin-off company.

The high participation of the Unit members in conference scientific committees and as journal referees was achieved and shall be increased, with a special reference to the Symposium on Enabling Optical Networks that is co-organized by the Unit and that is gaining wide participation from national institutions and researchers.

The Unit began the European project proposal that was approved in 2005. The proposal is concerned with optical gases sensing and is proposed by a strong European consortium that will increase Unit´s international visibility.

A national research project in consortium with FiberSensing was approved in the area of micropackaging of optical devices and began this year.

A R&D contract with ESA was won in a competitive basis that will open new ways of cooperation with this international agency.

A2.12.2 Cases of success, problems met, internal and external conditioning factors

The main success case refers to Fibersensing project. The development contract run with undeniable success and constitutes a model of research under contract and mixed teams of R&D institutions and companies collaboration work that shall be replicated. The prototypes developed and the timely execution of the contract shows the technological and scientific capability of the Unit.

The end of the incubation at INESC Porto premises and the change of the company to rented facilities at a new location brought also a temporary but potentially definitive hiring of several researchers of the Unit that fragilized the area of Electronic and Systems Integration. This scenario did not change and a definite strategy concerning electronic systems is lacking and needs to be set up in the near term.

This situation presents now a unique challenge to the Unit: how to continue becoming a source of technical innovation and upstream of new ideas and products.

Concerning industrial property rights, one national applications was granted but a valorization strategy is still lacking to exploit this potential source of income. Internationalization and/or a partnership with Fibersensing may help in this objective.

Another interesting result is the contract with the Optoelectronics Research Center of Tampere University in Finland to develop and build an integrated Bragg grating fiber manufacturing workstation. This activity, high-end advanced optical fiber technology equipment development, is to be enhanced, profiting from synergies with Fibersensing. The research under contract outside the framework of public funded R&D schemes needs to be further exploited.

In terms of external conditioning factors, the reduction in students in science and technology areas will pose a challenge to the continuous renewal of qualified human resources.

A3. UNIT: UESP – MANUFACTURING SYSTEMS ENGINEERING

A3.1 SHORT DESCRIPTION OF THE UNIT

The main goal of the Manufacturing Systems Engineering Unit is to promote the improvement of performance of industrial enterprises through R&D projects, consulting, technology transfer and training services. The Unit main competences are related to Operations Management and Enterprise Information Systems, applied to industrial companies and enterprise cooperation networks. The Unit main Research and Development areas include:

- Networked Business Models: Value network design; operations management; advanced planning systems; performance management; information and knowledge management; interoperability.

- Decision Support and Operations Management: Process analysis; modeling and simulation; advanced planning systems; operations scheduling; intelligent automation and logistics; cutting and packing; multi-criteria optimization; decision support systems.

The Unit has regularly promoted and participated in applied research projects, in partnership with software houses, aiming at the development of innovative products in the fields of: production planning, scheduling and control, quality and maintenance management, decision support, cutting and packing optimization, knowledge management, and integration infrastructures.

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

- Inter-organisational Networks: Operations Management; collaboration processes; management and decision support; knowledge management; interoperability.

- Optimization and Decision Support: structuring of decision processes; optimization methods; Combinatorial Optimization and meta-heuristics; optimization for planning and scheduling problems; optimization for cutting and packing problems; simulation; Decision Support Systems

- Information Systems in Organisations: requirements engineering; advanced applications of information systems; enterprise integration.

The Unit provides consulting services to industrial companies, including the analysis and optimization of business processes, requirements analysis of IT systems, selection of IT systems (ERP and others), change management and support in 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.

A3.2 ACTIVITIES DEVELOPED IN 2006

A3.2.1 National programmes

During 2006 ten projects have been executed with support from national RTD programmes, representing 15,52% of the year income.

The projects Codework, GlobalNest, Meta-Sim and APIS have been supported by the PraxisXXI Research programme and have generated significant scientific contributions in the optimisation area.

The projects GESTE (that has developed an innovative scheduling system for textile companies) and CEC-MadeShoe-prime (large project for the shoe industry, complementary to the CEC-Madeshoe European project) were supported by the PRIME programme.

The projects Sia-soft (system for supporting the environmental management inside companies) and ISO-Pross (document and process management for industrial quality management) were supported by the IDEIA programme. The RCED project identifies the requirements and potential advantages of

implementing High Performance Enterprise Networks in the North of Portugal and was supported by the North Operational Programme (ON).

The Competence Network on ICT for the Fashion clusters - TECMODA started in 2006 with the aim of activating a knowledge community for the fashion industries, able to follow the state of the art, develop technical visions for the future and promoting research projects. It was supported by Agência de Inovação.

A3.2.2 European programmes

During 2006 the Unit participated in nine European projects, that have represented 54,67 of its global activity.

Kobas (Maintenance management solutions for industrial machines) and the AMI@netfood (Strategic Research Agenda in ICT for the Agrifood industry) are projects supported by the IST programme. The CEC-Made-Shoe project (large integrated project improving materials, processes, machines and ICT in the Shoe industry) was supported jointly by the IST and by the Growth programmes.

Knowconstruct was supported by the COLLECTIVE research programme and aims at providing Knowledge Management and Collaboration tools for Construction SMEs.

AC/DC is a large project that started in 2006 and is supported by the European programme. It aims at creating the conditions to produce cars in five days, from the car specification by the customer to its delivery. INESC Porto participates in the supply chain optimisation for this scenario.

The projects REGINA (Knowledge management for Atlantic European Regions), R+D+I for SME's (promoting RTD and innovation activities in SME's) and Coopnav (a system for supporting cooperation in the ship building industry) were supported by the INTERREG programme. The IRC Portugal project (promotion of trans-national technology transfer) was supported by the INNOVATION programme.

A3.2.3 Other programmes, consulting, services

The main consulting and technology transfer projects during 2006 were:

- o Integration infrastructure for shoe manufacturers and suppliers, using ShoeNet and ebXML standards.

- o Design and development of an aggregate planning system for shoe supply networks.

- o Design and specification of a scheduling application for a company that produces decorative high pressure laminates.

- o Design and development of a benchmarking system for the metal manufacturing industry.

- o Consulting contracts to support several companies (Durit, Moldit, Alba and Siclave) in analyzing their business processes, identifying their requirements in IT, supporting the selection and implementation of the selected solutions.

- o Consulting contract to support AURN – the North Association of Universities on the identification of exploitable research results on associated Universities, and on the identification of local companies technological requirements.

- o Technical support to the systems and applications previously installed at SONAFI.

- o Technical support to the implementation of Internal Logistic systems produced by the partner company Lirel.

A3.3 SUMMARY OF RESULTS OF THE RESEARCH ACTIVITIES OF THE TEAM MEMBERS

- Projects

Summary of projects developed in 2006

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	12	6		934.025
D - Development	5			65.300
C - Consulting	4			118.500
A – Advanced training				
T – Technology Transfer	2	3		236.800
O - Other				
TOTAL	23	9		1.354.625

Summary of relative distribution ofsources of income

Financing (3)	Status (4)			Total Income (€)
	S - Started	OG– On-going	C - Concluded	
NP – National Programmes	2,75%	9,54%	3,23%	210.225
EP – European Programmes	1,31%	44,76%	8,60%	740.600
CS – Consulting and services	11,96%	15,33%	2,52%	403.800
O – Other R&D sources				
OS – Other sources				
Total	16,02%	69,62%	14,36%	1.354.625

Summary of projects developed in 2006

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Financ. Prog.	Starting date	Conclusion (prediction)	Status (4)
Consultoria	A. C. Alves	C	N	CS	-	-	Several contracts	OG
Lirel	P. S. Marques	T	N	CS	-	-	Renewable	OG
SONAFI	Paula Silva	D	N	CS	-	-	Renewable	OG
GESTE	J. S. Ferreira	R	N	NP	PRIME	10-2003	12-2006	OG
Regina	A. C. Alves	T	E	EP	Interreg	11-2003	10-2006	F
CodeWork	A. L. Soares	R	N	NP	FCT	01-2004	12-2006	F
GlobalNest	M. C. Ribeiro	R	N	NP	FCT	03-2004	12-2006	F
IRCPortugal	A. C. Alves	T	E	EP	IST	04-2004	03-2008	OG
Kobas	A. Azevedo	R	E	EP	NMP	06-2004	05-2007	OG
I+D+I PME's	A. C. Alves	T	E	EP	Interreg	09-2004	05-2007	OG
Softi9	Luís Guardão	D	N	CS	-	09-2004	06-2006	F
CEC Made Shoe	Rui Diogo	R	E	EP	IST	10-2004	09-2008	OG
CEC-MadeShoe-Prime	Rui Diogo	R	N	NP	Prime	10-2004	06-2008	S
CoopNav	Luís Guardão	R	E	EP	Interreg	10-2004	05-2006	F
ISO-Pross	Paula Silva	R	N	NP	Ideia	10-2004	03-2007	OG
DURIT AD	A. C. Alves	C	N	CS	Demtec	12-2004	05-2007	OG
Benchmarking	Luís Guardão	D	N	CS	-	01-2005	06-2006	F
KnowConstruct	A. L. Soares	R	E	EP	C. R.	01-2005	08-2007	OG

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)
				Type (3)	Prog.			
SIASoft	Luís Guardão	R	N	NP	Ideia	01-2005	08-2006	F
AMINETFOOD	Jorge P. Sousa	R	E	EP	IST	04-2005	12-2006	F
Sonae	Luís Guardão	D	N	CS	-	06-2005	02-2007	OG
META-SIM	Jorge P. Sousa	R	N	NP	FCT	07-2005	06-2007	OG
RCED	Luis Carneiro	R	N	NP	PON	07-2005	03-2007	OG
APIS	J. F. Oliveira	R	N	NP	FCT	09-2005	08-2007	OG
Escalon. Durit	Luís Guardão	C	N	CS	-	10-2005	03-2007	S
AVANTEC	A. C. Alves	C	N	CS	-	01-2006	12-2006	F
PRONIC	Luís Guardão	R	N	CS	-	01-2006	12-2007	S
SIUP	Luís Guardão	T	N	NP	SIUPI	01-2006	12-2007	S
ShoeBiz	César Toscano	R	N	CS	-	05-2006	12-2006	OG
DCB	Rui Diogo	D	N	CS	-	09-2006	01-2007	S
TECMODA	César Toscano	R	N	NP	R.Compet	09-2006	06-2008	S
AC/DC	Jorge P. Sousa	R	E	EP	IST	10-2006	09-2010	S

(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: S – Starting: activities initiated in 2006 and continuing in 2007; OG – On-going: activities started earlier than 2006 and continuing in 2007; F – Finished: activities ending in 2006.

- **Summary of publications**

Summary of publications in 2006

Type of publication	Number
Theses concluded in 2006 by members of the unit	2
Books (author)	
Chapter/paper in books	2
Publications (editor)	
Papers in International Journals with scientific referees	2 + 1(*)
Papers in National Journals with scientific referees	
Conference Proceedings in events with scientific referee and selection	30 + 1(*)
Other publications (National meetings, local journals, etc.)	5
Total	41 + 2(*)

(*) Papers co-authored with researchers of other Units

- **Summary of post-graduation activities**

Summary of theses supervised by members of the unit in 2006

Type	Starting	On-going	Concluded	Total
Master	3	9	5	17
Doctoral	2	11	2	15
Total	5	20	7	32

- **Summary of Advanced Training Actions**

Summary of Advanced Training Actions organized for external trainees in 2006

Type	Number
Training for graduation students *(estágios curriculares)*	6
Training for others *(estágios extra-curriculares)*	
Professional training actions *(estágios profissionais)*	3
Other actions	
Total	9

- **Summary of activities of cooperation or dissemination**

Summary of items

Type	Number
Organizing conferences or meetings	4
Colaboration in papers authored by INESC Porto researchers	2
External persons directly involved in actions organized by INESC Porto	25

- **Human resources in 2006**

Summary of Unit personel at the end of 2006

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Politechnic Staff	12	6	1		19	0
INESC Porto Fellows		1	6	1	8	+3
Other Fellows		1			1	0
Employees	1	1	8	2	12	0
Trainees			1		1	-1
Other						
Administrative			1	1	2	0
Total	13	9	17	4	43	+2

(*)   Relative to 2005, in absolute numbers.

A3.4 LIST OF PUBLICATIONS

A2.4.1 Theses concluded in 2006 by members of the unit

GOMES, A.M., "Abordagens Heurísticas ao Posicionamento de Formas Irregulares", January 2006, PhD Thesis, FEUP

PEREIRA, C.S., "Gestão de informação numa instituição de I&D: uma abordagem por redes colaborativas", MSc Thesis, FEUP, 2006.

A3.4.2 Books (Author)

Blank.

A3.4.3 Chapter/paper in Books

CHITUC, C., AZEVEDO, A., "Business Networking - the Technological Infrastructure Support" 2006, Knowledge and Technology Management in Virtual Organizations, Idea Publishing.

