The Portuguese secretary of state for Science, Leonor Parreira, greeted all the participants in her speech at the opening session. She reinforced the importance of the expression ‘coalition’, which is a very powerful word that shows the strong engagement between the three key players: Universities, Companies and End Users.

Joaó Barros, national director of the Carnegie Mellon Portugal Program, spoke about the five reasons to be proud of the Carnegie Mellon Portugal Program. In five years, the partnership carried out cutting-edge research and built world class research test beds. Several examples were point out by Joaó Barros: “there are 500 taxi cabs in Porto, Portugal, participating in the DRIVE-In project; there are several firemen in Amarante and Vila Nova de Gaia testing the Vital Responder jackets; there are foreign students learning Portuguese through an interface developed by the REAP.PT project; there are twenty families in the Madeira Islands monitoring their energy consumption; among so many other examples.” The second reason appointed by Barros was “our dual degree programs train more than 200 students.” In fact, the master and doctoral students of the Carnegie Mellon Portugal Program receive at the end of their course a dual degree, i.e., two diplomas: one from a Portuguese university and the other from Carnegie Mellon University. The third reason mentioned was that “30 faculty experienced life in a top U.S. school.” Through the Faculty Exchange program, launched by the Carnegie Mellon Portugal program, 30 researchers from several Portuguese universities went to Carnegie Mellon to conduct research and to teach for at least one semester. The fourth reason was
“82 companies are working closely with our universities.” These companies are participating actively in different ways: training their employees in the different dual degree programs or collaborating in the 25 research projects carried out within the Carnegie Mellon Portugal Program. The fifth reason stated by João Barros was “we have built a strong knowledge network in Information and Communication Technologies (ICT) that helps to connect our universities to the rest of the world.”

Jared Cohon, president of Carnegie Mellon University, emphasized the several benefits of this partnership to CMU during his speech at the opening session. He said that the university is committed to this program, and sees it as a positive model of collaboration. In his opinion, this program brought to CMU “great students, new faculty collaborators, among other things.” In his speech, Jared Cohon explained why CMU encourage faculty to work with companies, and to create their own. He feels that in this world crisis, small companies like startups, are the creators of new jobs. In the end of his speech, he highlighted that the collaboration with Portuguese universities and companies will continue after the partnership.

Rogério Carapuça, chairman of Novabase, presented several reasons why he considers that “it is crucial for the competitiveness of the Portuguese economy that these Portuguese / U.S. University collaboration programs continue.” He feels that it is not possible to innovate alone, and that “in times of economic turmoil you have to choose carefully where you spend your money; cut what is not needed of what you can afford to cut.” So in his opinion, “it is significantly easier to deal with these American universities that already have a track record of collaboration with Portuguese universities and industrial partners, then starting with someone unknown.”

The president of the Conselho de Reitores das Universidades Portuguesas (CRUP), António Rendas, ended the opening session congratulating the achievements of the Carnegie Mellon Portugal Program, and underlining that all partnerships with American universities should be renewed.

Different Topics in the field of Information and Communication Technologies (ICT)
Throughout the day were presented several demos and posters of the results obtained during the first five years of the partnership, which involves nine Portuguese universities (Aveiro, Católica Portuguesa, Coimbra, Lisboa, Madeira, Minho, Nova de Lisboa, Porto, Técnica de Lisboa), four associated laboratories (INESC ID, INESC Porto, Instituto de Telecomunicações, ISR), the Instituto de Soldadura e Qualidade (ISQ), Carnegie Mellon University, and more than 80 companies.

On the other hand, several managers from partner companies presented their views on the program and stressed the added value of increased collaboration with researchers. Companies such as Novabase, Portugal Telecom, OutSystems, Observit, Feedzai or Geolink demonstrated how the connection to the program enabled the development of research projects and created new services and products, essential components to the economic growth.

