

ASSOCIAÇÃO FRAUNHOFER PORTUGAL RESEARCH





MANAGEMENT REPORT

2009

FOREWORD

FRAUNHOFER: A NEW AMBITION FOR PORTUGAL'S R&D

Portugal and Germany agreed in 2007 to establish a long-term collaboration to explore mutual interests in the areas of science and technology.

Within this collaboration framework, Associação Fraunhofer Portugal Research was founded at the end of 2008 to own and operate the Fraunhofer Portugal Research Center for Assistive Information and Communication Solutions (AICOS) – a partnership between Fraunhofer-Gesellschaft, the biggest European society in applied R&D, and the prestigious University of Porto.

Adopting the well tested – and undisputedly successful – model operated in Germany, Fraunhofer Portugal promotes applied research that drives economic development and serves the wider benefit of society. Its services are solicited by customers and contractual partners in industry, the service sector and public administration.

During the year 2009 the first experiences with the market and customers were leading to a sharpening of the focus of activities of Fraunhofer AICOS, which was jointly discussed and agreed between the scientists and the management of AICOS as well as Fraunhofer colleagues from Germany.

The focus of AICOS will be described in a Strategic Research Agenda (SRA) and will cover specific topics being part of three main areas of research in order to serve the two primary target user groups 'Ageing and Elderly' and 'Connected in Developing Countries':

- i. Human Computer Interaction (HCI):
 - User & Social Experience
 - Mobile & Future Devices
 - Evaluation & Usability
- ii. Information Processing:
 - Context Awareness
 - Retrieval
 - Multimodal Information Fusing
- iii. Autonomic Computing:
 - Remote & Self Management,
 - Configuration, and
 - Control

It is important to understand that AICOS will monitor the result of its activities very closely and considers the topics above also subject to change if indicated by the market. In addition, and having our target user groups in mind, we serve the demands of our customers first and will extract the results related to those groups from our projects rather than limiting our activities to customers that perfectly fit.

In order to cover areas that are not yet in the focus of the customers that we are able to win, national and international research programs, as well as internal projects, will help us to build a comprehensive know-how and competence, in order to get recognized as experts in the field.

Doing so we feel prepared to tackle the strong challenge that we are facing with regards to the economic environment, given we do have a chance to implement our activities in the physical environment that was supposed to be provided during 2008, as the planned achievements in 2010 are considered by AICOS management to be a fundamental indicator about our future development, namely of the performance in the next two years and the subsequent assessment of the initial 5 year activity period.

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FUNDING MODEL

Fraunhofer-Gesellschaft and FCT agreed in the 12th of September 2007 in a funding model according to which, during its start up phase, FhP should evolve to a tripartite funding model, similar to the one used in Germany by FhG.

Thus, in order to guarantee the financing of FhP's activity and its research centers during the start up phase of the project (5 years), FhP will receive institutional funding in the form of subventions from FCT and FhG.

The institutional funding is endorsed with the objective of "reinforcing the national scientific and technological capacity in a European context, as well as attracting qualified human resources".

The baseline for institutional funding determines that these subventions will be granted in progressively smaller amounts over the first five years, thus creating the need for FhP to follow an efficient business model mainly financed by external revenues coming from research projects.

External revenues should be guaranteed through revenues from research projects and development projects and/or contracts celebrated with third parties within FhP's activity fields, revenues from intellectual property rights and revenues from licensing the commercial exploitation of products and services resulting from FhP's R&D results.

OVERVIEW OF FRAUNHOFER PORTUGAL

OUR VALUES
CORPORATE PROFILE
FRAUNHOFER STRUCTURE IN PORTUGAL
Fraunhofer Portugal AICOS
Founding Associates

OVERVIEW OF FRAUNHOFER PORTUGAL



Fraunhofer Portugal is an organization focused in researching and developing solutions – technologies, processes, prototypes and services – that enable the society to master the challenges it will face in the future.

To do so, Fraunhofer Portugal expects to maintain a focus on companies as partners, by promoting and undertaking applied research in an international context, of direct utility to private and public enterprise and of wide benefit to society as a whole. By developing technological innovations and novel system solutions for our customers, Fraunhofer Portugal helps to reinforce the competitive strength of the economy in the region, throughout Portugal and in Europe. Its research activities are aimed at promoting the economic development of our industrial society, with particular regard for social welfare and environmental compatibility.

We share an ambition – to add truly demand driven R&D capacities to the Portuguese R&D landscape. We would like to contribute to shift the paradigm regarding technology-based innovation made in collaboration with the National Scientific and Technological System (NSTS) entities, and we aspire to affirm ourselves as an agent of change in the interface between business and science.

Following the two main topics 'Ambient Assisted Living' (AAL) and 'Information and Communication Technology for Developing Countries' (ICT4D), the variety of themes to which our Research Center AICOS dedicates its projects – health and well-being, security, energy, communications, environment and mobility – is a powerful demonstration of the focus we put into people, their real needs, and the impact that people have in our creative process, in the ideas we explore and the R&D projects we develop.



To the users of our solutions we offer an increment in their quality of life by developing relevant, and most of all, practical solutions to their needs. To our industrial clients we offer the opportunity to increment their innovation dynamics by focusing our R&D efforts in developing new prototypes and services capable of contributing to a bigger differentiation and internationalization of their businesses. To all of those who invest in the promotion of the NSTS, we offer a committed collaboration in contributing to the growing qualification of our human resources, allowing Portuguese students and scientists to enroll in market-oriented R&D activities and the practical application of the generated scientific knowledge.

OVERVIEW OF FRAUNHOFER PORTUGAL

OUR VALUES

Fraunhofer Portugal success is built around a set of shared values that aggregate and mobilize the organization's action:

Market focus – above all, our focus is the market! Through the windows of our lab, we maintain a proactive look regarding our external environment, always alert for new scientific discoveries or emerging tendencies that might open business opportunity windows to our customers, and, mainly, to the end-users of the solutions developed together with our clients. We are aware of the impact this attitude can have in the directions we take in our R&D activities, and we explicitly reward the behaviors that might contribute the strengthening of this dynamic.

Utility of the developed solutions – our work is based in technologies that are approaching the necessary critical mass to become economically attractive for companies to incorporate them into their portfolios and product development strategies. We assume a compromise to develop R&D solutions that satisfy the needs of its users, and allow FhP to substantiate its capability to create value through technologically-based innovation.

Ethics – we value a behavior based in honesty and sincerity within all daily professional relationships that should emerge from the respect for individual opinions, as well as their contribution to the necessary collective compromise.

Social Responsibility – we try to act as a source of inspiration and cause a positive impact in society through the way our R&D is able to contribute to the improvement of sustainability and people's quality of life. Our collaborators search a feeling of pride in belonging to an institution capable of showing itself as useful to society.

Constructive and positive attitude – we recognize that R&D is an activity subject to diverse challenges, whose permanent evolution implies that some of our options in terms of R&D might reveal less correct. In that sense, we cultivate an open mentality, oriented to team work, which looks to maximize the benefits of all people involved, nevertheless assuming the inherent risk of this type of activity.

