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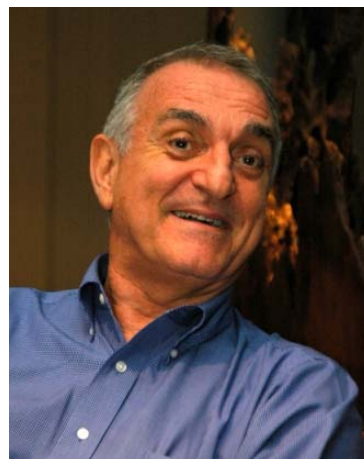
CIEC's Profiles in Creativity and Innovation

Innovation drives long-run economic growth. But who are the people who can make works of art, scientific breakthroughs and technological leaps possible in some of the world's most challenged economies?

Profiles in Creativity and Innovation is a series of vignettes that recognize individuals who have advanced creativity and innovation in countries around the globe. Throughout the year, CIEC's researchers will share with you stories of great people we've met who, against all odds, invent new technologies, embrace new ways of doing things, and create new cultural products.

Dr. Jose Fernando Perez
Founder and President
Recepta Biopharma
São Paulo, Brazil

*"Our challenge is to become an Embraer.
We can become a surprise like them. Nobody
expects a company from Brazil to succeed
in cancer drugs."*



The Cancer R&D Network Innovator

Contributed by Michael P. Ryan, PhD

Dr. Fernando Perez is the founder and president of Recepta Biopharma in São Paulo. He is the cancer R&D network innovator because he has organized a network of Brazilian and American researchers whose goal is to develop new pharmaceutical therapies for cancer. Dr. Perez explains that there are medical needs not yet met by the existing pharmaceutical therapies for most types of cancer. If their R&D efforts succeed, they will provide important contributions to the medical treatment of cancer.

The story of how a theoretical physicist with a PhD from Zurich and post-doctoral education at Bedford College in London came to the business of cancer medicine innovation is the story of a career network organizer and science innovator. After completing his studies, he joined the Institute of Physics at the University of São Paulo. Every year for 12 years, he was a visiting professor at the University of California, Irvine. In 2005 he retired from the USP faculty as Professor of Physics, but that does not begin to tell his story.

Dr. Perez served almost four 3-year terms as scientific director at FAPESP, the São Paulo State Research Support Foundation, beginning in December 1993. (See our Profile in Creativity & Innovation of Dr. Carlos Brito Cruz, who succeeded him as FAPESP scientific director.) Dr. Perez realized that as scientific director at FAPESP he was in a position



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CIEC's Profiles in Creativity and Innovation: Dr. Jose Fernando Perez

With tremendous opportunity for influencing the development of science in Brazil. Political leaders had created the opportunity in 1962 when they decided to provide FAPESP with substantial annual budgets to support scientific research at universities and research centers in the State of São Paulo. Thus Dr. Perez created and managed a wide range of peer-reviewed scientific research and merit-based science scholarship programs, and he knew that these programs would bear fruit over time. He himself owed his graduate education to FAPESP scholarships, and he had received research grants as a professor as well. But he also realized that many demands were placed on public funds and that the continuation of generous state support for science would depend on what he did with the money that captured peoples' imaginations.

On 1 May 1997, the Labor Day holiday in Brazil, a bio-chemist friend of his suggested that FAPESP initiate an ambitious genome research project. The citrus industry in Brazil struggled against a bacterium named *Xylella fastidiosa* that ruined millions of dollars worth of oranges every year. No one knew what to do to stop the pathogen, but sequencing its genome could open the door to possible solutions. Dr. Perez remarks, "I don't claim to be a brilliant guy, but I know a brilliant idea when I hear it." Dr. Perez quickly conceived what would be the most ambitious research project ever undertaken in Brazil—to organize a network of Brazilian researchers to sequence *Xylella fastidiosa*.

As a mathematical physicist, he not only appreciated the beauty of the mathematics that would be involved but knew that massive amounts of information would need to be coded and analyzed. The project's success would depend on networking the skills of specialists in mathematics and information technology. Thus, the FAPESP request for proposal did not announce a competition for the creation of one genomic center; rather, the RFP called for a variety of skill-sets and a willingness to work as part of a network. Dr. Perez remarks, "We were establishing a new model for conducting science in Brazil, and I believed that creating the virtual center model and learning *how* to sequence a genome mattered as much as the information about *X. fastidiosa*." With supplemental funding from the Brazilian orange growers and the assistance of peer reviewers—all experts based in the United States and Europe—Dr. Perez established a research consortium of 34 participating research centers with some 200 researchers from around the State of São Paulo and called it the Organization for Nucleotide Sequencing and Analysis. He recruited an English scientist who was a researcher at the São Paulo branch of the Zurich-based Ludwig Institute to be research director for project. He says, "I knew it would take a person who was not only a good scientist but someone with really good leadership skills to manage 200 egos." Dr. Perez grasped the importance of the "network" as an organizational form and believed that their genome project needed just such a social architecture to achieve success.

