Global Innovation Initiative

Catalyze.

U.S.-Brazil Innovation Learning Laboratories

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Catalyze. U.S.-Brazil Innovation Learning Laboratories

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PARTNER ORGANIZATIONS

The Brazilian Competitiveness Movement / Movimento Brasil Competitivo (MBC)

The Brazilian Agency for Industrial Development / Agência Brasileira de Desenvolvimento Industrial (ABDI)

PART OF

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Catalyze. U.S.-Brazil Innovation Learning Laboratories
Table of Contents

U.S.-BRAZIL INNOVATION LEARNING LABORATORIES

Letter from the President

Globalization, trade liberalization and information technology diffusion have opened up growth and investment opportunities around the world—raising the bar for performance; and creating pressures on nations, regions, industries, companies and workers to meet the new standards of global competitiveness.

As the Council on Competitiveness **National Innovation Initiative and Summit** demonstrated, the United States cannot compete in the 21st century on low wages, commodity products, standard services, and routine science and technology development. In today's economy, human capital—the source of creativity and new ideas—plays a paramount role in creating and sustaining a competitive advantage.

With growing competition from Asia and elsewhere, the United States and Brazil—the two largest economies, and two of the most populous countries in the Western Hemisphere with a diversity of industries and resources—have a strong incentive to work together to attract and assemble the best, most creative human capital.

To launch a concerted dialogue on these issues, and to evolve a strategic commitment to competitiveness policy and action, the Council on Competitiveness, the Brazilian Competitiveness Movement (Movimento Brasil Competitivo, MBC) and the Brazilian Agency for Industrial Development (Agência Brasileira de Desenvolvimento Industrial, ABDI) co-hosted in Brasília in July 2007 a first-of-its-kind **U.S.-Brazil Innovation Summit**. This Summit—led by Deere and Company CEO Robert W. Lane, Grupo Gerdau founder Jorge Gerdau and a delegation of CEOs, university presidents and public sector leaders—was a showcase to the unique bilateral relationship of the two nations, as well as to the importance of the U.S.-Brazil relationship in support of hemispheric competitiveness and prosperity.

Following the success of the 2007 Summit—which produced a Call to Action endorsed by President George W. Bush and President Luiz Inacio Lula da Silva—the Council on Competitiveness and its partners across Brazil have been on a journey of thoughtful inquiry and active engagement. Both countries are exploring how leadership can coalesce around a series of tangible, bi-national partnerships to deepen mutually beneficial relationships based upon a fundamental belief—that optimizing our societies for innovation, particularly innovation in energy efficency and renewable energy, is the key to future prosperity.

The "innovation" that the Council, MBC and ABDI created to help make such partnerships more concrete is the **U.S.-Brazil Innovation Learning Laboratory**. And it is my pleasure to release with this report, *Catalyze*, the proceedings and key findings from six U.S.-Brazil Innovation Learning Laboratories that took place in 2009 across both nations with the active engagement and support of the U.S. Depart-

Deborah L. Wince-Smith, Council on Competitiveness

ment of Energy, the National Renewable Energy Laboratory and more than 500 leaders from industry, academia and the public sector.[1]

As the title of this report suggests, the Innovation Learning Laboratory is, in essence, a "catalyst"—a series of progressive dialogues and intense workshops aimed at sparking participants to create new-to-the-world partnerships in the energy space that will boost innovation capacity and value creation in both nations.

The core issues of the U.S.-Brazil Innovation Learning Laboratories—around which tangible partnerships have been forged—include fundamental research, intellectual property, technology transfer, entrepreneurship, commercialization, and the overarching workforce and economic development environment in both nations.

Innovation Learning Laboratories 1 and 2 in Porto Alegre and Chicago focused on the investment, talent and policy infrastructure critical to ensuring a robust research capacity. Labs 3 and 4 in São Paulo and Silicon Valley focused on the processes and the people that would push and pull research out of the laboratory and into the marketplace. And Labs 5 and 6 in Rio de Janeiro and Golden, Colo., (at the National Renewable Energy Laboratory) focused on the human, organizational, financial and policy models needed for a robust 21st century manufacturing future in the United States and Brazil.

Flowing out of these U.S.-Brazil Innovation Learning Laboratories are a series of concrete, bi-national partnerships—generated by the participants themselves—to address real needs and opportunities in both nations. Described more fully in the following pages, major partnerships under development include:

- The Bi-National SmartGrid Collaboration Initiative: an industry-university-public sector partnership across both nations to conduct joint research and training in the smart grid space, as well as development of joint smart grid demonstration projects in the United States and Brazil;
- The Cleantech Open Brazil: a multi-stakeholder effort to turbocharge clean tech entrepreneurship in Brazil, engaging investors and experts from both nations; and
- The U.S.-Brazil Co-Incubation Initiative: an effort to create incubation hubs—creating a launching pad for U.S. firms looking to do business in Brazil and for Brazilian firms looking to do business in the United States.

Additional projects, brainstormed and scoped in the U.S.-Brazil Innovation Learning Laboratories, continue to come into focus and grow under the auspices of the Council on Competitiveness-MBC-ABDI innovation umbrella.

1 The participant group make-up was 45 percent from the United States and 55 percent from Brazil; and, 57 percent from industry, 21 percent from academia and 22 percent from the public sector.

And the Council is convinced that the 2009 U.S.-Brazil Innovation Learning Laboratories are just a first step in the deepening of the economic, societal and political relationship between both nations—the world's two largest agricultural producers; the world's two largest producers of ethanol. The next step will be our March 2010 second **U.S.-Brazil Innovation Summit** at Georgetown University. Hosted by Council executive committee member and Georgetown University President John J. DeGioia, the second U.S.-Brazil Innovation Summit will build on the momentum we have started in 2009—with a read-out on the progress of partnerships already shaped, and the creation of new opportunities for others to join the more than 500 leaders across the United States and Brazil who have participated in the 2009 U.S.-Brazil Innovation Learning Laboratories.

In closing and on behalf of the Council on Competitiveness, I would like to thank the many members and friends of the Council on Competitiveness who participated in and contributed to the the U.S.-Brazil Innovation Learning Laboratories—with special nods to Chancellor Richard Herman and his team at the University of Illinois at Urbana-Champaign for hosting the Chicago Lab, and to CH2M HILL CEO Lee McIntire and his team for hosting and sponsoring of a variety of activities associated with the Golden, Colo., Lab. And I send the Council's appreciation to the other hosts of the U.S.-Brazil Innovation Learning Laboratories—without their support and that of their teams, the Labs would not have been as rich or powerful: Ricardo Felizzola, vice president of Altus and vice president and coordinator of the Council of Innovation and Technology/FIERGS; Maria Tereza Fleury, director of the School of Business and Administration, Getúlio Vargas Foundation; Cláudio Furtado, director of the Getúlio Vargas Foundation Research Center on Venture Capital and Private Equity; Marc Gottschalk, partner in the Clean Tech Practice of Wilson Sonsini Goodrich & Rosati; John Mizroch, Of Counsel at Wilson Sonsini Goodrich & Rosati; and, Luís Fernandes, president of FINEP (The Brazilian Innovation Agency).

And, of course, without the vision and leadership of my friends and colleagues at MBC and ABDI—Claudio Gastal and Reginaldo Arcuri, respectively—the Innovation Learning Laboratories could not have come alive. Their tireless efforts across Brazil and the United States—and those of their teams, led by Roberto Alvarez, Eduardo Valle, Larissa Querino and Tatiana Ribeiro—have made this a true partnership, cultivated over the past five years.

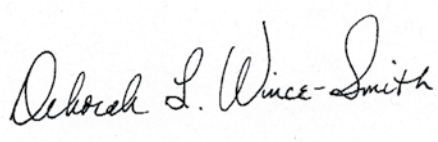
The Council has also received superb support and counsel over the past few years from two of the world's most dynamic and impactful ambassadors. We are indebted to the support of former U.S. Ambassador to Brazil Clifford Sobel and former Ambassador from Brazil Antonio Patriota—both of whom actively engaged themselves and their senior leadership teams in the build-out of the U.S.-Brazil Innovation Summit and Innovation Learning Laboratories.

I would like to express special gratitude to the U.S. Department of Energy (DOE) and the National Renewable Energy Laboratory for their generous support in underwriting a significant portion of the 2009 U.S.-Brazil Innovation Learning Laboratories—with special thanks to NREL Director and Chief Executive Dan Arvizu and his entire senior management team for their advice, guidance and hosting the Golden, Colo., Innovation Learning Laboratories; Former Assistant Secretary Andy Karsner for his early support of the 2007 U.S.-Brazil Innovation Summit and the ensuing U.S.-Brazil Innovation Learning Laboratories; David Rodgers, director for strategic planning and analysis, Office of Energy Efficiency and Renewables at the U.S. Department of Energy, for his early engagement, participation in the Porto Alegre launch Lab, and ongoing support; and, John Lushetsky, acting deputy assistant secretary for energy efficiency, for his leadership and engagement in the São Paulo Lab. I would also like to recognize the many strategic contributions of Thomas D. Perry IV, program manager at NREL's Clean Energy Entrepreneurship Center, and Ellen Luttrell of Energy Communications, a consultant to the U.S. DOE Office of Energy Efficiency and Renewable Energy, to the success of all the U.S.-Brazil Innovation Learning Laboratories.

Finally, I would like to commend Council staff: Chad Evans, senior vice president, for his innovation in conceptualizing and skill in managing the execution of the U.S.-Brazil Innovation Learning Laboratories. His personal passion for the U.S.-Brazil relationship and commitment to creating a new form of bilateral engagement is second to none. Special thanks are due to Jennifer Bond, a Council senior advisor, for her expertise, as well as to James Knuckles and Kate Simpkinson for the excellent organizational and research support they have provided for all of the Labs and the drafting and preparation of this report.

The Council looks forward to continuing to build on the achievements of the U.S.-Brazil Innovation Learning Laboratories—not only because of our conviction that they will help position the United States for success in the 21st century, but also because we feel strongly that these experiences create a new, sustainable and competitiveness-focused economic development model for our nation, the rest of the Western Hemisphere and beyond.

Sincerely,



Deborah L. Wince-Smith
President, Council on Competitiveness

Key Themes of the U.S.-Brazil Innovation Learning Laboratory Series

To strengthen and grow the U.S.-Brazil innovation partnership—cemented in the first-ever U.S. Brazil Innovation Summit in 2007 with the Brazilian Competitiveness Movement (MBC) and the Brazilian Agency for Industrial Development (ABDI)—the Council on Competitiveness launched a series of Innovation Learning Laboratories in 2009 to:

1. Identify the key policies, outline the action steps and catalyze the tangible partnerships that will form the baseline for the 2010 second U.S.-Brazil Innovation Summit; and
2. Engage forward-thinking CEOs, university presidents and peers from the public and private sectors—across the United States and Brazil—in creating a new, sustainable and competitiveness-focused economic development model, based on innovation, entrepreneurship and public-private partnerships for the rest of the Western Hemisphere.

Theme 1
Research and Development: Seedcorn for Innovation

Porto Alegre
April 22-23

Chicago
May 12 -13

Investment in—and the protection of—frontier research, along with support for cutting-edge researchers, has always been the bedrock of national innovative activity.

The Innovation Learning Laboratories in Porto Alegre and Chicago focused on answering questions—relating to investment, talent and policy infrastructure—aimed at stimulating the research capacity in the United States and Brazil.

Participants focused on innovation challenges and opportunities neither country can meet alone—particularly in strategic areas like energy efficiency and renewables.

Theme 2

Moving Ideas Out of the Lab and Into the Marketplace: the Role of Tech Transfer and Entrepreneurship in Innovation Economies

São Paulo
July 13-15

Silicon Valley
August 5-8

Building on the results from research and development to create value in the marketplace is the next step in the innovation spectrum.

And both the United States and Brazil face challenges in optimizing their environments to evolve new ideas into new products, new services and new solutions.

The São Paulo and Silicon Valley Innovation Learning Laboratories explored ways both nations can accelerate knowledge and technology transfer, spur entrepreneurship and catalyze the next generation of innovators in the Western Hemisphere's two largest economies.

Theme 3

Leveraging Innovation Capacity to Drive Competitiveness and Prosperity

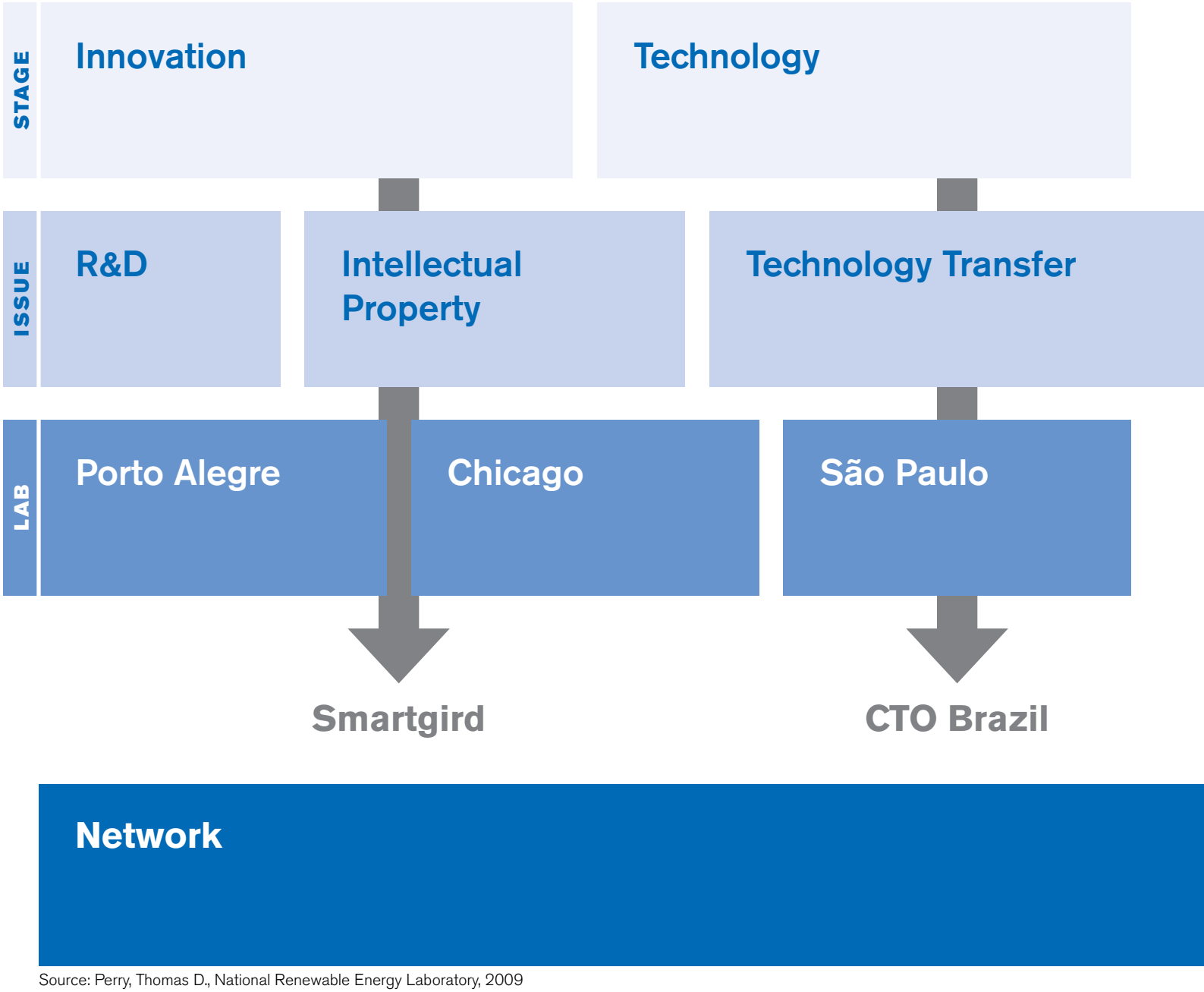
Rio de Janeiro
August 19-21

Golden, Colo.
September 9—11

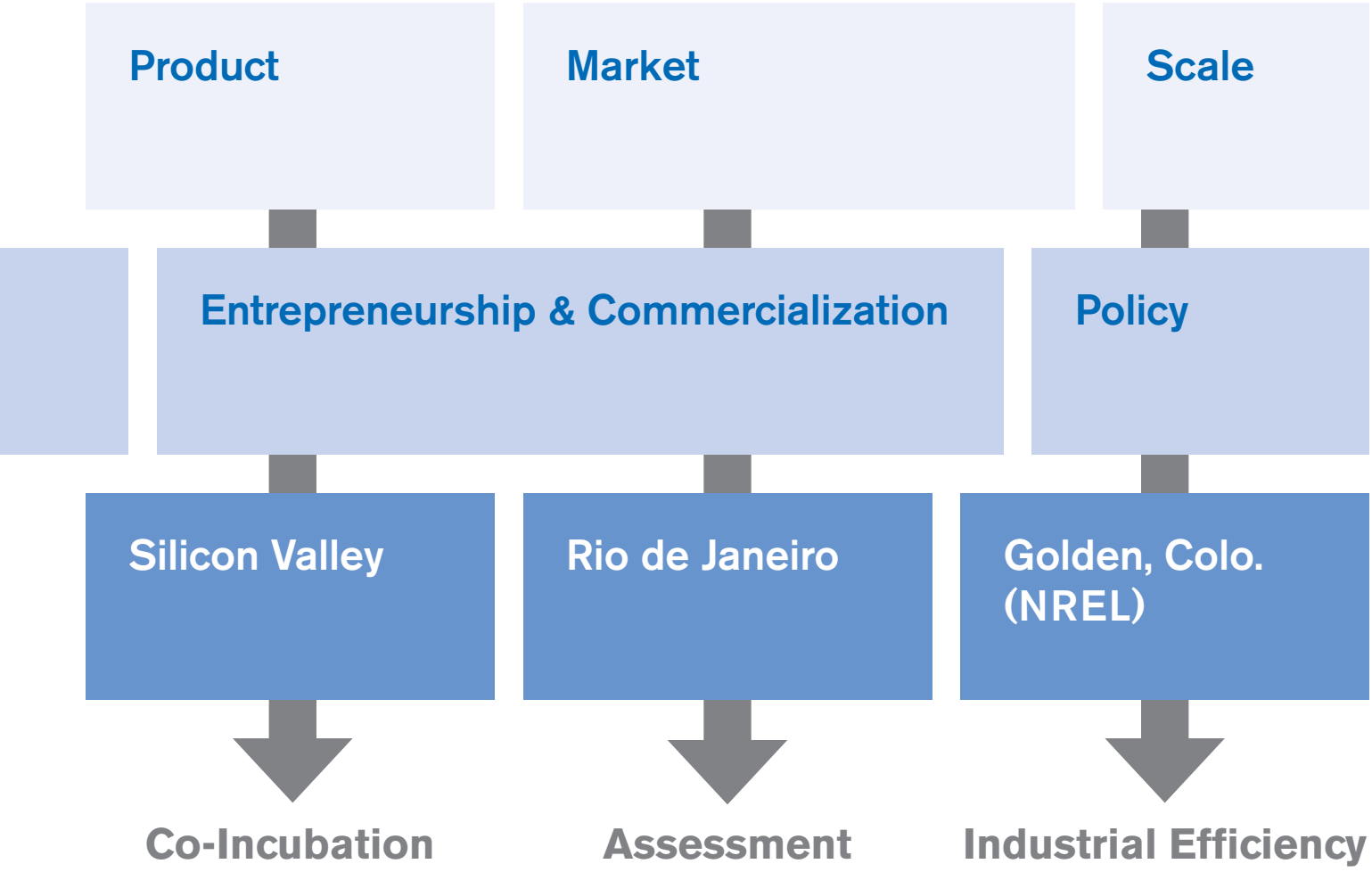
Prosperity—the intended outcome from innovative activity, defined by a higher living standard, job creation and the formation of new firms and industries—depends upon the ramp-up of manufacturing and production capabilities, as well as he workforce and economic development strategies regions develop to leverage resources and competencies.