CORPORATE PROFILE

The Associação Fraunhofer Portugal Research is a non-profit, private, collective association that detains and actively manages research institutions, which, in accordance to DL 125/99, constitute autonomous nucleae from the association, although juridically non-personified. This is the actual juridical form in which FhP detains and operates FhP-AICOS, an applied R&D unit in the area of information and communication technologies.

Fraunhofer Portugal's Statutes contemplate the possibility of establishing additional research units whenever FhP detects in the market a sustained demand for R&D services applied to a determinate area of scientific knowledge.

FRAUNHOFER STRUCTURE IN PORTUGAL

FOUNDING ASSOCIATES OF FHP: FhG Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung CCILA Câmara de Comércio e Indústria Luso-Alemâ FhP Associação Fraunhofer Portugal Research FhP-AICOS Fraunhofer Portugal Research Center for Assistive Information and Communication Solutions

Fraunhofer Portugal AICOS

The spirit of the people taking part in FhP-AICOS activities is to contribute to the democratization of access to the Information and Knowledge Society (IKS) through the development of applied R&D solutions in the area of Information and Communication Technology (ICT) strongly oriented to markets, to companies and the needs of its clients.

Fraunhofer Portugal AICOS, given its focus in the areas of assistive information and communication solutions, constitutes a new approach to ICT by the Fraunhofer-Gesellschaft, and

contributes to the creation of competences in an area of great relevance for the collective future of Europe: the Ambient Assisted Living (AAL). Developing R&D in the areas of AAL means offering to the end-users of solutions – especially elderly and less-favored persons – an increment in their quality of life, allowing a broader democratization of access to ICTs, reducing barriers to a bigger (and better) usage of technology, boosting the participation of these segments in the information and knowledge society (IKS).

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FOUNDING ASSOCIATES

Fraunhofer-Gesellschaft

Research of practical utility lies at the heart of all activities pursued by the Fraunhofer-Gesellschaft. Founded in 1949, the research organization undertakes applied research that drives economic development and serves the wider benefit of society. Its services are solicited by customers and contractual partners in industry, the service sector and public administration.

At present, the Fraunhofer-Gesellschaft maintains more than 80 research units in Germany, including 59 Fraunhofer Institutes. The majority of the 17,000 staff are qualified scientists and engineers, who work with an annual research budget of €1.6 billion. Of this sum, more than €1.3 billion is generated through contract research. Two thirds of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. Only one third is contributed by the German federal and *Länder* governments in the form of base funding, enabling the institutes to work ahead on solutions to problems that will not become acutely relevant to industry and society until five or ten years from now.

Affiliated research centers and representative offices in Europe, the USA and Asia provide contact with the regions of greatest importance to present and future scientific progress and economic development.

With its clearly defined mission of application-oriented research and its focus on key technologies of relevance to the future, the Fraunhofer-Gesellschaft plays a prominent role in the German and European innovation process. Applied research has a knock-on effect that extends beyond the direct benefits perceived by the customer: Through their research

and development work, the Fraunhofer Institutes help to reinforce the competitive strength of the economy in their local region, and throughout Germany and Europe. They do so by promoting innovation, strengthening the technological base, improving the acceptance of new technologies, and helping to train the urgently needed future generation of scientists and engineers.

As an employer, the Fraunhofer-Gesellschaft offers its staff the opportunity to develop the professional and personal skills that will allow them to take up positions of responsibility within their institute, at universities, in industry and in society. Students who choose to work on projects at the Fraunhofer Institutes have excellent prospects of starting and developing a career in industry by virtue of the practical training and experience they have acquired.

The Fraunhofer-Gesellschaft is a recognized non-profit organization that takes its name from Joseph von Fraunhofer (1787–1826), the illustrious Munich researcher, inventor and entrepreneur.

German Portuguese Chamber for Industry and Trade

The German Portuguese Chamber for Industry and Trade – *Câmara de Comércio e Indústria Luso-Alemã* (CCILA) – founded in 1954, is part of an international network with a total of 117 chambers of commerce, with delegations and representations of the German Federal Republic in 80 countries.

With over 1000 associates in Portugal and Germany, the objective of the Chamber is to enhance the economic relations between the two countries, supporting its associates by offering a diverse set of services. The chamber supports mainly average-sized German companies with their entrance in the Portuguese market. The same way, the Portuguese companies are supported in the beginning or expansion of their commercial activities in Germany.

MESSAGE FROM THE PRESIDENT OF THE EXECUTIVE BOARD

2009 Overview

As our first year of standalone operation closes, I am presenting our 2009 activity with positive results, but also with concerns regarding our future.

On the one hand side we were able to achieve the first turnover by project activities as expected. Also the project back-log at the end of 2009 is showing the potential to achieve the activity goals for 2010 with regards to the turnover.

But the global macroeconomic landscape remained under difficult conditions during 2009 and will be in 2010 as well. In addition to being affected by the global crisis, Portugal's structural macroeconomic indicators, and private investment - often significantly delayed or decreased – altogether, cast serious difficulties over the medium term.

The present report seals an intense year in Fraunhofer Portugal's and AICOS' development activity:

- Kicking-off on the 1st January 2009, our staff became formally FhP employees (having terminated their temporary contracts with UP Rectorate). Since then, the team of our FhP-AICOS centre has grown significantly with Scientists, MSC students and support staff;
- ii. As expected, our business development efforts delivered their first results: we joined forces with 2 Portuguese companies in project applications to QREN SI&IDT that have been approved, had our first European project approved, and we drove our first contract research project with an international industrial partner to a successful closure;
- iii. In addition, the team was seriously engaged in

international project acquisition through EU-funded projects targeting at ICT aspects for developing countries and AAL, and some important high level efforts directed at preparing a framework for the deployment of AAL products and services at the national level (QREN funded activity of the Health Cluster Portugal) were taken;

- iv. On the administrative front, we have initiated a strong (on-going) effort to prepare and align our operation with the challenging legal-administrative framework for Science and Technology organizations receiving public funding in Portugal. We were facing the need to strengthen our support team with additional resources, which does not benefit the scientific to support staff desired rate and has contributed to an unexpected amount of overhead costs;
- v. We have elected our Supervisory Board, appointed our Fiscal Board, set-up our Scientific Board –which now are an active and valuable governance structure of the Association and we have had a session of the Fraunhofer-Portugal Collaboration Steering Committee. In addition we are currently in the process to form the Scientific Advisory Board. Moreover, our General Assembly approved a new version of the Associação Fraunhofer Portugal Statutes in order to proceed with the process to obtain the 'Utilidade Pública' status;
- vi. We have hosted the public presentation of Fraunhofer Portugal's and FhP-AICOS' activity. On the 29 September we hosted at Círculo *Universitário do Porto* a major event that was attended by the Portuguese Minister for Science and Technology: Prof. José Mariano Gago, both





the Portuguese and the German State Secretaries for Science and Technology: respectively Prof. Manuel Heitor and Prof. Frieder Meyer-Kramer, Fraunhofer-Gesellschaft's Senior Vice-President: Dr. Alfred Gossner, the President of FCT: Prof. João Sentieiro, the Rector of UP: Prof. Marques dos Santos. Within the scope of the ceremony a couple of structurally important agreements were signed: The Co-Operation Agreement between FhG and FCT, the Co-Operation Agreement between UP, FhP and FhG, as well as the financing agreement between FhP and FCT.

vii. During the year 2009 the first experiences with the market and customers were leading to a sharpening of the focus of activities of Fraunhofer AICOS, which was jointly discussed and agreed between the scientists and the management of AICOS as well as Fraunhofer colleagues from Germany. The focus of AICOS will be described in a Strategic Research Agenda (SRA) and will cover specific topics being part of three main areas of research in order to serve the two primary target user groups 'Ageing and Elderly' and 'Connected in Developing Countries': Human Computer Interaction (HCI), Information Processing, and Autonomic Computing.