The success of the project exceeded his wildest dreams. The research team published their successful sequencing of *Xylella fastidiosa* in *Nature* in July 2000, and their project was featured on the cover. *The New York Times*, *The Washington Post*, *The Los Angeles Times*, and other major newspapers in the United States and Europe



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reported the findings. *The New York Times* covered the story in an article entitled, "Model for Research Rises in the Developing World." *The Economist* covered the story under the title "Fruits of Co-Operation" and declared "samba, football and... genomics" as that for which Brazil would henceforth be renowned. The consortium went on to apply their network capabilities to other genomes of agricultural and medical science interest.

A student of Vannevar Bush's ideas about the organization of science in the United States, Dr. Perez used the way the National Science Foundation established research centers as his model and took a trip to the United States to visit several NSF-established Science and Technology Centers to see them with his own eyes. Following this visit, FAPESP launched a program to fund ten such centers of excellence in research, innovation and diffusion. (See our Profile in Creativity & Innovation of Dr. Antonio Carlos Camargo, Director of one of these centers.)

Dr. Perez says, "I knew that Recepta, which is a network-based company, could be done in Brazil. I learned it at FAPESP." The genome project begat Recepta in more than one way. The English research coordinator for the genome project later left his position at the Ludwig Institute in São Paulo and went to New York, where he eventually became Scientific Director of the Ludwig Institute for Cancer Research. He told Dr. Perez in 2004 that they wanted to establish a consortium in Brazil for the purpose of developing cancer pharmaceutical therapies from several antibodies identified by their researchers and asked whether Dr. Perez would be willing to leave his position as scientific director at FAPESP to lead the effort. Dr. Perez recalls that he told the FAPESP board at the beginning of his fourth term that it would be his last, so he was indeed ready for a new challenge. That is how a theoretical physicist came to be the president of an innovative pharmaceutical company in January 2005.

The challenge for Dr. Perez with Recepta was seemingly much the same as with the genome project, in that he would need to organize a consortium of Brazilian institutions and a network of researchers to work with each other and with the Ludwig Institute worldwide. He obtained exclusive licenses to four Ludwig Institute patents of monoclonal antibodies. For one of these antibodies, Ludwig's team had successfully carried out what the drug development world calls Phase I clinical trials in a small number of patients for toxicity and safety. Perez recruited some 40 scientists and clinical researchers from universities and research hospitals in São Paulo, Rio de Janeiro, and Belo Horizonte. Phase II study, begun in July 2008, will indicate to Recepta's team whether their optimism owing to the laboratory research is warranted.

The challenge for Dr. Perez at Recepta, however, is decidedly unlike the genome project in some important ways. The genome project was a not-for-profit project that would place the research funds into the public domain. Recepta is a for-profit enterprise that will carry out proprietary research. He explains that this project requires risk-taking investors because, despite their best efforts and good management, they



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may not produce a pharmaceutical therapy that can be approved by drug regulators for use with cancer patients. His angel investors thereby know that if their R&D efforts succeed and if their judgment about the unmet cancer need is correct, that they will be rewarded for their financial contribution toward making the R&D effort possible.

But, for this same reason, Dr. Perez is again leading Brazilian science where it has not been. Brazilian universities follow the German model. The German research university model clearly demarcates separate, arms-length roles for university professors and private sector technology developers. In Germany and in Brazil, the professors conduct research, write journal articles, and educate students. German and Brazilian university cultural norms chill faculty-industry collaborations for the purpose of market application-directed R&D. A 2004 Brazilian technology law not only allows, but also encourages, universities to apply for and own patents and to become involved in contract-based public-private technology commercialization activities. Despite the existence of the law, however, Dr. Perez says that the universities and research hospitals in Brazil are only beginning to do what American universities do so commonly. In general, the professors lack experience with patents and intellectual property. Few universities have well-developed patent and intellectual property policies: Who owns the intellectual property? What information is kept secret as propriety information? What information is patented? What information is published and when? Who submits a patent application? Who decides? Who pays for the legal fees and patent maintenance fees over time? How are royalties divided by the university, the research department, and researchers? How are the intellectual property issues defined in the contracts that govern the relations among all concerned?

Dr. Perez is running a business in which product development is slow and his investors must be rewarded as soon as possible. Since the Brazilian public research institutions are not yet ready to manage patents and intellectual property, the Recepta strategy is to conduct its intellectual property-oriented R&D only in partnership with the São Paulo branch of the Ludwig Institute. With all its public partners, Recepta carries out non-intellectual property-oriented R&D. But Dr. Perez believes that, just as the Organization for Nucleotide Sequencing and Analysis network experience taught Brazilian scientists how to work together to advance the life sciences, so the Recepta network experience will contribute to development of the culture among Brazilian scientists of how to create the intellectual property that puts important pharmaceutical therapies into the health marketplace.

Questions or comments? Email us at ciec@gwu.edu or call (202) 994-2242.