

# Shared challenges

Company laboratories in university parks enrich students' education and respond to new research and development demands

**Fabício Marques**

PUBLISHED IN APRIL 2013

**T**he role of the university as a catalyst for innovation and development is taking on new dimensions in Brazil through initiatives such as the construction of the University of Campinas (Unicamp) Science and Technology Park, for which the infrastructure began to be delivered last month. Situated in a 100,000-square-meter area nestled on the university campus, the park will house innovative laboratories where corporate researchers, Unicamp professors, and students will work in the same setting. The model, which has only recently begun to spread in Brazil but exists at several foreign universities, has the ability to enrich the education of students and the work of scientists by bringing them in close contact with the demands of businesses. The model also has the ability to increase investment in university research. "The Unicamp laboratories will produce technological developments but will also make important contributions to basic research. They will also lead to student dissertations, theses, patents, and publications from the undergraduate to the post-doctoral level," says

## A NEW INCUBATOR

The new headquarters of the Unicamp Technology Company Incubator will occupy a 2,600-square-meter building and will house up to 48 new companies

## SAMSUNG

At least 25 professors and students from the Unicamp Institute of Computing work in the lab that Samsung created in partnership with the university. It operates in the Center for Innovation in Software (Inovasoft) building, which also houses centers established in partnership with Banco do Brasil and the company MC1

# An innovation enclave

The Unicamp Science and Technology Park occupies an area of 100,000 square meters on the university campus

## LIB

The Biofuels Innovation Laboratory (LIB) is located in a 1,600-square-meter building and provides space for research on ethanol, biodiesel, and bio-kerosene

## TECNOMETAL

A 500-square-meter laboratory in partnership with a solar panel manufacturer involves researchers from the Institute of Physics and the School of Mechanical Engineering. The projects are related to the manufacture of silicon wafers and solar cells

## LABRISER

Sponsored by Petrobras, the Experimental Laboratory for Production Risers in Ultra Deep Waters and Maritime Production Systems (LabRiser) will have a tank capable of simulating the conditions to which underwater structures are subjected in ocean oil production

## LaCTAD

The Central High Performance Technologies Laboratory (LaCTAD), a Unicamp facility inaugurated in March, brings together modern equipment for research in genomics, proteomics, bioinformatics, and cell biology under one roof