Although innovation is considered a key driver to recover from economic downturns, along 2009 we could observe that companies tend to significantly cut and/or delay R&D budgets, as well as we could sense that engaging potential national and international clients proved longer than expected and pulling discussions to a final proposal and decision level increasingly difficult.

In a move targeted at overcoming the difficulties felt on the industry side, we have increased our effort to participate in EU-funded projects targeting at ICT aspects for developing countries. On the national level AICOS drives coordinated efforts to place some longer term activities in order to prepare a framework for the deployment of AAL products and services in Portugal.

Notwithstanding, our operation begins to show an interesting resilience. In fact, we were able to post a pleasant performance in the year, especially during its last quarter, where our AICOS Centre efficiently taped into a last minute industry project request that strongly contributed to the full year achievement.

Fraunhofer Portugal's results for 2009 reflect the start-up profile of our operation, specially our cost structure profile, which denotes the organization's effort in implementing its activities, hiring the necessary staff to further advance the Institution's Research Potential, and equipping its labs with the infrastructure needed to develop internal pilot projects and contract research activities - all the while preparing to move into larger facilities that are currently still under construction.

MESSAGE FROM THE PRESIDENT OF THE EXECUTIVE BOARD

Fraunhofer Portugal AICOS Public Presentation

Ceremony Group photo

Outlook 2010

The challenging economic landscape, the administrative overhead and, most notably, being unable to grow in our current premises, creates a number of challenges to our ability of delivering a set of operating result in line with the ambitious planning we have. Nevertheless, we confidently look towards 2010 as an opportunity to further pursuit our ambition of leading the R&D market through an absolute differentiation in the approach to our customers and in the quality of the service Fraunhofer offers.

Our activity in 2010 will aim at – wherever possible – recover the delay introduced in our operation:

- i. Construction and new offices:
- ii. Set Up of ICT4D group in Lisbon and start of first projects related;
- iii. Launch of AAL4ALL (national AAL flagship initiative);
- iv. Increased third party project acquisition efforts, namely, Industry projects (through the strengthening of the business development team);
- v. Growth from 26 to almost 60 persons (including students) in the 12 months to December 2010;
- vi. Assignment of first group leaders;
- vii. Introduction of 'Actual Indirect Cost EU' Accounting Mechanism (sophisticated cost & profit centre analysis).

The delays introduced in our development make it still untimely to predict our potential to fulfill the proposed plans in the future. We are aware of the importance the coming year will have in the development of the operation, and we acknowledge the effort needed to meet the goals for 2010, specially because we consider ourselves still in a learning curve with regards to the best possible way to address and attract Portuguese customers.





We are very concerned with regards to the extent the delay of the building will influence our capability to set up the capacity of human resources needed to carry out the projects which will contribute to the 2010 results. Regarding the mix of projects, we might observe the need to shift the balance towards national and international R&D programs, if it turns out, that the effects of the macro economic crisis will last and lead to a long term reduction of industrial R&D expenses.

We are nevertheless confident that the experience of our founding associate Fraunhofer-Gesellschaft – with a proven record of market knowledge – in addition to the energy, ambition and creativity of our people, will contribute decisively to our ability to accomplish our mission with success.

Dirk EliasPresident of the Executive Board

OUR ACTIVITY

	2009 INDUSTRIAL, SCIENTIFIC AND ACADEMIC ACTIVIT HP-AICOS
	External Projects Activity
	Internal Projects Activity
	Academic Activities
THE	R&D MARKET
	Evolution and Global Trends
	Evolution and Trends in Portugal
	PEOPLE

OUR 2009 INDUSTRIAL, SCIENTIFIC AND ACADEMIC ACTIVITY AT FHP-AICOS

We would like to share some noteworthy industrial, scientific, and academic activities that FhP-AICOS team has been focusing on.

External Projects Activity

Among the activities being developed by our FhP-AlCOS Centre with industrial customers we'd like to highlight a project awarded by Deutsche Telekom that was completely developed with Portuguese technology and knowledge. After the project was completed we have received the following feedback from the customer:

"Our first collaboration was a full success: The Team of AICOS delivered the results on time and even exceeded our expectation as our partners introduced very valuable enhancements beyond the initial project idea. Based on this experience we are looking forward to exiting future projects with AICOS."

This expression of interest has in fact turned into reality and AICOS was awarded an additional project by DTAG in the last quarter of the year, focusing on content and end systems that has the goal of showing how DTAG may approach a new

market segment by providing a variety of applications and content services that to a large extent make use of the existing infrastructure and already available services. The results of this project will also show how usability barriers, that often lead to purchase barriers, can be lowered by thoughtful design of the User Experience.

On the national front AICOS and two industrial customers had two QREN funding applications approved that confirmed its two first Portuguese industry projects.





Waste Comm

A system that is able to measure the usage-level of waste containers and sending this information reliably to the waste-collection headquarters. With this information the optimal routes of the waste collection vehicles are defined. AICOS focus is on the development of the low-cost communication infrastructure of the system and optimal waste-collection route calculation.

During 2009 the first phase of this project was developed and concluded. At the moment we are discussing with the customer the options to proceed into phase 2.

Mobile CCTV

The goal of the project is to enhance a Supervisory Control and Data Acquisition (SCADA) system with mobile support. Currently the monitoring infrastructure comprises a set of cameras spread around a large area, and a central station where the monitoring of the video feeds and the management of issues/events is done. From the central station, the operators assign issues to the different field agents. The agents carry a mobile device that provides additional information to the

agents in the field, such as images from the event site. The main goals are to reduce reaction time to events and improve the management of events.

During 2009 the first phase of this project was developed and concluded. At the moment we are discussing with the customer the options to proceed into phase 2.

Regarding international project activities at the EU research programs level, FhP-AICOS had a project approved – CAALYX-MV – a project that is somehow a sequel to the ongoing eCAALYX project.

CAALYX-MV

CAALYX-MV main objective is to widely validate and refine the health monitoring technological solution developed within the CAALYX project. Three field trials will be performed, namely in Spain, Italy, and the Netherlands. Through the pilots it will be demonstrated that CAALYX-MV can be easily integrated into the contemporary technological infrastructure of most European network operators as well as with coming New Generation Networks integrating fixed and mobile networks seamlessly and homes and will be also available when users

OUR ACTIVITY

Our 2009 Industrial, Scientific and Academic Activity



visit their second homes or are in vacation in a foreign country. AICOS contribution to the project lies within the Aligned Backend Systems, End Systems topics.

The project will have a duration of 3 years and is being developed together with the following partners: Creativ Systems (ES), Telefónica I&D (ES), Cetemmsa, Corscience (DE), INESC Porto (PT), Fundació Hospital Comarcal Sant Antoni Abat (ES), Universidad Politécnica de Cataluña (ES), Stichting Smart Homes (NL), COOSS Marche Onlus (IT).

eCAALYX

The eCAALYX project is an AAL system that enables remote monitoring of the health condition of elders with chronic conditions. AICOS main focus is on the aspects of remote management and auto-configuration of the system as well as the system user interface and interaction.