The conference has drawn attention to multiple areas of research and development in ICT, including vehicular networks communication, intelligent surveillance networks, and social networks with behavioral effects, smart grid systems or security of computer networks.
For example, the project Vital Responder gathered at the Annual Conference the End Users: the firemen. The Commander of the Amarante Firefighters was there to speak with all the participants about the importance of being part of this project. In his opinion, this project can give more security to the firefighters because it allows monitoring their health during an action. As part of this project it was shown an emergency evacuation system that combines the old static signals with real data. The research team explained that this kind of system is very helpful in case of an accident because it gives real information about where is the fire, for example, and sends people to the other side.

Another project of national and international impact, the DRIVE-IN, gathered at the conference a team of researchers from the Instituto de Telecomunicações and the Universities of Aveiro and Porto to show a prototype of vehicle communication. This equipment is currently tested in taxis and it can give origin to an attractive product to export. The president of Raditaxis was also there to explain the importance of this project to the taxi drivers in terms of traffic efficiency and security.

The research team of the INTERFACES project joined researchers with a member of the OutSystems to show the prototype that was already emplaced in this company. Other projects were also in demonstration, such as machine translation systems in classrooms, secure platforms for web applications, sensor networks for data centers, interactive technologies to raise environmental awareness, and crowdfunding or business systems.

The closing session started with the statement of João Sentieiro, president of the Portuguese Foundation for Science and Technology, which reinforced the importance of investing “in people, knowledge and ideas.” José Marques dos Santos, rector of the Universidade do Porto, highlighted the distinctive advantages of the Carnegie Mellon Program Portugal compared to other partnerships, namely the dual degree master and doctoral programs. This was also reinforced by João Gabriel Silva, rector of the Universidade de Coimbra, who emphasized the true “culture of merit” that it is felt in the U.S., and that should be the way to go in Portugal, in order to succeed.
“I Want to Give Eyes to the CoBot Robot”

CoBot is a robot carried out by the research team of Manuela Veloso, at Carnegie Mellon University. The goal of this team is to contribute to a multi-robot, multi-human symbiotic relationship, in which robots and humans coordinate and cooperate as a function of their limitations and strength.

Susana Brandão, a dual degree doctoral student in Electrical and Computer Engineering (ECE), co-advised by Manuela Veloso at CMU and João Paulo Costeira, from Instituto Superior Técnico da Universidade Técnica de Lisboa (IST/UTL), is working with this robot and believes that she will help CoBot to “see” in the future.

Susana Brandão started her Ph.D. in 2009/2010 in Portugal, at Instituto Superior Técnico da Universidade Técnica de Lisboa (IST/UTL), through the Carnegie Mellon Portugal Program, funded by the Fundação para a Ciência e a Tecnologia. In the fall 2010 she went to Carnegie Mellon University. In looking back, five months behind, she was able to go by several challenges: “I wrote two papers, passed my qualifier exam, was teacher assistant in a Robotics Lab for undergraduates, and finished all the courses,” said Susana Brandão explaining that “the last four months were a marathon, but now I can be a hundred percent devoted to my research and doctoral thesis.”

During this time at IST/UTL and at Carnegie Mellon, Susana Brandão made some findings; she discovered an algorithm which combines offline with real-time images in a very effective way. She used the robot soccer team, also from Manuela Veloso research team, and made some tests using a regression learning approach. In fact, she described her results in the paper “Detection of Rotational-Invariant Objects through Regression,” wrote with her two co-advisors, João Paulo Costeira and Manuela Veloso, and published in the Proceedings of the 5th Workshop on Humanoid Soccer Robots @ Humanoids 2010. In their paper, they explained the regression learning approach which consists “in two main phases: (i) off-line training, where the objects are automatically labeled off-line by existing techniques, resulting in learned object models through regression, and (ii) online detection, where a given image is efficiently processed in real-time with respect to the learned models.” The authors showed that “in robot soccer, it is possible to leverage past experience to create simple and adequate models of objects without the need of computationally expensive algorithms nor explicit modeling of objects.” They also found that by accumulating past images and using the current state of the art algorithms to provide ground truth, the robots gained access to an unlimited number of labeled data which can be used for training the coefficients of a regression. The resulting algorithm is faster than the one used for training but without affecting precision considerably. Furthermore, the algorithm is capable of identifying its own error, which allows for online validation of its results.