The Rio de Janeiro and Golden, Colo., Innovation Learning Laboratories focused on how nations design and implement a new foundation for high-performance production; the human, organizational, financial and policy models needed for a robust manufacturing future in the United States and Brazil; and the benchmarks for success in regional economic development.

Core Issues Addressed by Lab Participants



Source: Perry, Thomas D., National Renewable Energy Laboratory, 2009


Product
Market
Scale
Entrepreneurship & Commercialization
Policy
Silicon Valley
Rio de Janeiro
Golden, Colo. (NREL)
Co-Incubation
Assessment
Industrial Efficiency

U.S.-Brazil Innovation Learning Laboratories

Porto Alegre / Chicago

Porto Alegre
Photo: Anderson Vaz (Flickr)

Chicago
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LOCAL PARTNERS

The Federation of Industries of the State of Rio Grande do Sul /
Instituto Euvaldo Lodi (FIERGS/IEL), and the State of Rio Grande do Sul

The University of Illinois at Urbana-Champaign

PORTO ALEGRE / CHICAGO

Research and Development: Seedcorn for Innovation

Investment in—and the protection of—frontier research, along with support for cutting-edge researchers, has always been the bedrock of national innovative activity.

The Innovation Learning Laboratories in Porto Alegre and Chicago focused on answering questions—relating to investment, talent and policy infrastructure—aimed at stimulating the research capacity in the United States and Brazil.

Attention focused on innovation challenges and opportunities neither country can meet alone—particularly in strategic areas like energy efficiency and renewables.

PORTO ALEGRE / CHICAGO

Executive Summary

The first and second Innovation Learning Laboratories—in Porto Alegre and Chicago—brought together U.S. and Brazilian leaders from the public and private sectors, academia and national laboratories to discuss research and development as the seedcorn for innovation. The agendas for the two Innovation Learning Laboratories centered on driving investments in frontier research, building the talent base for frontier research and building 21st century research hotspots—leveraging research, people and policy. In addition to the Innovation Learning Laboratories, strategic site visits and side meetings added value to participants' experience by creating opportunities for cross-border collaboration and introducing participants to global leaders in research.

Driving Investments in Frontier Research

Given the need of both the United States and Brazil to remain at the cutting edge of research—and to develop, attract and retain the best scientists and engineers—the Porto Alegre and Chicago Innovation Learning Laboratories highlighted the national strategies in place in Brazil and the United States that bolster high-level investments in frontier research, like energy efficiency and renewables.

Participants in Porto Alegre and Chicago heard perspectives from the public and private sectors on the priorities, challenges and new directions in frontier research. National laboratories and universities emerged as particularly strong resources for cutting-edge research, and participants discussed how to push the research envelope leveraging the assets of universities and national laboratories. Three key areas of research were highlighted as important for continued investment and support: bioenergy, sequestration technology and smart grid technologies.

Building the Talent Base for Frontier Research

The Learning Labs in Porto Alegre and Chicago acknowledged that the innovation process begins with curiosity-driven research, and then moves through the development of applications that are commercialized, creating new businesses and jobs. But participants noted that this all depends on talent—the human dimension of innovation.

The Porto Alegre and Chicago Labs addressed how both Brazil and the United States can develop the next generation of researchers and innovators, identifying avenues for cooperation and hemispheric leadership in strengthening educational opportunities—both formal and informal; in universities and in companies—across both nations.

Building a 21st Century Research Hotspot—Leveraging Research, People and Policy

Participants in Porto Alegre and Chicago agreed that in order to create an environment conducive to frontier research and innovation, stakeholders must address their physical, legal and policy underpinnings. Participants discussed the policies, frameworks and

best practices needed to optimize the environment for frontier research. The discussions led to four key areas on which Brazil and the United States should focus: create new (and improve) existing research hotspots by drawing from best practices and lessons learned of past projects, protect intellectual property rights, improve education and share information to benchmark progress.

Featured Cross-Border Collaboration: CEMIG-UFRGS-UIUC Smart Grid Demonstration Project

The Learning Labs in Porto Alegre and Chicago laid forth the foundation for ground-breaking partnerships and new ways to promote research and development as the seedcorn for innovation.

A cross-border collaborative project—between CEMIG (one of Brazil's largest power generators and manager of South America's largest network of electricity distribution), the Universidade Federal do Rio Grande do Sul (UFRGS) and the University of Illinois at Urbana-Champaign (UIUC)—focused on education exchange and creating a smart grid demonstration project emerged directly from the Innovation Learning Laboratories in Porto Alegre and Chicago. This project is spearheaded by Lab participants and has a clearly defined set of goals and deliverables.

PORTO ALEGRE / CHICAGO

Highlights from Porto Alegre and Chicago

The U.S.-Brazil Innovation Learning Laboratories in Porto Alegre and Chicago centered around research and development as the seedcorn for innovation. Investment in—and the protection of—frontier research, along with support for cutting-edge researchers, has always been the bedrock of national innovative activity.

And by many measures, the United States has key structural advantages that position it well for future innovative capacity. The United States provides a mix of strong corporate investments in research and development (R&D) and significant public sector R&D investments, a combination that few other countries can match. The human talent it educates and attracts also sets it apart from global competitors. And U.S. universities not only lead the world in cutting-edge research, they also have a strong tradition in terms of local clusters, collaborating with industries and helping to create new businesses. The United States has a well-established policy and legal framework for the protection of intellectual property, providing incentives to create new knowledge and intangible assets. Finally, regional clusters across the United States are hotbeds of innovation, where new ideas, products and services become commercially viable.

But while the United States remains strong in innovation, many other nations are focusing rightly and intently upon their own innovation future—including Brazil. As Brazil's economy advances, its demand for innovation is increasing, as is its capacity to become a larger part of the global innovation system. And nations like Brazil are innovating in the way they innovate—with strong focus on key research areas, as well as new funding models to seed frontier research and the development of talent.

The U.S.-Brazil Innovation Learning Laboratories in Porto Alegre and Chicago sought to answer questions—focused on investment, talent and policy infrastructure—aimed at strengthening the research capacity in both the United States and Brazil, as well as addressing innovation challenges and opportunities neither country can meet alone.

An agenda around driving investments in frontier research, building the talent base for frontier research and building 21st century research hotspots guided the discussions in the Porto Alegre and Chicago Innovation Learning Laboratories. U.S. and Brazilian leaders from the public and private sectors and academia kicked off discussions in each of these topics, and a moderated conversation ensued. Each Innovation Learning Laboratory also brought participants to strategic side visits—in particular to TECNOPUC, one of Brazil's largest research parks in Porto Alegre, and to the Energy Biosciences Institute at the University of Illinois at Urbana-Champaign, part of the world's first and largest research institution solely dedicated to the new field of energy bioscience.

Deborah L. Wince-Smith, Council on Competitiveness

Reginaldo Arcuri, ABDI

Driving Investments in Frontier Research

Given the need of both the United States and Brazil to remain at the cutting edge of research—and to develop, attract and retain the best scientists and engineers—the Porto Alegre and Chicago Innovation Learning Laboratories highlighted the national strategies in place in Brazil and the United States that bolster high-level investments in frontier research, like energy efficiency and renewables.

Council on Competitiveness President **Deborah L. Wince-Smith** highlighted in Chicago that higher national levels of R&D investment generate a range of economic benefits—boosting the stock of available knowledge and supporting the training of scientists and engineers, leading to commercial spin-offs and creating an innovative environment that attracts additional investment. This is borne out in findings and research from the Council on Competitiveness' 2005 report *Innovate America* and its 2007 *Competitiveness Index: Where America Stands*.

But a sense of urgency arose among participants for both nations to boost investment in research and development in the face of ever more rapid competition from emerging economies.

While the United States is by far the largest R&D investor in the world (including both industrial and government R&D spending), many of the countries with the fastest rates of growth in R&D investment are emerging economies (see Figure 1).

And while Brazil's overall R&D investment has grown over time, its R&D intensity has actually decreased during the recent past, falling from 1.22 percent of GDP in 2000 to 1.12 percent of GDP in 2005. Despite placing an emphasis on innovation, Brazil's R&D portfolio remains centered on the public sector, with 57 percent of science and technology funding coming from public sources.[1] In the United States, the business sector accounts for the largest share of R&D performance and provides most of the nation's R&D funding. The U.S. business sector's share peaked at 70 percent of total R&D expenditure in 2000 but has since dipped somewhat to 66 percent of total U.S. R&D expenditures in 2006.

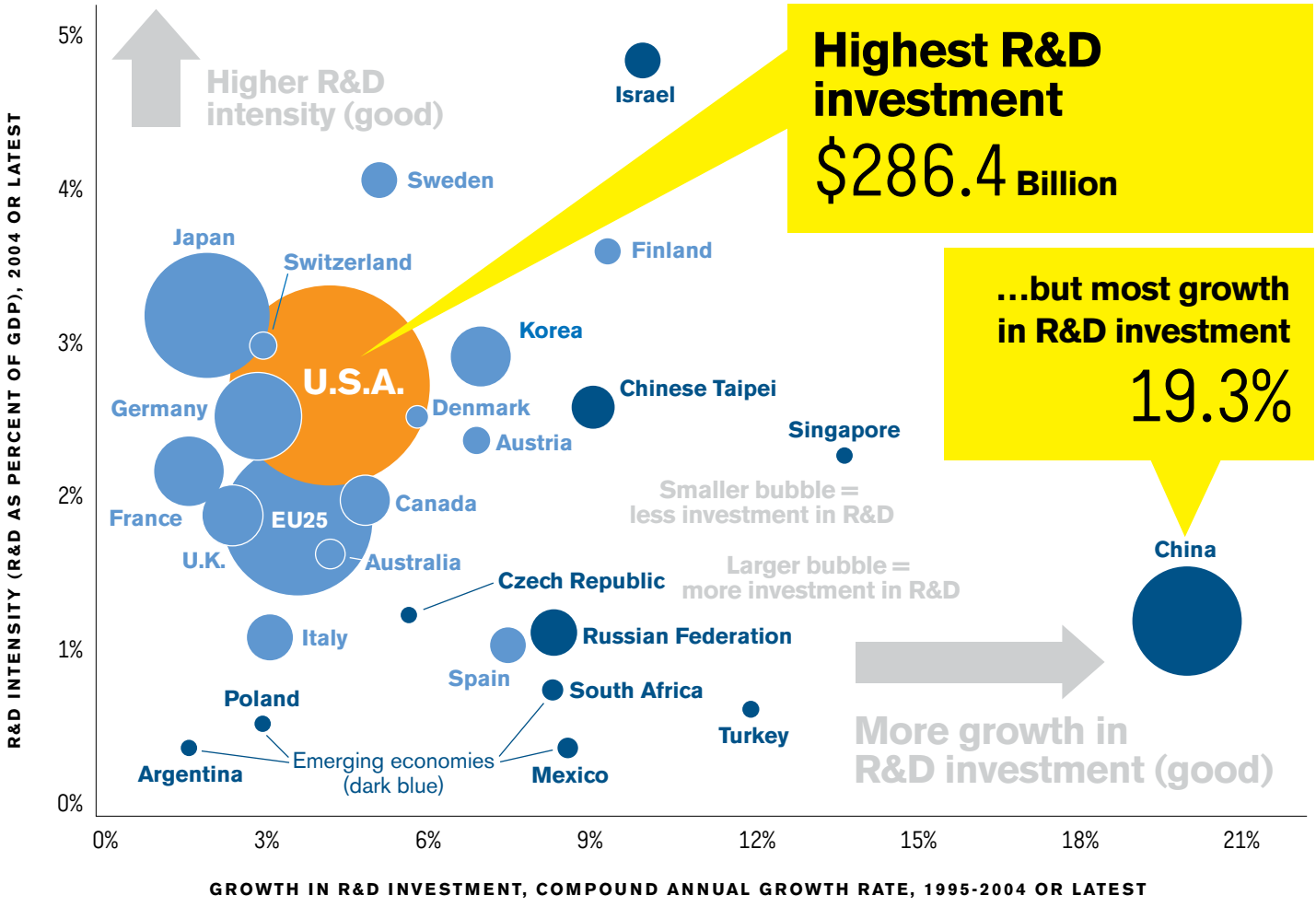
Reginaldo Arcuri, president of ABDI, underscored the important role the private sector must play in driving investment in research. Indeed, future growth in Brazil's total R&D will depend on greater private sector involvement, and Brazil is seeking to encourage increased private sector interaction with mechanisms like tax incentives and shared support for research projects.[2] In the United States, for comparison, R&D tax credits exist for the private sector, but an increase in public-private partnerships would improve private sector support for R&D even further.

1 Brazilian Ministry of Science and Technology, "Brazil: Comparisons Gross Domestic Product (GDP) and Investments in S&T, 2000-2005" (2005) [Portuguese]

2 NSF, Science and Engineering Indicators 2008

Figure 1: U.S. R&D Investment is Larger and Outpacing Developed Economies, but Growth Rates in Many Emerging Economies are Faster

Source: Council on Competitiveness, *Competitiveness Index: Where America Stands*, 2007



Claudio Gastal, MBC

Chad Evans, Council on Competitiveness

Priorities, Challenges and New Directions in Frontier Research: Views from the Public and Private Sectors

With the overall goal of developing these public-private partnerships and collaborations between the United States and Brazil, both countries must advance their efforts to promote cutting-edge research in areas of competitive advantage—like biofuels and carbon capture and sequestration (CSS) technology. In addition, though, the United States and Brazil must collaborate on best practices to encourage cutting-edge research.

Chad Evans, senior vice president at the Council on Competitiveness, set the tone in Porto Alegre for the importance of developing cross-border partnerships: "Today should not be seen as an ending, but as a beginning. There will be many opportunities over the coming months and years to continue to engage with each other—not only here in Rio Grande do Sul, but in the United States and across Brazil—to create new and important public-private partnerships that reach across our borders."

The Innovation Learning Laboratory in Porto Alegre asked participants to examine the status of public and private sector investments in science and engineering—with a focus on multidisciplinary areas of research like biotechnology, biofuels and information technology. Participants analyzed this topic through a discussion of the research and development process in both countries. **Tod Perry**, program manager for the Clean Energy Entrepreneurship Center at the National Renewable Energy Laboratory, provided his perspective on the research and development process, focusing on the linkages between industry, national laboratories and universities.

Participants from Brazil and the United States agreed in Porto Alegre that building a comprehensive research portfolio is a very challenging problem. Both nations will need to address financial deficiencies in moving technologies through the marketplace. A system that rewards and funds technologies that are both close to being market-ready and those that are still several years away from commercialization will require collaboration from industry, academia and the government. It will take angel investor and venture capital networks and other high-risk, high-reward investment vehicles.

In addition, cross-border collaborations must be made a key component to efforts that advance research and development. For example, the United States and Brazil must encourage faculty to collaborate with industry, and encourage industry to collaborate with faculty. This will take new compensation systems, new systems of benchmarking performance and a new management structure that focuses on interdisciplinary, multidisciplinary and innovative research programs.

U.S. and Brazilian participants in Chicago noted that Brazil is an international leader in some of these near-to-market and more experimental technologies, and has renewed its vigor toward promoting both types of research. There are, therefore, many

Ravishankar Iyer, University of Illinois at Urbana-Champaign

Views from the National Renewable Energy Laboratory

Tod Perry
Program Manager, Clean Energy Entrepreneurship Center

In the United States, we have a very flexible and very innovative research culture that encompasses research from national laboratories, universities and industry. Each one of those groups excels at conducting research for its particular need. But the hand-off between these groups—between academia and industry in particular—is not always as robust or efficient as it could be. Part the mission of the National Renewable Energy Laboratory is to facilitate those interfaces and help scientists—who may be more motivated by publishing their work and gaining the respect of their scientific peers—to at least understand what motivates the industrial researchers, like patents and ease of commercialization. Of course this does not apply to all scientists and academic researchers. But researchers in academia, industry and the national labs need to understand the context in which collaborators in other industries are working, such that research can be more targeted and collaboration can occur more easily.

opportunities to collaborate on multidisciplinary technologies in several critical areas, including smart grid development, biofuels, solar and hydroelectric power, and energy efficiency.

Pushing the Research Envelope in Universities and National Laboratories

How are leading universities in Brazil and the United States turbocharging investments, research opportunities and educational opportunities in and between both countries? And which research areas would benefit from U.S.-Brazil collaboration—for example, in the clean tech space? The Innovation Learning Laboratories in Porto Alegre in Chicago primed participants with these guiding questions, and participants galvanized around cross-border collaboration as a key driver of investment, and the creation of research and educational opportunities, in cutting-edge research.

Cross-border collaboration will expand the frontiers of cutting-edge research. Meeting a growing demand for energy provides two broad examples of opportunities to forge major partnerships and build relationships between the United States and Brazil: making energy generation more efficient, cleaner and more sustainable; and, making efficient, sustainable energy usage a way of life through education and robust public policies.