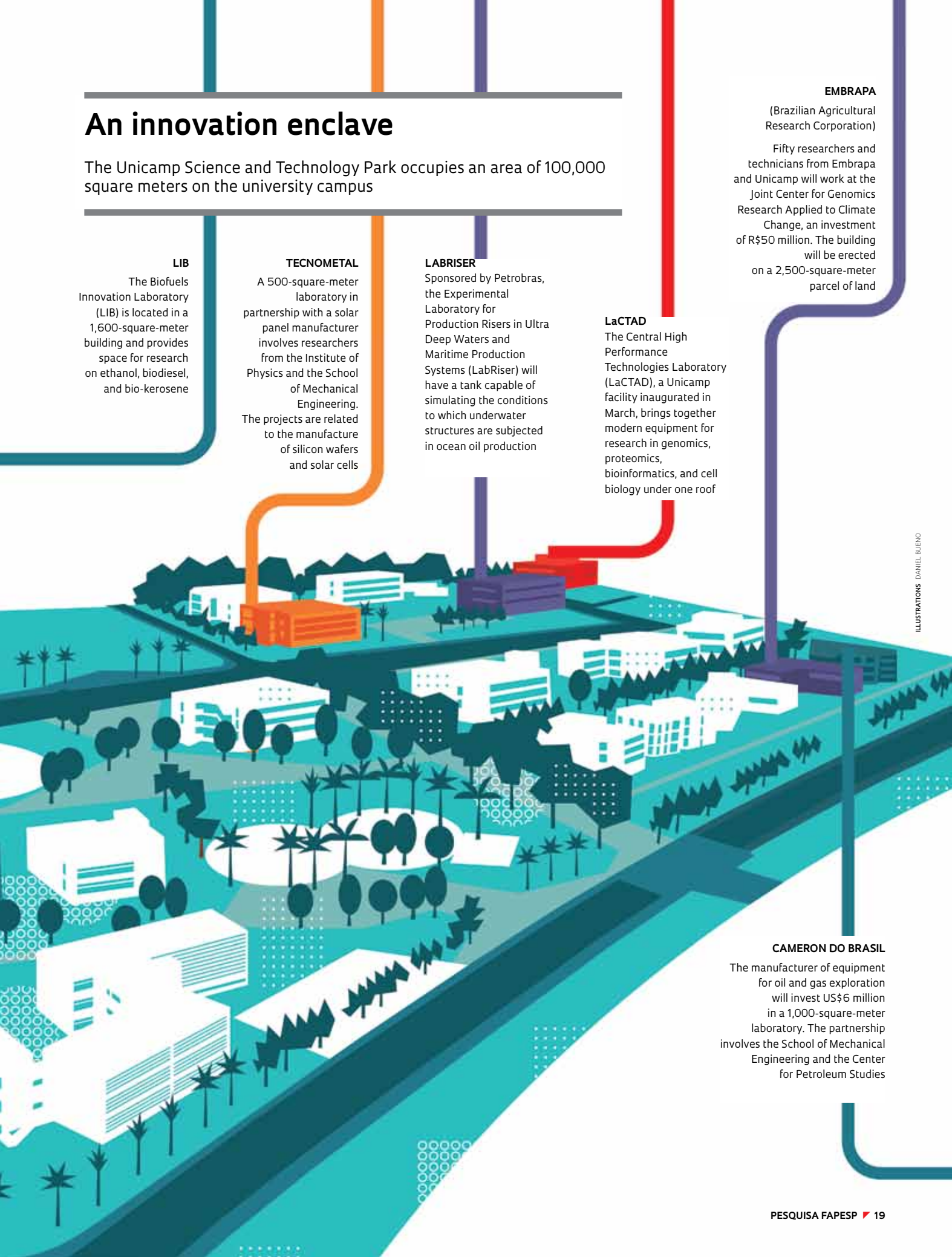
## EMBRAPA

(Brazilian Agricultural Research Corporation)

Fifty researchers and technicians from Embrapa and Unicamp will work at the Joint Center for Genomics Research Applied to Climate Change, an investment of R\$50 million. The building will be erected on a 2,500-square-meter parcel of land

## CAMERON DO BRASIL

The manufacturer of equipment for oil and gas exploration will invest US\$6 million in a 1,000-square-meter laboratory. The partnership involves the School of Mechanical Engineering and the Center for Petroleum Studies







Company centers in the Rio de Janeiro Technology Park: the fruits of UFRJ's specialization in oil research

Fernando Ferreira Costa, president of Unicamp. “It is not just to provide a service or to solve problems but to improve the education of our students, who can then use that experience outside of the university to contribute to innovation, national development, and the establishment of technology-based companies.”

#### IMMEDIATE BENEFITS

For companies, establishing laboratories at universities brings immediate benefits, such as the ability to use the expertise of good researchers in commercially sensitive areas, as well as other long-term benefits, such as the opportunity to interact with other companies and researchers working in the park and to recruit talented students to work as entry-level researchers. Companies such as Tecnometal, in the mining and renewable energy sector, and Cameron do Brasil, which provides technology and services to the oil and gas industry, have already signed agreements to create laboratories on campus. The park will also house the Embrapa Unicamp Joint Center for Genomics Research Applied to Climate Change, an unprecedented partnership model for a research firm, in which researchers from the two institutions will search for agricultural varieties that are more tolerant of the effects of global warming. Invasoft, the Unicamp Center for Innovation in Software, which houses start-ups and laboratories and was established in partnership with IBM, Samsung, and Banco do Brasil, is already operating in the park. The building that will be occupied by the Biofuels Innovation Laboratory is under construction; this

Laboratory will operate by attracting business laboratories, in a manner similar to Invasoft. “Unicamp has a long history of working with industry, and the Science and Technology Park will raise this to a new level,” says Ronaldo Pilli, Unicamp Dean of Research. There is a rule restricting negotiations for new laboratories in the park: only initiatives that include partnerships with Unicamp research groups are allowed. “The goal is to do competitive research. The company needs to recognize that Unicamp will be a strategic partner,” says Pilli.