Therefore, Susana Brandão believes that it will be possible to adapt this algorithm and to make it work on the CoBot robot. The research team expects that CoBot will be a fully autonomous robot that will do multiple tasks in our everyday life. It has a multidirectional base which allows it to roll forward, backward and sideways and a platform that holds a Microsoft Kinect sensor and a tablet PC that runs software.

CoBot2 can be operated remotely or locally through the same web-based interface. Susana Brandão is working specifically with the Microsoft Kinect, which gives CoBot the opportunity to distinguish image depth and light identity. Researcher in computer vision, Susana Brandão will join these characteristics to the research field in object recognition. The goal is that the CoBot can see besides pixels, i.e., Susana Brandão expects the robot to identify the entire environment.
Doctoral Student Wants to Give a Strong Contribution to the Machine Translation Community

Wang Ling is a dual degree Ph.D. student in Language Technologies, at the Instituto Superior Técnico of the Universidade Técnica de Lisboa and Carnegie Mellon University, who has been carrying out research on Machine Translation. He is under the supervision of Isabel Trancoso, from the IST/UTL and researcher at the L2F Spoken Systems Lab / INESC ID, and Alan Black, from CMU. Wang Ling goal is to “give a strong contribution to the Machine Translation community.”

During his first academic year, 2010/2011, this doctoral student developed an open-source Machine Translation toolkit named Geppetto, and had six papers accepted in several top conferences in the Machine Translation area. The toolkit Geppetto is used “to generate translation models for Phrase-based Machine Translation systems,” explained Wang Ling. With this project, Wang Ling presented one system description paper and a paper about this toolkit, at the International Workshop on Spoken Language Translation (IWSLT) 2010, in the Machine Translation track. The paper was written by several authors: Wang Ling, Tiago Luís and João Graça, Ph.D. students at the IST/UTL, and Luísa Coheur and Isabel Trancoso, researchers at the L2F Spoken Systems Lab, INESC ID.

As part of his Ph.D. course project, Wang Ling was involved in the conception of an educational game aimed at teaching a second language to foreign students which employed Machine Translation. “An automated agent is employed as an opponent in order to improve the user’s motivation and maintain the user focused,” said Wang Ling adding that “the agent’s actions are based on statistical machine translation outputs.” The system demo and description paper, written by Wang Ling, Isabel Trancoso, and Rui Prada, from IST/UTL, were submitted and accepted in the ISCA Special Interest Group on Speech and Language Technology in Education 2011. The test was conducted among 20 Portuguese learners of Mandarin in the Missão Macau, facilities in Lisbon, and in Centro Científico e Cultural de Macau, where weekly Mandarin Classes were given. This system had a web-based implementation and is easily accessible by language learners.

Finally, he had a partial contribution in a work involving Brazilian Portuguese to European Portuguese translation, which leads to a paper in the 15th Annual Conference of the European Association for Machine Translation (EAMT) 2011. In this paper the authors - Luís Marujo, dual degree doctoral student in Language Technologies, Nuno Grazina, from the Spoken Language Laboratory / INESC-ID Lisboa, Tiago Luís, from the Spoken Language Laboratory / INESC-ID Lisboa, Wang Ling, Luisa Coheur, and Isabel Trancoso - describe a method to “efficiently leverage Brazilian Portuguese resources as European Portuguese resources.” Based on this study, the authors of the paper derived a rule based system to translate Brazilian Portuguese resources. Some resources were enriched with multiword units retrieved semi-automatically from phrase tables created using statistical machine translation tools. Their experiments suggest that applying their translation step improves the translation quality between English and Portuguese, relatively to the same process without this adaptation step. Therefore, he finds “working in research very entrancing, especially when the results of your research are the fruit of your own ideas.”

