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# **AC 2011-296: AN INDUSTRY-GOVERNMENT-ACADEMIA PARTNERSHIP TO DEVELOP TALENT AND TECHNOLOGY**

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Lueny Morell, M.S., P.E., is Program Manager in the Strategic Innovation and Research Services Office of Hewlett Packard Laboratories in Palo Alto, California. She is part of the team facilitating co-innovation with government, partners and universities. From 2002-2008, she was in charge of developing engineering/science curriculum innovation initiatives worldwide in support of HPL research and technology areas and former director of HPL University Relations for Latin America and the Caribbean in charge of building research and education collaborations with universities throughout the region. Before joining HP, Lueny was full professor of Chemical Engineering at the University of Puerto Rico Mayagez Campus where she held various positions including associate dean of engineering and director Campus R&D. Recipient of the 2006 US National Academy of Engineering Bernard M. Gordon award for innovations in the engineering curriculum and the 2010 Latin America and the Caribbean Consortium of Engineering Institutions Academic Award, her work in curriculum, research, accreditation and economic development activities has been published in more than 80 papers, book chapters and journals. She is a licensed engineer, an ASEE Fellow, an ABET reviewer and member of various national and international boards including the US National Science Foundation International Science and Engineering Advisory Committee and Past President of the International Federation of Engineering Education Societies. Together with colleagues, Lueny has offered more than 65 engineering education, curriculum/learning environments innovation workshops around the world.

## **Martina Y. Trucco, HP Labs**

Martina Y. Trucco is responsible for research strategy and portfolio management at HP Labs, HP's global corporate research lab. Previously, she worked in HP Labs' Open Innovation Office and University Relations office, leading development of strategic university, commercial and government collaboration activities in the Latin America region, as well as creative and marketing activities for the team. She is passionate about education and technology, and a believer in the power of partnerships between industry, academia and government to effect change in education and foster economic development.

Martina joined HP in 2004, after receiving her Master's degree with honors in Digital Business Management from HEC Paris and Tlcom Paris. She also holds a Bachelor of Science in Economics with a concentration in Multinational Management from The Wharton School of Business, at the University of Pennsylvania. Prior to joining HP, Martina worked in the e-business departments of Eli Lilly France and Louis Vuitton. She was a founding member of a start-up in Munich, Germany in 2000, specializing in Tablet PCs and mobile computing solutions and consulting. She is a member of the Board of Directors of ISTEAC, the Ibero-American Science and Technology Education Consortium, and serves as Chair of the Advisory Board of the Caribbean Computing Center for Excellence.

## **Francisco Enrique Andrade Lopez, Hewlett-Packard Mexico**

Francisco E. Andrade-Lopez joined HP in April 2006 as program manager of University Relations staff of the Hewlett-Packard Company. Since then, he has been engaging in and supporting strong, strategic relationships with key Universities in Mexico. In October 2010, he was appointed to coordinate the Guadalajara Prototyping Organization (GUAPO), a group of engineers who support the development of lab prototypes and alpha implementations for new technologies in the HP Labs research portfolio.

Before joining HP, Francisco was consultant and professor of Information Technologies at Tecnológico de Monterrey in Mexico.

# **An Industry-Government-Academia Partnership to Develop Talent and Technology**

## **Abstract**

Since 2005, Hewlett Packard Laboratories (HP Labs) has been developing research collaborations with universities and public research centers in Mexico. The strategy has primarily focused on engaging Mexican engineering and science students in HP Labs' projects, aligning universities' research interests to HP Labs' research portfolio. In an effort to develop IT talent in Mexico, enhance the speed of innovation at HP Labs, and foster the development of attractive and adequate jobs in the region, HP's initiative has recently evolved to become a formal program sponsored by the Government of the State of Jalisco in Mexico. This paper describes the history, steps and some of the outcomes of the newly-established HP Guadalajara Prototyping Organization (GUAPO), a program developed and sponsored by HP Labs and the state government of Jalisco. We also share some of the lessons learned, best practices and challenges in establishing and nurturing such a program. This novel R&D, talent, and technology development partnership model can be of assistance to other companies and regions establishing similar programs.

## **Introduction**

As the largest IT company in the world, Hewlett Packard has a long history of supporting engineering education. Support and collaboration takes place in many dimensions, from research and development; to recruiting talent, providing students and faculty with opportunities for internships and experiences in the company; to philanthropic grants, assisting in engineering education policy enactment for win-win outcomes and business and sales opportunities for products and services. Integrated efforts documented in the past in the Latin America region<sup>1</sup> indicate that HP is highly valued partner in the education space.