Ravishankar Iyer, interim vice chancellor for research at the University of Illinois at Urbana-Champaign, laid out in Porto Alegre several specific

areas of technology development that can provide avenues for cross-border collaboration: next generation biofuels, carbon capture and storage (CCS), power generation and transmission, and information technology and tools to inform utilities, end users and policymakers alike. Key questions can drive research in each of these fields:

- **Biofuels:** Which renewable substance is best? What is the environmental impact of growing this energy source and converting it to power?
- **CCS:** What is the most cost and energy efficient way to sequester carbon? In what geographic locations should public and private sector investors support carbon sequestration projects to ensure a higher rate of return on investment?
- **Power Generation and Transmission:** How can innovative IT techniques, networks and systems be used to create a truly intelligent power grid? How can an intelligent grid be made more adaptive in terms of power delivery capabilities, security requirements and integration of many different forms of renewable energy? IT companies like Current Group, Concert Technologies, HP, Intel and IBM could play a major role in answering this question. In addition, does proximity to end users matter to energy generation in terms of cost and environmental impact?
- **Information Tools and Technologies:** What information tools and technologies are necessary to allow for informed decision-making? What tools do policymakers need to make good decisions? What technologies do utilities need in order to manage effectively an evermore intelligent grid? And which tools and technologies do end users need to make informed and more environmentally or cost conscious decisions?

But each of these areas of technology development must work in concert to create an energy production, management and consumption system that competes in the 21st century. Right now, for example, as participants in Chicago and Porto Alegre noted, policymakers struggle with understanding what renewable and clean technologies to support and where to support them. Knowing what is the real difference in terms of sustainability, pollution or power generation between solar cells and clean coal, for example, will require the right tools and technologies.

The nations that recognize all of the components of a competitive energy grid—from the IT to the policies to the renewable energy technologies—as a single system will be those that gain a competitive advantage in the coming years. The Innovation Learning Laboratory in Chicago focused on three key areas of the energy system and examples of opportunities for cross-border, public-private collaboration and investment: bioenergy, sequestration technology and smart grid technologies.

Frontier Research Focus: Bioenergy

Cutting-edge research institutions around the world are working to draw energy from biological material—algae, sugarcane, grasses, etc.—in order to

reduce carbon emissions from combustion engines and other sources of energy use. The United States and Brazil have emerged as leaders in this growing technology, developing new public-private partnerships and funding models to promote research and development.

In the United States, cutting-edge research in biofuels has led to technological breakthroughs and discoveries. As **Stephen Long**, deputy director of the Energy Biosciences Institute at the University of Illinois at Urbana-Champaign, discussed in Chicago, scientists at BP, UC Berkeley and the University of Illinois are conducting research on miscanthus—a tall and sturdy member of the grass family that has almost twice as much harvestable dry biomass as corn. Miscanthus can yield more than 11,066 liters of ethanol per hectare, whereas corn can produce just over 6,600 liters per hectare. And it grows well in retired soil—so no land currently used for important feedstock like corn or beans would have to be taken out of production.

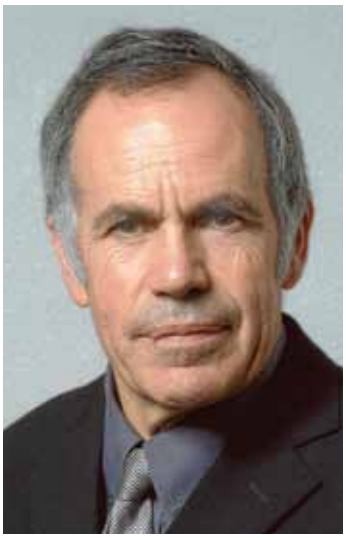
Participants in Porto Alegre and Chicago noted that in Brazil, the use of alternative fuels like ethanol in combustion engines has been commonplace for a number of years already, and technological breakthroughs continue to arise. For example, Brazilian engineers have succeeded in genetically modifying sugarcane to grow in desert-like soil that would otherwise not be tillable—and work is underway to expand this technology to other plants in order to create biodiesel.

In both the United States and Brazil, an enormous opportunity exists for public-private partnerships to develop new bioenergy and engine technologies for use in public transportation and shipping. A breakthrough in these technologies could lead not only to lower fuel costs but also lower carbon emissions.

Frontier Research Focus: Sequestration Technology

As nations demand more energy, power plants and other built-environment carbon emitters are turning to CCS technologies as a way to decrease the emission of carbon dioxide into the atmosphere. Advances are occurring across disciplines to make CCS more economically practical and technologically attainable. And partnerships across industries provide leading models for success.

Robert Finley, director of the Energy and Earth Resources Center for the Illinois State Geological Survey, described at the Innovation Learning Laboratory in Chicago an exciting project underway in Decatur, Ill., to capture and store the carbon dioxide emitted from the ethanol fermentation process at a corn wet mill. Called the Midwest Geological Sequestration Consortium (MGSC), its goals are lofty: capture and sequester more than one million metric tons of carbon dioxide. But the project's strength lies in public-private collaboration. The Illinois State Geological Survey, Archer Daniels Midland Company, Schlumberger Carbon Services and the U.S. Department of Energy's National Energy Technology Laboratory are joining forces to create one of the nation's



Stephen Long, Energy Biosciences Institute

Views from the University of Illinois

Stephen Long
Deputy Director, Energy Biosciences Institute

Currently, most of the investment in EBI goes toward research on second generation biofuels, with an international perspective. We are focusing on a grass called miscanthus, which is a very close relative of sugarcane and sorghum, and together with colleagues in Brazil, we are working to sequence the genetic codes of these three plants to better understand their composition and viability as long-term use biofuels.

We analyze the whole system—growing the crops, preventing diseases, agronomy, farm engineering, harvesting and processing. But not all of our research is scientifically technical. This research can provide the tools that policymakers need to make informed decisions. For example, there has been a great deal of debate about the greenhouse gas costs and benefits of using second generation biofuels, but what may have escaped people's attention is that there are actually no measurements to benchmark these costs and benefits—researchers rely on data from imperfect models. So we are working to measure in detail the greenhouse gas exchanges of this system in order to provide sound data on which projections can be made.

first large-scale studies intended to confirm that carbon dioxide emissions can be stored permanently in deep underground rock formations.[3]

John Tombari, vice president of Schlumberger Carbon Services, North and South America, discussed his company's public-private partnership that drives cutting-edge research in the field of carbon sequestration.

Indeed, conditions are ripe for cross-border collaboration between the United States and Brazil in the field of CCS. Both countries will see an increase in the demand for energy as both economies emerge from the global recession.

David Rodgers, director of Strategic Planning and Analysis for the U.S. Department of Energy, underscored in Chicago that the current administration in the United States has named sustainability a top priority, and the United States and Brazil are emerging as hemispheric leaders in renewable and clean energy technologies. Government programs like ARPA-E in the United States can spur quick-hit technologies through substantial public sector investment, but public-private partnerships have the potential to be even more powerful drivers of economic growth, job creation and innovative activity.

3 From the Illinois State Geological Survey website: http://www.isgs.illinois.edu/home.shtml

John Tombari, Schlumberger Carbon Services

Views from Schlumberger Carbon Services

John Tombari
Vice President, North and South America

Schlumberger Carbon Services started in 2005 to develop a business offering carbon sequestration services to those who have large point-source emissions. We work to find them a storage site, characterize the geological composition of the storage site, design the carbon storage facility, construct it, operate it, monitor it and close it properly. This is our area of expertise—and it is truly a multidisciplinary challenge. We realize that they way forward is through public-private partnerships. These projects will challenge the combination of geophysics, geology, reservoir engineering, geomechanics, geochemistry and petrophysics to name just a few. In one of our current projects in Decatur Ill., for example, we work with the U.S. Geologic Survey, the University of Illinois, the Department of Energy and Archer Daniels Midland, drawing on the strengths of each of these partners.

These types of public-private partnerships are important for gaining public trust. And it helps to develop the personnel of the future that will be involved in any new industry that cutting-edge research develops.

Great opportunities to develop such partnerships exist in Brazil as well. I participated in an international carbon sequestration symposium last year in São Paulo. The year before I went to Porto Alegre where I saw the construction of a carbon sequestration research facility, and Schlumberger Carbon Services has a large presence in Brazil—encouraged by the possibilities we see going forward.

Participants in Chicago agreed that a powerful partnership between the United States and Brazil could engage Petrobras, the Brazilian state-owned oil company. Petrobras has world-renowned expertise in deep-drilling for oil in mature oil fields, a technology that can be used to dig the deep wells needed to sequester carbon dioxide.

Capturing and sequestering carbon dioxide emissions have created a truly cross-disciplinary business and technology ecosystem. For example, a services industry built around the capture and sequestration of carbon dioxide emissions is emerging as companies and utilities work to curb their carbon emissions. Firms like Alstom and Schlumberger Carbon Services advise companies around the world on carbon management. Consultants, sales representatives, information technologists and many other business disciplines have begun to benefit from the growing investment in new green technologies like CCS.

Frontier Research Focus: Smart Grid Technologies

A nationwide smart grid—a power grid that fully integrates renewable and non-renewable sources of energy, and self-heals and communicates instantaneously with producers and end-users alike—may seem like a dream for the distant future, but leading companies and research institutions in the United States and Brazil are working to make this a reality in the near future. Of course, obstacles will need to

Figure 2: Customer Costs Due to Interruptions Mount
Source: MidAmerica Energy Company Customer Survey, 2002 (via presentation by Dr. George Gross given 5/12/09)

Interruption Duration (minutes)	Customer Costs ($U.S.)		
	Commercial	Industrial	Organizational / Institutional
20	744	20,551	15,373
60	1,002	33,436	21,878
240	2,299	61,710	53,455

George Gross, University of Illinois at Urbana-Champaign

Monica Cordeiro, CEMIG

be overcome, but the United States and Brazil possess strategic strengths that can enable the creation of new power grid technologies.

A smart grid must be reliable. As University of Illinois at Urbana-Champaign professor **George Gross** showed in Chicago, a 20 minute interruption in power service costs the average industrial user more than $20,000 (see Figure 2). Effectively and economically dealing with everything from solar flares to power surges to natural disasters are other obstacles through which new technologies must break. But the United States and Brazil have a common strength that can help to overcome these challenges: high performance computing (HPC). As high performance computers expand in their processing capabilities, scientists can build more realistic models and simulations of a smart grid. Many experts agree that the use of HPC can serve as a strategic advantage as new smart grid technologies develop.

William Goran, director of the Center for the Advancement of Sustainability Innovators at the Construction Engineering Research Laboratory, commented in Chicago that a national smart grid must be secure, both in its physical and cyber infrastructure. As new power grid technologies develop, ensuring the grid's security may emerge as an obstacle—but one that is not insurmountable.

But new and bigger steps are needed as technologies emerge. Combining networking capabilities with smart appliances and smart metering will be just one way to begin to integrate different energy sources across the grid. HPC will be required in this combination process as well—from monitoring the data from millions of meters, to maintaining security as more and more people and energy sources plug in to the grid.

Monica Cordeiro
Superintendent for New Business, CEMIG

In addition to building security and reliability into a national smart grid, the United States and Brazil must also ensure that new sources of energy—from wind, the sun, water, tides, etc.—can be easily and fully integrated. This will require vast investments in communications infrastructure. Brazil serves as a global leader in this arena. As Brazil increased its electric-power capacity—more than 90 percent of which comes from hydroelectric sources—several years ago, it created a communications infrastructure that was more comprehensive than that of the commercial sector at the time.

Public-private collaborations will be essential to ensure secure, reliable and fully integrated smart grids in the United States and Brazil. The national laboratories in the United States house some of the best high performance computers in the world, and research institutions and companies will need to tap these resources to bring new technologies into existence. Similarly, Brazilian research institutions and companies must utilize the HPC abilities in Brazil. Tapping into HPC power will be a competitive advantage for the U.S. and Brazilian public

Carlos Pereira, Federal University of Rio Grande do Sul

and private sectors—and many opportunities exist for cross-border partnerships to conduct research, co-innovate and co-develop new technologies.

Building the Talent Base for Frontier Research

The innovation process begins with curiosity-driven research, and then moves through the development of applications to commercialize, creating new businesses and jobs.

But this all depends on talent—the human dimension of innovation. The Innovation Learning Laboratories in Porto Alegre and Chicago addressed how both Brazil and the United States can develop the next generation of researchers and innovators, identifying avenues for cooperation and hemispheric leadership in strengthening educational opportunities (both formal and informal; in universities and companies) across both nations.

Carlos Pereira, vice dean of the School of Engineering and professor of electrical engineering at the Federal University of Rio Grande do Sul, highlighted in Chicago that grand challenges excite young people—and energy and the environment provide myriad opportunities to make significant advancements in some of the toughest challenges the world faces. Nurturing this excitement and engaging the current workforce through training and continuing education will ensure the strong talent base needed to bring forth frontier research. And ensuring a strong base of talent will drive the success of Brazilian and U.S. efforts to innovate—in energy efficiency, renewable energy technology, information technologies and many other areas. **Jeffrey Bell**, mission director for the United States Agency for International Development (USAID), highlighted in Porto Alegre the importance of focusing on nurturing the talent at universities.

Brazilian and U.S. leaders from academia underscored in Porto Alegre and Chicago that several advancements to the current educational model in both nations will be critical to developing the talent needed to tackle this century's grand challenges. These include increasing student and workforce exchange and internship programs, developing and expanding new and existing fields of study to promote education degrees and training programs that cut across disciplines, and developing reliable metrics to benchmark performance.

In addition, participants in Porto Alegre and Chicago noted that in the United States and Brazil, there is a growing need for the right people—science-literate business managers and business-savvy scientists—to be able to move new technologies into society. Scientists and innovators at U.S. and Brazilian universities and laboratories share a capacity to invent and create new technologies and provide services to industrial or government partners. But in both countries, a strong link between the innovators and the business community at the early stage of invention and creation is missing. Strengthening the connection between the creators, the commercializers and the consumers will enable the United States and Brazil to push the research envelope further than what is possible today.

Jeffrey Bell, USAID

Karen Holbrook, University of South Florida

Views from USAID in Brazil

Jeffrey Bell
Mission Director—Brazil, USAID

Our focus should be on the young entrepreneur; the young innovator; the young woman who has an idea that she thinks will make a big difference, because most of the innovations that have a major societal impact, in the Unied States, Brazil or anywhere, are made by people under 30 years of age. So, as we design joint projects, I think it is very advantageous for both countries to consider further and deepen our collaboration with universities worldwide, honing in on successful partnership models and best practices.

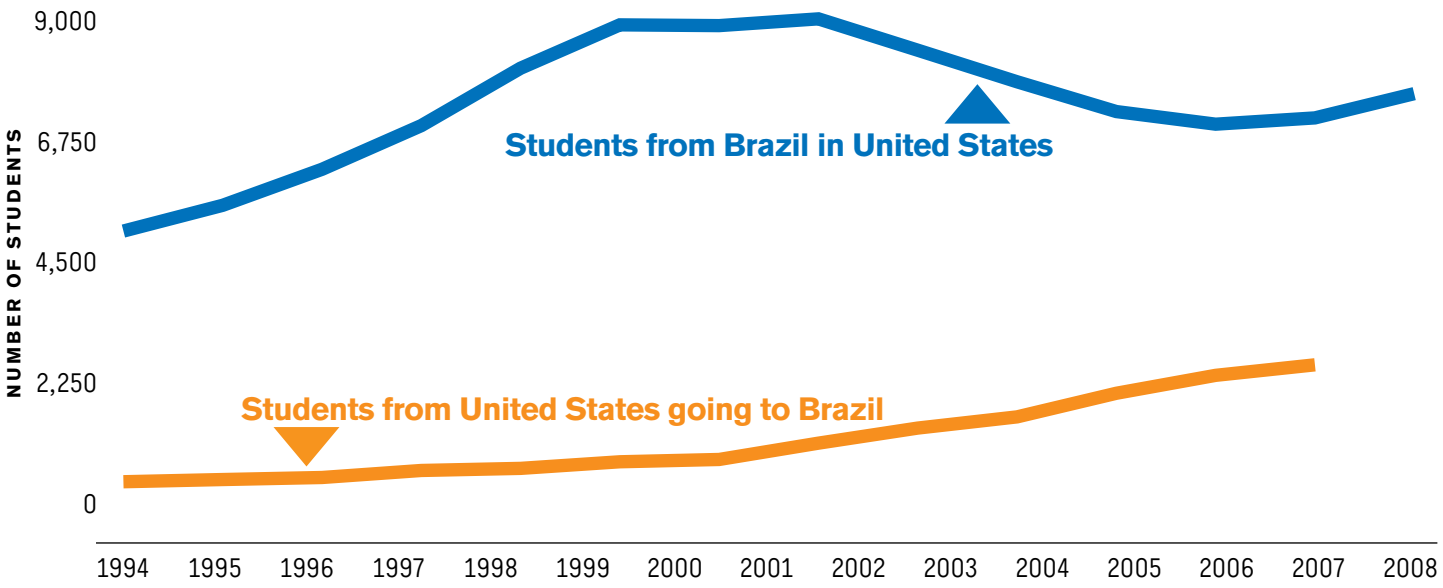
The country that strengthens the links along the research and development process will create a workforce for the 21st century capable of high-value innovative activity. One method to strengthen these links, noted **Karen Holbrook**, vice president for research and innovation at the University of South Florida, is to promote cross-border student exchange—to give students the multidisciplinary and multicultural experiences that they need to be successful global citizens in the 21st century.

Brazilian and U.S. students—through cross-border internships and cutting-edge exchange programs at universities—are already gaining valuable experience through these opportunities. Student exchange between colleges and universities in the United States and Brazil has increased during the past decade.

Brazil is the 17th leading place of origin for students coming to the United States to study at all degree levels. In the 2007-2008 academic year, there were 7,578 students from Brazil studying in the United States (up 6.3 percent from the previous year). The majority of Brazilian students in exchange programs with the United States study at the undergraduate level. In 2007-2008, their academic breakdown was as follows:

- 49.0 percent Undergraduate
- 37.0 percent Graduate students
- 7.2 percent Optional practical training
- 6.8 percent Other

Figue 3: U.S.-Brazil Student Exchange, 1994-2008
Source: Institute of Internatinoal Education, *Open Doors 2008*



A drop in the number of Brazilian students coming to study in the United States occurred soon after 2001, likely a result of stricter U.S. policies on immigration and issuance of student visas following the terrorist attacks of 9/11.