Wang Ling’s work in Portugal has been focused mainly on Machine Translation, namely in improving the translation quality of the translation system. Although, the PT-STAR project, were he is a researcher, is focused on Speech-to-Speech translation, where Machine Translation is only one component within the pipeline, improvements in this component generally lead to an improvement in the overall Speech-to-Speech translation quality. In the future, Wang Ling said that he might be interested in working with Speech Recognition, since he thinks that the field is both relevant to the project and interesting.
Education and research were the main interests that lead Rodrigo Ventura to embrace this chance given by the Carnegie Mellon Portugal program. Ventura is one of the 30 researchers from Portuguese universities that have had the opportunity to spend one semester at Carnegie Mellon. While participating in the Faculty Exchange program, faculty are engaged with teaching courses and conducting research. This researcher believes that “even though the high level quality of most research carried out in Portugal, the academic community would benefit from a more widespread participation in this faculty exchange program.”

Rodrigo Ventura is an assistant professor at the IST/UTL and a researcher at the Institute for Systems and Robotics – Lisboa (ISR-Lisboa), who participated in the Faculty Exchange program at CMU. He was hosted by Manuela Veloso, a Portuguese full professor in the Computer Science Department at Carnegie Mellon University from January to May 2011.

“The Academic Community would benefit from a More Widespread Participation”

Rodrigo Ventura is an enthusiastic researcher in Robots, and while at CMU, he worked closely with Manuela Veloso with the CoBot project. The project consists of working with a robot developed by the Manuela’s Veloso research group and the goal of the project is to contribute to a multi-robot, multi-human symbiotic relationship, in which robots and humans coordinate and cooperate as a function of their limitations and strength. Ventura’s participation on this project focused “on the challenges of effectively deploying mobile service robots to real users.” Office and home environments are not robot-friendly; consequently many trivial tasks cannot be (reliably) performed by mobile robots. During his time at CMU, Rodrigo Ventura helped to develop architecture for users to schedule tasks to the robot, and even interacting with it during the task execution. On the other hand, the team guarantees “the execution of these tasks in order to both detect faults or other unexpected events, end to cope with them,” said Ventura. Currently, the CoBot robot is able to transport objects from A to B, and it is possible to do real-time monitoring of robot location and status, and to perform telepresence.

For the past six years, Rodrigo Ventura lectures the course Artificial Intelligence and Decision Systems at the IST/UTL. So while at CMU he attended the Graduate Artificial Intelligence which allowed him to “apprehend many interesting aspects about the teaching of the course contents.” After this experience at CMU, Rodrigo Ventura submitted a proposal to the IST/UTL administration to create a Ph.D. course which could “cover a similar range of topics, but with more emphasis on robotics.” Rodrigo Ventura is proud to say that his proposal was accepted and he “will teach it during the 2012/2013 academic year.”

Rodrigo Ventura feels that the program was “extremely fruitful” in twofold: from a personal level it was positively enriching “in terms of improving my teaching and student supervision practices, as well as research-wise,” and from an institutional point of view, “it allowed to initiate a collaborative line of research, which is currently ongoing beyond the end of the exchange,” he said.

“‘It allowed to initiate a collaborative line of research, which is currently ongoing beyond the end of the exchange.’”

- Rodrigo Ventura.
Bruno Cabral, assistant professor at the Informatics Engineering Department of the Universidade de Coimbra (UC), recently finished his faculty exchange at Carnegie Mellon University (CMU), through the Carnegie Mellon Portugal Program. He spent four months and a half in the United States.

The main goals of Bruno Cabral were to acquire the core competences necessary to integrate the faculty body of the CMU/UC Professional Master Program in Software Engineering (MSE), and to follow and contribute to the research work carried out at CMU in the AEMINIUM project.