The project will have a duration of 3 years and is being developed together with the following partners: Telefónica I&D (ES), Cetemmsa (ES), Corscience (DE), INESC Porto (PT), Fundació Hospital Comarcal Sant Antoni Abat (ES), Telemedic Systems (UK), Univ. Limerick (IE), Univ. Galway (IE), Charitee, Berlin (DE).

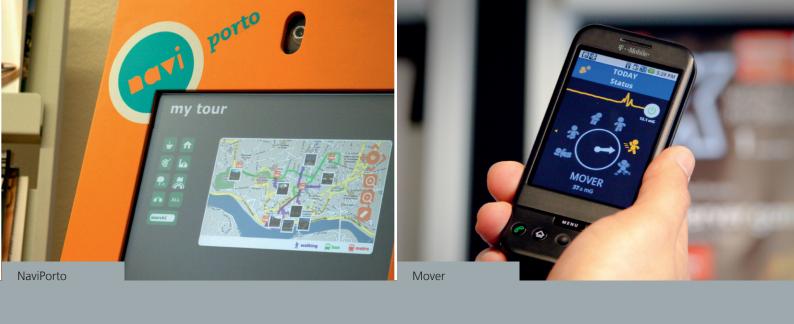
Internal Projects Activity

In order to foster core competence building and to enhance our team's experience, we frequently assess ideas and launch internal project initiatives. In 2009, we finished two activities that had been launched immediately after initiating operations in May 2008 (TAnDI/TInDI and NaviPorto), and we launched a new activity – Mover.

TAnDI/TInDI

TAnDI/TInDI is a mobile phone application that allows the user to share media content (photo/video), generated on the mobile device, very easily. Versions of the application were developed for Android-based phones (TAnDI) as well as for the iPhone (TInDI).

TAnDI/TInDI had different versions being released to the Android App market, having received interesting user feedback. The project was closed in July 2009.



NaviPorto

RFID-based public transport ticketing systems rely on wide-spread networks of RFID readers that locate the user within the transport network in real time. NaviPorto is a system that uses that RFID-based location information to give the user navigation indications per SMS depending on his current location; provided that the user has indicated beforehand the places he intends to visit. The system was designed to be cost-effectively deployable on the short term but open for easy extension. A fully working demonstrator was developed and runs in our premises. The project was closed in July 2009.

Mover

Mover leverages Android-based phones with an accelerometer to offer the permanent availability of a personal trainer on your phone, an object that you carry every day, everywhere. It also detects a fall and can warn a relative or emergency service by sending an SMS or email.

The lack of physical movement is one of present day concerns. Population is more and more exhibiting health problems partially caused by their lack of movement. Among these issues we find the risk of cardiovascular diseases and obesity. One way to solve the problem would be to go to a gym on a regular basis, however, people do not always find the time and motivation to do it and even if they do, there is rarely a systematic advice from a personal trainer. Nonetheless, a few minutes of walking or other similar activities can significantly improve people's daily routines.

Falling unconscious is another problem, which is difficult to solve, especially for older adults. In order to detect falls, there is the need to continuously monitor the movement of the user. Once a fall is detected people who can help, should be warned, since there is often the possibility the user is completely alone.

Mover has produced exciting results. Not only it was a major attraction at the AICOS public presentation ceremony in September, as well as it was placed in the second Google Android Developers Challenge, finishing 5th out of more than ~150/200 in the life style category, and a couple of thousand applications in total.

ACADEMIC ACTIVITIES

Regarding Academic Activities, not only FhP-AICOS Director is an invited Professor at the Engineering Faculty of Porto University as AICOS received its first time ever MSc students that, having selected some of the different scientific topics AICOS had proposed for MSc graduation thesis, joined the team to develop their work between March and June 2009. Noteworthy is the fact that every student received excellent classifications at the University for the results produced while at AICOS. For the Academic year 2009/2010, we have increased the number of MSc thesis being developed at AICOS, and 8 students in total were joining between October and January to have their experience with us.

Content Blaster (2008/2009)

The Content Blaster is a recommendation system of online content. The system allows to display relevant content in different end-systems, from TV/STBs to digital photo-frames, with only little user interaction (instead of proactive content search the user just needs to rate the content that is being shown). With Content Blaster API, recommendations can now be anywhere, be it on a smartphone, a set-top-box, a flat panel display on a waiting room or any other internet capable device, adapting recommendations to a modern lifestyle.

HyperVis (2008/2009)

Targeting mobile phone users and the related network operators, HyperVis simplifies the way users navigate through a generic collection of content, providing a context-based representation of that collection.

HyperVis is a visualization tool for mobile devices that employs the hyperbolic geometry to represent trees on a two dimensional space. It supports focus and context visualization, that despite having a focused node, the tree context is always visible. Due to the hyperbolic geometry properties it also makes an efficient use of the space available. The tool is suitable to mobile devices with small displays and multi-touch displays. It has been implemented on the i-Phone and supports media content remotely available on web services such as Flickr.

EMA – Energy Monitoring Anytime, Anywhere (2008/2009)

Targeting households and domestic users that feel the drive to improve their homes' energy efficiency, EMA enables gathering in back office energy consumption data for individual domestic appliances and provides its user-friendly visualization

in a platform-independent manner from any device connected to the Internet. The system was designed for low cost of physical devices to be installed, ease of installation, use of as much existing infrastructure as possible, interoperability and support of different business models.

The modularity of EMA's architecture is the key to its great deployment flexibility, as it enables easy extension of any block of the system without requiring modifications to the other parts, which, in turn, enables the straightforward support of different business models. Due to its wireless approach, it can be adaptable to other types of metering other than electricity.

Virtual PVR (Personal Video Recorder) (2008/2009)

Devised as a consumer product for households the system offers the distinct advantage of being seamlessly and remotely accessed through well-established web interfaces which means that the user only needs to access a terminal with a www browser to interact with the system. The system allows users to stream music, video and image items available in different devices without having to perform a specific configuration.

The concept behind the Virtual PVR is to aggregate the functionalities spread among various home consumer devices such as TV, STB, NAS, PVR systems, DVD player, or the PC, on a universally accessible web-based interface. The ultimate objective is to offer a richer, more flexible PVR system experience to the user.

Regarding the Academic year 2009-2010, FhP-AICOS proposed different scientific topics for MSc students to develop their theses at FhP-AICOS. During the last two quarters of the year the students were selected and AICOS will be supervising thesis with the following topics.

Automatic Photo Collections (2009/2010)

Digital still cameras became universal due to its convenience and affordability. The typical user takes hundreds of photos that are then stacked in a hard disk. Often the photos are not labeled properly and remain unorganized. This results in enormous collections of photos that are difficult to skim through.

This project aims to develop solutions that can obviate this problem and give users a better experience when browsing a photo collection. The obvious method of organizing a photo

collection is associating photos with specific albums. However, this can be a tedious task and the user-defined albums not always give the best cues to search for a specific photo. The albums are typically related to events but other references can be used, like location or even image content.