AZEVEDO, A., SILVA, P., TOSCANO, C., CARDOSO, J., "An Innovative Maintenance Solution for Complex Machinery: The Kobas Project Case", Information Technology For Balanced Manufacturing Systems, IFIP International Federation for Information Processing, Springer Boston, vol. 220/2006, pp. 243-252.

A3.4.4 Publications (Editor)

Blank.

A3.4.5 International Journals with scientific referees

DE MAGALHÃES, J.M., PINHO DE SOUSA, J., "Dynamic VRP in pharmaceutical distribution—a case study", Central European Journal of Operations Research, June 2006, vol.14, no.2, p.177-192.

GOMES, A.M., OLIVEIRA, J.F., "Solving Irregular Strip Packing problems by hybridising simulated annealing and linear programming", European Journal of Operational Research, vol. 171, pp 811-829, 2006.

FERREIRA, H., FERREIRA, D., "An integrated life cycle for Workflow Management based on learning and planning", International Journal of Cooperative Information Systems, vol.15, no.4, pp.485, December, 2006. (*)

A3.4.6 National Journals with scientific referees

Blank.

A3.4.7 Conference Proceedings with scientific referees

MADUREIRA, R., "The Role of Multinationals in the "Doctoral Paradox"", *31st EIBA - 31st EIBA - European International Business Academy annual conference*, December 2006, Fribourg, Switzerland.

PEREIRA, D., "The Socio-Technical Design of a SME Knowledge Community in the Construction Industry"*, PRO-VE'06 - 7th IFIP Working Conference on Virtual Enterprises* 2006, Helsinki, Finland.

SILVA, P., AZEVEDO, A., TOSCANO, C., CARDOSO, J., "An innovative approach in supporting the operation of complex equipment machinery: the KoBaS Project case"*, CISTI 2006 - 1ª Conferência Ibérica de Sistemas e Tecnologias de Informação* 2006, Esposende, Portugal.

SOARES, A.L., SIMÕES, D., SILVA, M., MADUREIRA, R., "Developing Enterprise Sponsored Virtual Communities: The Case of a SME's Knowledge Community" in R. Meersman, Z. Tari, P. Herrero et al. (Eds.): OTM Workshops 2006, LNCS 4277, pp. 269 – 278, 2006. Springer-Verlag Berlin Heidelberg 2006.

PEREIRA, J., VIANA, A., LUCUS, B., MATOS, M., "Constrained Unit Commitment and Dispatch Optimization"*, Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector*, September 2006, ISBN 989-95055-0-1, Coimbra, Portugal. (*)

SILVA, M. F., SOARES, A. L., SIMÕES, D., "Integrating Semantic Resource to Support SME Knowledge Communities", ICEIS 2006, 8th International Conference on Enterprise Information Systems. Pafos, Greece.

SILVA, M. F., SOARES, A. L., SIMÕES, D., "Selecting and Structuring Semantic Resources to Support SME'S Knowledge Communities", INCOM 2006, 12th IFAC Symposium on Information Control Problems in Manufacturing. St. Etienne, France.

SORLI, M., MENDIKOA, I. , PÉREZ, J. , SOARES, A., et al., "Knowledge-based Collaboration in Construction Industry", ICE-06, 12th International Conference on Concurrent Enterprising, Milan, Italy.

SIMÕES, D., SOARES, A.L., "The Socio-Technical Design of a SME Knowledge Community in the Construction Industry", Proceedings of the 7th IFIP Working Conference on Virtual Enterprises PRO-VE'06. Kluwer.

MARTINS, C., SOARES, A.L., "Dissecting the Business Process Modelling fields: a concept maps approach", Proceedings of the 7th IFIP Working Conference on Virtual Enterprises PRO-VE'06. Kluwer.

MARTINS, C., SOARES, A.L., "A Conceptual Map to clarify the Inter-Organizational Business Process Domains", in 8th Advanced International Summer School (AISS)on "Innovation in the Extended Enterprise".

SILVA, P., AZEVEDO, A., TOSCANO, C., CARDOSO, J., "An Innovative Maintenance Solution for Complex Machinery: The Kobas Project Case", *BASYS'06 - 7th IFIP International Conference on Information Technology for BALANCED AUTOMATION SYSTEMS in Manufacturing and Services* 2006, Niagara Falls - Ontario, Canada.

AZEVEDO, A., "Business Networks in Small Textile Enterprises: The Case of Nova Friburgo - BRASIL", *BASYS'06 - 7th IFIP International Conference on Information Technology for BALANCED AUTOMATION SYSTEMS in Manufacturing and Services* 2006, Niagara Falls - Ontario, Canada.

CLARO, J., PINHO DE SOUSA, J., "Capacity investment under uncertainty: multiobjective decisions with multiobjective local search", *ECCO XIX - CO2006 - Joint Meeting* 2006, Porto, Portugal.

PINHO DE SOUSA, J., "Metaheuristics in Combinatorial Optimization: flexibility and decision support" (invited tutorial talk), *ECCO XIX - CO2006 - Joint Meeting* 2006, Porto, Portugal.

COSTA, M. T., GOMES, A.M., OLIVEIRA, J. F., "Clustering irregular shaped pieces for lattice packing.", *ECCO XIX - CO2006 - Joint Meeting* 2006, Porto, Portugal.

PIEDADE, R., AZEVEDO, A., "Dynamic Performance Management in Businness Networks Environment", *DET'06 - 3rd International CIRP Conference on Digital Enterprise Technology* 2006, Setúbal, Portugal.

VIANA, A., PINHO DE SOUSA, J., MATOS, M., "Hydrothermal coordination: an integrated approach with metaheuristics", *ISMP 2006 - 19th International Symposium on Mathematical Programming* 2006, Rio de Janeiro, Brazil.

VIANA, A., "Multiobjective constraint oriented neighbourhoods", *EURO XXI 2006 - 21st European Conference on Operational Research* 2006, Reykjavik, Iceland.

PINHO DE SOUSA, J., CLARO, J., "Multiobjective local search for MEAN-Risk capacity planning in a supply network.", *EURO XXI 2006 - 21st European Conference on Operational Research* 2006, Reykjavik, Iceland.

PINHO DE SOUSA, J., CLARO, J., "Multiobjective Tabu Search for a Mean-Risk Static Stochastic Knapsack", *ISMP 2006 - 19th International Symposium on Mathematical Programming* 2006, Rio de Janeiro, Brazil.

GALVÃO DIAS, T., PINHO DE SOUSA, J., FALCÃO E CUNHA, J., "Multiobjective Genetic Algorithms for Relaxed Versions of the Set Partitioning Problem applied to the Bus Driver Scheduling Problem", *ISMP 2006 - 19th International Symposium on Mathematical Programming* 2006, Rio de Janeiro, Brazil.

GOMES, A.M., COSTA, M.T., OLIVEIRA, J. F., "Solving nesting problems by lattice packing of clusters of irregular shapes.", *EURO XXI 2006 - 21st European Conference on Operational Research* 2006, Reykjavik, Iceland.

FARIA, L., AZEVEDO, A., "Strategic Production Networks: the approach of small textile industry.", *PRO-VE'06 - 7th IFIP Working Conference on Virtual Enterprises* 2006, Helsinki, Finland.

MARQUES, Juan A., SOEIRO FERREIRA, J., "A Line Balancing Simulation System", *CISTI 2006 - 1ª Conferência Ibérica de Sistemas e Tecnologias de Informação* 2006, Esposende, Portugal.

RODRIGUES, A. SOEIRO FERREIRA, J., "Solving Cutting Path Problems by Memetic Algorithms", II SELASI - European Latin American Workshop on Engineering Systems, 21 a 23 de Junho, 2006, Porto, Portugal.

PEREIRA, C., SOARES, A. L., "Usando uma abordagem de redes sociais na especificação de sistemas colaborativos: um caso na gestão de informação em unidades de I&D" [Uing a social network approach in the specification of cooperative systems: a case in the information management in R&D units], *CISTI 2006 - 1ª Conferência Ibérica de Sistemas e Tecnologias de Informação* 2006, Esposende, Portugal.

COSTA, M. T., GOMES, A. M., OLIVEIRA, J. F., "Abordagens ao Problema do Posicionamento de Figuras Irregulares Baseadas na Criação e no Posicionamento Periódico de Agrupamentos de Figuras Irregulares"" ["Approaching the problem of the positioning of irregular figures based on the creation and on the periodic positioning of groupings of irregular figures"], *IO 2006 - 12° Congresso da APDIO* 2006, Lisboa, Portugal.

OLIVEIRA, J.F., GOMES, A.M., ""METATOPOS-Abordagens Meta-heurísticas ao problema de corte de figuras irregulares (Irregular Strip Packing Problem)"." ["METATOPOS-Meta-heuristic approach to the problem of cutting and packing irregular shaped figures (irregular strip packing problem)"], *IO 2006 - 12° Congresso da APDIO* 2006, Lisboa, Portugal.

CLARO, J., PINHO DE SOUSA, J., "Pesquisa local multiobjectivo aplicada ao investimento em capacidade com incerteza" ["Multiobjective local search applied to the investment on capacities with uncertainty"], *IO 2006 - 12° Congresso da APDIO* 2006, Lisboa, Portugal.

REGO, N., PINHO DE SOUSA, J., "Apoio à definição de estratégias para a gestão da cadeia de abastecimento intra e inter hospitalar" ["Supporting the definition of strategies for managing hospital supply chains"], *IO 2006 - 12° Congresso da APDIO* 2006, Lisboa, Portugal.

A3.4.8 Other Publications

GOMES, A.M., OLIVEIRA, J.F., "Solving Irregular Strip Packing Problems by Hybridising Simulated Annealing and Linear Programming", European Journal of Operational Research, June 2006, vol.171, no.3, p.811-829.

SILVA, P., CORREIA ALVES, A., "Metodologia de Consultoria Especializada na Implementação de Sistemas de Gestão Empresariais", *ENGI - Encontro Nacional de Gestão Industrial*, February 2006, Espinho, Portugal.

BARBOSA MARTINS, R., CARRAVILLA, M. A., RIBEIRO, C., "Solving Combinatorial Problems: An XML-based Software Development Infrastructure", *Actas da XATA'2006 XML - Aplicações e Tecnologias Associadas*, February 2006, Portalegre, Portugal.

RODRIGUES, A.M., SOEIRO FERREIRA, J., "Memetic Algorithms applied to cutting path determination problems", ESICUP 2006 Meeting, Porto, Portugal, March 16-18, 2006.

MOREIRA, R., SOEIRO FERREIRA, J., "A Genetic Algorithm for the Rural Postman Problem", ECCO XIX - CO 2006 Joint Meeting, Porto, Portugal, May 11-13, 2006.

(*) Publications counted in other units (according to the main author affiliation).

A3.5 LIST OF JOURNALS

Journal	Number of papers
Central European Journal of Operations Research	1
European Journal of Operational Research	1
TOTAL	2

A3.6 LIST OF PATENTS

Blank.

A3.7 LIST OF PROTOTYPES

A system for supporting cooperation in the ship building industry, including enginnering and production phases and link with association portals (final prototype)

Developed under (Project Name): Coopnav

Demo Place: Several companies in the North or Portugal and in the North of Spain

Development Period: June 2004 to June 2006

Benchmarking system for the foundry industry (final prototype)
Developed under (Project Name): Benchmarking
Demo Place: Associação Portuguesa da Indústria de Fundição
Development Period: January 2004 to June 2006

Maintenance management solutions for industrial machines (first prototypes)
Developed under (Project Name): Kobas
Demo Place: INESC Porto
Development Period: 2005-2006

A system for supporting the environmental management inside companies
Developed under (Project Name): SIA
Demo Place: Sia-soft
Development Period: 2005-2006

HybridNesting - Solving Irregular Strip Packing problems by hybridising simulated annealing and linear programming (final prototype)
Developed under (Project Name): CPackMO
Demo Place: FEUP
Development Period: 2002-2006

Integration infrastructure for shoe manufacturers and suppliers, using ShoeNet and ebXML standards
Developed under (Project Name): ShoeBiz
Demo Place: Centro Tecnológico do Calçado
Development Period: 2006

Aggregate planning system for shoe supply networks (first prototype)
Developed under (Project Name): SAPIR
Demo Place: Aerosoles company
Development Period: 2006

A scheduling system for decorative high pressure laminates (first prototype)
Developed under (Project Name): SIR
Demo Place: SONAE
Development Period: 2005-2006

A3.8 LIST OF THESES SUPERVISED BY MEMBERS OF THE UNIT DURING 2006

PhD Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
António Miguel Gomes	FEUP	José Fernando Oliveira	INESC Porto/FEUP	Raw material optimization in irregular cutting processes	2006
Maria Eduarda Cunha e Silva Pinto Ferreira	FEUP	José Fernando Oliveira	INESC Porto/FEUP	Graph based approach for the n-dimensional Rectangular packing problem	2006
Abailardo Lucilio de Natividade Silva Moreira	FEUP	Américo Azevedo	INESC Porto/FEUP	Dinamic evaluation of production capacity in Enterprise Networks	2007
Bernardo Sobrinho Simões de Almada-Lobo	FEUP	José Fernando Oliveira Maria Antónia Carravilla	INESC Porto/FEUP	Scheduling problems in the glass containers industry	2007
Henrique José Amorim da Silva	FEUP	José Fernando Oliveira	INESC Porto/FEUP	Heuristics and Meta-heuristics for rectangular 2D cutting problems	2007