During the past decade, the number of U.S. students studying abroad has increased nearly 150 percent. While Brazil is not among the top 20 places for U.S. students to study abroad, the number of U.S. students studying in Brazil has increased almost 500 percent in the past decade. This could be an indicator of a growing awareness by U.S. universities and students of Brazil's growing, global importance (see Figure 3).[4]

This rapid increase in student exchange has strained some universities to their limits, participants in Chicago noted, reaching maximum infrastructure capability to manage students' growing demand for gaining international experience through exchanges, internships, research opportunities, etc. Participants discussed how this infrastructure shortfall can be

4 Institute of International Education, *Open Doors 2008*

addressed by cross-border partnerships between the United States and Brazil at the university level as well as at the corporate level. One idea would be to create a U.S.-Brazil Innovation Fellows program that draws on financial and institutional support from U.S. and Brazilian businesses, technology parks, clean technology clusters, government institutions and universities. Both students and current workers could engage in this program to gain international experience—with students conducting research or interning at a university or with a private sector firm and employees engaging in international training and internship programs.

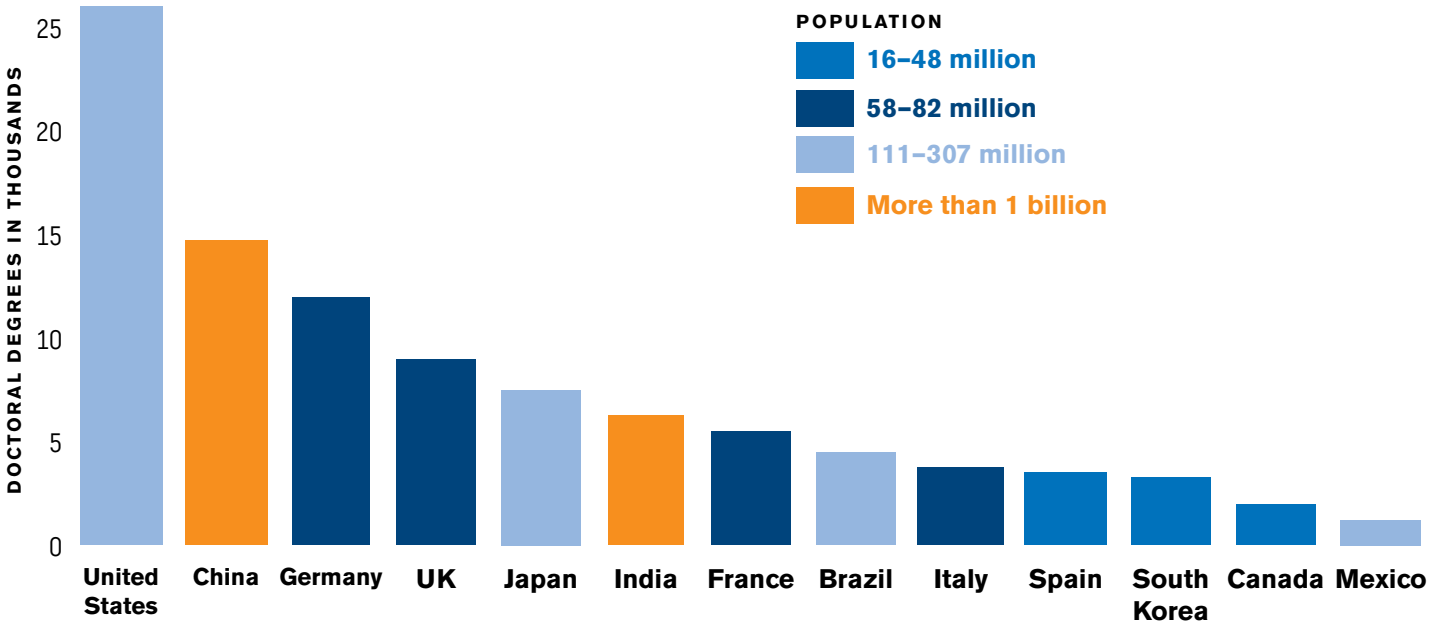
This same model could work for small companies and entrepreneurs as well. U.S. and Brazilian small companies could send their employees to larger companies in the other country for training programs and to develop business partnerships. And entrepreneurs from both countries could engage with universities and large and small companies to share best practices and break down barriers to creating new business ventures.

To fill the talent pipeline for cutting-edge research, Brazil and the United States must advance education at the highest levels, in addition to supporting earlier stages of education. As participants in Chicago and Porto Alegre noted, and as research shows, Brazil has emerged as a rapidly rising global player in graduating students with doctoral degrees (see Figure 4).

When compared to other nations with similarly-sized populations, Brazil outnumbers Mexico in terms of doctoral degrees awarded, and falls not far behind Japan, India and France. Brazil also leads Latin America in the number of doctoral degrees awarded. But while promoting science and engineering as educational pursuits certainly can have a positive impact on the amount of research conducted in a country, the rapid advancements in technology, policy and other scientific and social fields create a need for multidisciplinary talent.

Already, universities grant degrees in combined fields like economics and sustainability, but demand for the skills these programs develop is rapidly increasing: around 50 percent of the world population lives in cities, where the intersection of infrastructure, health, security, energy, sustainability, public policy, finance and urban planning come into play in nearly every profession. Universities must remain flexible and adaptive, creating new degree programs—like lifecycle analysis—as social and technological advances occur. And as the world economy globalizes, students and those in the workforce will need to be global citizens with cross-cutting talents. Collaboration across borders with universities, companies and public-sector institutions will make this possible as partnerships develop to create innovative degree programs, fruitful exchange programs and meaningful internships. Research parks can provide ideal venues for these cross-border collaborations and partnerships.

Figure 4: S&E Doctoral Degrees by Country, 2004 or Most Recent Year
Source: NSF, *Science and Engineering Indicators, 2008*



Participants in the Innovation Learning Laboratory in Porto Alegre visited TECNOPUC to gain a better understanding of the important role these research parks play in building talent for cutting-edge research.

Participants at both the Chicago and Porto Alegre Innovation Learning Laboratories noted that neither country can gauge the success of its programs or measure the impact of cross-border partnerships without creating a comprehensive set of metrics.

These metrics must capture not just performance in reading, writing and mathematics, but also new ways to measure the impact of cross-border exchange and collaboration. Creating common standards of measurement and a free-flowing, open and transparent data stream between the United States and Brazil that taps existing databases and integrates new metrics will create a platform on which to build an integrated benchmarking system.

TECNOPUC

Spotlight on Building Talent: TECNOPUC

TECNOPUC is the scientific and technological park from the Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS). At its core, it is a technological incubator, drawing on the research strengths at one of Brazil's leading universities to drive innovation. TECNOPUC integrates industry, academia and government with the aim of creating an interdisciplinary technological research community in the region.

Currently, TECNOPUC focuses on information and communication technologies, energy and physics, biotechnology and electronics, and engages university students and faculty with both Brazilian and multinational corporations in these research areas. It employs researchers from PUCRS and offers approximately 100 scholarships for master's and doctorate students.

TECNOPUC has more than 40 R&D projects currently under way in Photovoltaic Solar Energy, Electric Energy Systems, Nanotechnology, Software Engineering, Telecommunications and Pharmaceuticals, and hosts almost 40 global companies, including Siemens, HP, Dell, Tlantic/ Sonae, Microsoft, Stefanini, DBServer and CPM. TECNOPUC works with these companies not only to provide services but also to create opportunities for Brazilian students through internships and other exchanges.

TECNOPUC incorporates an integrated relationship between PUCRS, Brazilian and international companies, and the state and federal government. The belief that this tripartite partnership will extend mutual benefits to all stakeholders forms the platform on which the collaborative projects are based.

Nuno Simões, Intel Semiconductores do Brasil, Ltda

Building a 21st Century Research Hotspot—Leveraging Research, People and Policy

In order to create an environment conducive to frontier research and innovation, stakeholders must address their physical, legal and policy underpinnings. Participants in Porto Alegre and Chicago discussed the policies, frameworks and best practices needed to optimize the environment for frontier research. The discussions focused on creating new and improving existing research hotspots, protecting intellectual property rights, improving education and sharing information to benchmark progress.

The game-changing innovations and breakthroughs that lead to national growth and prosperity often emerge from research hotspots—centers at universities, corporate research facilities, government laboratories and research parks—where the right infrastructure, investment and talent come together to create and commercialize new technologies and ideas. Brazil and the United States have many strong research hotspots—from TECNOPUC in Rio Grande do Sul to the Energy Biosciences Institute (EBI) at the University of Illinois at Urbana-Champaign—but participants in Porto Alegre and Chicago agreed that both countries will need to create new and continue to develop existing centers for high-value research. And in order to make this possible, the right policy infrastructure must be in place.

The day following the Innovation Learning Laboratory in Chicago, participants visited the University of Illinois at Urbana-Champaign campus to tour EBI and meet with its leaders—seeing first-hand a successful public-private partnership and research hotspot whose focus is bioenergy.

EBI is a collaborative effort between the University of California, Berkeley, the Lawrence Berkeley National Laboratory, the University of Illinois at Urbana-Champaign and BP, who will support the institute with a 10-year, $500 million grant. At EBI, the largest single investment is in second generation biofuels—and graduate and post-graduate students work with scientists to develop these technologies.

New research hotspots can follow the successful models of research centers in the United States and Brazil, but Innovation Learning Lab participants in Porto Alegre and Chicago agreed that these models can be improved when developing new centers of research.

Nuno Simões, director of corporate affairs for Latin America at Intel Semiconductores do Brasil, Ltda, commented in Porto Alegre that a research hotspot should not focus solely on producing cutting-edge research—it should provide opportunities for partnerships to facilitate commercialization and drive high-value innovation. Innovation differs from research in that innovation needs a direction to add value and to be market-ready—and research hotspots can bring in partners in the private, public and academic sectors to provide this direction.

Energy Biosciences Institute

Spotlight on a 21st Century Research Hotspot: Energy Biosciences Institute

The Energy Biosciences Institute (EBI) is a new research and development organization that harnesses advanced knowledge in biology, the physical sciences, engineering, and environmental and social sciences to devise viable solutions to global energy challenges and reduce the impact of fossil fuels on climate change. The world's first research institution solely dedicated to the new field of energy bioscience is initially focusing on the development of next-generation biofuels, but will also look into various applications of biology to the energy sector.

EBI hosts approximately 25 research teams, housed at the University of California, Berkeley, and at the University of Illinois at Urbana-Champaign.

EBI Programs

If people and ideas are the heart of a research hotspot like EBI, the programs are its lifeblood. These three categories—research, outreach and education—envelop the broad scope of EBI's mission of harnessing the potential of energy bioscience, making discoveries and sharing them with the world.

Research scientists in the private sector and at universities collaborate with students to solve global energy problems. EBI's multidisciplinary and multisector research teams explore total-system solutions to global energy problems that include the sustainable production of cellulosic biofuels, enhanced biological carbon sequestration, bioprocessing of fossil fuels, biologically-enhanced petroleum recovery, and the social and economic impacts of transitioning to sustainable energy.

Outreach efforts serve as the public voice of research hotspots like EBI. These global forums provide venues for the exchange of ideas and for broadening knowledge of researchers interested in energy. Research hotspots must educate the public and children from kindergarten through 12th grade through training for students and researchers and education for non-scientific students, policymakers and the general public on the benefits of the cutting-edge research.

Education must be not just a goal, but a deliverable of a 21st century research hotspot. Research hotspots like EBI must shoulder the significant task of inspiring the next generation of researchers by challenging talented young minds through undergraduate and post-graduate programs. For EBI, this means contributing to the development of the human and social capital required for transitioning to a sustainable energy system. Through its affiliation with the University of California, Berkeley, Lawrence Berkeley National Laboratory, and BP, EBI offers innovative study programs that prepare undergraduate, graduate and post-doctoral students in the biological sciences and engineering to bring novel approaches to solving global energy challenges. This program is under development, and details will be announced during the first year of the program.

Claudio Gastal, MBC

Kenan Sahin, TIAX LLC

Participants representing each of these groups added their recommendations. Participants in Porto Alegre and Chicago from the public and private sectors noted that the development of new research hotspots will require significant public and private investment at the onset, but the returns on the initial investments will more than validate the financial commitment. And participants from academia highlighted how private equity funds and venture capitalists can serve as a good resource for non-public sector or corporate investment.

Existing research hotspots will succeed by remaining innovative in their structure and research focus. **Eric Jackson**, CEO of CP Holdings, discussed in Chicago how emerging fields like environmental economics, environmental psychology, and the integration of finance and energy will require cutting-edge research, and many research hotspots have the physical infrastructure in place to begin to fold in these new fields. Expanding the outreach for new talent in these fields, he noted, will be necessary not only to attract investment but also to attract more researchers. In addition, as **Pedro Arboleda**, a partner with Monitor Group, noted in Chicago, maintaining a focus on encouraging entrepreneurial activity will help grow a research hotspot.

Creating new research hotspots and improving and expanding existing ones will require a robust and proactive policy infrastructure. **Claudio Gastal**, president of MBC, underscored in Chicago how a policy infrastructure that enables research hotspots must include policies to protect intellectual property rights, promote education, enable information sharing and incentivize partnerships, and track the impact of policies through metrics and benchmarking efforts to ensure results-based policy decisions.

Protect Intellectual Property Rights

Successful research hotspots, as participants in Porto Alegre and Chicago noted, require strong protection of intellectual property rights. Without a system in place to prevent pirating of technologies and ideas, a research hotspot cannot attract researchers, entrepreneurs and investors. **Kenan Sahin**, Council on Competitiveness executive committee member, and president and founder of TIAX LLC, underscored how strong intellectual property rights hinge on an effective judiciary system that operates with speed and efficiency, strength and prudence. And a well-funded and empowered national patent office also plays a critical role in the protection of intellectual property rights.

The United States remains a global leader in protecting intellectual property, and in 2005, more than 16,000 U.S.-based patents were filed with the triadic patent offices.[5] Brazil lags considerably behind China and India in the number of patents filed with triadic patent offices, but its rates are slowly increasing (see Figure 5).

5 OECD, Individual Country Statistics

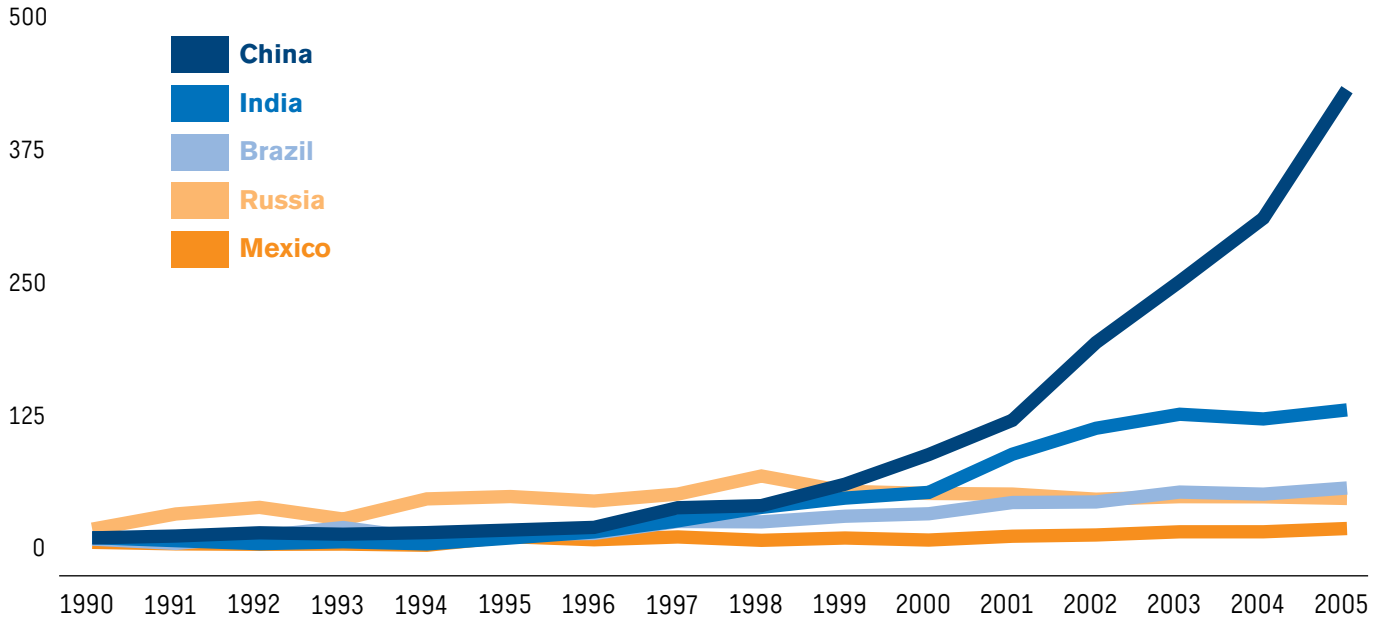
Roberto Alvarez, ABDI

Roberto Alvarez, international affairs manager at the Brazilian Agency for Industrial Development, highlighted in Chicago that several new innovation laws at the national and state level—that provide considerable funding for research and development and public-private partnerships—has likely aided this increase. He added, stronger protection of intellectual property rights in Brazil will likely lead to increased returns on these investments as entrepreneurs, researchers, companies and universities can commercialize their innovations.

Improve Education

Research hotspots require an educated population to ensure their success. Brazil and the United States are hemispheric leaders in education—several U.S. universities sit atop the global rankings, and thanks to new reforms in Brazil, 97 percent of children aged 7-14 now have access to schooling—but improvements can be made. In the United States, graduation rates in urban public schools are abysmal, and in

Figure 5: Triadic Patent Applications, 1990-2005
Source: OECD



Cláudio Furtado
Director of the Getúlio Vargas Foundation

New metrics will also be needed—no longer are statistics like the number of researchers per capita accurate enough to allow policymakers to make correctly informed decisions. The Council on Competitiveness and its Brazilian partners—MBC and ABDI—are uniquely positioned, given their membership structure and strong links across industry, academia and the public sector, to lead the hemisphere in developing new metrics and ways to benchmark progress. And opportunities for cross-border partnerships abound in this area.