The application of such system to the mobile environment will receive a special emphasis. Although the underlying concepts are not restrictive, the system should take into account the advantages and restrictions of that environment.

Email Visualization (2009/2010)

Email has become a widespread communication medium. Its key characteristics are that it is persistent (i.e. email messages remain on people's accounts for years), and that people frequently search through their emails to retrieve information. Despite these characteristics that make email amiable to data mining and visualization, very few systems provide an interactive visualization for browsing and searching.

First, the student must complete a thorough investigation into the existing email visualization systems – thus becoming an expert in the area. Next, the student will develop a system that visualizes users' emails for a number of purposes (to be agreed, depending on the results of the investigation). For instance, the visualizations may be used to convey aggregate information to the user, or it may be used to quickly find a specific email that the user is looking for. Ideally, the system should also let the user explore their emails and derive new knowledge and insights about the communications and relationships with other people.

As part of the project, the students must evaluate her/his proposed visualization. This means testing the system with real users, and observing whether or not the system has a positive impact (for e.g. in terms of speed, efficiency, and satisfaction).

Home Display for Ambient Assisted Living (2009/2010 project co-oriented with University of Minho)

This project aims at exploring the concept of a home display in the context of AAL scenarios. The home display should enable not only some basic interactions but also the continuous and autonomous selection of contents for presentation. These should be chosen with regards to its context, which includes the room in the house, people, time of day, day of week and events gathered by sensors and explicit interaction of the house users.

The home display should also be fully integrated in the home services ecosystem. Particularly, there is the assumption that the house is equipped with some kind of home gateway, where one can find a diversity of sensors related to AAL applications. Moreover, the home display serves also as a way to provide visibility and generate a greater awareness regarding events associated it. One of the requisites is the possibility to interrupt any task in order to deal with emergency situations that might occur. This is important in many AAL situations, in which sensors may initiate a variety of alarms.

This work will be carried out based on an existent screen software manager; for this reason, its main goal is the development of the concept, exploring multiple applications and modes of interaction, functioning and reaction to external events.

Open Mobile Location-based Services (LBS) Application Platform (2009/2010)

The focus of the project is on the design and development of an open platform for providing location/ context-aware services on a mobile phone without relying on constant online access.

Most state-of-the-art mobile phones are equipped with a camera that can be used for 2D barcode and pattern recognition using existing libraries. A possible application is to trigger location-based information download, which some projects have proven to be feasible. Within this project, the same technology should be used to provide context-aware services in a limited geographic area, indoor or outdoor, without the need to be always online. The goal of the project is to design and develop a mobile application that can identify a location marked by a 2D code and provide the user with associated information. The application should run on the mobile phone and have well-defined interfaces to contents and content formats.. Once the user has installed the application, he can download the data specific of an area to be used by the application offline: map, database, information, etc. In this way, the user can benefit from location-based services of different geographic areas using a single application; also, location-based services for an area can be easily provided just by producing the contents in the specified format. As a case study, we suggest the adaptation of the tourist routes of Porto Turismo and a navigator for FEUP to this platform.

Outcomes of the project should be: specification of the architecture, interfaces and data formats; set of actions relevant for location-based services; comparison (efficiency and accuracy) and eventual improvement of 2D barcode recognition libraries.

Mobile Based Context Aware Services Framework (2009/2010)

The focus of the project is on the design and development of an open platform for providing location/ context-aware services on a mobile phone relying on constant online.

Most mobile phones nowadays have GPS, WIFI and 3G incorporated, allowing users to connect and interact with web services. The web services can be provided by institutions or simple users. The main goal is to index all these web services by their location and provide them to mobile user when they is near this location. The web service can be accessed too just decoding a 2D bar code. The mobile application should list the web services over the camera images as an augmented reality application and allow the user to choose among the services available.

The back office service should allow the institutions or simple users to add their web services based in their location, and should too allow the user to choose the way that information will be shown. This should be well specified in order to allow the inclusion of any web service.

Outcomes of the project should be: specification of the architecture, interfaces and data formats; set of actions relevant for location-based services; comparison (efficiency and accuracy) and eventual improvement of 2D barcode recognition libraries.

Web Based Interfaces for TV (2009/2010)

Despite the exponential growth of the web, many of its contents are still inaccessible to the older population. This reality is likely to change as Web contents are currently starting to reach the TV.

This project aims at understanding the fundamentals of human-computer interaction of Web-based interfaces and their transition into a TV screen controlled by a typical remote control.

Moreover, this project will place a special focus on elderly users, since these users: 1) tend to spend a large amount of time in front of the TV; 2) still do not use the Internet as much as other users, 3) are less tolerant to technology, which is inadequately designed and therefore result in a poor interface, and 4) have specific cognitive and physical characteristics.

The outcome of the project will be a study of the specific target group as well as a set of design guidelines for developing TV-based interactive interfaces for elders with application to healthcare

Personal Health Channel (2009/2010)

Despite the exponential growth of the web, many of its contents are still inaccessible to the older population. This reality is likely to change as Web contents are currently starting to reach the TV.

This project aims at understanding the fundamentals of human-computer interaction of Web-based interfaces and their transition into a TV screen controlled by a typical remote control.

Moreover, this project will place a special focus on elderly users, since these users: 1) tend to spend a large amount of time in front of the TV; 2) still do not use the Internet as much as other users, 3) are less tolerant to technology, which is inadequately designed and therefore result in a poor interface, and 4) have specific cognitive and physical characteristics.

The outcome of the project will be a study on the set of technologies that enable the development of interactive TV channels for elders as well as the implementation of a prototype personal health channel. This prototype will be integrated in a real-world trial of a healthcare solution developed within a European project.

Optimized Trash Collection Routes (2009/2010)

The main goal of the project is to implement and compare algorithms for calculation of efficient trash collection routes for a pre-defined number of collection trucks according to different scenarios and constraints. Additionally, software modules and interfaces necessary to provide the route calculation as a service in a modular way on different machines should be specified and implemented, building a back office for a system that optimizes urban solid waste collection.

Assuming that data on the actual fill status of public waste bins can be gathered on a central location, it is necessary to store it in an adequate manner, and since the data can be used by different software modules, it is necessary to define which kinds of data should be delivered in which format to each other module. For example, processing is needed to automatically prepare data for the calculation of route algorithms, i.e. transform geographic location and fill status into a data structure that is understood by the route calculation module. It will be part of the work to specify and implement APIs to retrieve and expose data from and to other software modules, namely insertion, update and configuration of basic data (e.g. location, responsible, access rights), visualization, and route calculation. The results should be a fully functional, almost deployment ready back office.

This project will be part of a real-world project and the student will be fully integrated in the project team.

Doctor Router (2009/2010)

The project consists of developing a software module for a residential Linux-based router that is able to process the data provided by a set of medical sensors, and generate an alert when a given data pattern is observed.

The data patterns to be monitored are defined by the medical community in an electronic format (e.g. XML) which the router collects, parses and processes.