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
João Claro	FEUP	Jorge Pinho de Sousa	INESC Porto/FEUP	Strategic Planning in Collaborative Commerce Networks	2007
José Crispim	FEUP	Jorge Pinho de Sousa	INESC Porto/FEUP	Contributions for a multi-criteria model for supporting the creation of collaborative enterprise networks	2007
Maria Teresa do Valle Moura da Costa	FEUP	José Fernando Oliveira António Miguel Gomes	INESC Porto/FEUP	New approaches to the periodic placement of irregular shapes	2007
Claudia Melania Chituc	FEUP	Américo Azevedo	INESC Porto/FEUP	Self-organization in enterprises and business networks and behavior semantics	2008
Dora Simões	FEUP	António Lucas Soares	INESC Porto/FEUP	Socio-technical Models for the formation and dissolution of Cooperation Networks of Small and Medium Enterprises.	2008
Maria do Rosário Moreira	FEUP	José Soeiro Ferreira	INESC Porto/FEUP	Combinatorial Optimisation in Graph Problems	2008
Adília Alves	FEUP	António Lucas Soares	INESC Porto/FEUP	Collaborative technologies for strategic decision making in enterprise networks: Development of the High Performance Collaborative Enterprise Networks concept	2009
Célia Talma Matins	FEUP	Eugénio Oliveira António Lucas Soares	FEUP INESC Porto/FEUP	Collaborative Business in Enterprise Networks: Inter-organisational processes.	2009
Manuel Fernando Silva	FEUP	Rute Costa António Lucas Soares	UNL INESC Porto/FEUP	Terminology contributions for the development and operation of semantic platforms supporting knowledge communities	2009
Paulo Veloso Gomes	FEUP	António Lucas Soares	INESC Porto/FEUP	Meta-processes in Socio-technical Networks	2009
1	2	3	4	5	6

1 – Name of the post-graduation student
2 – Institution where the thesis is submitted; if the host institution for the student is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester
3 – Name of supervisor or supervisors
4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid
5 – Title of the thesis
6 – Predicted year of conclusion and delivery – will be taken in account in summary tables

MSc Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Carla Sofia Pereira	FEUP	António Lucas Soares	INESC Porto/FEUP	Gestão da informação numa instituição de I&D: Uma abordagem por redes colaborativas	2006
Luísa Faria	UA	Américo Azevedo	INESC Porto/FEUP	Business Networks: The Case of Nova Friburgo (Brasil)	2006
Pedro Lobo	UA	Américo Azevedo	INESC Porto/FEUP	Business and Process Models in Hospital Facilities	2006
Ricardo Almeida	UA	Américo Azevedo	INESC Porto/FEUP	Definition of Capacity Models for supporting Order Negotiation	2006
Teresa Mota	FEUP	Américo Azevedo	INESC Porto/FEUP	Information systems' evolution and their relationship with management and organization models.	2006
Ana Patrício Vale	FEUP	Américo Azevedo	INESC Porto/FEUP	Management Systems integration – according with standard references	2007
Ana Santos	FEUP	José Soeiro Ferreira	INESC Porto/FEUP	Parallel Machine Scheduling	2007
Hélder Tiago de Resende Gomes	EGP (UP)	Américo Azevedo	INESC Porto/FEUP	Decision Support system for the management of production activities in a make-to-order of complex products environment	2007

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Hugo Caldeira	FEUP	José Soeiro Ferreira	INESC Porto/FEUP	Logistic Pallet and Packing problems	2007
Inês Souto e Castro	EGP (UP)	Américo Azevedo	INESC Porto/FEUP	Definition of a cost model: application to the cork transforming industry	2007
João Pimentel Peixoto Coentro	FEUP	Américo Azevedo	INESC Porto/FEUP	Service Quality Management Model in Information Systems Development	2007
João Sabino Vilaça	EGP (UP)	Américo Azevedo	INESC Porto/FEUP	Balanced ScoreCard application to the definition of organizations' strategic course particularly to the Portuguese model of multi-municipal enterprises.	2007
Miguel Andrade	EGP (UP	Jorge P. Sousa	INESC Porto/FEUP	A multi-criteria framework for the design and assessement of Demand Response Transport services	2007
Nazaré Gonçalves do Rego	EGP (UP	Jorge P. Sousa	INESC Porto/FEUP	Decision support for managing hospital supply chains	2007
Pedro Cruz	FEUP	José Soeiro Ferreira	INESC Porto/FEUP	Task Scheduling in a Paint Factory	2007
Rita Estácio	FEUP	Jorge Pinho de Sousa	INESC Porto/FEUP	Cost models for Demand Response Transport services	2007
Teresa Marques	EGP (UP)	Maria Antónia Carravilla	INESC Porto/FEUP	Sistema de Apoio à Decisão para o planeamento conjunto da produção e da distribuição do negócio Cloro-Álcalis da Quimigal, SA	2007
1	2	3	4	5	6

1 – Name of the post-graduation student
2 – Institution holding the course where this student in enrolled in; if the host institution is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester
3 – Name of supervisor or supervisors
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5 – Title of the thesis
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A3.9 ORGANISATION OF INTERNATIONAL SCIENTIFIC EVENTS

3rd ESICUP Meeting
Porto, Portugal, March 16-18 2006
José Fernando Oliveira, António Miguel Gomes

MCDA 63 - 63th Meeting of the European Working Group «Multiple Criteria Decision Aiding»
Porto, Portugal, March 30-31 2006
Jorge Pinho de Sousa, Manuel Matos– together with the Power Systems Unit

ECCO XIX - CO 2006 Joint Meeting
Porto, Portugal, May 11-13 2006
José Fernando Oliveria, Maria Antónia Carravilla, António Miguel Gomes

II SELASI – European-Latin-American Workshop on Engineering Systems
Porto, June 21-23 2006
José Soeiro Ferreira, President of the 'Scientific Committee'

A3.10 ADVANCED TRAINING

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A3.11 OTHER CONTRIBUTIONS TO THE OBJECTIVES OF ASSOCIATE LABORATORY

UNIT: UESP – MANUFACTURING SYSTEMS ENGINEERING	Thematic Line
The RCED project – High Performance Enterprise Cooperation Nertworks in the North of Portugal was a powerful means to gather rich information and knowledge on "collaborative networks" both for achieving practically interesting results and for providing useful findings for research activities.	Enterprise Cooperation Networks
The AMINETFOOD project collected a set of diverse and interesting international experiences on collaborative networks in the agri-food sector and their role for sustainable rural development; it produced a roadmap for the domain, identifying trends and research and development opportunities.	
Consolidation of the area of optimization for production planning and scheduling. Large experience has been gained both at production aggregate planning and shecduling.	
Conclusion of a system for supporting cooperation in the ship building industry.	
Design and development of an integration infrastructure for shoe manufacturers and suppliers, using ShoeNet and ebXML standards (this practical implementation is expected to have an important impact in the shoe business and in the enterprise networking field).	
The AC/DC Integrated Project started by the end of 2006 but showed already to have an enormous potential in producing new concepts and solutions for some challenging problems in complex supply networks (particularly in the case of the automotive industry).	

A3.12 ANALYSIS AND ASSESSMENT OF DEVIATIONS RELATIVE TO FORMER PLANNING

A3.12.1 Comparison with strategic actions or policy lines defined in the plan of the previous year

Concerning the objectives defined in the plan for 2006, we might emphasise the following aspects:

o A significant increase in the volume of activity directly funded by companies was achieved, as a result of a large commercial effort. This volume of activity more than doubled this year.

o The global level of activity has also increased by 36%.

o However it was not yet possible to achieve the goals set for the training activities, mainly because of the huge effort required for the activities and the lack of sufficient human resources..

o Although the number of publications has been lower than expected, a significant set of research activities has been started (e.g. several FCT projects) that will hopefully result in important research work and scientific publications.

A3.12.2 Cases of success, problems met, internal and external conditioning factors

The "scheduler" developed by INESC Porto and integrated in the IZARO-GREY system, marketed by SOFTI9 and I68 (Spain) could be considered as a commercial success during its first year of existence. The "scheduler" is the core of the system to which a prize has been awarded.

Conclusion of an integration infrastructure for shoe manufacturers and suppliers, using ShoeNet and ebXML standards. This practical implementation is expected to have an important in the shoe business and in the enterprise networking field.

International recognition of some elements of the group was clearly demonstrated by the successful organization of international scientific meetings (3rd ESICUP, MCDA 63, ECCO XIX - CO 2006).

Increasing and quite demanding activities in very different development projects make the conduction of sound research projects extremely difficult.

New opportunities for collaboration with companies in various sectors have emerged, and successful contacts with well-known international research groups and companies have created the basis for the development of future projects.

A4. UNIT: USE – POWER SYSTEMS

A4.1 SHORT DESCRIPTION OF THE UNIT

The Power Systems Unit focuses his activity in some of the key (emerging) areas of the electric sector: regulatory issues and electricity markets, integration of distributed independent producers (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. The unit develops basic and applied research in different topics and integrating the results in models that address high level problems in a way suitable for technology transfer to vendors, utilities and companies.

The researchers developed 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., most of the times 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 and integration of independent dispersed generation.

A.4.2 ACTIVITIES DEVELOPED IN 2006

A4.2.1 National programmes

In 2006, the project REWEB (FCT funded project) was concluded. Four other FCT funded projects (Venus, Genedis, EPSO and Miles), already described in previous reports continued.

A4.2.2 European programmes

In 2006, the new project MORE MICROGRIDS was launched. The project aims at increasing the penetration of microgeneration in electrical networks through the exploitation and extension of the Microgrids concept, involving the investigation of alternative microgenerator control strategies and alternative network designs, development of new tools for multimicrogrids management operation (involving Distribution Management Systems architectures and new software adaptation) and standardization of technical and commercial protocols. Another new project was approved, ANEMOS PLUS, dedicated to the Advanced Tolls for the Management of Electricity Grids with Large Scale Wind Generation. The project RISE, already1 described in previous reports, continued. In the area of training, the TEMPUs project (CEFES) ended with very interesting results associated to the development of MSc innovative programs in Serbia, Bosnia i Herzegovina and FYROM.

A4.2.3 Other programmes, consulting, services

The main consulting and development activities in 2006 were the following:

- Development of new modules for the DMS/EMS system of EFACEC, in the framework of a sustained partnership with about ten years.

- Extension of the contract with EDP Distribution to build the profiles for LV consumers that will be used in the settlement process of the electricity market.

- Support to ONS (National System Operator of Brazil) regarding the effects of wind power integration in the transmission network and definition of technical conditions for wind generator connection to the grid.

- Conclusion of the project EEM-RENOV, contracted with the Electrical Utility of Madeira, to identify operational strategies and protection schemes for a new hydro pumping power station to be installed in the island of Madeira to allow for a safe increase of wind power generation.

- Start of the new project PrevEol, contracted with APREN (Portuguese Association of the Renewable Generation), in collaboration with INEGI, CESA and FCUL. The objective of the project is the development of an advanced tool for wind power forecasting for the next 72 h, combining meteorological information and historical data.

- Contract PrevC with REN (TSO of Portugal) to develop a tool dedicated to the forecast of the global load in the next 24 hours.

- Preparatory work for the new project TSO-Reservas, contracted with the Iberian TSO (REN and REE), dedicated to the evaluation of the security of supply in the long term for the Iberian Peninsula and operational reserve planning until 2025.

- Deployment of the course "Electricity Market Integration and Tariffs Harmonization", in the framework of the European consortium EES-UETP (Electric Energy Systems – University Enterprise Teaching Programme).

- Organization of the 63rd meeting of the European Group of Multiple Criteria Decision Aid.