HP Labs today has about 500 researchers working in seven locations around the world: Palo Alto (US), Bristol (UK), St. Petersburg (Russia), Beijing (China), Bangalore (India), Haifa (Israel), and Singapore. The challenge that many corporate research labs face is whether to do basic science or product-related research. HP Labs has taken a portfolio approach to pursuing research: about one-third of its research projects are basic or exploratory in nature, with possible applications 5 to 10 years into the future; one-third are related to current products and services, with potential applications about 6 to 18 months away; and one-third are applied in nature—not tied to any products, but related to an application with possible use in two to four years.

At Hewlett Packard Laboratories (HP Labs), Open Innovation (OI) is a core element that augments and accelerates knowledge creation and tech transfer<sup>2</sup>. HP Labs' OI philosophy includes joint research with universities worldwide; research and internships and post-doc programs co-funded by governments; and, collaborations with partners and customers. Some

examples of Open Innovation at HP Labs are global programs such as the Innovation Research Program (IRP), that create connections between HP Labs scientists and university researchers around the globe, and the showcase initiative Open Cirrus™ that has brought several corporate and university partners together to advance a shared cloud-computing agenda with a demonstration testbed<sup>3</sup>. HP Labs engages with government agencies in various strategic geographies to broaden HP Labs' reach and ability to conduct critical IT research by hosting interns and post-docs.

## **Background**

Since 2004, HP Labs has been developing research collaborations with universities and public research centers in Mexico. The strategy has primarily focused on engaging Mexican engineering and science students from universities in HP Labs projects, aligning the universities' existing research interests to HP Labs' research portfolio. The program has grown from one University of Sonora student in 2004 to 30 students from 8 institutions in 2010. These have been co-supported by different State and Federal agencies and programs in Mexico and by HP Labs, adding layers of complexity to the program's administration, since each agency and university or public research center must comply with its own set of policies around these types of collaboration programs.

Despite a high level of interest on the part of Mexican and other Latin American universities in working with HP Labs on deeper research collaborations involving faculty researchers, the results from the IRP program in 2008 and 2009 confirmed that there continued to be limited understanding of and alignment with HP Labs' research agenda beyond recruitment of top-notch student talent. The OI team thus concluded that undertaking complementary activities would become necessary in order to prepare for the future possibility of undertaking a deeper collaborative research project with universities in the region.

Throughout these years, the State and Federal Governments of Jalisco and Mexico have been kept informed on these collaborations and outcomes, demonstrating the value proposition to all stakeholders involved. HPL's analysis in 2009 found that, despite the positive results obtained by the program, and the fact that the State of Jalisco had become Mexico's primary attractor and driver for the development of IT companies, HPL had been able to establish only one collaboration with a university in the state. As a result of this analysis, early in 2010 the Executive Director of the Jalisco State Council of Science and Technology (COECYTJAL) was invited to visit HP Labs and met with HP Labs officials, lab directors and Mexican research assistants who were at HP Labs at the time (to date, none of the research assistants at HPL have been from Jalisco) to explore the possibility of increasing research collaborations specifically with universities and public research centers in the state. As a result of this visit, HP Labs and COECYTJAL agreed to establish an Advanced Prototyping Center (GUAPO) in HP Guadalajara to be jointly funded for 2 years. A survey of HP Labs interest in such a Center resulted in 9 HP Labs researcher groups interested and 14 possible projects. This show of interest in the center, plus the emphatic support by the government, was sufficient for all parties to make the decision to go ahead with the initiative.

## **Why Jalisco, Mexico?**

The Jalisco State Council of Science and Technology (COECYTJAL)'s vision is to succeed in making Jalisco an innovation and knowledge-generating hub through articulated, organized and complementary collaboration initiatives between the various public and private institutions and players in the state<sup>4</sup>. To achieve this vision, they promote scientific and technology initiatives that are aligned with the social needs of Jalisco, aiming for continuous and sustainable development. The state envisions its future to become a globally-recognized center for science and technology that facilitates national and international investments along the whole value chain. One example of existing state and federal mechanisms is the Federal Program called PROSOFT<sup>56</sup> which aims at developing the software industry in Mexico by sponsoring projects that promote creation, development, consolidation, viability, productivity and sustainability of enterprises in this sector. This program framework was leveraged by HP and COECYTJAL to obtain funding for the GUAPO center's first year of operations.