THE R&D MARKET

Evolution and Global Trends

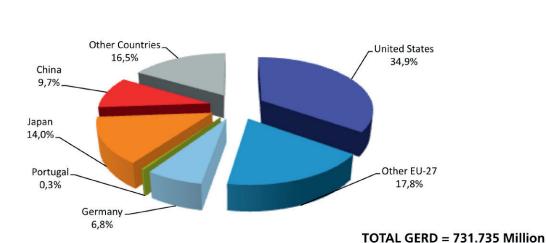
The Associação Fraunhofer Portugal Research develops its activity within a frame of increasing globalization of the scientific research and technological development (R&D) market.

In fact, the internationalization of R&D is facing a growth in its pace, as companies tend to relocate their R&D efforts in specialized knowledge clusters that are emerging at regional levels, nevertheless acting as global players in their field of work given their particular knowledge focus¹.

At the same time, R&D subcontracting is re-emerging as a source of competitive advantage, as companies try to improve their cost effectiveness by searching for more efficient ways to source specialized competences¹.

The global investment in R&D maintains a steady growth trend, mainly due to emerging economies intensifying their effort in R&D:

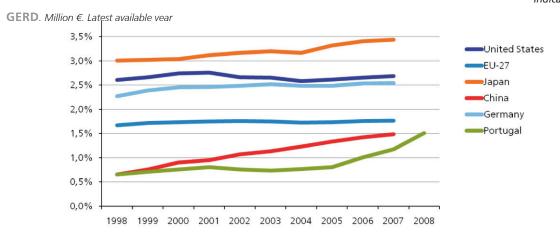
Expenditure on R&D as % of GDP



Source: OECD Main Science & Technology Indicators 2009 + GPEARI IPCTN08 (provisional data)

In terms of volume, the world's R&D investment is concentrated in a relatively small number of countries (the top 10 countries in R&D volume represented more than 80% of the world's investment in 2007), but that tendency is changing as emerging economies intensify their effort in R&D². In fact, China is already 3rd in terms of R&D investment, relegating Germany to 4th place and being only surpassed by Japan and USA:

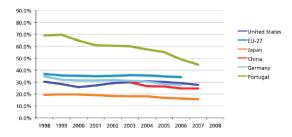
- 1 Source: OECD The Internationalization of Business R&D 2008
- 2 Source: OECD Main Science and Technology Indicators 2009



Source: OECD Main Science & Technology Indicators 2009 + GPEARI IPCTN08 (provisional data)

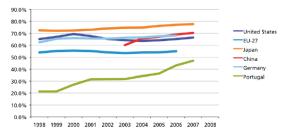
From the funding point of view, the world's R&D market has suffered profound changes in the financing sources of its activity. The last decade saw a significant growth of R&D financing coming from industry – today the leading financing source for this activity – while government financing has suffered the inverse tendency in terms of relative significance:

Expenditure on R&D as % Financed by Government



Source: OECD - Main Science & Technology Indicators 2009 + IN

Expenditure on R&D as % Financed by Industry



Source: OECD - Main Science & Technology Indicators 2009 + IN

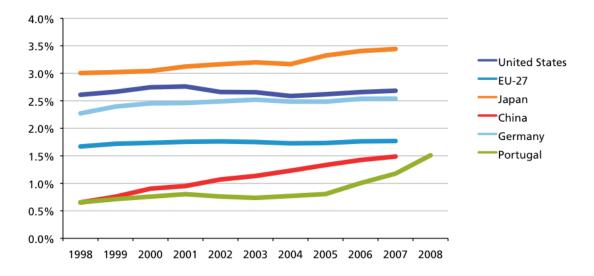
Evolution and Trends in Portugal

In 2008, Portugal's total investment in R&D represented approximately 2,51 billion Euro, the equivalent to 1,51% of its GDP³. In the past decade, Portugal has been converging to the EU27 average in terms of gross domestic expenditure on R&D as a percentage of GDP:

to ao Potencial Científico e Tecnológico Nacional 2008 (provisional data)

3 Source: IPCTN – Inquéri-

In Portugal, the R&D financing sources have also suffered dramatic changes . In fact, the change in the financing "mix" during the last decade from Government to Industry as the main Expenditure on R&D as % of GDP

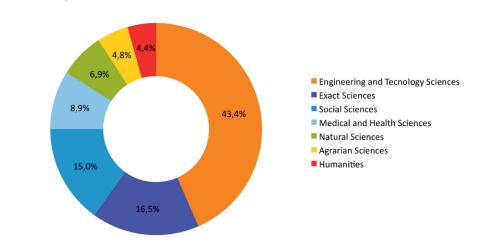


Source: OECD Main Science & Technology Indicators 2009 + GPEARI IPCTN08 (provisional data)

financing source for R&D activities has been highlighted as a case study within the EU27.

When analyzing R&D expenditure by scientific and technological domain, we can point out that Engineering and Technology Sciences are by far the most representative domain in Portugal:

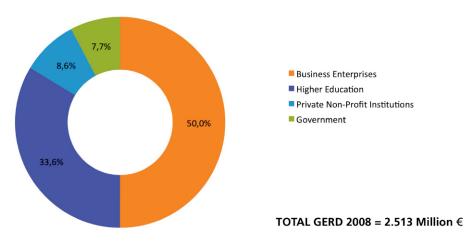
By Scientific and Technological Domain, Million €, 2007



Source: GPEARI IPCTN07

When analyzing in more detail the R&D expenditure by performance sector, we can see that business enterprises represent already half of the total expenditures in Portugal:

By Performance Sector, Million €, 2008



Source: GPEARI IPCTN08 (provisional data)

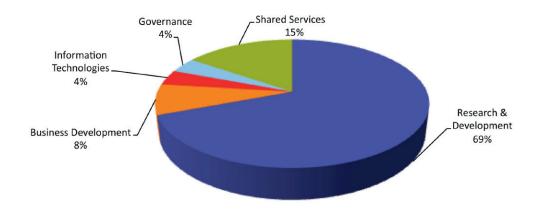
OUR PEOPLE

Fraunhofer Portugal's success, as well as its' R&D Centers are built around a set of core values that congregate and mobilize the organization towards the achievement of a shared vision. A sheer market focus, the drive for developing highly useful and intuitive solutions, an ethical and socially responsible behavior, as well as, a deeply positive attitude towards challenges created by R&D activities, rank highly amongst the shared core values.

Our human resources policy is based on the respect for the human values, the merit, the proactivity, its observance of the law, and on knowing how to reach the goals we purpose to. We must have a motivated, dynamic and solid shaped team.

In 2009 the human capital of the Associação Fraunhofer Portugal Research registered an annual growth of approximately 42%. Being 69% dedicated to scientific activities and 31% dedicated to support activities.

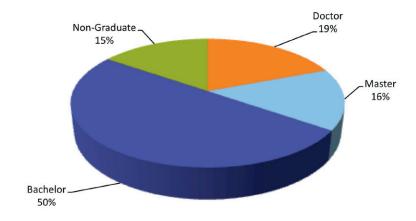
H eadcount by Department, 2009



The Fraunhofer Portugal team presents a quite young age average (28 years). In terms of gender distribution, the male gender is dominant (80%).