A4.3 SUMMARY OF RESULTS OF THE RESEARCH ACTIVITIES OF THE TEAM MEMBERS

- Projects

Summary of projects developed in 2006

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research	5	1	1	165.925
D - Development	4	1		280.438
C - Consulting	5		1	193.450
A – Advanced training	1	1	1	23.000
T – Technology Transfer				
O - Other				8.500
TOTAL	15	3	3	671.313

Summary of relative distribution ofsources of income

Financing (3)	Status (4)			Total Income (€)
	S - Started	OG– On-going	C - Concluded	
NP – National Programmes		10%	1%	76.225
EP – European Programmes	13%	5%	1%	130.900
CS – Consulting and services	15%	32%	18%	442.488
O – Other R&D sources			2%	10.700
OS – Other sources			3%	20.000
Total	28%	47%	25%	671.313

Summary of projects developed in 2006

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)
				Type (3)	Prog.			
EFACEC	J. Pereira	D	N	CS	-	04-2001	-	OG
Reweb	C. Monteiro	R	N	NP	FCT	03-2004	12-2006	F
Venus	M. P. Leão	R	N	NP	FCT	04-2004	04-2007	OG
Genedis	J. Fidalgo	R	N	NP	FCT	05-2004	04-2007	OG
CarCons	J. Fidalgo	D	N	CS	_	2004	2007	OG
EDA_Desp	J. P. Lopes	C	N	CS	_	2004	2007	OG
RISE	C. Monteiro	D	E	EP	INCO	01-2005	12-2008	OG
ONS	J. P. Lopes	C	I	CS	-	05-2005	04-2007	OG
EPSO	V. Miranda	R	N	NP	FCT	07-2005	08-2007	OG
MILES	J. Pereira	R	N	NP	FCT	07-2005	06-2008	OG
A. Port/Arg	M. Matos	A	I	O	-	2005	2006	F
EEM-Renov	J. P. Lopes	C	N	CS	_	2005	2006	F
Ren-Prevc.	J.N. Fidalgo	D	N	CS	-	2005	2007	OG
TEMPUS_CEFES	V. Miranda	A	E	EP	TEMPUS	2005	2006	F
Consultoria	J. P. Lopes	C	N	CS	_	2006	2006	F
DGGE-Concurs	M. Matos	C	N	CS	_	2006	2007	S
EES-UETP	J. T. Saraiva	A	I	OS	_	2006	2006	F
MCDA63	M. Matos	O	I	O	-	2006	2006	F

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ. Type (3)	Prog.	Starting date	Conclusion (prediction)	Status (4)
More-MGrids	J. P. Lopes	R	E	EP	NNE	2006	2009	S
PrevEol	C. Monteiro	D	N	CS	_	2006	2007	S
Reservas	M. Matos	D	E	CS	_	2006	2007	S

(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: S – Starting: activities initiated in 2006 and continuing in 2007; OG – On-going: activities started earlier than 2006 and continuing in 2007; F – Finished: activities ending in 2006.

- **Summary of publications**

Summary of publications in 2006

Type of publication	Number
Theses concluded in 2006 by members of the unit	4
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	38
Other publications (National meetings, local journals, etc.)	5
Total	57

- **Summary of post-graduation activities**

Summary of theses supervised by members of the unit in 2006

Type	Starting	On-going	Concluded	Total
Master	11	8	2	21
Doctoral		14	2	16
Total	11	22	4	37

- **Summary of Advanced Training Actions**

Summary of Advanced Training Actions organized for external trainees in 2006

Type	Number
Training for graduation students *(estágios curriculares)*	10
Training for others *(estágios extra-curriculares)*	2
Professional training actions *(estágios profissionais)*	
Other actions	
Total	12

- **Summary of activities of cooperation or dissemination**

Summary of items

Type	Number
Organizing conferences or meetings	1
Colaboration in papers authored by INESC Porto researchers	40
External persons directly involved in actions organized by INESC Porto	12

- **Human resources in 2006**

Summary of Unit personel at the end of 2006

Type	Education				Total	Variation (*)
	PhD.	MSc.	BSc.	Other		
R&D						
University or Politechnic Staff	9	3			12	0
INESC Porto Fellows		2	9		11	+2
Other Fellows	3	6	1		10	+3
Employees				1	1	0
Trainees	1	1			2	-2
Other	2	2			4	+1
Administrative				1	1	0
Total	15	14	10	2	41	+4

(*)   Relative to 2005, in absolute numbers.

A4.4 LIST OF PUBLICATIONS

A4.4.1 Theses concluded in 2006 by members of the unit

SECA, L.M., "Defining Operating Strategies and Service Restoration Procedures for Isolated Distribution Networks with Large-scale Integration of Dispersed Generation", November 2006, MSc Thesis, FEUP.

ALMEIDA, R., "Evaluation of the Capability of Ancillary Services Delivery by Dispersed Generation Units using Different Technologies", September 2006, PhD Thesis, FEUP.

BROWN, P.D., "Evaluation of Integration of Pumped Storage Units in an Isolated Network", July 2006, MSc Thesis, FEUP.

Win Oo, N., "Evolving agents in Energy Market Simulation", June 2006, PhD Thesis, FEUP.

A4.4.2 Books (Author)

Blank.

A1.4.3 Chapter/paper in Books

Blank.

A4.4.4 Publications (Editor)

Blank.

A4.4.5 International Journals with scientific referees

LOPES, P., MOREIRA, C., MADUREIRA, A., RESENDE, F., WU, X., JAYAWARNA, N., ZHANG, Y., JENKINS, N., KANELLOS, F., HATZIARGYRIOU, N., "Control Strategies for MicroGrid Emergency Operation", International Journal of Distributed Energy Resources, July 2006, vol.2, no.3, p.211-231.

FARIA, J., MATOS, M., "Availability Analysis and Design of Business Information Systems", International Journal of Business and Information, June 2006, vol.1, no.1, p.3-27.

LOPES, P., MOREIRA, C., MADUREIRA, A., "Defining Control Strategies for MicroGrids Islanded Operation", IEEE Transactions on Power Systems, May 2006, vol.21, no.2, p.916-924.

ALMEIDA, R., CASTRONUOVO, E.D., LOPES, J.A.P., "Optimum Generation Control in Wind Parks when Carrying out System Operator Requests", IEEE Transactions on Power Systems, May 2006, vol.21, no.2, p.718-725.

YU, W., SHEBLÉ, G., LOPES, P., MATOS, M., "Valuation of switchable tariff for wind energy", Electric Power Systems Research, March 2006, vol.76, no.5, p.382-388.

PEREIRA DE FARIA, J.A., MATOS, M., NUNES, E., "Optimal design of work-in-process buffers", INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS, February 2006, vol.99, no.1, p.144-155.

YU, W., SHEBLÉ, G., MATOS, M., "Application of Markov chain models for short-term generation assets valuation", PROBABILITY IN THE ENGINEERING AND INFORMATIONAL SCIENCES 2006, vol.20, no.1, p.127-141.

DE OLIVEIRA-DE JESUS, P.M., PONCE DE LEÃO, M.T., "Integrated Framework for Energy Cost Allocation of Distribution Systems in Liberalised Markets", International Journal of Global Energy Issues 2006.

DE OLIVEIRA-DE JESUS, P.M., DE LEÃO, T.P., KHODR, H., "Network Cost Loss Allocation Methods Evaluation under the Perspective of the Social Welfare Theory", International Journal of Global Energy Issues 2006.

YUSTA, J.M., KHODR, H., URDANETA, A.J., "Optimal Pricing of Default Customers in Electrical Distribution Systems: Effect Behavior Performance of Demand Response Models", Electric Power Systems Research 2006.

A4.4.6 National Journals with scientific referees

Blank.

A4.4.7 Conference Proceedings with scientific referees

GOMES, M., SARAIVA, T., "An Active / Reactive Power Market Dispatch Model Including Soft Constraints ", *Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector*, September 2006, Coimbra, Portugal.

HODŽIĆ, N., KONJIĆ, T., MIRANDA, V., "Artificial Neural Networks Applied To Short Term Load Diagram Prediction", *NEUREL-2006 - 8th Seminar on Neural Network Applications in Electrical Engineering*, September 2006, Belgrade, Serbia.

PEREIRA, J., VIANA, A., LUCUS, B., MATOS, M., "Constrained Unit Commitment and Dispatch Optimization", *Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector*, September 2006, ISBN 989-95055-0-1, Coimbra, Portugal. (*)

FARIA, J., MATOS, M., NUNES, E., "Integrated reliability management in industrial production systems", *Proceedings ESREL'06 - European Safety and Reliability Conference 2006*, September 2006, Estoril, Portugal, p.1181-1187.

GOMES, B., SARAIVA, T., "Market And System Operator Simulator Integrating Complex Bids And Network Constraints Using Simulated Annealing ", *Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector*, September 2006, Coimbra, Portugal.

OLIVEIRA, F.S., PEREIRA, J., SARAIVA, T., SOUSA, R.M., "Modelling the Impact of Emissions Trading on the Iberian Electricity Market", *Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector*, September 2006, ISBN 989-95055-0-1, Coimbra, Portugal.

MALKOCEVIC, D., KONJIC, T., MIRANDA, V., "Preliminary comparison of different neural-fuzzy mappers for load curve short term prediction", *NEUREL-2006 - 8th Seminar on Neural Network Applications in Electrical Engineering*, September 2006, Belgrade, Serbia.

S., G., KANJUH, S., KONJIć, T., MIRANDA, V., "Using a Fuzzy Modeling in Decision Making for Planning Under Uncertainty with Risk Analysis Paradigm", *NEUREL-2006 - 8th Seminar on Neural Network Applications in Electrical Engineering*, September 2006, Belgrade, Serbia.

NUNES, E., FARIA, J., MATOS, M., "Using fuzzy sets to evaluate the performance of complex systems when parameters are uncertain", *Proceedings ESREL'06 - European Safety and Reliability Conference 2006*, September 2006, Estoril, Portugal, p.2351-2359.

DE OLIVEIRA DE JESUS, P.M., KHODR, H., DE LEÃO, T.P., "A General Framework for the Remuneration of Costs and Benefits of Distributed Generation"", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006*, August 2006, vol.1, no.1, Caracas, Venezuela.

GOMES, M., SARAIVA, T., "A Model to Remarry the Active/Reactive Power Dispatches in Competitive Environment and Active/Reactive Marginal Prices Computation ", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006*, August 2006, Caracas, Venezuela.

HATZIARGYRIOU, N., JENKINS, N., STRBAC, G., LOPES, P., RUELA, J., ENGLER, A., OYARZABAL, J., KARINIOTAKIS, G., AMORIM, A., "MICROGRIDS – Large Scale Integration of Microgeneration to Low Voltage Grids", *CIGRE 2006 - International Council on Large Electric Systems*, August 2006, Paris, France.

MIRANDA, V., CERQUEIRA, C., MONTEIRO, C., "Previsão de potência eólica - treino de sistemas com critérios de entropia" [Wind power prediction - training mappers under an entropy criterium], *SBSE - Simpósio Brasileiro de Sistemas Eléctricos*, July 2006, Rio de Janeiro, Brasil.

DE OLIVEIRA-DE JESUS, P.M., KHODR, H., DE LEÃO, T.P., "Remuneration of Distribution Networks using a Fuzzy Multicriteria Planning Algorithm ", *Proceedings of PMAPS 2006 - The 9th International Conference on Probabilistic Methods Applied to Power Systems* , June 2006, Stockholm, Sweden.

ESTANQUEIRO, A., CASTRO, R., APELIDO, J.R., PINTO, M., LOPES, P., "How to prepare a power system for 12% wiond energy penetration: The portuguese Case Study", *NWPC´2006 - NORDIC WIND POWER CONFERENCE 22-23 MAY, 2006, ESPOO, FINLAND*, May 2006, ESPOO, FINLAND.

MARQUES, P., LOPES, P., "Impact of the Use of FACTS to Increase Robustness of Operation in Grids with Large Scale Wind Generation", *NWPC´2006 - NORDIC WIND POWER CONFERENCE 22-23 MAY, 2006, ESPOO, FINLAND*, May 2006, ESPOO, FINLAND.

DE OLIVEIRA-DE JESUS, P.M., CASTRONUOVO, E.D., PONCE DE LEÃO, M.T., "Optimal Reactive Power Provision of Wind Farms in Liberalized Markets – A Generation Viewpoint ", *Proceedings of IEEE T-D'2005 - 2005 IEEE-PES Transmission & Distribution Conference & Exposition*, May 2006, New Orleans, United States of America.

MADUREIRA, A., MOREIRA, C., LOPES, P., "Preliminary Steady State and Dynamic Analysis of a MicroGrid System", *Proceedings of ICREPQ'06 - International Conference on Renewable Energies and Power Quality*, April 2006, Palma de Mallorca, Spain.

GOMES, M.H., SARAIVA, T., "A Fuzzy Decision Model for the Active and Reactive Dispatch in Market Environment", *Proceedings of PMAPS 2006 - The 9th International Conference on Probabilistic Methods Applied to Power Systems* 2006, Stockholm, Sweden.

GOMES, M.H., SARAIVA, T., "ACTIVE / REACTIVE DISPATCH IN MARKET ENVIRONMENT AND NODAL ACTIVE / REACTIVE PRICE DETERMINATION", *X SEPOPE - X SYMPOSIUM OF SPECIALISTS IN ELECTRIC OPERATIONAL* 2006, Florianópolis, Brasil.

GOMES, M.H..., SARAIVA, T., "An Active / Reactive Power Market Dispatch Model Including Soft Constraints", *Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector* 2006, Coimbra, Portugal.

MIRANDA, V., CERQUEIRA, C., MONTEIRO, C., "Better prediction models for renewables by training with entropy concepts", *IEEE 2006 PES General Meeting* 2006, Montreal, Canada.

GOUVEIA, E., MATOS, M., "Detailed Calculation of the Fuzzy Power Flow", *Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector* 2006, Coimbra, Portugal.

COSTA, P.M., MATOS, M., "Economic analysis of microgrids including reliability aspects", *Proceedings of PMAPS 2006 - The 9th International Conference on Probabilistic Methods Applied to Power Systems* 2006, Stockholm, Sweden.

