INESC PORTO

PLAN FOR 2005

INTRODUCTION

Although we are confident that new policies and a larger budget for Science and Technology will improve our perspectives, an institution like INESC Porto must rely partially on direct R&D contracts with companies and public administration. This is both a need and an obligation. In such a case, the fact that the Portuguese economic environment will continue to be of recession or very modest growth advise that any predictions for 2005 must be formulated cautiously. A strict policy of confining costs will be continued without harming the global objectives of high level research with international quality and scope. This will be partially accomplished by the continued participation in a significant number of projects in the 6th Framework Programme of the EU, which is seen as a strategic guideline and will help setting the standard for quality in research and in the internationalisation of activities.

INESC Porto is confident that the Associated Laboratory Programme will be reinforced in political support by the new Government, and therefore will continue recruiting high profile researchers at Post-Doc level, in the international market.

In 2005, INESC Porto will also continue to develop a special effort in order to recover activity in the area of innovation and technology transfer. The desired effect is an increase in number of direct contracts with industry, services and public administration, which are essential to the good balance and financial health of the institution and also to keep its activity focused on the reality of the markets. Experience has shown, however, that without economic recovery of the country, this target is difficult to meet. INESC Porto will also reinforce its support to the emergence of spin-off companies from its research activities, continuing the policy of recent years.

PREDICTED PERFORMANCE INDICES

The following table displays a set of indices about the predicted activity of INESC Porto during 2005. These indices were collected from cautious predictions made by the research Units.

UNIT	UTM	UOSE	UESP	USE	USIC	Total
PhD Theses to be concluded	7	7	4	5	1	**24**
MSc Theses to be concluded	26	3	15	9	1	**54**
On-going PhD and MSc Theses	30	5	40	10	3	**88**
Short courses	2	0	2	1	0	**5**
Development projects and consulting contracts	15	0	10	11	14	**50**
Visitors (foreign students, post-docs)	4	0	2	10	0	**16**
Publications	50	10	28	48	8	**144**
Participation in the organization of conferences or international meetings	10	0	1	1	0	**12**

Some of these estimates are obviously conservative, namely in what concerns publications. One must be aware that there is still a broad margin to introduce planning discipline in this activity of publication.

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. Algorithms for adaptive equalization of rooms in a transparent way using psychoacoustics and high-resolution frequency analysis synthesis.	Audio Signal Processing
2. Development of a video coded statistical multiplexer using perceptual based metrics. Development of video segmentation algorithms based on depth maps. Improvements on the MPEG4 and MPEG7 video objects editor.	Image Analysis and Synthesis
3. Application of the nonlinear four-wave mixing effect in photonic crystal fibers to optical packet switching in optical networks using the optical label swapping technique. Design and development of novel RF/microwave components based on the electromagnetic band gap (EBG) technology that find applications in wireless and optical communication systems. Development of new products to extend the portfolio of Fibersensing.	Optical Communications
4. Publication of the book "Dynamic Characterization of A/D Converters". Design and fabrication of an ASIC for the control and generation of clock signals. Design and test of embedded RF circuits, and development of a software tool for the automatic generation of test dedicated processors. Design of an IC with a CMOS analogue implementation of an olfactory cortex model.	Microelectronics
5. Methodology for integrating ad-hoc into structured networks. Monitoring Testing System for 4G wireless access networks. Mechanisms for mapping layer three QoS parameters into heterogeneous layer two QoS parameters. Discovery and auto-configuration of Ambient Networks. Support of QoS and Mobility in Ambient Networks. Ambient Intelligence testbed. IP and secure IP multicast. Optimised mobility mechanisms.	Network Architectures and Services
6. Enhancement of the functionality of the Integrated Management Supervisor for QoS-aware and adaptable audiovisual services. Implementation of Service Level monitoring functionality in networked audiovisual services. Development of modules that use metadata to take decisions to adapt audiovisual content to meet network constraints, terminal capabilities and user preferences. Development of a data model supporting standardised metadata schemes for efficient searches to audiovisual repositories. Development or improvement of software modules to implement parts of the MPEG-21 standard, namely part 7 (Digital Item Adaptation).	
UNIT: UOSE – Optoelectronics and Electronic Systems	**Area**
1. Optical fibre sensors for biomedical and eco-monitoring applications.	Sensors
2. Integrated monitoring system with wireless transmission and web page interface.	Sensors
3. Novel optical fiber devices.	Sensors
UNIT: Manufacturing Systems Engineering	**Area**

1. Platform for the support of Cooperation and services for the marine industry of the North of Portugal and Galiza.	Enterprise Cooperation Networks
2. Design of a platform for business processes integration and coordination between manufacturers and suppliers of custom, environment and comfort made shoes.	Enterprise Cooperation Networks
3. Design of a Maintenance Management System to be supplied by a network of high-tech SME's to producers of manufacturing equipments.	Enterprise Cooperation Networks
4. Design and development of several innovative manufacturing equipments and intra-company logistic systems for the shoe industry.	Intra-company Logistics
5. Optimization Algorithms for Production scheduling using specific heuristics and Metaheuristics.	Operations Management
6. Innovative and automatic scheduling system for a large number of looms in the textile industry.	Operations Management
7. Support to the implementation of Enterprise Information Systems in a group of industrial companies.	Consulting
UNIT: Power Systems	**Area**
1. Dynamic equivalents of micro-sources	Operation planning
2. Enhanced control strategies for delivering primary reserve from double-fed induction wind generators	Power Systems Analysis Electricity Markets
3. Models and procedures for the estimation of losses by voltage level in a distribution system	Electricity Markets Distribution Management
4. Multi-Agent system prototype for electricity markets	Electricity Markets, AI
5. Wind-hydro operation optimal strategies in a market environment	Electricity Markets Renewable Energy
UNIT: Information and Communication Systems	**Area**
1. MEDSI – Prototype (crisis management tool)	Geographic Information Systems
2. SCOPE project – Implementation of software certification process	Information Systems
3. SIGDIC project – Content management prototype	Information Systems

FACILITIES AND EQUIPMENT

Since 2002 INESC Porto has a new building and no significant change in the facilities is foreseen during 2005. 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 the computing equipment. In 2005 the institution will finally have access to funds to renew infrastructures and heavier equipment, namely in Laboratories devoted to optical communications.

ASSOCIATE LABORATORY IN 2005

During 2005 the expectation is to timely have the funds to fulfil the duties deriving from the statute of Associate Laboratory. The selection of new senior Post-Docs to be contracted will continue and the decision will be based not only on the absolute qualities of the candidates but also on their research interests, which will have to fit INESC Porto's own development strategy.

Pedro Guedes de Oliveira

President of INESC Porto