When analyzing the educational level of FhP's collaborators, we can see that the majority of our staff (85 %) has a university degree (19% with a PhD, 16% with an MSc and 50% with a Bachelor degree):

H eadcount by Academic Degree, 2009



OUR MANAGEMENT

OUR SUPERVISORY BOARD
OUR EXECUTIVE BOARD

ACCORDING TO FHP'S STATUTES, THE SUPERVISORY BOARD (WITH BROAD ASSESSMENT POWERS) AND THE EXECUTIVE BOARD (RESPONSIBLE FOR THE DAILY MANAGEMENT OF FHP'S BUSINESS, WITH POWERS TO CARRY OUT CURRENT MANAGEMENT ACTIONS) ARE, TOGETHER, THE ORGANS RESPONSIBLE BY FHP'S MANAGEMENT.



Our Supervisory Board

Our Supervisory Board has at its disposal the broadest of powers in order to insure the assessment of the activities of the remaining association organs, namely evaluating the administration of the association by the Executive Board, as well as proposing to the General Assembly the approval of the Directors' administration, among others.

Already in 2009, the General Assembly, summoned for the 12th of March of the current year, named Georg Rosenfeld, Paulo Simões and João Paulo Oliveira as members of the Supervisory Board. In addition, the GA also nominated Georg Rosenfeld as President of the Supervisory Board.

There are no circumstances that might affect the analysis or the decision making process of the independent members of the Supervisory Board. These members, exert an important influence over the decision making process and the strategy and policy development of FhP.

Georg Rosenfeld

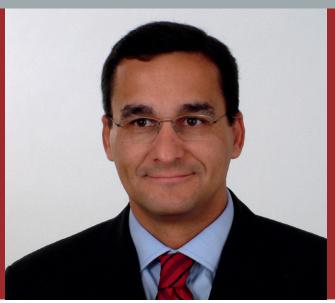
President of the Supervisory Board

With experience in the areas of management of scientific research, Georg Rosenfeld has a PhD in Physics and received the Venia Legendi in Physical Chemistry by the University of Bonn.

Professional Career Summary

Fraunhofer-Gesellschaft Division Director, Corporate Development

Fraunhofer-Gesellschaft Vice-Director, R&D Planning Fraunhofer-Gesellschaft, R&D Planning MESA/Applied Physics Faculty of the University of Twente, Senior Scientist Jülich R&D Center, Scientist





João Paulo Oliveira Supervisory Board Member

With a professional career in the areas of production engineering and global management with growing levels of responsibility, João Paulo Oliveira has an MSc in Industrial Production Engineering by the Universidade de Lisboa, having also an MBA by the Instituto Empresarial de Portugal in partnership with ESADE (Barcelona), and attending advanced international executive training programs (Carnegie Bosch Institute Pittsburgh and IESE/ Universidade de Navarra)

Professional Career Summary

Robert BOSCH: Vice-President of the hot water and solar residential unit

Robert BOSCH /Vulcano Portugal: Representative for BOSCH Group in Portugal

Robert BOSCH Thermotechnik Germany Vulcano Termodomésticos Portugal Vista Alegre Group Robert BOSCH France, Chile and China Vulcano Termodomésticos Portugal

Paulo Simões

Supervisory Board Member

With experience in strategic planning, financial controlling, organizational development and management, Paulo Simões has a MSc in Biotechnology by the Universidade Nova de Lisboa, an MBA by the Universidade Nova de Lisboa/Wharton Business School (UCLA), and attended the Harvard Business School General Management Program.

Professional Career Summary

Sonae: Investment Management

Sonae: Portfolio management and controlling, Secretary to the **Board of Directors**

Optimus Telecomunicações: Business Unit Marketing IS Leader

Sonaecom SSI: Financial Administrator

Sonaecom: Management control and Secretary to the Board

of Directors

Sonae: Management Planning

I.T.Q.B.: Researcher





Our Executive Board

It's up to our Executive Directors to insure the business administration of FhP according to the laws, statutes and other applicable proceedings, following with appropriate diligence a criterious and orderly administration. The Executive Directors have been granted the appropriate powers needed to put into practice every action inherent to the current management of the organization, being only limited, in accordance to article 18 of the Statutes, to a set of particular actions that need prior approval from the Supervisory Board.

The constituent General Assembly of the Associação Fraunhofer Portugal Research, gathered in the 4th of November 2008, elected Dirk Elias as the President of the Association's Executive Board. In a subsequent session, made in the 19th of December 2008, the General Assembly elected Miguel Barbosa and Berthold Butscher as members of the Executive Board.

Dirk Elias

President of the Executive Board

With a professional career going from R&D activities development to entrepreneurial experiences and management, Dirk Elias is a Dipl. Ing. in Electrotechnical Engineering by the Technical University of Munich, having developed his PhD in the Technical University of Berlin.

Professional Career Summary

President of the supervisory board of Ivistar AG until the company was sold to a foreign investor.

CEO of Ivistar AG

Senior Scientist & deputy department leader in Fraunhofer FOKUS institute, Berlin

Scientist in Fraunhofer FOKUS Institute, Berlin





Miguel Barbosa

Executive Board Member

With a professional career initiated in technical areas, evolving to corporate and business development functions, Miguel Barbosa has an MSc in Electrotechnical and Computers Engineering by the University of Porto and has an MBA by the Escola de Gestão do Porto.

Professional Career Summary

Corporate Development (Corporate Strategy & Finance) in Sonaecom

Business Development and Innovation Manager in INI-GraphicsNet foundation

Mobile Telecommunications Network Development Manager

- Optimus

Software Development Engineer at Siemens

Berthold Butscher

Executive Board Member

With a career highly oriented to R&D, both in industry and in R&D institutions, Berthold Butscher has a Dipl. Ing. in Electrotechnical and Computers Engineering by the University of Applied Sciences of Konstanz and by the Technical University of Berlin.

Professional Career Summary

Deutsche Telekom Berlin/Germany: Leader of the Integrated Communication Systems Unit

Hahn-Meitner-Institute Germany: Distributed Systems Department Chief

Hahn-Meitner-Institute Germany: Scientist

OUR MANAGEMENT

Supervisory Board

Supervisory Board of the Associação Fraunhofer Portugal Research	Non-Executive	
	Independent	Non-Independent
President		
Georg Rosenfeld		
Board Members		
Paulo Simões		
João Paulo Oliveira*		

^{*}João Paulo Oliveira was invited to integrate the Supervisory Board in the quality of Vice-President of Robert Bosch GmbH/Bosch Termotecnologia Portugal, being in that quality a Non-Executive Independent Member. Afterwards he was also elected President of the Directory Council of the Câmara de Comércio e Indústria Luso-Alemã, a founding associate of FhP, therefore assuming the quality of Non-Executive Non-Independent Member.

Executive Board

The functions and responsibilities of the Executive Board are detailed in the below table:

President	Executive Director	Executive Director
Dirk Elias	Miguel Barbosa	Berthold Butscher
General Administration	Business Development	R&D Planning Support
R&D Planning	Planning & Control	
Business Development	Accountancy and Finances	
Facilities	Human Resources	
	Legal	
	Facilities	
	Legal	

Other roles carried out by the Members of the Executive Board		
Director of Fraunhofer Portugal AICOS		
Invited "Catedrático" Professor at the Engineering Faculty of University of Porto		
Invited Assistant Professor of the MSc in Innovation and Technological Entrepre-		
neurship, Engineering Faculty of University of Porto		
Vice-Executive Director of FOKUS Institut, Berlin		

OUR GOVERNANCE MODEL

CORPORATE BOARDS
ASSOCIATES
GENERAL ASSEMBLY
SUPERVISORY BOARD
FISCAL BOARD
SCIENTIFIC BOARD AND SCIENTIFIC ADVISORY COUNCIL
EXECUTIVE BOARD

OUR GOVERNANCE MODEL

We seek to follow best practice in every area of the Association's governance and that is reflected in our organization, our principles and in our transparency.