According to Roberto de Alencar Lotufo, director of the Unicamp Inova Innovation Agency, which acts as a liaison with companies, the park allows the university to propose and plan the construction of new collaborative laboratories with companies. “Until now, when an opportunity arose to build a new laboratory, its location did not follow a plan, and this resulted in the installation of various buildings scattered around the campus,” says Lotufo. “The Science and Technology Park will organize and present a plan for the construction of new laboratories for collaborative research, creating a multidisciplinary, synergistic environment. The park will function like a ‘condominium’, in which companies pay for space and share infrastructure and security expenses.”

Companies that participate in the park will use various types of funding to build their laboratories. In the case of Cameron do Brasil, the laboratory will be built with the company's own resources—Unicamp offered 10 years' exemption from the occupation fee in exchange for

the company's construction of the building. The agreement was signed in 2011, and the company's laboratory should have already been under construction. But Cameron decided to postpone construction by one year, after the recent reduction in Petrobras investments. The partnership involves a collaboration with the School of Mechanical Engineering (FEM) and the Center for Petroleum Studies (Cepetro) in research projects involving subsea equipment and processes for oil processing and production, with an emphasis on the subsalt layer. Cepetro, created in 1987 in partnership with Petrobras, helped to increase



## The principal goal of the partnerships is to conduct competitive research, says Ronaldo Pilli, Dean of Unicamp

Unicamp's expertise in petroleum engineering research, which is now attracting the attention of other companies. In 2015, for example, the facilities for the Laboratory for Production Risers in Ultra Deep Waters and Maritime Production Systems (LabRiser) will be completed. These facilities consist of an experimental tank, which is the only one of its kind in the world able to simulate the conditions to which underwater structures are subjected in ocean oil production, such as the force of marine currents. The 30-meter deep tank and the laboratory building will cost R\$ 6 million (US\$ 2.5 million), and the laboratory will need experimental equipment, laboratory and analysis instruments, and computer equipment,

Petrobras  
has invested  
**\$ 2.5**  
million in the  
experimental  
tank at  
Unicamp

and all of these will be sponsored by Petrobras "Because our oil is offshore, Petrobras has always focused on developing research in ocean drilling and ocean oil production and has found that ability at Unicamp," says Celso Morooka, a professor at the School of Mechanical Engineering and CEO of LabRiser.

There are also partnerships that utilize non-reimbursable financing mechanisms provided by the Brazilian National Economic and Social Development Bank (BNDES) through the Technology Fund (Funtec). An example is the 500-square-meter laboratory that Unicamp is building in partnership with Tecnometal. The project obtained R\$12 million from Funtec to construct the building and purchase equipment. Tecnometal's contribution was equivalent to 10% of the total cost of the project. The company has a photovoltaic panel factory in Campinas (SP) and has been working in conjunction

with researchers from the Unicamp School of Mechanical Engineering and the Gleb Wataghin Institute of Physics on research related to the purification process for metallurgical-grade silicon, the manufacture of solar-grade silicon wafers, and solar cell manufacturing. The Unicamp Inova Agency is currently in advanced talks with at least three companies interested in participating in the park using Funtec resources.

### BIOFUELS

There is also a third type of funding, which is used by the Biofuels Innovation Laboratory (LIB). The construction of the 1,656-square-meter building was sponsored by the Brazilian Innovation Agency (Finep) through the CT-Infra program. The goal now is to find companies interested in participating in joint projects with Unicamp researchers involving the ethanol, biodiesel, and bio-kerosene production chains.