VASCONCELOS, H., LOPES, J.A.P., "ANN Design for Fast Security Evaluation of Interconnected Systems with Large Wind Power Production", *PMAPS 2006 - The 9th International Conference on Probabilistic Methods Applied to Power Systems* 2006, Stockholm, Sweden.

KHODR, H., FEIJOO, D., ZERPA, I., PEREZ, E., DE OLIVEIRA DE JESUS, P.M., YUSTA, J.M., "Efficiency Control of the Electrical Distribution Utilities Using Data Envelopment Analysis", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006* 2006, Caracas, Venezuela.

ANDRADE, A.C., MACIEL BARBOSA, F., KHODR, H., "FSQV and Artificial Neural Networks to Voltage Stability Assessment", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006* 2006, Caracas, Venezuela.

KHODR, H., SALLOUM, G., MIRANDA, V., "Grounding System Design in Electrical Substation: An Optimization Approach", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006* 2006, Caracas, Venezuela.

GOMES, B.A., SARAIVA, T., "INTEGRATION OF COMPLEX BIDS IN ELECTRICITY MARKETS", *X SEPOPE - X SYMPOSIUM OF SPECIALISTS IN ELECTRIC OPERATIONAL* 2006, Florianópolis, Brasil.

GOMES, B.A., SARAIVA, T., "Market And System Operator Simulator Integrating Complex Bids And Network Constraints Using Simulated Annealing", *Proceedings of ORMMES06 - 19th Mini EURO Conference on Operational Research Models and Methods in the Energy Sector* 2006, Setembro 2006, Coimbra, Portugal.

MIRANDA, V., OO, N.W., "New experiments with EPSO – Evolutionary Particle Swarm Optimization", *IEEE Swarm Intelligence Symposium 2006* 2006, Indianapolis, Indiana, USA.

KHODR, H., OCQUE, L., YUSTA, J.M., DA ROSA, M., "New Load Flow Method S-E Oriented For Large Radial Distribution Networks", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006* 2006, Caracas, Venezuela.

KHODR, H., ZERPA, I., DE, P.M., MATOS, M., "Optimal Phase Balancing in Distribution System Using Mixed-Integer Linear Programming", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006* 2006, Caracas, Venezuel.

PIEMONTI, C., BERMÚDEZ, J., KHODR, H., "Optimal solutions for the Venezuelan unit commitment hydrothermal systems", *Proceedings of IEEE/PES Transmission and Distribution T&D Latin America 2006* 2006, Caracas, Venezuela.

MIRANDA, V., CERQUEIRA, C., MONTEIRO, C., "Training a FIS with EPSO under an Entropy Criterion for Wind Power prediction", *PMAPS 2006 - The 9th International Conference on Probabilistic Methods Applied to Power Systems* 2006, Stockholm, Sweden.

GOMES, M., SARAIVA, T., "Mercado de Ajustes e Determinação de Preços Marginais Nodais de Potência Activa e Reactiva" [Adjustment market and calculation of nodal marginal prices for active and reactive powers], *IST Forum ENERGIA - IST Forum ENERGIA*, November 2006, Lisboa, Portugal.

LOPES, P., "Limites Técnicos à Integração de Energia Eólica na Redes", March 2006, Actas das III Jornadas de Engenharia Electrotécnica do IPTomar - "Energia sem Limites".

GOMES, B.A., SARAIVA, T., "Integration of Renewable Energy in Electricity Markets", *ENER'06 - ENER'06 – Conferência sobre Energias Renováveis e Ambiente em Portugal* 2006, Figueira da Foz, Portugal.

A4.4.8 Other Publications

RESENDE, F., MOREIRA, C., LOPES, P., "Identification of Dynamic Equivalents for MicroGrids with High Penetration of Solar Energy using Artificial Neural Networks", *PV-Hybrid and MiniGrid - 3rd European PV-Hybrid and Mini-Grid Conference*, May 2006, Aix en Provence, France.

LOPES, P., "New Technical and Conceptual Solutions to Allow a Larger Increase of the Integration of Intermittent Energy Sources in Power Systems", May 2006, X SYMPOSIUM OF SPECIALISTS IN ELECTRIC OPERATIONAL AND EXPANSION PLANNING.

MOREIRA, C., RESENDE, F., LOPES, P., "Estratégias de Reposição de Serviço Utilizando Microgeração ", *IST Forum ENERGIA - IST Forum ENERGIA* 2006, Actas IST Forum Energia, Vol.2, No.1 , Lisboa, Portugal.

LOPES, P., "Oferta e Eficiência Energética em Sistemas Eléctricos" 2006, Gazeta da Física (Número especial dedicado à Conferência As Energias do Presente e do Futuro), vol.29.

VASCONCELOS, H., LOPES, J.A.P., "Security Evaluation of Interconnected Systems with Large Wind Power Production using Artificial Intelligence Systems", *AIESP - ARTIFICIAL INTELLIGENCE IN ENERGY SYSTEMS AND POWER, 2006* 2006, Funchal, Portugal.

(*) Co-authored with UESP researchers.

A4.5 LIST OF JOURNALS

Journal	Number of papers
Electric Power Systems Research	2
IEEE Transactions on Power Systems	2
International Journal of Business and Information	1
International Journal of Distributed Energy Resources	1
International Journal of Global Energy Issues 2006	2
International Journal of Production Economics	1
Probability in the Engineering and Information Sciences 2006	1
TOTAL	10

A4.6 LIST OF PATENTS

Blank.

A4.7 LIST OF PROTOTYPES

DSM modules
Developed under EFACEC-DMS
Demo Place: EFACEC
Development Period: 1999-2006

Fuzzy Analysis of Power Systems Platform
Developed under Prime
Demo Place: INESC Porto
Development Period: 2006

Blocks for Dynamic Simulation of Variable Speed Synchronous Wind Generators
Developed under Prime
Demo Place: INESC Porto
Development Period: 2006

A4.8 LIST OF THESES SUPERVISED BY MEMBERS OF THE UNIT DURING 2006

PhD Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Naing Win Oo	FEUP	Vladimiro Miranda José Nuno Fidalgo	INESC Porto/FEUP	Evolving agents in Energy Market Simulation	2006

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Rogério Almeida	FEUP	João Peças Lopes	INESC Porto/FEUP	Evaluation of the Capability of Ancillary Services Delivery by Dispersed Generation Units using Different Technologies	2006
Ângelo Mendonça	FEUP	João Peças Lopes	INESC Porto/FEUP	Development of Robust Control Systems for Stabilizing Power Oscillations in Systems with Large Scale Wind Power Integration	2007
António Ferreira da Silva	ISEP	José Nuno Fidalgo Aristides Castro	INESC Porto/FEUP ISEP	Application Techniques of Adaptive Control and Artificial Intelligence	2007
Carlos Moreira	FEUP	João Peças Lopes	INESC Porto/FEUP	Identifying and Developing Emergency Procedures for the Operation of Micro-Generators in Isolated Grids and Participation in Black-Start Strategies	2007
Eduardo Gouveia	FEUP	Manuel Matos	INESC Porto/FEUP	Development and Evaluation of Investment Plans for the Transmission Activity in a Liberalized Environment	2007
Fernanda Resende	FEUP	João Peças Lopes	INESC Porto/FEUP	Identification of Control Procedures in Micro-Generation Islanding Conditions	2007
Maria Helena Vasconcelos	FEUP	João Peças Lopes José Nuno Fidalgo	INESC Porto/FEUP	Identification of Efficient Preventive Control Procedures Exploiting Security Evaluation Structures Derived using Machine Learning Techniques	2007
Mário Helder Gomes	FEUP	João Tomé Saraiva	INESC Porto/FEUP	New Mechanisms for Electricity and Ancillary Services Markets	2007
Paulo Jesus	FEUP	Maria Teresa de Ponce Leão	INESC Porto/FEUP	Remuneration of distributed generation: a holistic approach	2007
Paulo Mendes da Silva	FEUP	Maria Teresa de Ponce Leão	INESC Porto/FEUP	Integrated Methodologies for Distribution Planning	2007
Paulo Moisés	ESTV	Manuel Matos	INESC Porto/FEUP	Regulation and Planning of Electric Distribution Systems	2007
Pedro Marques	FEUP	João Peças Lopes	INESC Porto/FEUP	Dynamic security assessment in interconnected power systems with large scale integration of wind generation	2007
Francisco Font Bell	FEUP	João Tomé Saraiva	INESC Porto/FEUP	Planning the Expansion and Reinforcement of Electric Networks Considering Uncertainties Related with the Generations Assets	2008
Mauro da Rosa	FEUP	Vladimiro Miranda	INESC Porto/FEUP	Reliability of Power Systems with distributed generation	2008
Nuno Gil	FEUP	João Peças Lopes	INESC Porto/FEUP	Elaboration of Procedures and Criteria for Definition of Limits of Eligibility of Acceptance of Renewable Production in Isolated Networks	2008
Sanderson Emanuel Uchôa de Lima (*)	FCUP	José Luís Santos Vladimiro Miranda	INESC Porto/FCUP INESC Porto/FEUP	Optical fiber sensors	2009
1	2	3	4	5	6

1 – Name of the post-graduation student
2 – Institution where the thesis is submitted; if the host institution for the student is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester
3 – Name of supervisor or supervisors
4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid
5 – Title of the thesis
6 – Predicted year of conclusion and delivery – will be taken in account in summary tables
(*) Thesis to be counted in UOSE.

MSc Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Luís Miguel Seca	FEUP	João Peças Lopes	INESC Porto/FEUP	Defining Operating Strategies and Service Restoration Procedures for Isolated Distribution Networks with Large-scale integration of Dispersed Generation	2006
Paul Brown	FEUP	João Peças Lopes	INESC Porto/FEUP	Evaluation of Integration of Pumped Storage Units in an Isolated Network	2006
Bogdan Lucus	FEUP	Manuel Matos Jorge Pereira	INESC Porto/FEUP	Constrained Unit Commitment and Dispatch Optimization	2007
Célia Tenente	FEUP	Cláudio Monteiro	INESC Porto/FEUP	Project optimization of Building Integrated Photovoltaics	2007
Filipe Tadeu Oliveira	FEUP	Manuel Matos	INESC Porto/FEUP	Investments and quality of service in regulated electric distribution systems	2007
Helena Maria Soares	FEUP	Cláudio Monteiro	INESC Porto/FEUP	Small Wind Turbines Integration in Urban Environment	2007
João Guincho	FEUP	João Tomé Saraiva	INESC Porto/FEUP	Marginal Remuneration of RNT – Evaluation from 1998 to 2005	2007
João Nuno Sousa	FEUP	Cláudio Monteiro	INESC Porto/FEUP	Modeling of Short-term Wind Power Forecasting	2007
Jorge Filipe Gomes Pereira	FEUP	Manuel Matos	INESC Porto/FEUP	Comparing the efficiency of secondary schools using DEA	2007
José António Simões	FEUP	João Tomé Saraiva	INESC Porto/FEUP	Optimal Power Flow Model Using Sequential Linear Programming	2007
José Carlos Sousa	FEUP	João Tomé Saraiva	INESC Porto/FEUP	Estimate of the Remuneration of Hydro Station in Electricity Markets	2007
José Luís Pascoal	FEUP	Cláudio Monteiro	INESC Porto/FEUP	Geocomputational Reliability Analysis of Power Distribution Systems	2007
José Luís Soares	FEUP	Cláudio Monteiro	INESC Porto/FEUP	Electric networks optimization for Offshore Renewable Energy Generation	2007
Luís Ribeiro	FEUP	Claudio Monteiro	INESC Porto/FEUP	Geographic Web Services for Evaluation of Small Renewable Energy Project	2007
Marco Paulo Ferreira	FEUP	Manuel Matos	INESC Porto/FEUP	Fast evaluation of the security of supply at the Generation level	2007
Mário de Sousa Neto	FEUP	Cláudio Monteiro	INESC Porto/FEUP	Remuneration of renewable energy technologies	2007
Pedro Brito Parreira	FEUP	Cláudio Monteiro Vladimiro Miranda	INESC Porto/FEUP	Error Distribution Optimization of Wind Power Forecasting Models	2007
Pedro Lima	FEUP	Cláudio Monteiro	INESC Porto/FEUP	Optimization of Large Photovoltaics Power Plants.	2007
Ricardo Ferreira	FEUP	Manuel Matos	INESC Porto/FEUP	Reserve adequacy in Power Systems with a high penetration of wind power	2007
Susana Silva	FEP	José Nuno Fidalgo Dalila Fontes	INESC Porto/FEUP FEP	Impact analysis of small dispersed generation under different regulation directives	2007
Tiago Morais	FEUP	João Peças Lopes	INESC Porto/FEUP	Study of the operation of wave energy conversion systems	2007
1	2	3	4	5	6

1 – Name of the post-graduation student
2 – Institution holding the course where this student in enrolled in; if the host institution is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester
3 – Name of supervisor or supervisors
4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid
5 – Title of the thesis
6 – Predicted year of conclusion and delivery – will be taken in account in summary tables

A4.9 ORGANISATION OF INTERNATIONAL SCIENTIFIC EVENTS

MCDA 63 – Organization (in collaboration with UESP and with the support of FEUP and DEEC) of the 63rd meeting of the European Working Group for Multiple Criteria Decision Aid, in 30-31 March 2006, under the topic "Performance evaluation (individuals, institutions, services, etc).". 50 participants from 15 countries attended the meeting.