Brazil, high rates of teacher absence at the primary and secondary education level lead to poor results in testing.[6]

Thomas White, consul general to the U.S. Consulate in São Paulo, noted in Porto Alegre that aside from improving primary, secondary and university-level education, both Brazil and the United States will need to educate a new workforce. Indeed, with both countries' governments and private sectors making substantial investments in new energy technology and infrastructure, new jobs will arise that need to be filled by educated workers. A recent *Wired* magazine article noted that more than 770,000 people are employed in green jobs in the United States. This is somewhat of a conservative figure, as only individual jobs—electricians who install solar panels—were counted, rather than entire job groups—electricians. In Brazil, a very large hydro-electric power grid is a major employer of green jobs, but as new technologies arise and demand for clean energy increases, other major opportunities will come forward as well.

Three critical steps to educate, train and grow a talented workforce in the United States and Brazil emerged from discussions in Porto Alegre and Chicago.

- First, both countries must invigorate interest in science and technology, starting at the earliest levels of education. And at the university level, prizes and opportunities to work in a team to tackle grand challenges will attract the best and brightest students.
- Second, academia and industry in both countries must make a stronger effort to create university-industry partnerships. Collaborations of this nature have proven to be beneficial for both sides.
- Third, no longer do jobs fit into neat silos. Developing skills across a range of subjects will enable workers to compete more effectively in an evermore global labor supply. And for developing research parks, this means integrating the soft sciences and art with hard sciences and technology.

6 "Still a Lot To Learn," *The Economist*, June 4, 2009

Share Information to Benchmark Progress

Staying ahead of the global competition requires the ability to develop and share knowledge across the globe—a key goal of the Innovation Learning Laboratories in Porto Alegre and Chicago. But this is never easy, as participants at both Labs agreed. It requires creating a collaborative and knowledge sharing environment and infrastructure. Open communication and shared access to data and other resources would facilitate such an environment. But equally important is ensuring that increased collaboration does not lead to higher accidental or malevolent risk. **Alexandre Saccol Martins**, a development engineer for CP Electronics, noted in Chicago that proper oversight and the shared creation of equal standards and rules will aid in this security effort.

Knowledge sharing is a key enabler of benchmarking the results of collaborations and the effectiveness of policies aimed at developing research hotspots. Porto Alegre and Chicago Innovation Learning Lab participants agreed that effective policy enactment must be results-based—and all sides of any collaboration between the United States and Brazil must have equal input on benchmarking results.

Next Steps: Featured Cross-Border Collaboration

The challenges ahead for Brazil and the United States are great—remaining competitive in a rapidly developing and changing global playing field is not easy. But the tools to compete already exist. By driving investments in frontier research, building a strong and innovative talent base for frontier research and developing 21st century research hotspots, the United States and Brazil can emerge as hemispheric models of excellence and global leaders in innovation.

The learning laboratories in Porto Alegre and Chicago laid forth the foundation for ground-breaking partnerships and new ways to promote research and development as the seedcorn for innovation. A cross-border collaborative project focused on education and creating a smart grid emerged directly from the Innovation Learning Laboratories in Porto Alegre and Chicago:

Smart Grid Collaboration and Education Exchange

Leads

- **Monica Cordeiro**, CEMIG
- **Ravishankar Iyer**, University of Illinois at Urbana-Champaign
- **Carlos Pereira**, Federal University of Rio Grande do Sul

Goal: Establish a Renewable Energy and Smart Grid Demonstration Project through education exchange and institutional collaboration focused on smart grid technologies

This project will develop a joint proposal to public and private sector funders in Brazil and the United States to develop a tangible Demonstration Project of Renewable Energies and Intelligent Grids, incorporating

student, faculty, business leader and idea exchange between leading research institutions, utilities and private sector companies in both countries.

The demonstration project will be designed to assist the Brazilian distributed power industry in the development and testing of distributed power systems, focusing on technologies available to generate energy from renewable sources (e.g. wind, solar) and the systems needed to integrate the power generated to the grid (such as smart grid infrastructure, power line communication, wireless infrastructure, etc.). Through an open invitation and a project commission, selected Brazilian and U.S. companies and sponsoring distribution companies can work together—with leading research institutions in both countries—on different themes in order to structure a demonstration project at two or three sites that supply a minimum of 60,000 consumers.

In addition to CEMIG, the University of Illinois at Urbana-Champaign and the Federal University of Rio Grande do Sul, the Smart Grid Collaboration and Education Exchange will engage other institutions and organizations in the United States and Brazil, including:

- The current exchange program between the Getúlio Vargas Foundation and the University of Colorado at Boulder's Leeds School of Business;
- Deere & Company's employee education opportunities; and
- Other companies and universities who are members of the Council on Competitiveness and the Brazilian Competitiveness Movement.

The future holds countless opportunities in brand new fields, false leads and dead end ventures, rapidly increasing global competition, and a growing sense of "if not us, then who?" And there are threats—business and political crises, natural or man-made disasters, and even newer opportunities passed over for easier targets. But the United States and Brazil can succeed in this even with these unforeseeable threats through preparation and preparedness, flexibility and receptiveness.

Both countries must remain focused—focusing common agendas on the most critical areas of change, opportunity and common interest. Funding must be found, tapping into new resources and developing collaborations to share resources across borders. Common gaps must be identified and tackled with renewed vigor and an eye toward developing new partnerships between industry, universities and the public sector. Developing common standards and analyzing case studies will enable both countries to create effective innovation-driving policies, but remaining results-oriented will be critical to success. New metrics and ways to benchmark progress globally will make this possible, and the Council, MBC and ABDI can provide expertise in this area.

In short, the United States and Brazil must collaborate to build a bridge to the future and cross over it together.

PORTO ALEGRE / CHICAGO

Learning Laboratory 1: Porto Alegre
Key Activities and Strategic Visits

Wednesday, April 22, 2009

Innovation Learning Laboratory
9:00 a.m.–5:00 p.m.

Host: **Ricardo Felizzola**, Vice President, Federation of Industries for the State of Rio Grande do Sul / Instituto Euvaldo Lodi (FIERGS/IEL)

Location: FIERGS/IEL Headquarters

The first U.S.-Brazil Innovation Learning Laboratory that FIERGS/IEL hosted in Porto Alegre brought together more than 70 leaders from U.S. and Brazilian private and public sectors, academia and national laboratories to discuss research and development as the seedcorn for innovation and begin to define possible areas for cross-border collaboration.

Innovation Learning Laboratory Dinner
8:00–10:30 p.m.

Host: **Yeda Crusius**, Governor of the State of Rio Grande do Sul

Location: The Governor's Palace

Governor Yeda Crusius hosted Innovation Learning Laboratory participants and local guests at her official state palace.

Thursday, April 23, 2009

Strategic Visit to TECNOPUC
8:00 a.m.–2:00 p.m.

Host: **Roberto Moschetta**, Director, TECNOPUC

Location: TECNOPUC Headquarters

Following the Innovation Learning Laboratory, participants visited TECNOPUC—one of Brazil's leading research parks. This site visit provided participants with access to TECNOPUC leaders and highlighted one of the key themes in the Laboratory—the role that public-private partnerships like research parks play in developing the talent for cutting-edge research.

PORTO ALEGRE / CHICAGO

Learning Laboratory 2: Chicago
Key Activities and Strategic Visits

Tuesday, May 12, 2009

Innovation Learning Laboratory
8:00 a.m.–3:00 p.m.

Host: **Richard Herman**, Chancellor, University of Illinois at Urbana-Champaign

Location: The University Club, Chicago

The second U.S.-Brazil Innovation Learning Laboratory, hosted by University of Illinois Chancellor Richard Herman at the University Club in Chicago, brought together almost 60 leaders from U.S. and Brazilian private and public sectors, academia and national laboratories to continue discussions on research and development as the seedcorn for innovation and further develop opportunities for U.S.-Brazil collaborative projects.

Innovation Learning Laboratory Dinner
8:00—10:30 p.m.

Host: **Richard Herman**, Chancellor, University of Illinois at Urbana-Champaign

Location: The Park Grill, Chicago

Chancellor Herman hosted Innovation Learning Laboratory participants for a concluding, networking dinner.

Wednesday, May 13, 2009

Strategic Visit to the University of Illinois at Urbana-Champaign
12:00–6:00 p.m.

Host: **Ravishankar Iyer**, Interim Vice Chancellor for Research, University of Illinois at Urbana-Champaign

Locations: Energy Biosciences Institute and Coordinated Sciences Laboratory

Following the Innovation Learning Laboratory in Chicago, participants visited the University of Illinois at Urbana-Champaign. This site visit provided participants with access to the leading researchers and members of the university's administration, and introduced participants to the Energy Biosciences Institute and the Coordinated Science Laboratory—two cutting-edge research facilities at the University of Illinois.

Closing Dinner
6:00–7:15 p.m.

Host: **Ravishankar Iyer**, Interim Vice Chancellor for Research, University of Illinois at Urbana-Champaign

Location: Beckman Institute Tower Room

Interim Vice Chancellor Ravishankar Iyer hosted Innovation Learning Laboratory participants for a final dinner, wrapping up the daylong visit to the UIUC campus.

PORTO ALEGRE / CHICAGO

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PORTO ALEGRE

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U.S.-Brazil Innovation Learning Laboratories

São Paulo / Silicon Valley

São Paulo
Photo: Roberto Sena (Flickr)

Silicon Valley
Photo: (nz)dave (Flickr)

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SÃO PAULO / SILICON VALLEY

Moving Ideas Out of the Lab and Into the Marketplace: the Role of Tech Transfer and Entrepreneurship in Innovation Economies

Continuing along the innovation spectrum and building on the core research activities at the heart of innovation, the São Paulo and Silicon Valley Innovation Learning Laboratories focused on improvements needed in the process to translate fundamental research and ideas into new products, services and solutions.

The São Paulo and Silicon Valley Innovation Learning Laboratories explored ways both nations can accelerate knowledge and technology transfer, spur entrepreneurship and catalyze the next generation of innovators in the Western Hemisphere's two largest economies.

Attention in the Laboratories focused on innovation challenges and opportunities neither country can meet alone—particularly in strategic areas like energy efficiency and renewables, and information and communications technologies.

SÃO PAULO / SILICON VALLEY

Executive Summary

The second and third Innovation Learning Laboratories—in São Paulo and Silicon Valley—brought together U.S. and Brazilian leaders from the public and private sectors, academia and national laboratories to brainstorm about overcoming barriers and creating actionable opportunities to move ideas out of the laboratory and into the marketplace. These discussions centered on exploring the technology transfer and entrepreneurship profiles in Brazil and the United States, and encouraging risk-taking in research and entrepreneurship. In addition to the Innovation Learning Laboratories, strategic site visits and side meetings added value to participants' experience by creating opportunities for cross-border collaboration and introducing participants to global leaders in innovation.

Exploring the Technology Transfer Profile in Brazil and the United States

Participants in the São Paulo and Silicon Valley Innovation Learning Laboratories set about to explore the ecosystem for innovation, tech transfer and commercialization activities in each country. They discussed the main features and key elements of the innovation ecosystem—regional and national—that facilitate technology transfer, as well as policy/regulatory barriers and best practices to optimize the transfer of technology into the marketplace.

The important role that a "business engineer"—someone who understands the science or technology behind the innovation as well as what is required to take the innovation successfully to the market—plays in technology transfer and entrepreneurship quickly emerged from the discussions in São Paulo and Silicon Valley. And participants recognized that these business engineers are vital mechanisms to moving technologies and ideas through the "valley of death"—loosely defined as the stage after a technology exits the lab but before it is a marketable product.

Exploring the Entrepreneurship Profile in Brazil and the United States

Two key questions guided the discussions around entrepreneurship at the Innovation Learning Laboratories in São Paulo and Silicon Valley:

- How are entrepreneurship and risk-taking encouraged (or discouraged)?
- Are there model entrepreneurship programs/best practices to leverage across both the United States and Brazil?

Participants addressed these questions and analyzed the platforms necessary for innovation and entrepreneurship in both countries—notably, avoiding risk aversion, confidence in innovation, intellectual property protection and a robust legal environment. In addition, the Silicon Valley Innovation Learning Laboratory featured the leaders of several startup companies through roundtable conversations.

Encouraging Risk-taking in Research and Entrepreneurship: Cross-Sector Learnings

Participants in São Paulo and Silicon Valley emphasized that in order to promote entrepreneurship, technology transfer and ultimately innovation, Americans and Brazilians must encourage and support risk-taking by entrepreneurs, researchers and investors. And Brazil and the United States have strengths on which both countries can draw to encourage risk-taking. The discussions in São Paulo and Silicon Valley focused on how effective policies in both countries will not just provide incentives and other tools to accelerate risk-taking, but also raise awareness of the opportunities that exist in taking a risk and engaging in entrepreneurial activity.

Learning Laboratory participants in São Paulo and Silicon Valley stressed that innovation-driven industries receive a larger and larger share of venture capital and private equity investment. A great opportunity to drive investments in innovation arose through breakout sessions held in São Paulo and Silicon Valley, where participants discussed tangible projects and partnerships across both countries in energy efficiency and renewable energy technologies. Projects and partnerships in this area will optimize entrepreneurial activity and investment in innovation in both countries.

Featured Cross-Border Collaborations: U.S.-Brazil Co-Incubation and Cleantech Open Brazil

The Labs in São Paulo and Silicon Valley laid forth the foundation for ground-breaking partnerships and new ways to promote entrepreneurship and technology transfer. Two cross-border, collaborative projects have emerged directly from the São Paulo and Silicon Valley Innovation Learning Laboratories:

- A co-incubation initiative in which business incubators and accelerators in both countries reciprocally support entrepreneurial ventures; and
- The sharing of the U.S.-based Cleantech Open concept with Brazil.

These projects are spearheaded by Innovation Learning Laboratory participants, and each has a clearly defined set of goals and deliverables.

SÃO PAULO / SILICON VALLEY

Highlights from São Paulo and Silicon Valley

The U.S.-Brazil Innovation Learning Laboratories in São Paulo and Silicon Valley centered around moving ideas out of laboratories and into the marketplace. While the United States and Brazil must certainly retain and enhance their research at the frontiers—a key theme from Innovation Learning Laboratories 1 and 2 in Porto Alegre and Chicago—both nations must also improve the processes that evolve these ideas into new products, new services or new solutions.

By many measures, the U.S. economy leads the world in knowledge creation and entrepreneurship. But it is clear that good ideas are left on the shelf, and new strategies are needed to develop the next generation of innovative workers who will bring ideas to the marketplace. These Innovation Learning Laboratories have explored ways both nations can accelerate knowledge and technology transfer, spur entrepreneurship and catalyze the next generation of innovators in the Western Hemisphere's two largest economies.

The Innovation Learning Laboratories in São Paulo and Silicon Valley sought to answer questions—focused on investment, talent and policy infrastructure—aimed at strengthening the technology transfer and entrepreneurship capabilities in both the United States and Brazil, as well as addressing innovation challenges and opportunities neither country can meet alone.

An agenda around exploring the technology transfer and entrepreneurship profiles in Brazil and the United States, and encouraging risk-taking in research and entrepreneurship, guided the discussions in the São Paulo and Silicon Valley Innovation Learning Laboratories. U.S. and Brazilian leaders from the public and private sectors and academia kicked off discussions in each of these topics, and a moderated conversation ensued.

The São Paulo and Silicon Valley Innovation Learning Laboratories also introduced participants to groundbreaking startup companies and incubators. And each Innovation Learning Laboratory brought participants to strategic side visits—this report highlights two: UNICA, the Brazilian sugarcane industry association; and Serious Materials, a manufacturer of energy-saving materials.

Exploring the Technology Transfer Profile in Brazil and the United States

Participants in the São Paulo and Silicon Valley Innovation Learning Laboratories set about to explore the ecosystem for innovation, tech transfer and commercialization activities in each country. They discussed the main features and key elements of the innovation ecosystem—regional and national—that facilitate technology transfer, as well as policy/regulatory barriers and best practices to optimize the transfer of technology into the marketplace.

Deborah L. Wince-Smith, president of the Council on Competitiveness, noted in São Paulo that transferring technology out of the university or laboratory and into the hands of the market is a critical component of a competitive, innovation-driven economy.

Deborah L. Wince-Smith, Council on Competitiveness

Ken Polasko, Arizona Technology Enterprises

In addition, Brazil and the United States have competitive advantages on which to capitalize to create a strong technology transfer ecosystem—and U.S.-Brazil partnerships and collaborations to enhance technology transfer will secure both countries as hemispheric leaders in innovation.

As one Brazilian participant noted at the São Paulo Innovation Learning Laboratory, Brazil does not have a strong history of technology transfer. But the United States can offer successful technology transfer models. For example, in the United States, many companies are formed directly from universities—with the university taking a partial ownership role in the company. The Massachusetts Institute of Technology in Cambridge, Mass., is a good example of this type of partnership—with the research university becoming a partner in the technology transfer ecosystem. This practice does not exist in such a robust form in Brazil, although many Brazilian universities are beginning to explore innovative technology transfer models like this. As a result, opportunities for U.S. universities to partner with Brazilian companies—and vice versa—abound.

Ken Polasko, vice president of business development with Arizona Technology Enterprises, explained in Silicon Valley that the difficulty in measuring the return on investment to initial R&D funding poses a major hindrance to efforts in the United States and Brazil to promote technology transfer and commercialization. As a result, R&D in large companies and technology transfer at many universities has declined, while product pipelines continue to grow. And companies are increasingly turning to universities and laboratories to develop new products.

Polasko also argued that support must be given to these critical innovation enablers—universities and national labs. Universities and national laboratories are often the best places to develop innovations and engage in technology transfer because they have the human intellectual capital, along with the time, to invest in alternative technologies. These are resources that a company whose focus is on quarterly returns may not have. Technology development can take up to 10 or even 20 years from initial concept to functioning prototype—and universities and national labs often offer the best resources to pursue these technological breakthroughs.

Participants in the São Paulo Innovation Learning Laboratory agreed, and noted that today's market is not only about good ideas, it is also about making these ideas become viable and marketable. The model of finding a person at a university or laboratory with a good idea and trying to commercialize this idea is rapidly changing. More and more, the model is about finding a good entrepreneur to make an innovative project or idea marketable.

Silicon Valley and São Paulo participants noted that given an evermore competitive market filled with new ideas capable of rapid commercialization, it is critical to think of new ideas, technologies or innovations as intellectual property. Then, the transfer of this idea or technology out of the university or labo-

Guilherme Ary Plonski, ANPROTEC

ratory into the market becomes more about developing intellectual property. This requires three critical components.