Corporate Boards

The associative structure of FhP distributes clearly the functions, duties and responsibilities of the diverse boards.

Associates

Fraunhofer Portugal has two categories of associates: founding associates and effective associates.

The founding associates have been already identified in this report (FhG and CCILA). The effective associates of FhP will be collective and private entities which, considering their specific competences, areas of activity and objectives, whish and are able to give a relevant contribute for the prosecution of the association objectives. At this moment FhP doesn't have any effective associates.

Associação Fraunhofer Portugal Research General Assembly Scientific Advisory Council Fiscal Board Scientific Board Supervisory Board Executive Board

General Assembly

The General Assembly is composed by all the associates in possession of their associative rights. The General Assembly is chaired by its President (named by the associate founder FhG) and the Vice-President. At the moment, the Presidency of the General Assembly is taken by Lorenz Kaiser (FhG), being the Vice-President Patrick Schwarz (CCILA).

Supervisory Board

According to the statutes, the Supervisory Board should consist in a number of members – from three to five – elected by the General Assembly. The Supervisory Board mandate consists in a two year period and contemplates the possibility of re-election of its members. The current mandate encompasses the period from 2009 to 2011, and ends in the date of the General Assembly of 2011. The General Assembly is responsible for the nomination of the Supervisory Board President. The current composition of the Supervisory Board has been already addressed in the chapter "Our Management".

Fiscal Board

In accordance to FhP's statutes, the Fiscal Board is composed by three members and includes an official chartered accountant (ROC - Revisor Oficial de Contas). The Fiscal Board members are elected by the General Assembly, by proposal of the Supervisory Board, for a mandate of 2 years, being allowed the re-election for the same role. The current mandate encompasses a period from 2008 to 2009 and ends in the date of the General Assembly of 2010. The current composition of the Fiscal Board is the following: Joaquim Barreiros, José Miguel Oliveira, and José Pereira Alves (representing SROC – PricewaterhouseCoopers).

Scientific Board and Scientific Advisory Council

The Scientific Board and the Scientific Advisory Council are FhP's non-executive organs.

The Scientific Board is composed by all the researchers that, developing their activity in FhP's research centers, possess the qualifications stated in article 23 of the DL 125/99 of 20th of April.

The Scientific Board competences are defined as:

- Stating their opinion about the scientific research, the budget, the plan and annual report of FhP's activities;
- Stating their opinion about any other matters that the Management decides to submit to their appreciation;
- Stating their opinion about the proposed names for members of the Management;
- 4. To present to the Management proposals, within their competences, about all aspects related to the activities of the association.

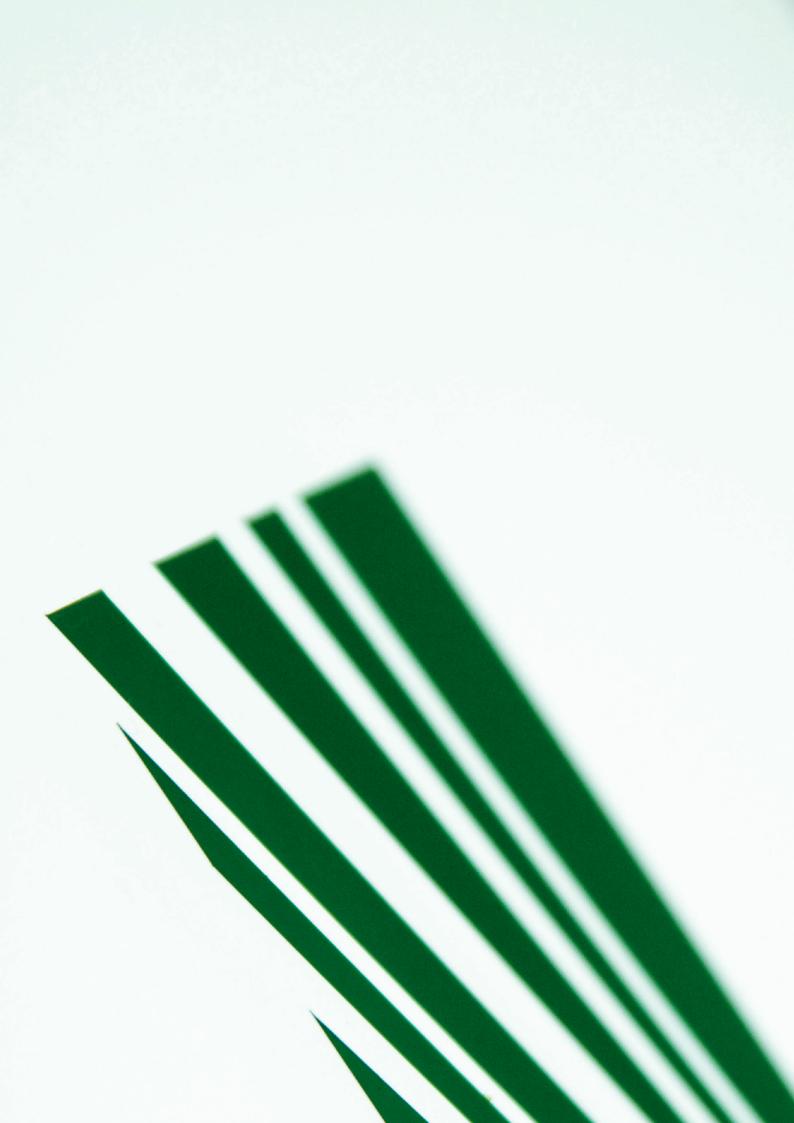
The Scientific Advisory Council members should be experts and individualities external to the association, and are nominated by the General Assembly. The SAC should be composed by representatives of diverse scientific areas, economics and the public sector. The SAC has the responsibility to evaluate and analyze on a regular basis the research activities of FhP and provide their view on those activities.

Executive Board

According to the statutes, the Executive Board should consist in an uneven number of members – with a maximum of five – elected by the General Assembly. The Management mandate consists in four years and contemplates the possibility of re-election of its members. The current mandate goes from 2008 to 2012, and ends in the General Assembly of 2012. The General Assembly is responsible for the nomination of the President of the Executive Board. The current composition of the Executive Board has already been described in the chapter "Our Management".

The Executive Board can deliberate about any matter related to the current management of FhP but not over issues which are of the exclusive competence of the Supervisory Board or the General Assembly, as defined in the statutes.

In urgent cases, the approval for the practice of such acts by the Executive Board may be conceded simultaneously by the President of the Supervisory Board and its substitute. The remaining members of the Supervisory Board will be informed of any decisions that might be made using this urgency disposition.







Portugal Porto UPTEC Campus

Future Location

Porto

Current Location



Postal address:

Rua do Campo Alegre 1021 4169-007 Porto, Portugal Phone: +351 220 408 300 Fax: +351 226 005 029 email: info@fraunhofer.pt www.fraunhofer.pt

Portugal