A fourth model is used by the Embrapa Unicamp Joint Center for Genomics Research Applied to Climate Change, which will be jointly funded by Embrapa and the university. Ten researchers from the two institutions are already working on the project, which will involve approximately 50 researchers and technicians within three years. An estimated R\$50 million will be invested in infrastructure and operations. "The five-year goal is to have drought-tolerant genetics-based technology applicable to important Brazilian crops, such as corn, soybeans, sugarcane, and wheat," says Embrapa president Maurício Antônio Lopes. "Embrapa has had an important

role in the adaptation of crops such as soybeans, rice, and wheat to tropical conditions. Now, the challenge is to remain competitive in the seed and biotechnology market, which is increasingly complex. The innovative nature of genomics applied to genetic improvement requires a basic research basis, and this led Embrapa to seek out the University," he says.

#### ALLELYX'S EXPERIENCE

According to Lopes, Unicamp was the natural choice because Embrapa has a computational biology center at Unicamp. Lopes emphasizes the importance of having Paulo Arruda, Professor of the Institute of Biology, as the project leader at the university. Arruda was one of the founders of Allelyx, a biotechnology company that was established based on the sequencing of *Xylella fastidiosa* and that has now merged with Monsanto. "Professor Paulo Arruda is known in Brazil and abroad as a scientist, and he also has experience setting up a pipeline in the private sector. He will work with some researchers who worked at Allelyx and are now at Embrapa," says the president of Embrapa. According to Arruda, the focus of the center is to ensure the sustainability of agricultural production in Brazil. "Brazil had agricultural losses of R\$5.4 billion last year due to bad weather. We need a strategy to sustain the production of corn, soybeans, and wheat, which are our staples," he says. "We will work at the Joint Center and use a pragmatic business vision, in a format similar to that of drug development in the pharmaceutical industry," he says. The benefits to Unicamp, according to Arruda, will be many. "Undergraduate and doctoral students and post-doctoral researchers will have unprecedented opportunities. They will dive into the world of technological development, with its demands, goals, and deadlines. This will increase their employability and contribute to creating a critical mass of knowledge in a subject of great interest to Brazil."

One of the most complex tasks of the Unicamp Inova Innovation Agency in creating the park is to find research groups at Unicamp who are suitable for meeting the needs of the partner company and to promote an agreement between the two parties. "We are now working on a partnership with Schreder, a public lighting company based in Valinhos. The first thing is to identify the research groups that can help, but that is not all. We have to ensure that the researchers have time to help the company and, above all, are interested in the collaboration," says Roberto Lotufo. The agency maintains a database, known as the

knowledge bank, with updated information on research groups. Inova operates on several fronts. It helps university researchers file patents. It manages Unicamp's intellectual property. It acts as a liaison with companies that are interested in licensing technologies. It coordinates the activities of an incubator for technology-based companies. Last, it encourages entrepreneurship among researchers and undergraduate and graduate students. According to Lotufo, the Science and Technology Park will be one more tool to fulfill the agency's mission of encouraging innovation and its transfer to society. "This is what happens at the world's major research universities. When we receive foreign delegations, the heads of universities always ask us about our incubator, our technology licensing, and our technology park. They are links in the same chain," he says.

On a reduced scale, the ambitions of the Science and Technology Park are already being realized in the Inovasoft building, the Unicamp Center for Innovation in Software. This building houses laboratories in partnership with several companies, in addition to functioning as an incubator for information technology companies. Since late last year, Inovasoft has housed a laboratory set up by Samsung, where researchers and