1. **An audience must be defined.** Who will benefit from a particular technology transfer? Most organizations do not have a single customer. The same holds true for universities. Successful intellectual property development through technology transfer depends on satisfying the right shareholder.
2. **Constraints must be identified.** Technology transfer offices at large universities receive hundreds of innovative ideas and technologies from faculty and staff each year—so management of these ideas is critical. In addition, are there investors? And what kind of investors are available?
3. **An entrepreneur or team of entrepreneurs must be identified.** These entrepreneurs must be able to take the technology or idea and turn it into something commercially viable. While there are many good ideas, very few are, by themselves, viable near-term investment or commercialization opportunities.

The Role of Business Engineers in Technology Transfer and Entrepreneurship

The third point above calls for an entrepreneur who can take a technology and sell it to a willing market, or, create a market for a particular idea. These entrepreneurs are often referred to as "business engineers"—someone who not only understands the science or technology behind the innovation, but who also understands the market and complexities involved with transferring technologies and ideas from the university or laboratory into the market.

Participants in the São Paulo and Silicon Valley Innovation Learning Laboratories discussed the role that these business engineers play in technology transfer. They also looked at barriers to and best practices in business engineering.

Guilherme Ary Plonski, president of ANPROTEC—the Brazilian National Association of Innovative Entrepreneurship Promoting Entities—noted in Silicon Valley that, in Brazil, incubators often play the role of a business engineer. And this model has proven to be quite successful. More than 90 percent of Brazilian incubated companies survive, according to research done by ANPROTEC. The United States has much to learn from Brazil's achievements with incubators—which create mini Silicon Valley's across the country. In Brazil's incubators, innovative technology transfer and commercialization methods are more than the norm—they are ever-improving. Brazilian incubators focus on the process of taking an idea from concept to market—and have proven methods of learning from successes and failures in these processes. Incubators offer a unique place to pull together all components of the technology transfer ecosystem.

Marc Gottschalk, a partner with the clean tech practice at Wilson Sonsini Goodrich & Rosati, highlighted how business engineers can also play a key role at various stages of technology transfer and

commercialization. Law firms like Wilson, Sonsini, Goodrich & Rosati, for example, can play the role of a business engineer by protecting intellectual property and advising on best practices to ensure proper entry into the market. In addition, for companies trying to raise money and prepare business plans, law firms can advise on the agreements and contracts.

Participants in São Paulo and Silicon Valley noted that the many different roles a business engineer must fill demonstrate not only the importance of such an individual but also the complexity of the technology transfer ecosystem. Indeed, several business engineers with expertise in particular areas may be needed at different stages of technology transfer and commercialization. But finding a business engineer—or a team of business engineers with different expertise—is never easy. Universities and national laboratories must be innovative in their technology transfer and commercialization processes, and seeking better and better business engineering practices is a critical component of this effort.

Crossing the "Valley of Death" in Brazil and the United States

In addition to the concept of a business engineer, participants in São Paulo and Silicon Valley discussed in their exploration of U.S. and Brazilian technology transfer the barriers to crossing the "valley of death"—loosely defined as the stage after a technology exits the lab but before it is a marketable product. They discussed key characteristics of the valley of death, as well as successful investment programs/best practices to leverage across both Brazil and the United States.

Ted Rogers
Managing Partner, PPI Ventures

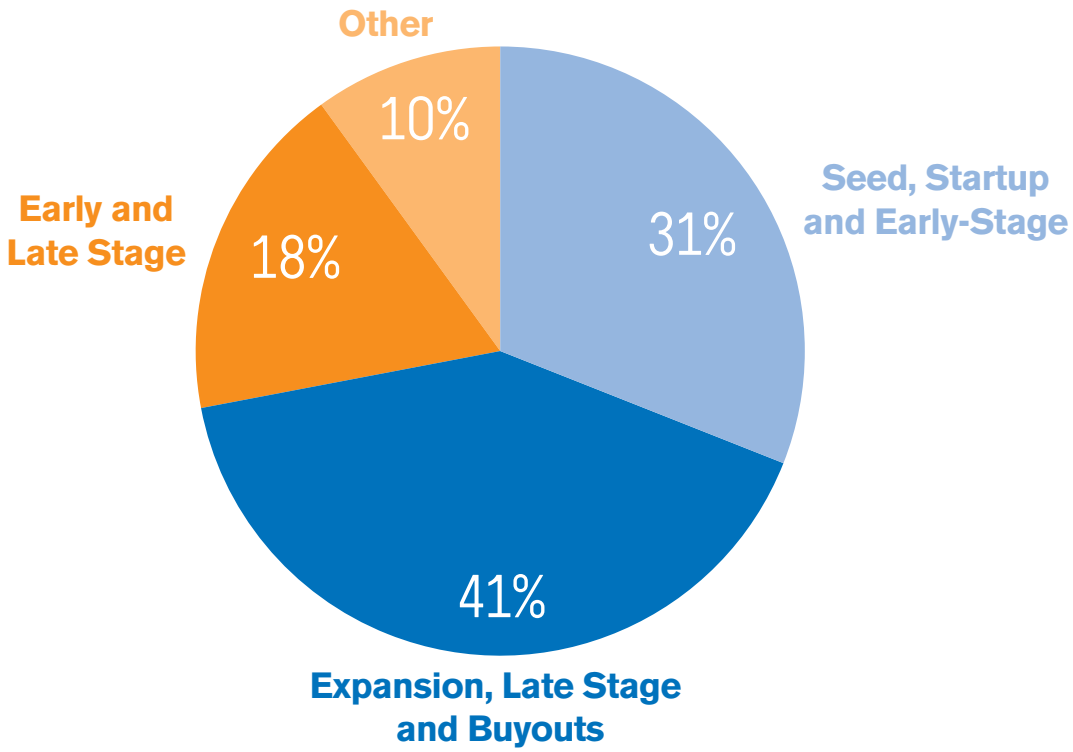
In Brazil, research in universities is still in the early stages of understanding how economically viable ideas are in the marketplace. In Europe and the United States, by contrast, a diverse array of funding sources exists to bring projects to market. A culture of developing a proof of concept exists in the United States and in Europe, allowing for an idea to become more attractive to the investor. This can play a positive role in bridging the "valley of death." In Brazil, a lack of funding for a proof of concept often exists, making it difficult for an idea or technology to escape the valley of death.

The investment data in Brazil confirm this assertion. While the committed private money on venture capital in Brazil has increased more than 55 percent a year, according to research conducted by the Getúlio Vargas Foundation, the money is not making it into the hands of entrepreneurs and early stage technologies; rather, it is going to late-stage projects.

Only about one-third of the committed private capital in Brazil in 2008 went to seed, startup and early-stage projects. The rest, as Figure 6 shows, went to later stage projects, other investments or a combination of early and late stage projects.

Simon Olson, DFJ FIR Capital

Figure 6: Distribution of Investment Vehicles by Stage in Brazil, 2008
Source: Presentation by Dr. Claudio Furtado, Getulio Vargas Foundation



Simon Olson, a partner with DFJ FIR Capital, contended in Silicon Valley that the quality of private venture funds in Brazil is static. So, an opportunity exists for the Brazilian government to play a crucial role in funding early-stage ideas in Brazil, especially where investors may not have an appetite to fund a proof of concept. Through direct funding mechanisms like special banks or loans, or stronger policies to incentivize early-stage funding, the government can help bridge the valley of death.

Olson added that, from his perspective, a cultural barrier exists that hinders the ability to cross over the valley of death in Brazil: distrust among family members, friends and colleagues of those who leave

Roberto Alvarez, Brazilian Agency for Industrial Development

to work for a startup. He further contends that, in the United States, because of the success of firms like Microsoft, Netscape, Google and others, people realize the opportunities for success in entrepreneurship, providing a necessary momentum to fight through the valley of death when funding is not readily available. In his experience, this momentum does not exist in Brazil. As Innovation Learning Laboratory participants in Silicon Valley noted, in order to remove the distrust in startups and early-stage projects as a cultural barrier, Brazil needs to educate students and young entrepreneurs on the possibilities inherent in entrepreneurial activity. Too often, Olson notes, Brazilian students want to pursue job security in the public sector—but this limits entrepreneurial activity and widens the valley of death. In Brazil, Olson would like to see incentives to steer students and young professionals away from public sector careers and into entrepreneurial, private ventures.

Roberto Alvarez, international affairs manager at ABDI, noted in São Paulo that another major issue Brazil struggles with—that impedes early-stage projects from crossing the valley of death—is a lack of diversity in available funding. In the United States, a wide range of funding sources is available for each stage of technology creation and commercialization. Because of this, a firm can specialize in funding a particular stage of a project—seed funding, late-stage commercialization funding, etc. In Brazil, venture capital firms need to cover all stages of technology development. This leads to an inability to fund many good ideas simply due to bandwidth issues within a particular firm trying to provide capital to an early-stage project.

Discussions from the Innovation Learning Laboratories in São Paulo and Silicon Valley highlighted how best practices in both countries do exist—and cross-border collaborative projects can draw upon these and highlight what makes a successful technology transfer ecosystem. For example, proof of concept funds—those funds that target ideas with a potential to be commercially viable—have succeeded in Brazil and the United States in helping ideas cross over the valley of death. These funds help to narrow the distance between investors and technology/innovation centers. Another best practice that currently works quite well in Brazil and the United States is to have incubators receive a portion of the startup company's revenue for a short but agreed-upon length of time as a way to keep the demand for new funding projects among incubators high.

The São Paulo Innovation Learning Laboratory featured **Julia Rosen**, associate vice president for innovation and entrepreneurship at Arizona State, who introduced participants to SkySong, an incubator housed at the university. This incubator has a successful track record at playing the role of a business engineer and as a vehicle by which ideas can cross through the valley of death.

ARIZONA STATE UNIVERSITY

Spotlight: SkySong

Julia Rosen
Associate Vice President for Innovation and Entrepreneurship, Arizona State University

SkySong is a mixed-use incubation project at Arizona State University serving the needs of businesses, research and technology industries and academia while building vital networks between university innovations, regional progress and the global technology industry.

SkySong serves as a model of an incubator successfully acting as a business engineer, a key component to a strong technology transfer ecosystem, and a robust bridge across the valley of death for many early-stage projects. In short, we are a vehicle for technology transfer and entrepreneurship.

A key component of our incubation services is to ensure that Arizona entrepreneurs go global—focusing from the very initial concept on how to create a competitive global venture. And SkySong creates a soft landing for startups through ensuring that the entrepreneurs have sales in their home country, a feasible business plan and growth strategy, and introduction to customers, investors and markets. We customize the experience for each venture. The fundamental issue is to reduce barriers—like startup costs—for entrepreneurs, because in the end it is always about sales.

As demonstrated by the creation of SkySong, Arizona State University places a significant amount of its resources on promoting entrepreneurship. And we have had a profound impact during the past few years:

- Engaged 22 colleges across four campuses in 112 entrepreneurship courses;
- Supported 102 ventures (200 students) with $850,000, office space and mentoring;
- Placed 145 student interns with 55 small and medium-sized enterprises;
- Established a network of 3,000 investor contacts;
- Trained 897 entrepreneurs from 436 companies; and
- Spun off 26 companies, with $16.5 million in commercialization revenue.

We look forward to partnering with Brazilian incubators and universities to create cross-border collaboration. This will be essential to drive entrepreneurship in the United States and Brazil, carrying viable technologies and ideas across the valley of death in both countries.

Participants at both the São Paulo and Silicon Valley Innovation Learning Laboratories concluded that many components play a role in successful technology transfer ventures, including intellectual property protection, angel and seed funding, incubators, robust technology transfer and commercialization processes, and a legal and regulatory framework—but each of these must fit together to comprise a cohesive technology transfer ecosystem.

Exploring the Entrepreneurship Profile in Brazil and the United States

Two key questions guided the discussions around entrepreneurship at the Innovation Learning Laboratories in São Paulo and Silicon Valley. How are entrepreneurship and risk-taking encouraged (or discouraged)? And, are there model entrepreneurship programs/best practices to leverage across both Brazil and the United States? Participants addressed these questions and analyzed the platforms necessary for innovation and entrepreneurship in both countries. In addition, the Silicon Valley Innovation Learning Laboratory featured the leaders of several startup companies through roundtable conversations.

Brazilian participants in São Paulo and Silicon Valley noted that Brazilians—perhaps more than Americans—recognize the importance of entrepreneurship, and see it as a driver of high-value activity and job creation. A recent Global Entrepreneurship Monitor survey showed that 68 percent of adults surveyed in Brazil considered entrepreneurship as a desirable career choice. And 78 percent recognized favorable media attention given to entrepreneurs. This compares with 63 percent and 73 percent, respectively, in the United States.

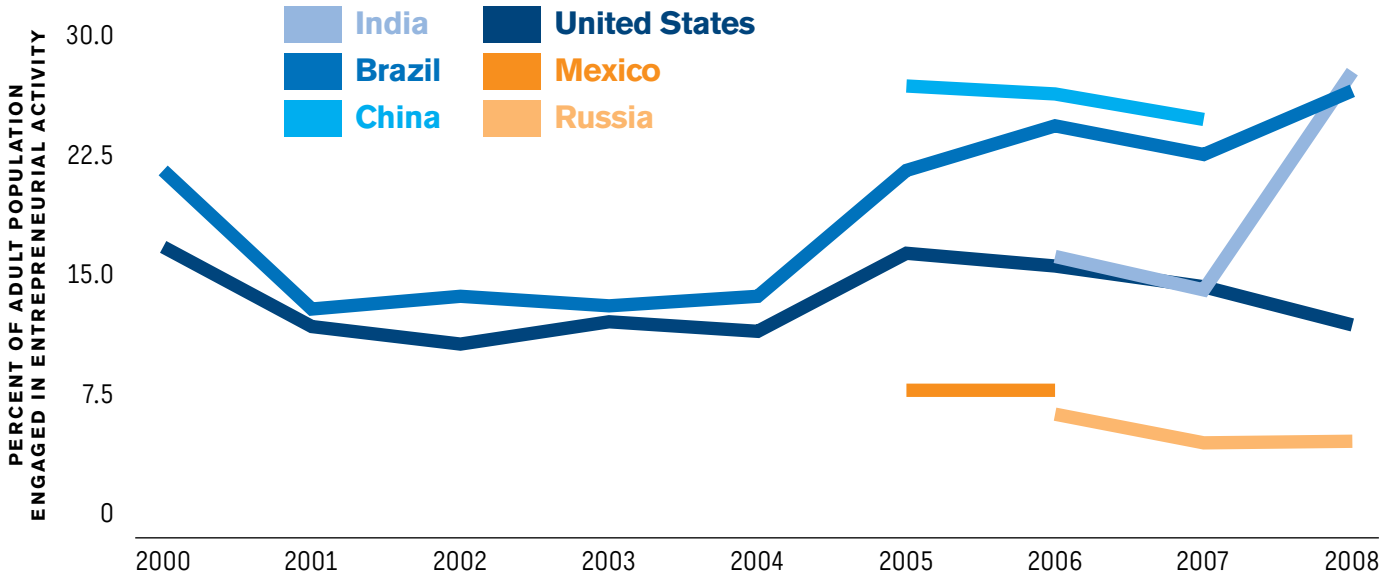
These survey results are borne out in the number of entrepreneurs in Brazil engaged in entrepreneurial activity. Of 2,000 Brazilian adults surveyed by the Global Entrepreneurship Monitor in 2008, 26.4 percent were engaged in entrepreneurial activity.[7] This compares with 18.7 percent of U.S. respondents engaged in entrepreneurial activity.

While Brazil leads other rapidly developing countries and the United States in entrepreneurial activity, it lags similar rapidly developing economies as well as other developed economies like the United States in high-growth expectation, early-stage entrepreneurial activity. According to the Global Entrepreneurship Monitor's 2008 report, just over 0.5 percent of Brazil's adult population is engaged in early-stage entrepreneurship that is expected to see large growth. This compares with over 3.5 percent in Columbia, 2.5 percent in China, 2 percent in Chile and 1.5 percent in the United States.

Participants in São Paulo and Silicon Valley touched on several key factors that contribute to Brazil's lagging behind similar emerging economies in high-

7 Entrepreneurial activity includes: nascent entrepreneurial activity, new business owner/manager, early-stage entrepreneurial activity and established business owner/manager.

Figure 7: Entrepreneurial Activity in Rapidly Developing Countries
Source: Global Entrepreneurship Monitor Reports, 2000-2008



growth expectation, early-stage entrepreneurial activity. These are structural impediments to entrepreneurship.

- Brazil needs to put in place the policies and regulations that reduce the cost and time it takes to start a business in Brazil. According to the World Bank's most recent *Doing Business* report, it takes on average 120 days and 6.9 percent of income per capita to start a business. By comparison, in the United States it takes just 6 days and 0.7 percent of income per capita to start a business.
- Hiring/firing employees in Brazil is too difficult. This has led to startup companies being unable to hire the best and brightest employees, and has caused some startups to hire only temporary workers—a deterrent for many venture capital firms looking to invest. According to the same *Doing Business* report, the United States scores a "0" on a scale of 0-100 for rigidity of hiring and firing practices (100 being extremely rigid). Brazil scores a 46.

Claudio Gastal, MBC

- In Brazil, it is quite difficult to close a business. Companies need to be able to fail and to fail quickly so the entrepreneur can move on to the next project. The World Bank's *Doing Business* report indicates that closing a business in Brazil takes on average 4 years and costs 12 percent of the estate. In the United States, however, it takes an average of just 1.5 years and costs 7 percent of the estate. Being able to close a business creates healthy job churn within an economy—from 1987-2005 in the United States, firms with fewer than 20 employees accounted for 86.7 percent of net job creation.
- The final structural impediment is cultural. In Brazil, failure has a very strong stigma and is often the major reason why an entrepreneur does not strike off to start a business venture. This stigma exists in the United States as well, but to a lesser extent.[8]

Claudio Gastal, president of MBC, noted in São Paulo that better policies, legal structures and regulations will help Brazil be a more business and entrepreneurship-friendly country, and collaboration with regulators in the United States can have a positive cross-border impact. But in addition to this, Brazil must work to reinforce the need to educate entrepreneurs from a young age to change a culture that fears failure.

8 Sandy Baruah and Tom Sullivan, "Government and Small Business: Maybe Less is More," AmericaSpeakOn.org, November 17, 2009.