A4.10 ADVANCED TRAINING

The research projects that were carried out under contract with PT Inovação (PTIN) had, besides their specific goals, a common goal of giving advanced training to young researchers who would join PTIN at the end of the projects. This objective was reached and during 2006 three researchers joined PTIN at the end of the respective projects - "Secure IP Multicast of Video Channels", "MPEG-21 - management and adaptation of multimedia content" and "nPVR – networked Personalized Video Recorder".

A4.11 OTHER CONTRIBUTIONS TO THE OBJECTIVES OF ASSOCIATE LABORATORY

UNIT: USE – POWER SYSTEMS	Thematic Line
Support to evaluation phase of the international public tender for new wind generation connection points in Portugal.	Electric sector and integrated territorial planning
Support to the legislative process for the electric sector in Azores.	
Participation in the advisory board of the "Technological Plan", a government initiative.	
Participation in the implementation of the projects MIT-Portugal (Energy and Sustainability area) and CMU-Portugal, launched by the portuguese government.	
Participation, as Portuguese representative, in the Smart Grids Mirror - the EU initiative that prepared the FP7 research work program for Energy.	

A4.12 ANALYSIS AND ASSESSMENT OF DEVIATIONS RELATIVE TO FORMER PLANNING

A4.12.1 Comparison with strategic actions or policy lines defined in the plan of the previous year

The activity of the Power Systems Unit in 2006 followed in general the strategic lines defined in the planning exercises. However, it was not possible to launch some internal initiatives regarding new areas and software valorization, due to the external constraints mentioned in the next section. On the other hanoned, the unit was able to address the multiple challenges faced in 2006, regarding new projects and partnerships, extension of projects after successful conclusion and also saw a fruitful result of stragec moves made in the past.

A4.12.2 Cases of success, problems met, internal and external conditioning factors

In terms of external conditioning factors, the main event of 2006 was the public tender for new wind generation connection points in Portugal, that lasted for the entire year (and continues in 2007). Besides the consulting activity carried out by the Power System Unit, one of the coordinators (J. Peças Lopes) was appointed as the president of the jury. This corresponds to the recognition of the Power Systems Unit (and its members) role in the wind energy area, but was also a big burden in terms of occupation, limiting some internal initiatives (as mentioned in the previous section).

Another external constraint is related with the Iberian Electricity Market, whose launching has been systematically postponed. For that reason, some internal initiatives related to that specific area were not considered as a priority.

Regarding projects, we saw in 2006 the opening of the market for LV consumers in Portugal, supported by the load profiles developed by the Power Systems Unit (in collaboration with INESC Coimbra) and we negotiated and start important new projects with EFACEC, with APREN and with REN and REE (the Transmission System Operators of Portugal and Spain). These successes of 2006 are also the main challenges for 2007.

A5. UNIT: USIC – INFORMATION AND COMMUNICATIONS SYSTEMS

A5.1 SHORT DESCRIPTION OF THE UNIT

The Information and Communication Systems Unit (USIC) studies, develops and promotes integrated solutions in the communication and information systems fields. The Unit performs several types of activity, namely: research, development, technology transfer, consulting, auditing and advanced training.

These activities are carried out in several sectors. Important partners and clients may be referenced in the following areas: public administration (local, regional and central administration), healthcare, telecommunications, transports, industry, commerce and services.

The Unit is composed by a heterogeneous team, with skills in diversified areas: computer systems, office automation, telecommunications, computing sciences, software engineering and geographic engineering.

The Unit acts independently from technology suppliers, complementing its partners and enabling them to select and implement the solutions needed for the modernization of their activities.

USIC has special skills in GIS – Geographic Information Systems, not only in their applications but also in interoperability of systems from different vendors and technologies. This has allowed successful projects enhancing communication among different actors in the market or public administration, as well as different departments inside the same institution.

The solid know how detained at USIC allows its researchers to cooperate in task forces with the other Units of INESC Porto, giving the institution its recognized strength in building up technically strong teams for projects in all areas, which usually require skills in information systems.

A5.2 ACTIVITIES DEVELOPED IN 2006

A5.2.1 National programmes

Blank.

A5.2.2 European programmes

e-ASLA - INTERREG III B - Definition of one Framework for Open Source and Commercial Software integration to support the administrative processes in Small Local Authorities (with less than 20.000 inhabitants) with multilingual support.

CoopNAV – INTERREG III A - Creation of a trans-border distributed infrastructure for business coolaborationin the area of shipbuilding.

A5.2.3 Other programmes, consulting, services

IMOPPI - Consulting activities for IMOPPI (Real Estate and Public Construction Market regulator), enabling implementation of e-government solutions.

m-GIS - Development of a technological framework that enables the creation of interoperable GIS products or services for mobile platforms for Portugal Telecom Inovação.

INVICTA TV – Customization of a management system for multiplatform content diffusion (wap, teletext and infographics).

PROT-N - Platform for the elaboration and public discussion of a regional master plan (Norte) and participation in the thematic working group ICT for the same regional master plan.

LINK-IVDP – Consultancy activities for the definition of a GIS architecture for SIVV-RDD (Douro Wine Region Information System), maintaining interoperability with SIVV (national wine production information system).

Geoforum – Development and customization of a democracy tool that supports asynchronous and georeferenced public discussions, for example, between citizens and public administration (local, regional, national), providing a collaborative and geographical platform, enabling, for instance, the discussion of master plans (city, environmental impact, etc). This product is being commercialized by Medidata and is already operational at Águeda Municipality, where it was first used to publicly debate city mobility issues.

UPTV – Development and installation of a corporate TV solution for the Oporto's University.

SIGCMP – Development of GIS services for the Oporto Municipality.

SIGEP - Specific GIS developments for the Oporto's Emergency Management Integrated System, for Oporto's Civil Government (local representation of the Internal Administration Ministry).

SIVIDA - Specification of an Information System for AIDS data collection and processing, for the Healthcare High Commissioner.

PROT-OVT – Platform for the elaboration and public discussion of a regional master plan (Oeste e Vale do Tejo) and participation in the thematic working group ICT for the same regional master plan.

POAP CCRDN – Process modelization/reengineering and specific GIS developments for internal management application of the Norte Regional Coordination and Development Commission, the regional branch of the Environment, Territory Planning and Regional Development Ministry.

SEGALAB – Modernization of SEGALAB Information System, including activities such as business process modeling and reengineering, specification, technology transfer and training. Innovative approaches are planned such as inclusion collaboration with customers and suppliers via Web and mobility support for field teams. SEGALAB is a laboratory specialized in food and veterinary tests.

PROT-C - Platform for the elaboration and public discussion of a regional master plan (Centro).

A5.3   SUMMARY OF RESULTS OF THE RESEARCH ACTIVITIES OF THE TEAM MEMBERS

- Projects

Summary of projects developed in 2006

Type of Activity (1)	No. Projects (2)			Total Income (€)
	N	E	I	
R - Research		2		95.443
D - Development	5			87.740
C - Consulting	9			206.024
A – Advanced training				
T – Technology Transfer	1			15.000
O - Other				
TOTAL	15	2		404.207

Summary of relative distribution ofsources of income

Financing (3)	Status (4)			Total Income (€)
	S - Started	OG– On-going	C - Concluded	
NP – National Programmes				
EP – European Programmes		22,93%	0,68%	95.443
CS – Consulting and services	55,99%	8,02%	11,63%	308.764
O – Other R&D sources				
OS – Other sources				
Total	55,99%	30,95%	12,31%	404.207

Summary of projects developed in 2006

Name of the project	Respons.	Type Proj. (1)	Degree of Intern. (2)	Financ.		Starting date	Conclusion (prediction)	Status (4)
				Type (3)	Prog.			
IMOPPI	Rui Barros	C	N	CS	-	03-2003	03-2007	OG
e-ASLA	Rui Barros	R	E	EP	Interreg	02-2005	06-2007	OG
m-GIS	Artur Rocha	T	N	CS	PT IN	03-2005	04-2006	F
Consultadoria	P.Monteiro	C	N	CS	-	01-2006	-	OG
Invicta TV	José Correia	D	N	CS	InvictaTV	03-2006	-	OG
PROT-N	A.Gaspar	C	N	CS	CCDRN	12-2006	06-2008	S
LINK-IVDP	Artur Rocha	C	N	CS	LINK	04-2006	12-2006	F
Geoforum	Artur Rocha	D	N	CS	Medidata	02-2006	12-2007	S
UPTV	J.P.Rodrigues	D	N	CS	UP	01-2006	12-2006	F
SIGCMP	A. Carvalho	D	N	CS	CMP	01-2006	03-2007	S
SIGEP	Artur Rocha	D	N	CS	GCP	07-2006	12-2006	F
SIVIDA	José Correia	C	N	CS	ACS	07-2006	01-2007	S
PROT-OVT	A. Gaspar	C	N	CS	CCDR-LVT	07-2006	12-2007	S
POAP CCDRN	Artur Rocha	C	N	CS	CCDR-N	12-2006	12-2007	S
SEGALAB	A. Gaspar	C	N	CS	Segalab	10-2006	12-2007	S
PROT C	A Gaspar	C	N	CS	CCDR-C	12-2006	12-2007	S
CoopNav	A.Gaspar	R	E	EP	Interreg	10-2004	06-2006	F

(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: S – Starting: activities initiated in 2006 and continuing in 2007; OG – On-going: activities started earlier than 2006 and continuing in 2007; F – Finished: activities ending in 2006.

- **Summary of publications**

Summary of publications in 2006

Type of publication	Number
Theses concluded in 2006 by members of the unit	
Books (author)	
Chapter/paper in books	1
Publications (editor)	1
Papers in International Journals with scientific referees	1
Papers in National Journals with scientific referees	
Conference Proceedings in events with scientific referee and selection	12
Other publications (National meetings, local journals, etc.)	1
Total	16

(*)   papers co-authored with researchers of other Units

- **Summary of post-graduation activities**

Summary of theses supervised by members of the unit in 2006

Type	Starting	On-going	Concluded	Total
Master	13	10	4	27
Doctoral	1	4	1	6
Total	14	14	5	33

- **Summary of Advanced Training Actions**

Summary of Advanced Training Actions organized for external trainees in 2006

Type	Number
Training for graduation students *(estágios curriculares)*	10
Training for others *(estágios extra-curriculares)*	
Professional training actions *(estágios profissionais)*	
Other actions	
Total	10

- **Summary of activities of cooperation or dissemination**

Summary of items

Type	Number
Organizing conferences or meetings	2
Colaboration in papers authored by INESC Porto researchers	
External persons directly involved in actions organized by INESC Porto	

- **Human resources in 2006**

Summary of Unit personel at the end of 2006

Type	Education				Total	Variation
	PhD.	MSc.	BSc.	Other		(*)
R&D						
University or Politechnic Staff	6	1			7	+1
INESC Porto Fellows			1	1	2	-3
Other Fellows						
Employees		3	9		12	0
Trainees			1		1	+1
Other			1		1	0
Administrative			1		1	0
Total	6	4	13	1	24	-1

(*)   Relative to 2005, in absolute numbers.

A5.4 LIST OF PUBLICATIONS

A5.4.1 Theses concluded in 2006 by members of the unit

Blank.

A5.4.2 Books (Author)

Blank.

A5.4.3 Chapter/paper in Books

CARVALHO, A., RIBEIRO, C., DE SOUSA, A.A., "A Spatio-Temporal Database System Based on TimeDB and Oracle Spatial", September 2006, IFIP-International Federation for Information Processing, vol.205.

A5.4.4 Publications (Editor)

RAMALHO, J., CORREIA LOPES, J., SIMÕES, A., "Actas da XATA2006, Quarta Conferência XML: Aplicações e Tecnologias Associadas (Portalegre, 9 e 10 Fevereiro 2006)", Actas da XATA'2006 XML - Aplicações e Tecnologias Associadas, February 2006, Portalegre, Portugal.

A5.4.5 International Journals with scientific referees

FERREIRA, H., FERREIRA, D., "AN INTEGRATED LIFE CYCLE FOR WORKFLOW MANAGEMENT BASED ON LEARNING AND PLANNING", International Journal of Cooperative Information Systems, December 2006, vol.15, no.4, p.485. (*)

A5.4.6 National Journals with scientific referees

Blank.

A5.4.7 Conference Proceedings with scientific referees

VILLATE, J.,"Teaching Dynamical Systems with a Computer Algebra System"*, Proceedings of SIIE' 06 - 8th International Symposium on Computers in Education*, October 2006, Léon, Espanha, p.125-131.