The AEMINIUM project, developed by the Universidade de Coimbra, Universidade da Madeira and Carnegie Mellon University, with Novabase, aims to be a strong contribution to shaping how concurrent software development will be performed in the future and to strengthening Europe and America’s capabilities in this important area. Bruno Cabral, as researcher of this project, took part of the weekly research meetings at CMU. Alcides Fonseca a master student at UC, which is also involved in the AEMINIUM project, spent three months at CMU working closely with Bruno Cabral and Jonathan Aldrich. Alcides Fonseca, that is not involved in the CMU Portugal program directly, was at CMU as a visiting scholar.

During his time at Carnegie Mellon University, Bruno Cabral was totally engaged in all the activities related with the Professional Master in Software Engineering, from the admission process to the teaching part. He was a Teaching Assistant (TA) on several MSE courses, such as Analysis of Software Artifacts and Seminar in Software Process. As TA he gave five lectures, prepared materials for the students, and participated in the course faculty meetings. He was also a mentor of studio projects teams and individual students.

New Institute for Software Engineering (ISE)

Besides being involved in the MSE program, Cabral is the coordinator of the new center of excellence in Software Engineering consult-

ing and training in Portugal, the Institute of Software Engineering (ISE). “We hope that the ISE will provide top quality services and training in Software Engineering to its clients and partners,” said Bruno Cabral adding that “this institute will help raising the quality and efficiency of SE practices in Europe, giving it a worldwide competitive edge.” Therefore, the research team involved in the foundation of this institute believes that it will contribute to the consolidation of the Universidade de Coimbra as a center of excellence in SE, by supporting research and training programs at the University. While in CMU, Bruno Cabral had the opportunity to learn more about the Software Engineering Institute from this university, an institute well known all over the world, in areas such as organization and management, and to establish some synergies that will work beyond this visit.

Bruno Cabral said “this exchange period was extremely challenging and rewarding at both professional and personal levels,” adding that he believes “that all the proposed objectives were accomplished and even exceeded.”
Manuel Beja, head of Corporate Development at Novabase, explained that the implemented solution was quite challenging for the group: the Carnegie Mellon Portugal graduates should dedicate 80 per cent of their time to their former business area, and 20 per cent to the Software Engineering Group (SEG). This strategy would be effective threefold: it would generate knowledge transfer among their colleagues, it would potentiate career advancement, and it would create value to the customers. The results are already appearing.

The SEG group was created in January 2010 with the mission of contributing to the adoption of best practices in the Software Engineering area, based on the knowledge acquired through the MSE program taught by the Universidade de Coimbra and Carnegie Melon University, in the scope of the Carnegie Mellon Portugal program. Initially the SEG group had 8 members, but this number has grown to 12 members that come from different business areas. Manuel Beja is the Software Engineering Group mentor and believes that it will be possible to integrate “more than 20 members until the end of the fifth year of this partnership.”

Alumnus of the MSE program, João Pina is one of the members of the SEG. “Rewarding and intense,” were the words uttered by João Pina about the MSE program experience, where he had the opportunity to develop his skills and knowledge with a group of international experts. Before entering the MSE program, João Pina, through Novabase’s outsourcing company was working as a developer for the Caixa Geral de Depósitos. After completing the MSE program, this Carnegie Mellon Portugal Program alumnus was invited to join SEG, and to work as a software architect and analyst. João Pina said “the 20 percent of our time that we get to work at SEG is extremely fulfilling as we have a chance to use what we learned at the MSE while helping people from all areas improving the way they work”.

The role of SEG is centered in analyzing the problem, suggesting new techniques, monitoring results, and validating what was done. The group activity is organized in three areas: Requirements Design (what should be done?), Software Architectures (how should it be done?), and SmartWorld (“soft” skills for team management). In each area, the members of SEG develop and detect opportunities to better apply these “components” in the different projects developed by Novabase.

During 2010, the Software Engineering Group was involved in 45 projects with around 450 Novabase employees from all areas, and gave more than 1500 training hours for a total of 150 people. “The evolution of SEG is the result of the good integration that this group has had with the customers, inside and outside, which lead the group to reorganize and diversify its offer” said Manuel Beja.