Platforms for Innovation and Entrepreneurship

Participants in the Silicon Valley and São Paulo Innovation Learning Laboratory discussed what systems of support—legal, regulatory, marketing, etc.—are necessary to enable entrepreneurship and innovation. And the Silicon Valley Learning Lab focused on how both countries might build and nurture platforms for innovation and entrepreneurship, as well as the roles that government—local, regional, state and/or national—the private sector and academia play in creating this innovation and entrepreneurship platform.

Certain key platforms emerged in Silicon Valley as critical enablers or deterrents of innovation and entrepreneurship. These include, but are not limited to, avoiding risk aversion, confidence in innovation, intellectual property protection and a robust legal environment.

Participants in São Paulo and Silicon Valley noted that since early 2009, Brazilian consumers and companies have lost some confidence in their current and future economic condition. Low confidence and poor expectations will lead to a decrease in funding by angel investors, corporations and venture capitalists—who tend to be more risk averse in tougher economic times. Risk aversion is a major deterrent to innovation and entrepreneurship.

Figure 8 reflects how consumers and companies in Brazil feel about their current economic situation as well as their future outlook for growth and confirms the consensus among participants of a loss in consumer and business confidence.

Figure 8: Consumer Expectation and Business Confidence in Brazil
Source: Central Bank of Brazil

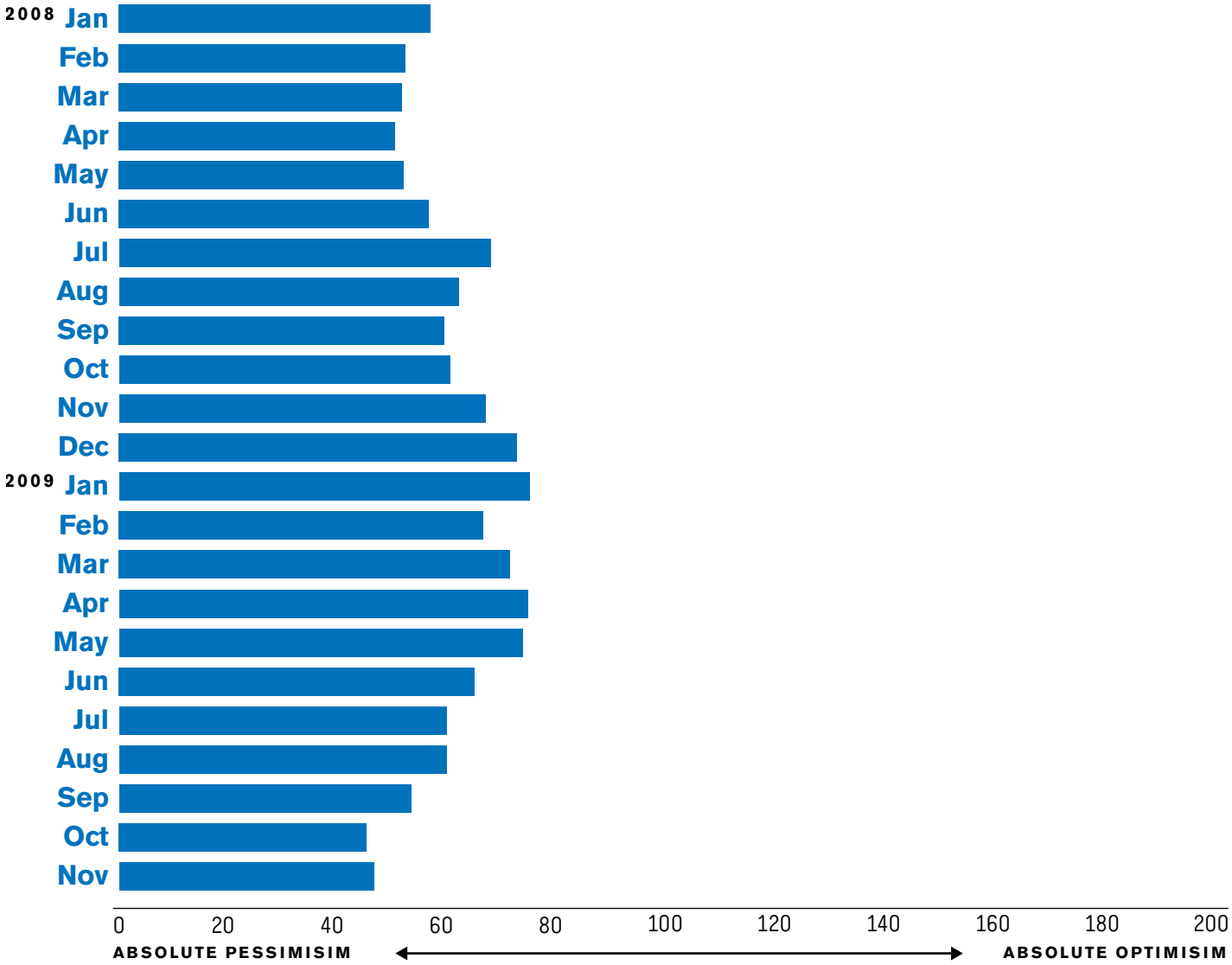
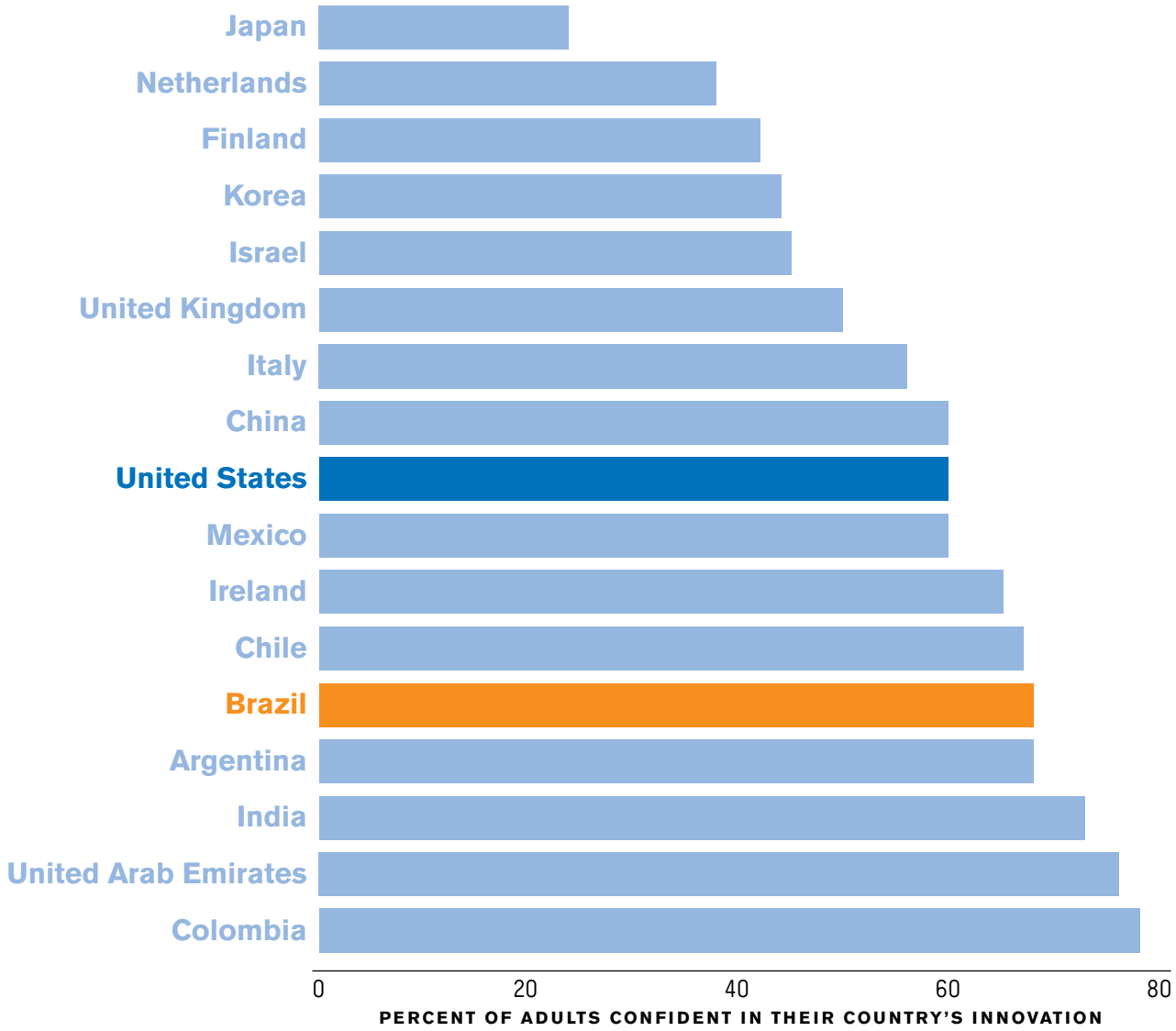


Figure 9: Innovation Confidence Index, 2007–2008
Source: Institute for Innovation & Information Productivity



Reginaldo Arcuri, ABDI

Denis Maia, Choice Energy Intelligence

However, as economists predict that Brazil will experience slow but positive growth in 2010, consumer and business confidence should increase as small gains in the economy lead to improved expectations for future growth. This should, in turn, make investors and entrepreneurs alike less risk-averse.

Reginaldo Arcuri, president of ABDI, added in São Paulo that although consumers and businesses have become more risk-averse, Brazilians have a history of confidence in their country's ability to innovate—a strong enabling condition for technology transfer and entrepreneurship.

São Paulo and Silicon Valley Innovation Learning Laboratory participants agreed that a country's confidence in its ability to innovate also plays a key role in driving entrepreneurial activity. Innovative entrepreneurs need customers who are willing to buy new products and services and to try products and services that utilize new technology. In Brazil, higher levels of innovation confidence can provide strong enabling conditions for entrepreneurs to find sources of funding, and for universities and companies to engage in technology transfer and commercialization. The chart on the previous page indexes national levels of confidence in innovation by measuring the adult population's willingness to buy new products or services, willingness to try products or services that involve new technology, and belief that new products or services will improve one's life.[9]

Raul Suster, coordinator of the Center for Technological Information at Brazil's National Institute of Industrial Property (INPI), noted in Silicon Valley that in addition to low risk aversion and high confidence in innovation as cultural platforms for innovation, protecting intellectual property rights through a robust legal environment will spur entrepreneurial activity. In Brazil, INPI has bolstered its efforts to protect the intellectual property of companies, researchers and entrepreneurs alike. INPI has doubled its staff during the last few years in order to keep up with the increasing number of patents being filed—last year alone saw more than 24,000 patents filed with the Brazilian patent office. Still, in the United States, it takes around 3 years to complete a patent, while it takes around 5 years to complete a patent in Brazil.

Denis Maia, CEO of Choice Energy Intelligence, underscored in Silicon Valley how many entrepreneurs in Brazil find the legal and regulatory environment to be overly complicated—and must spend time navigating the laws and regulations. This complicated environment, he noted, may result in less risk-taking by both entrepreneurs and investors.

Participants in Silicon Valley agreed and discussed a double-pronged approach to this issue to overcome its effects. First, to help entrepreneurs and investors navigate the complicated legal environment in Brazil, more lawyers need to be engaged from the beginning of the innovation and idea creation process. And second, policymakers must be made aware of

9 Institute for Innovation & Information Productivity

Kyle McCue, Ternion Bio Industries

Jack Oswald, SynGest, Inc.

Kyle McCue
Chief Executive Officer, Ternion Bio Industries

Ternion Bio Industries makes Photo Bioreactors that provide a controlled, scalable environment in which harmful emissions, notably carbon dioxide, are used to "feed" any strain of algae, producing high-quality raw material for beneficial algae-based products. As a result, Ternion Bio helps emitters of carbon dioxide, such as power plants and petroleum refineries, more easily and cost-effectively meet tightening requirements for sequestering greenhouse gases.

We have a special interest in Brazil, given the importance of biofuels to the Brazilian energy sector. But we need assistance in understanding how to set up our business in Brazil—which technologies are already in place, which carbon emitters would be most willing to use our technology, etc.

In the United States, entrepreneurs can find funding perhaps more easily than in Brazil because the United States has a culture that is more open to risk—to investing in startups and entrepreneurs. In Brazil, it will be important for entrepreneurs to cultivate partners and funding from diverse sources. Government investment agencies can play important roles here.

Jack Oswald
Chief Executive Officer, SynGest, Inc.

At SynGest, we have developed a cutting-edge way to make environmentally friendly fertilizer in an environmentally friendly way. We see this as critical for the United States, as we currently import more than 55 percent of our nitrogen fertilizer needs, which becomes a food security issue.

With our technology, there is an opportunity for us to produce all the fertilizer the country needs. We have announced plans to build our first commercial scale facility in the United States to convert crop waste such as corn stalks and cobs into anhydrous ammonia—an advanced biofuel and nitrogen fertilizer. But in order to expand—in particular, in Brazil—we need local partners who understand not only the market but also the complex laws and regulations by which startups must abide.

As an entrepreneur, it is critical to be flexible. In addition to being able to react to shifts in the market and changes to laws and regulations, entrepreneurs in both countries must be flexible enough to capitalize on new opportunities for growth—and develop new strategies for capital accumulation.

Zach Gentry
Chief Strategy Officer, Adura Technologies

Adura Technologies™ is a clean energy technology company that applies low-power wireless mesh networking technology to building automation. Our mission is to provide cost effective lighting solutions for retrofit of commercial buildings so that building owners, tenants and facility managers can implement energy efficiency and load curtailment strategies, reducing their operating cost and their carbon footprint.

Our core wireless technology was developed at the University of California, Berkeley, Center for the Built Environment by Charlie Huizenga, one of Adura's founders. Clearly, we see the tremendous benefits to supporting research at universities, and both countries should continue to increase investments in centers for research like universities.

Adura developed an IP portfolio based on uses and improvements to the core technology—so the ability to protect intellectual property wherever we deploy our technology will be important. Without a strong legal and regulatory infrastructure in place to protect intellectual property, entrepreneurs would be wary of deploying new technologies and ideas.

the effects of the regulations on entrepreneurial and innovative activity. Laws may take a while to change, but even incremental changes will have a positive impact. Brazil has improved its legal and regulatory framework significantly during the last few years, and individual states are creating their own innovation-friendly laws, regulations and incentives.

Connecting Ideas with the Market: Focus on Startups

The Innovation Learning Laboratory in Silicon Valley showcased leaders of energy efficiency and renewable energy technology startup companies. The Learning Lab highlighted these entrepreneurs in order to demonstrate how small and medium-sized enterprises bring job growth and innovation to the United States and Brazil. The particular companies were selected because of their leadership in energy efficiency and clean energy technologies—an area that will see a dramatic growth in the coming decade, and that will generate innovation and economic growth across both countries.

The startup leaders discussed business products and services ready for deployment in Brazil. In addition, they spoke with Innovation Learning Laboratory participants about how entrepreneurs can tap into opportunities in the United States and Brazil.

Dario Azevedo, Pontifical Catholic University of Rio Grande do Sul

Encouraging Risk-Taking in Research and Entrepreneurship: Cross-sector Learnings

In order to promote entrepreneurship, technology transfer and ultimately innovation, risk-taking—by entrepreneurs, researchers and investors—must be encouraged. And Brazil and the United States have strengths on which both countries can draw to encourage risk-taking.

Participants in São Paulo and Silicon Valley discussed how effective policies in both countries will focus not just on providing incentives and other tools to accelerate risk-taking, but also to raise awareness of the opportunities that exist in taking a risk and engaging in entrepreneurial activity.

Dario Azevedo, the dean for international and institutional affairs at the Pontifical Catholic University of Rio Grande do Sul, noted that policymakers cannot be the sole players in encouraging risk-taking. Investors play a critical role in funding risky ventures and supporting entrepreneurship at all stages. A strong investment climate can help researchers, entrepreneurs and innovators focus on commercializing a technology or building a business, and not on what will happen if the technology, idea or business fails. And it is innovation—a resource that Brazil and the United States have in abundance—that drives investment.

This is borne out by data collected by the Getúlio Vargas Foundation. As Figure 10 demonstrates, information technologies, electronics, energy, telecom and agribusiness receive the largest portions of private equity and venture capital investment in Brazil.

And in 2008, a Brazilian "Industry Guide" study revealed that innovation-oriented sectors saw an increase of more than 55 percent in investments from Brazilian private equity and venture capital vehicles. These innovation-oriented industries include IT and electronics, telecom, biotechnology, health and cosmetics, energy, and logistics and distribution.[10]

As **Claudio Furtado**, director of the Getúlio Vargas Foundation Research Center on Venture Capital and Private Equity, described in São Paulo, investments through private equity and venture capital in Brazil have risen rapidly.

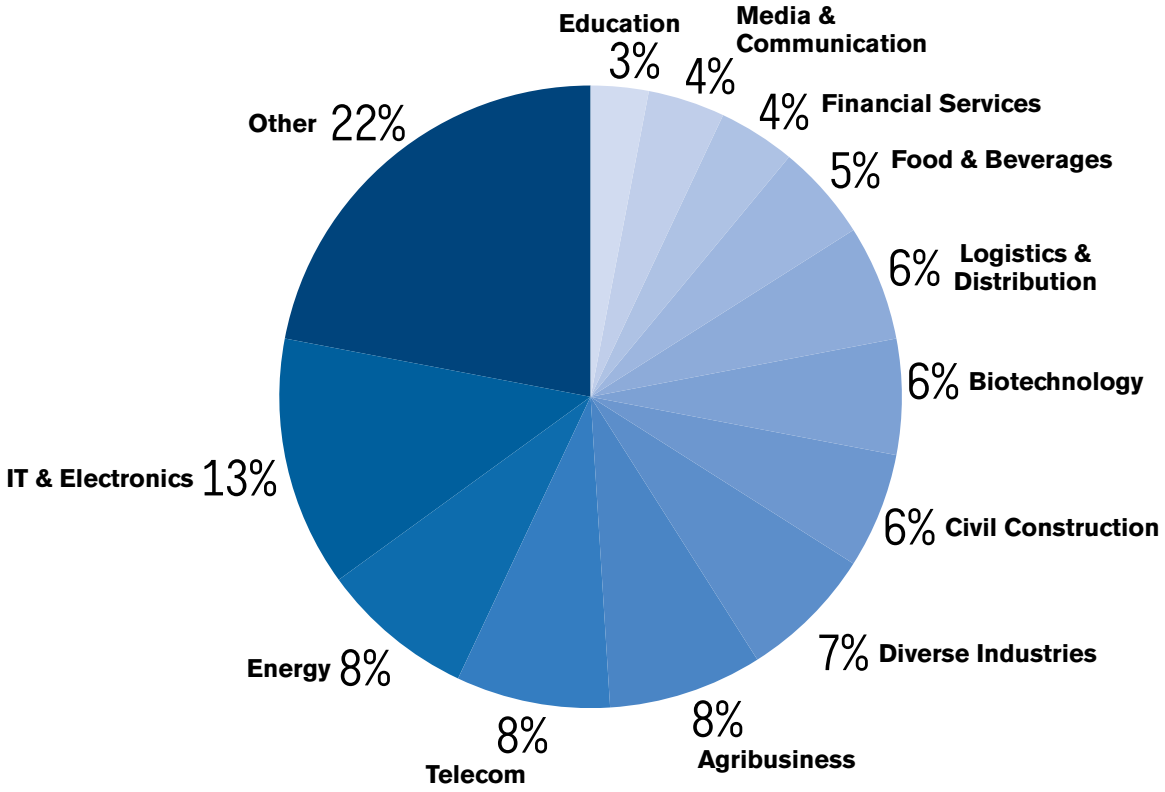
Since 2005, investments in Brazilian firms by Brazilian private equity and venture capitalists have risen almost 4-fold (see Figure 11). Through government-funded and privately funded business incubators, venture capital and private equity firms, and growth in innovation-driven industries, entrepreneurs and organizations engaged in technology transfer have seen a steady increase in available capital. As a percent of Brazil's GDP, the private equity and venture capital commitments have grown from 0.97 percent of GDP in 2004 to 1.73 percent of GDP in 2008.[11]

Furtado also highlighted how this funding is also going toward small- and medium-sized enterprises at a faster rate than just five years ago.