TEIXEIRA, D.D., PEREIRA, F.J., CARVALHO, J.F.B., LEITÃO, S., BENCATEL, R., VILLATE, J., RESTIVO, M.T., CHOUZAL, M.F.C., ALMEIDA, F.G., "A Michelson Interferometer for a Virtual Laboratory "*,*

Proceedings of M2D'2006 - Fifth International Conference on Mechanics and Materials in design, July 2006, Porto, Portugal, p.553-554.

VILLATE, J.,"Remote and Virtual Laboratories for Engineering Education"*, Proceedings of M2D'2006 - Fifth International Conference on Mechanics and Materials in design*, July 2006, Porto, Portugal, p.551-552.

FALCÃO E CUNHA, J., LEITÃO, M.J., PASCOAL FARIA, J., PIMENTA MONTEIRO, A., CARRAVILLA, M.A., "A Methodology for Auditing e-Voting Processes and Systems used at the Elections for the Portuguese Parliament"*, e-voting - The 2nd International Workshop on Electronic Voting* 2006, Vienna, Austria.

FLORES, N., AGUIAR, A., "Design Pattern Recovery to Improve Framework Understanding"*, WCRE2006-DPD4RE2006 - WCRE2006-13th Working Conference on Reverse Engineering DPD4RE2006-1st International Workshop on Design Patterns Detection for Reverse Engineering* 2006, Benevento, Italia.

SANTOS, P., AGUIAR, A., "Drag-and-Dock Design Pattern"*, OOPSLA2006/PLOP2006- PLOP2006- Pattern Languages of Programming Design 2006 em conjunto com OOPSLA2006-Internacional Conference on Object-Oriented Programming, Systems, Languages and Applications* 2006, Portland, Estados Unidos da América.

AGUIAR, A., DAVID, G., "Patterns for Documenting Frameworks – Part II" "*, EuroPLoP™ 2006 - 11th European Conference on Pattern Languages of Programs* 2006, Irsee, Alemanha.

AGUIAR, A., DAVID, G., "Patterns for Documenting Frameworks – Part III"*, OOPSLA2006/PLOP2006 - PLOP2006- Pattern Languages of Programming Design 2006 em conjunto com OOPSLA2006-Internacional Conference on Object-Oriented Programming, Systems, Languages and Applications* 2006, Portland, Estados Unidos da América.

ROCHA, A.J.D.S., CARVALHO, A., "Proposta para um Web Feature Service Temporal"*, Actas da XATA'2006 XML - Aplicações e Tecnologias Associadas*, February 2006, Actas da XATA'2006, Portalegre, Portugal, p.212-223.

MARINHO, F., VIEGAS, P., LOPES, J.A.C., "Utilização de SVG na Visualização de Sinópticos"*, Actas da XATA 2006 - XATA2006-XML:Aplicações e Tecnologias Associadas*, February 2006, Portalegre, Portugal, p.99-112.

CARVALHO, A., RIBEIRO, C., DE SOUSA, A.A., "Spatial TimeDB - Valid Time Support in Spatial DBMS", IADC 2006 - 2nd International Advanced Database Conference 2006, San Diego, Estados Unidos América.

FACHADA, M., LIMA, J., FERREIRA, J.J., "Embedding Comunication Features within an existing authoring tool"*, IADIS 2006 - IADIS International Conference* 2006, San Sebastian, Espanha.

A5.4.8 Other Publications

VILLATE, J., "E-Learning na Universidade do Porto. Caso de Estudo: Física dos Sistemas Dinâmicos 2004/2005 " 2006, Relatório.

(*) Co-authored with UESP researchers.

A5.5 LIST OF JOURNALS

Journal	Number of papers
International Journal of Cooperative Information Systems	1
TOTAL	1

A5.6 LIST OF PATENTS

Blank.

A5.7 LIST OF PROTOTYPES

Business Process Modelator
Developed under (Project Name): e-ASLA
Demo Place: INESC Porto
Development Period: 2006

Framework m-GIS
Developed under (Project Name): m-GIS
Demo Place: Portugal Telecom Inovação - Aveiro
Development Period: 2005-2007

Platform PROTN
Developed under (Project Name): PROT-N
Demo Place: Web (online: http://protovt.inescporto.pt)
Development Period: 4Q 2006

Geoforum
Developed under (Project Name): Geoforum
Demo Place: Câmara Municipal de Águeda (online)
Development Period: 2006

Corporate TV System
Developed under (Project Name): UPTV
Demo Place: Oporto University
Development Period: 2006

Public Discussion Forum
Developed under (Project Name): SIGCMP
Demo Place: Câmara Municipal do Porto
Development Period: 2006

Emergency Management System
Developed under (Project Name): SIGEP
Demo Place: CDOS-Porto (online: http://www.sigep.gov.pt)
Development Period:

Platform PROTOVT
Developed under (Project Name): PROT-OVT
Demo Place: Web (online: http://protovt.inescporto.pt)
Development Period: 4Q 2006

Platform PROTC
Developed under (Project Name): PROT-C
Demo Place: Web (online: http://protc.inescporto.pt)
Development Period: 4Q 2006

A5.8 LIST OF THESES SUPERVISED BY MEMBERS OF THE UNIT DURING 2006

PhD Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Maria Clara S. P. Silveira	FEUP	Raúl Vidal João Pascoal Faria	FEUP INESC Porto/FEUP	A Reutilização de Requisitos no Desenvolvimento e Adaptação de Produto de Software	2006
Ana Cristina R. Paiva	FEUP	Raúl Vidal João Pascoal Faria	FEUP INESC Porto/FEUP	Automated specification based-testing of graphical user interfaces	2007
Artur Rocha	FEUP	Ademar Aguiar Augusto Sousa	INESC Porto/FEUP	Enabling Cooperative Distributed Support for GI-based Decision Making	2008
João António Gonçalves Sousa M. Carvalho	FEUP	Jaime Villate	INESC Porto/FEUP	Interacção de Feixes de Partículas com Cristais	2008
André Restivo	FEUP	Ademar Aguiar Ana Moreira	INESC Porto/FEUP UNL/FCT	Disciplined Reuse of Aspect-Oriented Software	2009
Daniel Oancea	FEUP	João Correia Lopes Rui Moreira	INESC Porto/FEUP INESC Porto/UFP	Adaptive Multimedia Components in Distributed Environments	2009
1	2	3	4	5	6

1 – Name of the post-graduation student

2 – Institution where the thesis is submitted; if the host institution for the student is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester

3 – Name of supervisor or supervisors

4 – Affiliation institutions of supervisors – ex: INESC Porto/FEUP, FCTUC, P. Univ. Comillas Madrid

5 – Title of the thesis

6 – Predicted year of conclusion and delivery – will be taken in account in summary tables

MSc Dissertations

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Guilherme de Oliveira Dutra	FEUP	Jaime Villate	INESC Porto/FEUP	Portal colaborativo para Gestão de Conteúdos e Colaboração	2006
José Rios Fonseca	FEUP	Ademar Aguiar	INESC Porto/FEUP	Descompilação de Código Máquina	2006
Manuel Magalhães Freire	FEUP	Ademar Aguiar	INESC Porto/FEUP	Gestão de versões num Modelo relacional com aplicação a um configurador de Redes Eléctricas	2006
Nuno Honório Flores	FEUP	Ademar Aguiar	INESC Porto/FEUP	Engenharia Reversa de Padrões em Arquitecturas Reutilizáveis	2006
Alexandra Marieiro Cabral	FEUP	Vítor Martins João Correia Lopes	FAP INESC Porto/FEUP	Sistema Digital de Comunicação Urbana	2007
Bruno Miguel Meira Pestana	FEUP	João Correia Lopes Maria João Silva	INESC Porto/FEUP ESE/IPP	Interfaces Lúdicas para Comunicação Multissensorial Ubíqua no 1º ciclo do Ensino Básico	2007
Carlos Torres Quental	FEUP	João Correia Lopes	INESC Porto/FEUP	Acesso distribuído a fontes heterógeneas de dados	2007
Cláudio Lopes Simões de Madureira	FEUP	Ademar Aguiar	INESC Porto/FEUP	Integração e Avaliação do Impacto de uma ITIL/CMDB nos Serviços do CICA	2007
Conceição Vilas Boas	FEUP	Ademar Aguiar	INESC Porto/FEUP	Método de avaliação ex-post de projectos de Sistemas de Informação na Administração pública	2007
Fernando Monteiro Gomes	FEUP	João José P. Ferreira	INESC Porto/FEUP	Oportunidades de Inovação na Aplicação de redes de comunicação móvel a sistemas de automação de redes de distribuição de energia	2007
Filipe Teixeira Campos	FEUP	Ademar Aguiar	INESC Porto/FEUP	Estudo de arquitecturas e desenvolvimento de ferramentas em plataformas Mobile para sistemas SCADA	2007

Author	Instit.	Supervisor	Instit.	Title or topic	Conc. Date
Jorge Esparteiro Garcia	FEUP	Rui Camacho João Correia Lopes	FEUP INESC Porto/FEUP	Web assistant for collaborative and automatic data analysis- The WebCAD system	2007
Mafalda Vaz Moreira	FEUP	João José P. Ferreira	INESC Porto/FEUP	Gestão de Processo Criativo na Inovação ao nível dos serviços de consultadoria em Sistemas de informação e comunicação	2007
Manuel José Novais Malheiro F.Sousa	FEUP	Jaime Villate	INESC Porto/FEUP	Duas filosofias de implementação da Plataforma Moodle	2007
Margarida Maria Silva R. Fachada	FEUP	João José P. Ferreira	INESC Porto/FEUP	Integração de um modelo de Comunidade Virtual "Peer-to-Peer" em conteúdos tutoriais Multimédia, usando ferramentas de Authoring, para e-Learning	2007
Maria do Céu Moreira Lobarinhas	FEUP	João José P. Ferreira	INESC Porto/FEUP	Empreendedorismo, o MIETE no contexto de uma Aprendizagem ao longo da vida	2007
Nuno Miguel Moreira Baldaia Queiroz	FEUP	Ademar Aguiar	INESC Porto/FEUP	Extending Eclipse to Support Agile Documentation	2007
Orlando Abel Neves Gonçalves	FEUP	Jaime Villate	INESC Porto/FEUP	A utilização do Moodle numa escola de ensino Básico/Secundário-Estudo de caso na Disciplina de Matemática do ensino recorrente	2007
Patrícia Barrosa Filipe	FEUP	João Correia Lopes Mário Florido	INESC Porto/FEUP FCUP/LIACC	Biologia Computacional em Haskell	2007
Paulo Alexandre R. Cunha Fernandes	FEUP	João Pascoal Faria	INESC Porto/FEUP	Independência de Fonte de Dados e Gestão de Alterações em Editores de Diagramas de Redes	2007
Pedro Madureira	Portucal ense	Filomena Lopes Ângelo Martins	Portucalense INESC Porto/ISEP	O sincronismo entre a evolução natural e permanente dos processos e sua representação em sistemas de modelação	2007
Ricardo Ferreira Rodrigues Pinto	FEUP	Ademar Aguiar	INESC Porto/FEUP	Audit Documentation Framework	2007
Rui Barros	FEUP	Ademar Aguiar	INESC Porto/FEUP	Definição de uma Framework para Municípios de Pequena Dimensão	2007
Rui Reis Gomes	FEUP	João Pascoal Faria	INESC Porto/FEUP	Testes de interfaces de Voz	2007
Sara Campos de Araújo	FEUP	João Pascoal Faria José M. Cruz	INESC Porto/FEUP	Segurança na circulação de Informação clínica	2007
Vagner David Pinto Morais	FEUP	João Pascoal Faria	INESC Porto/FEUP	Web-Based Build, Configuration and Testing Tool for a Grid Application	2007
Lígia Alexandra F. Silva	FEUP	Paulo Pinho Ademar Aguiar	FEUP INESC Porto	Modelo de Ordenamento do Território	2008
1	2	3	4	5	6

1 – Name of the post-graduation student

2 – Institution holding the course where this student in enrolled in; if the host institution is other than INESC Porto, write the name in brackets. Ex. FEUP, for a student enrolled in a course at FEUP and having INESC Porto as host institution; FCUP (Univ. Manchester), for a student enrolled in a course at FCUP and staying at the University of Manchester

3 – Name of supervisor or supervisors

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5 – Title of the thesis

6 – Predicted year of conclusion and delivery – will be taken in account in summary tables

A5.9 ORGANISATION OF INTERNATIONAL SCIENTIFIC EVENTS

<u>XATA2006 — XML: Aplicações e Tecnologias Associadas</u>
Portalegre, Portugal
February 9-10, 2006
João Correia Lopes – Editor and Organizing Committee
(*) In collaboration with UTM.

VECPAR – 7th International Meeting on High Performance Computing for Computational Science
Rio Janeiro, Brasil, July 10th-13th, 2006
João Correia Lopes - Organizing Committee; Proceedings Editor

A5.10 ADVANCED TRAINING

Blank.