## **The Guadalajara Advanced Prototyping Center (GUAPO)**

The Guadalajara Advanced Prototyping Center (GUAPO) was officially established in the fall of 2010 with shared funding from HP Labs and COECYTJAL. GUAPO's charter (hosted by HP Guadalajara in Montemorelos) centers on developing lab prototypes and alpha implementations for new technologies in the HP Labs research portfolio, in close alignment with HPL's applied research projects. As of January 2010, the Center is currently in the process of hiring 20 highly-qualified recent graduates in Guadalajara, of whom 10 have already been hired. These new engineers will be contributing to research projects in the areas such as Intelligent Infrastructure, Analytics, Digital Commercial Print, Sustainability, and Information Management.

HPL's manager of the Center is also tasked with enhancing the strategic engagement with key universities and research institutes in the region aligned with HP Labs' research portfolio, augmenting HP Labs researchers' contact with universities, developing new collaborative opportunities, and providing local and national thought leadership.

GUAPO's stakeholders share a vision that, as the Center grows and matures, and as its participants increase the value they provide to the development, design and conception of prototypes and the projects in which they participate, perhaps this initiative will pave the way for continued and deeper engagement by HP Labs in Mexico.

## **GUAPO: a Win –Win Program**

Open innovation benefits all stakeholders. For companies, it represents a core strategy to augment and accelerate knowledge creation and technology transfer. Universities are able to leverage corporate research and amplify the innovation process, helping them to build capacity in emerging areas of science and technology as well as identify skills and competencies needed in graduates to assist in renovating their curricula. For governments, an open innovation culture fosters entrepreneurship, catalyzing technology transfer and new business creation for sustaining and expanding knowledge-based economies, as well as

creates new employment that demands more skilled workers, that can be filled with the country's graduates from engineering and science undergraduate and graduate programs. In developing OI programs, HP Labs targets one or more of our key outcomes of bringing together minds, ideas and resources, while at the same time bringing value to all involved stakeholders. GUAPO provides an example of a program where all three key outcomes come together.

GUAPO provides HP Labs with top talent while effectively and efficiently supporting its prototyping and development needs. GUAPO also allows HP Labs to protect its intellectual property (IP), as these engineers are contracted by HP and abide by employment confidentiality and IP agreements. Finally, the center also provides some economies of scale in terms of administrative benefits: instead of negotiating 20 contracts with universities or individuals, there is now a single HP organization on site hosting and managing these engineers.

GUAPO provides recently graduated engineers with an excellent growth and professional development opportunity for their careers. These young engineers have the opportunity to work closely with world-renowned researchers in HP Labs, learn about emerging technology trends and knowledge, and develop key skill sets in an environment that seeks to “innovate for business outcomes” (unlike more theoretical research and development in academia) and maybe publish a paper or two. They will learn how to work as part of an international team, develop their written and oral communication skills in English, and understand the business constraints of R&D, among others valuable lessons.

Based on the successful outcomes of prior programs with universities and public research centers in Mexico, GUAPO will also encourage its participating engineers to pursue graduate studies once they have reached a certain level of professional experience and maturity. It is the Center's intent to offer participants experiences that will aid them in the selection of the area of their graduate studies, and in some cases, graduate student research may be sufficiently aligned with HPL research to warrant an ongoing collaboration. Once their graduate studies are complete, participants may also have the possibility of returning to GUAPO as a post-doc researcher.

It also anticipated that many participants will be recruited by other high-tech companies in the region, and this also forms part of the Center's commitment to developing local engineering talent. In addition to having contributed to those candidates' professional careers, they will also serve as ambassadors in other companies, demonstrating the kind of work that GUAPO carries out, potentially attracting new partners to the Center.

For the state of Jalisco, GUAPO will develop a cadre of experienced young engineers knowledgeable in new technologies and, even more important, with a new set of skills that will make them a valuable asset to the state. Given the right set of incentives and facilities, these young engineers could become the next local technology entrepreneurs in Jalisco, as has already been the case of some HP Labs post doctoral researchers<sup>7</sup>.