**"Undergraduate and doctoral students and post-doctoral researchers will have unprecedented opportunities," says Paulo Arruda**







students from the Unicamp Institute of Computing (IC) are working. Agreements involving investments of approximately R\$3 million have focused on research and development in various areas related to mobile computing platforms; Samsung is a leader in the mobile phone sector. The partnership began with three projects, and two new projects are being incorporated. One of the main benefits identified by project participants is the opportunity to obtain resources and research infrastructure. Samsung has set up a laboratory with computers, tablets, and smartphones that the researchers use in their work and is funding scholarships for students involved in the project. Sandro Rigo, an IC professor heading one of the projects, stresses the importance of the opportunity for students and researchers to work in areas of great interest to companies. “Graduate students in the United States often intern at large companies, but it rarely happens here in Brazil,” he says. Yeun Bae Kim, Samsung Vice President of Research and Development, says that the company’s goal is the joint development of new technologies in the medium and long term. “The objective is to produce results with a high technological impact, to obtain significant improvement in the state of the art in research areas of interest to Samsung,” he stated when he participated in the laboratory’s official inauguration in January.

Another Inovasoft laboratory houses a collaborative research project started in 2011 by the Unicamp IC with Banco do Brasil. The focus is the study of and support for the implementation of solutions for computer registration and authentication for Banco do Brasil customers using the Internet portal to access their accounts.

TECNOPIUC Headquarters (below), in Porto Alegre, model of the new park building (above, left) and computer company innovation centers: the park leveraged resources for research

“The bank gave us freedom to suggest solutions. We proposed both a new solution and a modification to make the system they already have more robust,” says Ricardo Dahab, IC professor and leader of one of the Banco do Brasil projects. “It was an important project because the requirements were very sophisticated. It provided work for three doctoral students, and good academic articles were published.” The project involved three professors and eight students, including graduate (PhD and MS) and undergraduate research assistants.

According to MC1, a São Paulo-based software and services company, the recently signed partnership with researchers from the Institute of Computing seeks more than just innovative solutions. “We’re not simply seeking information and scientific and technological upgrades

Embrapa and  
Unicamp  
invested  
**R\$ 50**  
million in the  
Joint Center





1 Aerial view of the Stanford Research Park, an inspiration for technology cities in the United States and in various other countries

2 The São José dos Campos Technology Park, one of the most advanced of the 27 initiatives in the São Paulo State system

for our company. One of our goals is to hire the individuals participating in the project,” says Kayo Hisatomi, software development coordinator at the company. The company has already signed agreements with other universities in the past, but this is the first time it has invested in its own laboratory. “We learned about this format and decided to invest in it,” says Hisatomi, who majored in computer engineering at Unicamp in 1998 and still maintains contact with the university. The project leader is IC Professor Luiz Fernando Bittencourt, who will coordinate a team of 15 researchers and students in developing a platform that enables the company to offer its solutions to several clients at the same time using cloud computing resources. “The goal is to create a software architecture that allows the company to offer its software without having to create a customized copy for each client,” he says. MCI is investing about R\$170,000 in the project.

One of the main inspirations for the more than 900 technology parks around the world is the pioneering experience of Stanford University in the early 1950s, when the relationship between the university, microelectronics companies, and research institutions gave rise to Silicon Valley, the most important enclave of technology companies in the world. In the early 1970s, Japan enthusiastically embraced the idea of technology parks, creating 25 “technopoles.” Among the major parks embedded in universities around the world, the ones that stand out are at the University of Wisconsin–Madison and Purdue University in the United States and the University of Oxford and the University of Cambridge in the UK.

### SILICON VALLEY

Brazil decided to invest in this model later than other countries. One of the largest Technology Park developments in Brazil is in Rio de Janeiro. Established 10 years ago on the outskirts of the Federal University of Rio de Janeiro (UFRJ) campus, its emphasis is on research and development in oil and gas, based on the work that UFRJ has been conducting in this area for decades (especially at its Alberto Luiz Coimbra Institute - Graduate School and Research in Engineering (Coppe)) and on partnerships established with the Petrobras Research and Development Center (Cenpes). The park occupies an area of 350,000 square meters and will house the research and development centers of more than 20 large and medium-sized companies by 2015. Between 2003 and 2014, R\$1 billion is expected to be invested. The French company Schlumberger, the American companies Baker Hughes, GE, and FMC Technologies, and the Brazilian company BR Asfaltos, owned by Petrobras, are already operating at its centers. Centers for the Siemens and Halliburton companies are expected to begin operations later this year. “The park was created 10 years ago, but its history began long before that,” says Maurício Guedes, director of the park. “Similar to Unicamp, UFRJ is an example of a university with an entrepreneurial culture. UFRJ also has experience with company relationships, through Coppe, for example, which alone has signed over 3,000 agreements with Petrobras. We have had a very successful relationship with Petrobras for more than 40 years, since the establishment of Cenpes on the UFRJ campus,” says Guedes.