A5.11 OTHER CONTRIBUTIONS TO THE OBJECTIVES OF ASSOCIATE LABORATORY

UNIT: USIC – INFORMATION AND COMMUNICATIONS SYSTEMS	Thematic Line
Platforms for the elaboration and discussion of regional master plans (PROT) for CCDR - Lisboa e Vale do Tejo, CCDR - Centro and CCDR – Norte.	Power Sector and Integrated Territorial Planning
Emergency management system (implementation of GIS components).	Power Sector and Integrated Territorial Planning

A5.12 ANALYSIS AND ASSESSMENT OF DEVIATIONS RELATIVE TO FORMER PLANNING

A5.12.1 Comparison with strategic actions or policy lines defined in the plan of the previous year

According to the strategic actions defined for 2006:

Scientific activity reinforcement

A new PhD from FEUP joined the Unit, with a background in Physics, but involved in Open Source Software and Computing Science.

Two employees received PhD scholarships from FCT, starting in 2007, demonstrating the quality of USIC resources and lowering substantially the operation costs for next year.

There has been an increase in the number of supervised theses (an increase of 7 MSc and 3 PhD theses), which will certainly lead to an increase in the number of publications in the next years. However, in the mean time, the publication level decreased (from 20 to 16 publications).

Internal innovation process, a new culture for the Unit

Several pratical training activites were developed in order to introduce innovative approaches in the generation of new research or consulting proposals. These included thematic brainstorm meetings, ideia development, market research and partnership identification. Several meetings with potential partners were performed as well as exploratory telephone contacts, particularly to exploit the Geoforum product.

Consulting services reinforcement

There has been reinforcement in the exploitation of potential opportunities, but their results were visible only in the second half of 2006.

Proposals were presented, independently or in conjunction with new partners to: CCDR-LVT, CCDR-C, CCDR-N, CEM, APDL, Governo Civil do Porto, INH, POAP, AdI, IVDP, APP, SCMP, SEGALAB, Operação Norte. New ideias were also proposed to AIRC and RAVE.

New partnerships have been constructed or reinforced in the process, with: Accenture, IDATE, Consulglobal, FLUP, EID, LINK, FORDESI, IVDP, CVRVV, ADVID, DRAEDM, DRATM, just to name the pivots of several enlarged consortia.

Presentation of proposals to national calls

Several proposals were presented, namely to POAP and Operação Norte.

Use of our network of contacts in the creation of new proposals, turning sporadic contacts into solid partnerships

This approach was used with Accenture, taking advantage of an exploratory meeting held in 2005 and with some partners from a previous IST project (MEDSI) in the last IST calls, which resulted in a new project (CAALYX) for 2007.

Presentation of European proposals, namely in the area of GIS and eGOV

- CAALYX - Complete Ambient Assisting Living Experiment, presented to IST and addressing Objective 2.6.2 "Ambient Assisted Living (AAL) for the Ageing Society".

- CIMSAP - Crisis Information Management Service Oriented Approach, presented to the PASR-2006 (Preparatory Action in Security Research).

CAALYX was approved and started in January 2007.

Increased participation in conferences and results publication

The level of conference proceedings decreased slightly from 14 to 12 and the number of papers in international journals decreased from 3 to 1. The overall publication level decreased from 20 to 16 publications. This was a partial consequence of the high proportion of consulting and services projects. The increase in supervised theses will certainly provide better results in the future.

A5.12.2 Cases of success, problems met, internal and external conditioning factors

2006 was a very difficult year for USIC. The majority of funded projects ended (5 projects in 2005 vs 1 in 2006) and due to the economic crisis the consultancy and services market shrinked, particularly in the area of public administration, facing tight budgetary restrictions. Private companies, tipically dependent of public funding for R&D&TT activities refrained from contracting additional services.

Although there was reinforcement in the presentation of new proposals, there were almost no approvals in the first semester. Only after the first signs of economic growth were visible, situation started to change. By the very end of the year the situation changed completely, leading to understaffing of most projects, as they started to be approved one after the other. However it was too late to save the year and USIC ended with a negative result. Since in the last years USIC had difficulties to cover its fixed costs, DIP decided to start a debate about the future of this Unit.

Nevertheless it must be pointed out the effort performed by the team, which tried to the very last day of 2006 to maximize revenue, gain new projects and, at the same time, execute the allocated activities in most cases in understaffing situations. But due to the ever increasing decision windows, some projects will only start in early 2007, creating good perspectives for the upcoming year, combined with decreased fixed operations costs (2 employees with PhD scholarships and 1 allocated to an Excellence Centre) of more than 100.000 euros.

There were however success cases. A Platform for the elaboration and public discussion of regional master plans was very successful and it being used by three regional planning authorities. USIC was also invited for the working groups dealing with ICT and regional development in two of these master plans. This effort opened a new activity line which appears very promising in the near future.

INESC PORTO
PLAN FOR 2007

INTRODUCTION
The hope of a mitigation of the continued recession or stagnation of the Portuguese economy allow an expectation for some change in the capacity of INESC Porto to sign direct research and development contracts with industrial partners or the administration. This aspect of the activity of INESC Porto is instrumental to the feasibility of its model. However, one has observed that the Unit leaders are extremely cautious in predicting radical changes in their profile activity.

The objective for 2005 is to maintain at the general same level the indices of scientific productivity at the level reached in 2005 and 2006, consolidating them and demonstrating their sustainability – especially at the level of indicators such as the number of publications in journals and the number of concluded PhD thesis. This objective is set considering that 2006 was the last year of the contract as Associate Laboratory and the increase in more than four times of those indices since 2002 seems to give a strong support to the policies followed of promotion of scientific excellence.

The effort of participation in the EU 6th Framework Programmes will continue. INESC Porto is the single Portuguese instiutution with the largest participation in those European Programmes and this fact speaks for itself.

Valorization of the output of projects is the new emphasis for the coming years, starting in 2007 with a nnew research Unit (UITT – Innovation and technology Transfer Unit) that will lead to the creation of scientific knowledge at INESC Porto about the Innovation process and to activities generating economic value from research. The objective of increasing the number of patents, of product licensing and of new spin-offs will be the focus of an organized effort.

PREDICTED PERFORMANCE INDICES
The following table displays a set of indices about the predicted activity of INESC Porto during 2007. These indices were collected from cautious predictions made by the research Units.

UNIT	UTM	UOSE	UESP	USE	USIC	UITT	Total
PhD Theses to be concluded	7	4	5	7	1	0	24
MSc Theses to be concluded	29	3	8	12	22	1	75
On-going PhD and MSc Theses	36	6	24	12	30	2	110
Short courses	3	0	0	2	0	1	6
Development projects and consulting contracts	15	1	6	13	23	3	61
Visitors (foreign students, post-docs)	5	2	4	10	0	1	22
Publications	50	29	37	49	16	4	185
Participation in the organization of conferences or international meetings	6	1	3	1	3	0	14

Some of these estimates are obviously conservative, namely in what concerns publications. This conservative estimate has been observed consistently in the recent years. As the estimated number of publications for 2007 is higher than the one forecasted for 2006 in the 2005 planning, one hopes that in 2007 one will witness again a growth in publications.

PREDICTED SCIENTIFIC RESULTS
At INESC Porto the research activities take place in each research Unit – with different degrees of importance, as well as different impact on other activities as graduate education and training, or technology transfer. In this report the option has been to mention only a selected number of foreseen results that may nevertheless be representative of the diversity of the activity to be developed. The following table, therefore, summarizes the most important scientific results expected during 2005, in each research Unit of INESC Porto, together with an identification of their scientific areas.

UNIT: UTM – Telecommunications and Multimedia	Area
1. Scheme for managing the mobility of terminals between heterogeneous access networks, controlled by the terminals, and taking into consideration QoS requirements. Infrastructure based on public keys and on DNS, which provides secure communications to moving devices and networks that can be temporarily disconnected from the Internet. Scheme for discovery of communicating devices, and autoconfiguration of devices and networks that can lead to the efficient and dynamic formation of personal and home networks. Mechanism that improves the utilization of resources and its fairness, and controls network congestion, in scenarios comprising mesh and moving networks that carry significant amount of real time and multicast traffic. Mechanism for managing the dynamics of multi-layer multicast trees, which improve resource utilization and that can be used in scenarios comprising moving devices and moving networks. Mechanism for the automatic and dynamic selection of communication channels in ad-hoc and mesh networks. Mechanism for integrating harmoniously ad-hoc networks into infrastructure networks. Network and cross layer solution adequate for the transport of multi-dimensional video over UMTS and WLAN access networks. Techniques for compressing packet headers in WLAN, which are adequate for the transport of real time traffic.	Communications Networks and Services
2. Specification of a content management system using p2p technologies and allowing semantic content search. Evaluation of the use of open protocols (MPEG-21 ER and SLAs) to exchange control information between different modules of a distributed content management system. Definition of strategies to collect context information. Definition of a core set of descriptors to hold contextual information and of extended subsets specific for different application areas. Specification of a methodology to measure the impact of context information and the degree of user satisfaction. Specification of software modules to generate or capture contextual information. Initial specification of data model based on MPEG-21, associated indexing strategies and search engine. Development of objective metrics for evaluating object-based spatial segmentations of video. Development of multimodal techniques for background modeling and subtraction, robust to illumination changes, shadows and background clutter. Development of image segmentation algorithms based on non-parametric Bayesian models. Development of new perceptually motivated methodologies for the analysis and processing of complex audio signals. Development of automatic description methods based on information provided by heterogeneous sensors, with an emphasis on intelligent surveillance.	Multimedia Technologies and Systems
3. Development of methodologies for the design of EBG components and antennas. Development of new devices based on the EBG technique for chromatic dispersion equalization in optical communication systems. Development of models for the assessment of the impact of device nonlinear distortion on the "UWB over fiber" system. Development of transversal filters for electrical dispersion equalization in coherent optical systems. Development, fabrication, and evaluation of a prototype chip of an	Optical and Electronics Technologies

oscillation based low-power LNA BIST scheme.	
Development of a linearity correction methodology and prototype of an adaptive RF amplifier.	
Development of testing methodologies and tools for A/D converters that take advantage of existing reconfigurable logic blocks.	
Fabrication and evaluation of a novel multiplexed olfactory bulb in CMOS-VLSI.	
Development of effective linearization procedures of RF Power Amplifiers.	
UNIT: UOSE – Optoelectronics and Electronic Systems	**Distributed Multimedia Systems**
1. Dissolved oxygen optical fiber sensor	Sensors
2. Thin films for photovoltaic cells	Microfabrication
3. Novel distributed sensor based on optical nonlinearities	Sensors
4. Optoelectronics packaged devices	Micropacking
UNIT: Manufacturing Systems Engineering	**Area**
1. Development of a new concept for planning and controlling the supply network for the production of customized cars in very short lead times	Enterprise Cooperation Networks
2. Finalise the analysis of the potential for the implementation of high performance enterprise cooperation networks in the North of Portugal	Enterprise Cooperation Networks
3. Finalise the development and implementation of a system to support knowledge management in communities from the civil construction industry	Enterprise Cooperation Networks
4. Finalise the development and implementation of a system for the management of standardisation for civil construction works definition	Integration
5. A system for enterprise integration in the shoe industry using workflow techniques	Integration
6. A scheduling system for decorative high pressure laminates production.	Planning and scheduling
7. A general tool for operations scheduling	Planning and scheduling
8. A new concept for shoe production in one step	Operations management
UNIT: Power Systems	**Area**
1. Long-term reserve definition in power systems with large wind power penetration	Security of supply
2. New optimization algorithms based on Evolutionary Particle Swarm Optimization	Optimization
3. Active/reactive integrated dispatch methodology for market operation	Electricity Markets
4. Dynamic simulation tools for multi-microgrid operation	Distribution Systems
5. Methodology for simultaneous tuning of PSS installed in wind generators to assure robust operation in power systems with large scale wind penetration	Power Systems Analysis
UNIT: Information and Communication Systems	**Area**
1. e-ASLA framework for local public administration	N/A
UNIT: Innovation and Techonology Transfer	**Area**
1. Development of "Value chain Model for R&D and Innovation activities"	Innovation Management
2. Understand the impact of organizational practices behind entrepreneurship behaviour – case study analysis	Entrepreneurship
3. Define best practices concerning technology transference	Technology Transfer

FACILITIES AND EQUIPMENT

Since 2002 INESC Porto has a new building and no significant change in the facilities is foreseen during 2007. Also, the facilities for the UOSE Unit, at the Faculty of Sciences, will be maintained.

INESC Porto will continue to try to benefit from the nationally funded research to renovate part of its laboratory equipment. In 2005 the institution had finally access to funds to renew infrastructures and heavier equipment, namely in Laboratories devoted to optical communications and optics and the new laboratories were installed during 2006, largely increasing the capacity of INESC Porto in those fields.

ASSOCIATE LABORATORY IN 2007

2006 is the last year of contract as Associated Laboratory and there is the general feeling that the duties and compromises were fulfilled and respected.

The impact of this contract has been extremely positive and is measured by the (in some cases remarkable) difference between in performance indicators in 2001 and the same indicators in 2006, while maintaining a healthy financial and economical balance at a level of income of almost M€7.0.

The preparation for a new cycle will be done with great hopes that this special relation with FCT may be renewed.

José Manuel Mendonça
President of INESC Porto