## **The Changing Dynamics of Next-Generation Offshoring**

Moving business processes, information technology applications, and even research and development activities to more geographically diverse locations (“offshoring”) has become an accepted, and now increasingly important, business practice and strategic tool. Offshoring refers to the process of sourcing any business task, process, or function supporting domestic and global operations from abroad, in particular from lower cost emerging economies<sup>8</sup>. However, where these moves were once largely driven by reduced labor costs, this is no longer the only strategic driver behind these moves<sup>9</sup>. As more companies experience difficulties in finding sufficient engineering and science human resources in advanced economies, at the same time, these companies are finding much greater availability of this talent in emerging economies. Thus, while “outsourcing” or “offshoring” jobs has become a contentious issue in developed nations (particularly during difficult economic times when unemployment rises)<sup>10</sup>, many companies are adding higher-skilled activities (such as engineering or product development) in a variety of locations around the world in order to gain access to a larger market for skilled human resources. In fact, according to a global survey and analysis by Manning et al, new product development—including product design, engineering services, and R&D—was the second most frequently offshored business function after IT<sup>11</sup>.

As a global organization with seven sites around the world, HP Labs places a premium on having access to the best and brightest engineering and science talent to support our research and development efforts; as part of a global company with over 300,000 employees, geographic and employee diversity at HP is a key driver of our success. Therefore, a key aspect of our OI programs is to seek out the best talent to collaborate with our researchers in our worldwide sites.

### **Lessons Learned**

Given HP’s long history and experience implementing state and federal government agencies in Mexico, the process from concept to implementation of this program was relatively straightforward, which reduced the program’s risk, and investment in time and resources significantly. Nevertheless, there have been some lessons learned in the process. One is the time schedule and rules of government grants programs, which may not align well with corporate fiscal timelines. In the case of the program GUAPO has benefited from, proposals must be submitted according to set deadlines, and matching funds expensed before the end of the calendar year, while also demonstrating that the matching investment by the company has taken place during the calendar year. This was a challenge during GUAPO’s first year, as the center’s investment and ramp-up did not commence until the state funds were received. In addition, COECYTJAL’s requirements for the funding were not apparent at the start of the initiative, which also led to delays in starting up the Center.

These challenges are being addressed by asking the Government for a no-cost extension into early 2011 and by planning the research projects matching process with an earlier timeline, to be better aligned with HP Labs’ own internal research portfolio reviews.

## Conclusions

In developing external research collaboration programs, HP Labs targets one or more of the our key outcomes of Open Innovation: bringing together minds, ideas and resources, while at the same time bringing value to all involved stakeholders. GUAPO is also helping HP Mexico develop a new operation with a high added-value to the company, thereby increasing its competitiveness as a premier “best-shore” destination for development inside HP. HP Labs hopes to continue to explore OI collaborations around the globe using GUAPO’s model to augment and enhance its research portfolio, as the 5+year outcomes of the relationship with the Jalisco Government show. HP’s experience with this kind of industry-government-academia partnership can be used by other companies and regions who wish to establish similar win-win collaborations to advance science and technology.

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<sup>1</sup> Morell, Lueny, Martina Y. Trucco, Edgardo Torres-Caballero and Francisco Andrade. **HP University Relations: helping build engineering capacity in Latin America.** 2007 ASEE Conference Proceedings

<sup>2</sup> Banerjee, Prith, Rich Friedrich and Lueny Morell, **Open Innovation at HP Labs**, Computer, IEEE Computing Society, November 2010, pp 88-90.

<sup>3</sup> **Open Cirrus Expands:** <http://www.hpl.hp.com/news/2010/jul-sep/cirrusexpands.html> 27 Sep 2010.

<sup>4</sup> <http://www.jalisco.gob.mx/wps/portal/coecyt>

<sup>5</sup> <http://www.mexico-it.net/>

<sup>6</sup> [http://www.mexico-it.net/index.php?option=com\\_content&view=category&layout=blog&id=11&Itemid=12](http://www.mexico-it.net/index.php?option=com_content&view=category&layout=blog&id=11&Itemid=12)

<sup>7</sup> Morell, Lueny, Martina Trucco, Rich Friedrich. **Developing the Next Generation of Technology Leaders in Challenging Times: the ASEE-NSF Industry Research Fellows Program.** 2010 ASEE Conference Proceedings.

<sup>8</sup> United Nations Conference on Trade and Development. (2005). **Prospects for foreign direct investment and the strategies of transnational corporations 2005–2008** (United Nations Report). Geneva: UNCTAD.

<sup>9</sup> Manning et al. (2008) A Dynamic Perspective on Next-Generation Offshoring: The Global Sourcing of Science and Engineering Talent. *Academy of Management Perspectives*. 22.3: 35-54.

<sup>10</sup> Wadhwa, Vivek. **Outsourcing Benefits U.S. Workers, Too.** *BusinessWeek*, Viewpoint, August 2, 2009.

<sup>11</sup> Manning et al. (2008)