The Unicamp Science and Technology Park is one of the pre-certified São Paulo Technology Parks, which includes 27 initiatives spread across various cities in the state of São Paulo, several of which have close ties to universities such as the Botucatu Park (which is linked to the



Universidade Estadual Paulista) and the Ribeirão Preto Park (which is linked to the University of São Paulo). One of the earliest—and the first to receive official certification—was the São José dos Campos Technology Park, an initiative promoted by the city to bring together innovation centers in the areas of health, information technology, aerospace, energy, and water resources. The park operates with anchor companies such as Embraer, Vale, Ericsson, and Sabesp and has partners such as the Technological Institute of Aeronautics (ITA), the Polytechnical School (Poli-USP), and the USP-São Carlos Engineering School, in addition to the Federal University of São Paulo (Unifesp) and the São Paulo Institute for Technological Research (IPT).

The task of creating a technology park within a university is far from trivial. “One common obstacle is space. Few universities have the land to create parks. Even great institutions, such as Harvard and MIT, have this limitation,” says Roberto Lotufo, who participates in the annual meeting of the Association of University Research Parks (AURP), an entity created in 1986 whose members include the 32 science and technology parks owned by US universities. According to Lotufo, in Brazil, there is also the legal difficulty of maintaining an enclave within the campus

**“The coexistence of the companies in the parks generates unexpected interactions,” says Roberto Moschetta**



The Rio de Janeiro Technology Park obtained R\$ 1 billion in investments in 10 years

that follows rules that are different from those that govern public universities. A park linked to a community university epitomizes the benefits that such initiatives can provide to both companies and the academic environment. The Technology Park of the Pontifical Catholic University in Rio Grande do Sul (TECNO PUC), in the city of Porto Alegre, currently consists of 101 innovation centers that bring together companies and institutions of various sizes and employ 4,800 people. The park was established in 2003 as part of PUC-RS's strategy to qualify as a research institution. “There was an imbalance between PUC's established tradition in teaching and the institu-

tion's research that needed to be resolved, and there was also difficulty in raising funds to invest in research because our source of funds—student fees—was intended mainly to fund teaching,” says Roberto Moschetta, director of TECNO PUC.

#### FULL PARK

Initially the TECNO PUC park focused on information technology and communication, with Dell and HP as anchor laboratories, and sought to attract private funding for research at the institution. Today, the park includes centers for companies such as Microsoft and TOTVS and has expanded its research areas into the fields of energy and health, with agreements with the National Health Surveillance Agency and Petrobras. There is no more space for new initiatives—the 15-hectare lot next to PUC, bought from the Army, is full. Park expansion will take place in a large area 12 kilometers from the university campus. “Of course, not all company centers are developing high-tech research. Some companies seek the university's expertise for simple applications,” said Moschetta.

The results of the initiative exceed expectations. The director notes that TECNO PUC information technology graduate courses offer scholarships, funded by companies located in the park, to almost all students. “It's a virtuous circle. We are able to attract highly qualified students, and our courses gain even more prestige,” he says. “The coexistence of the companies in the parks also generates unexpected interactions. Partnerships and exchanges of experiences that could not be foreseen at the beginning of the project occur. The environment is synergistic and acts as a catalyst. The energy you see in the park environment is due more to the connections that form than to the environment itself,” he says. ■