10 Presentation by Dr. Claudio Furtado, Getúlio Vargas Foundation

11 Presentation by Dr. Claudio Furtado, Getúlio Vargas Foundation

Figure 10: Focus of Investment Vehicles by Sector, 2008
Source: Presentation by Dr. Claudio Furtado, Getúlio Vargas Foundation

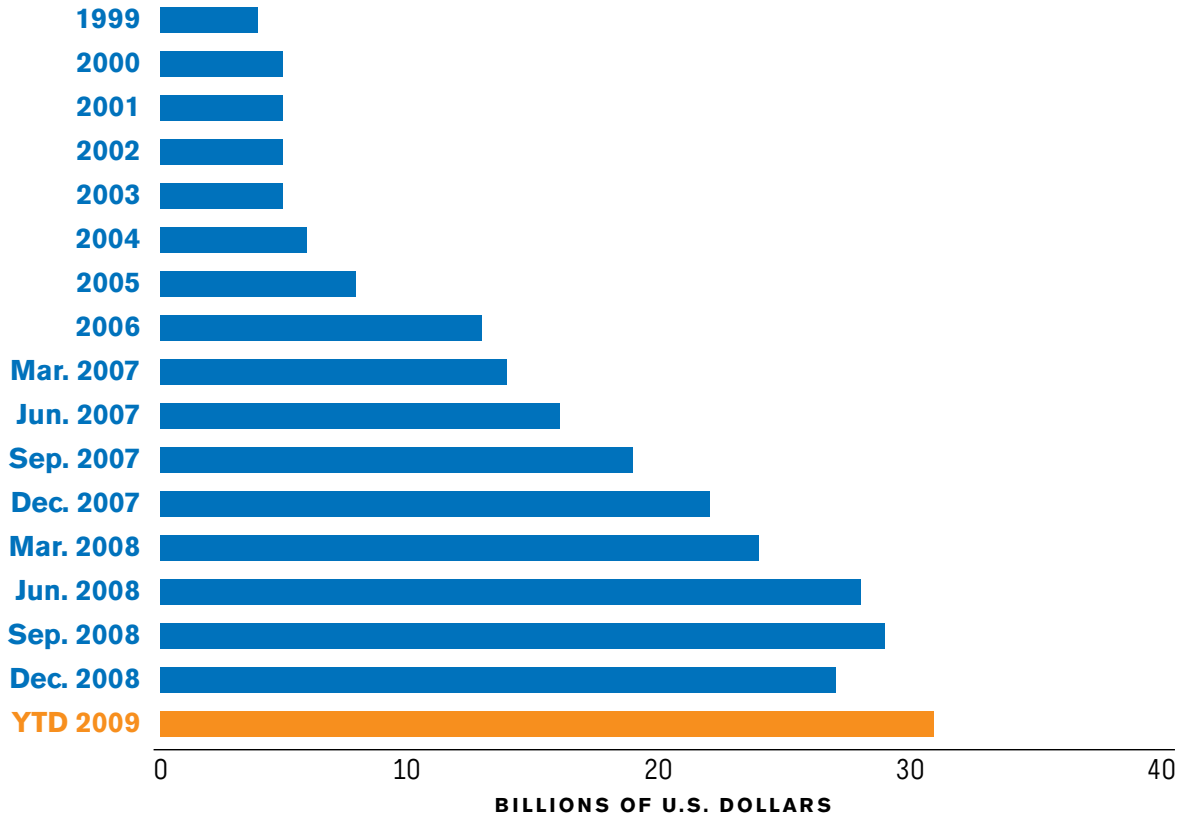


Between 2004 and 2008, fund managers at Brazilian venture capital and private equity firms have increased the number of small and medium-sized enterprises in their portfolios by 17 percent each year (see Figure 12). This represents a positive trend for entrepreneurs—as many small and medium-sized firms are created by entrepreneurs. Combining this trend with the growth in private equity and venture capital money in innovation-driven industries, there will likely be robust funding for innovative SMEs over the coming year—and entrepreneurs would benefit as a result.[12]

To overcome this fear, policies, incentives and diverse funding structures can play a positive role, but a mentor or advisor can play an even stronger role. The Innovation Learning Laboratory in Silicon Valley hosted by Wilson Sonsini Goodrich & Rosati—a Palo Alto-based law firm that counsels startup firms—is an example of this type of mentor. **Marc Gottschalk**, a partner with the clean tech practice at Wilson Sonsini, explained how they work to connect their clients—the entrepreneurs and innovators—with their networks and establish relationships to get the companies off the ground. In addition, they provide incentives like waiving legal fees for entrepreneurs, encouraging them to take risks.

12 Presentation by Dr. Claudio Furtado, Getúlio Vargas Foundation

Figure 11: Committed Capital Allocated to Brazil Through Private Equity and Venture Capital
Source: Presentation by Dr. Claudio Furtado, Getúlio Vargas Foundation



Hamilton Moss de Souza
Director of Energy Development, Brazilian Ministry of Mines and Energy

While venture capital and private equity investments have risen in Brazil, a fear of failure still persists as a major deterrent to risk-taking. Brazilians have difficulty with the concept of "tolerance with error." While Americans see a great opportunity with a small problem, Brazilians just see the problem. We have to learn by making errors. And the implications of failing are felt by young entrepreneurs willing to take risks at every stage of the idea-to-market process.

Ideas from Breakouts: Opportunities in Energy Efficiency and Renewable Energy Technologies

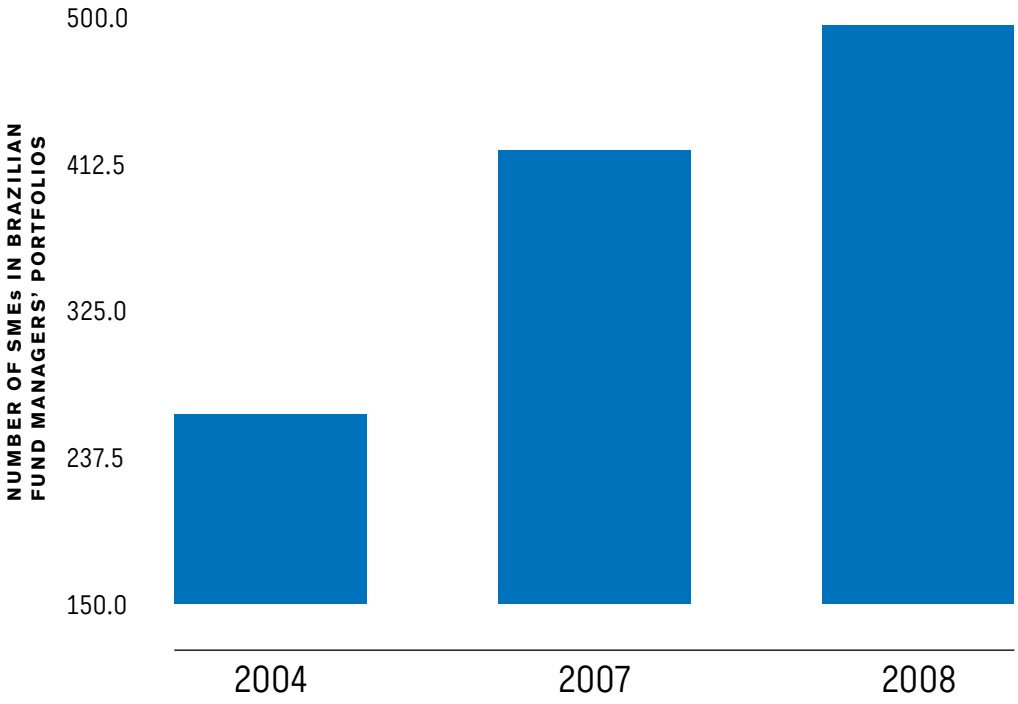
Innovation Learning Lab participants in São Paulo and Silicon Valley broke into moderated, sector-focused discussion groups to identify tangible projects and partnerships across both countries that could optimize entrepreneurial activity and investment around energy opportunities and challenges.

Each discussion group addressed the following questions:

Assess the current environment

- What policies are in place—at the local, regional and national levels—that support entrepreneurship?

Figure 12: Brazilian Fund Managers' Investments in Small and Medium-Sized Enterprises (SMEs)
Source: Presentation by Dr. Claudio Furtado, Getúlio Vargas Foundation



- What top three priorities are needed to enable greater entrepreneurial activity?
- How are viable projects and investments currently funded—what are the successful private and public funding models?
- What is the status of seed and venture funding? Are there funding gaps (valley of death)?
- What are the barriers to creating a thriving venture capital investment environment in this field?

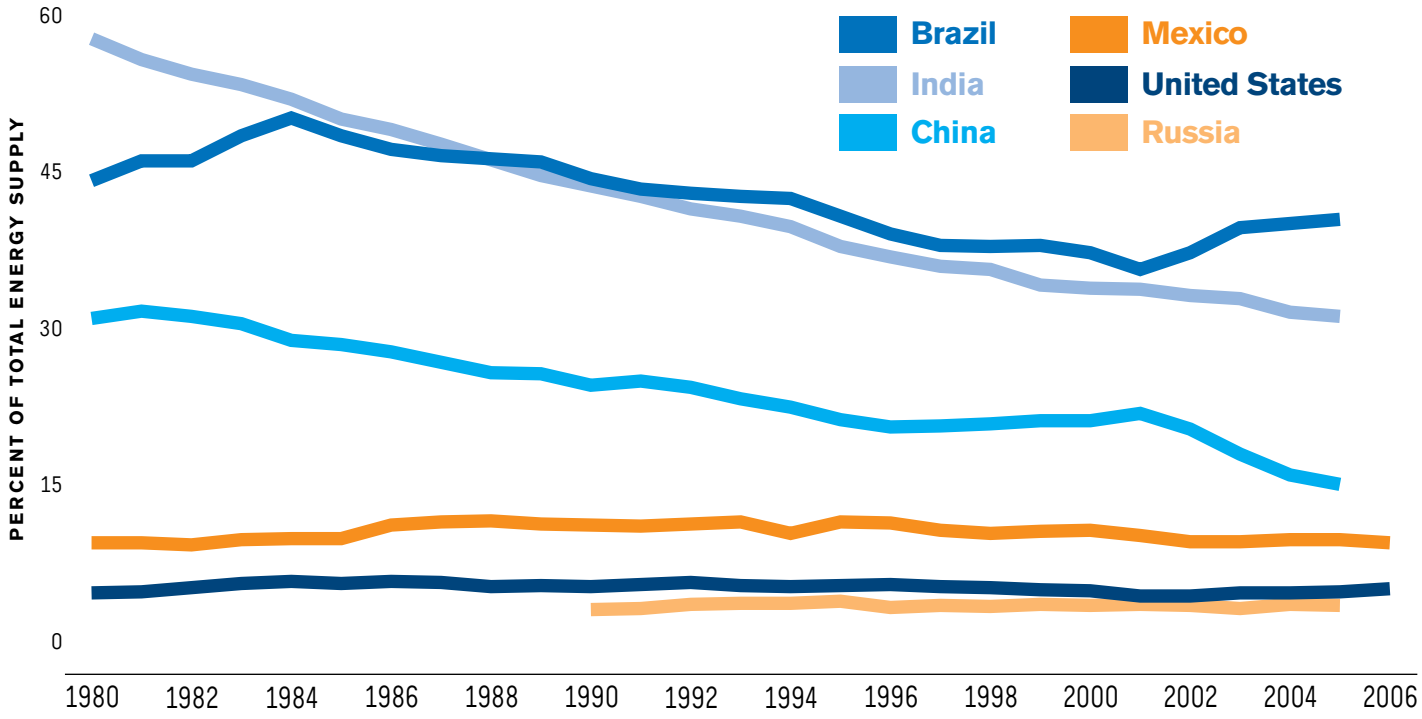
Share best practices

- What are the best practices in (as well as challenges to) promoting knowledge and technology transfer? Driving entrepreneurial activity? Attracting investment?
- Are there successful models—in the United States and Brazil—that can be scaled and replicated in either country?

A concrete opportunity for cross-border collaboration to drive technology transfer, risk-taking and entrepreneurship in energy efficiency and renewable energy technologies arose from these breakout sessions in São Paulo and Silicon Valley. Energy efficiency and renewable energy provides an ideal space where Brazilian and U.S. companies, universities and laboratories can collaborate to improve prosperity for both countries.

Janio Itiro Akamatsu, director of technology for Eletrobrás, noted in São Paulo that Brazil has a strong energy infrastructure, leading BRICM (Brazil, Russia, India, China and Mexico) countries in

Figure 13: Contribution of Renewables to Energy Supply, 1980-2006
Source: OECD



contributions of renewables to energy supply (see Figure 13). Through aggressive policies, like requiring vehicles to run on fuel that is at least 20 percent ethanol,[13] Brazil contributes more renewables to its total energy supply than any other BRICM country—and this lead has been growing since 2003. At the end of 2006, renewable sources of energy accounted for more than 40 percent of Brazil's total energy supply. In the United States, for comparison, renewable sources of account for less than 10 percent of the total energy supply.

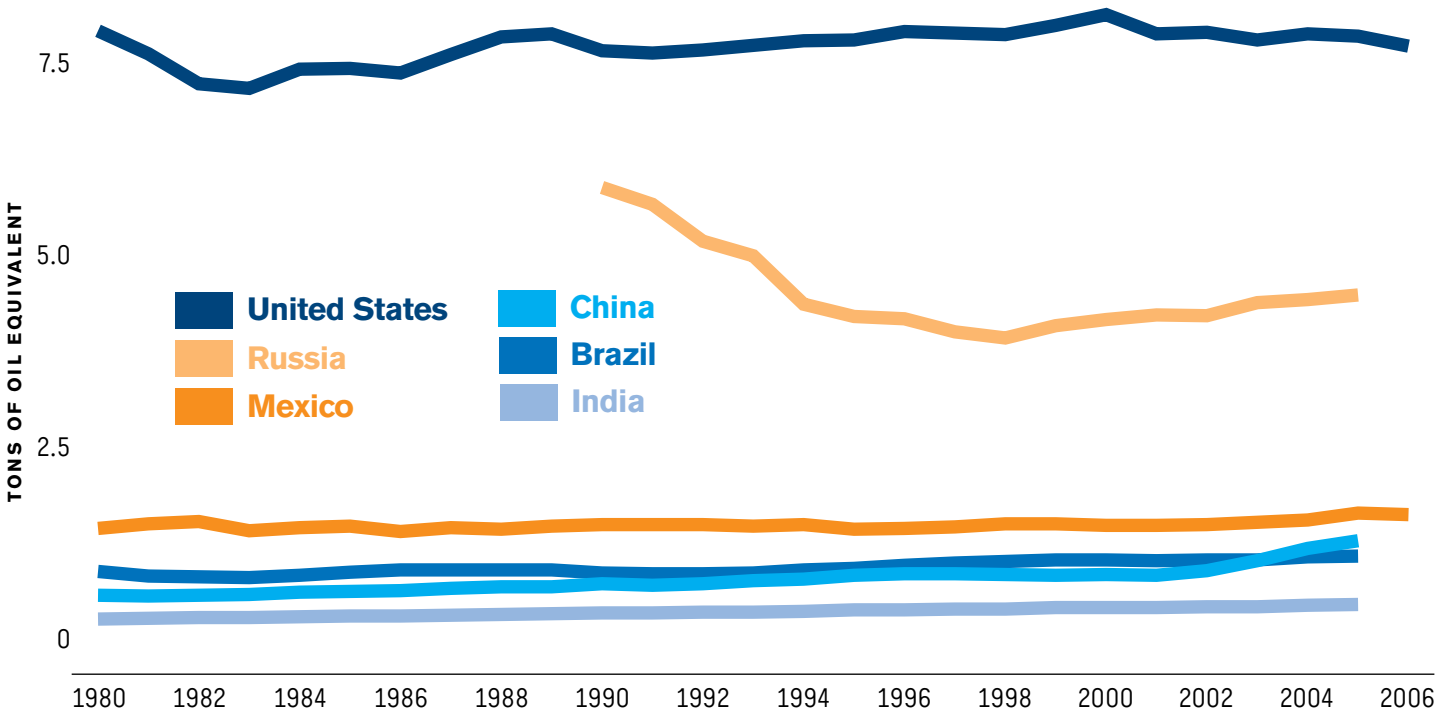
John Lushetsky, acting deputy assistant secretary for energy efficiency with the U.S. Department of Energy, noted that Brazil will likely benefit from this strong position, not only as a means of insulation from global oil market shocks but also through increased recognition as a world leader in renewable and alternative energy use—which could bring in significant research and capital investment from abroad.

He added that many opportunities exist for the United States to partner with leading Brazilian universities, laboratories and companies to share not only technology advances but also best practices in creating the enabling conditions for developing and implementing energy efficiency and renewable energy technologies.

Research that the Council on Competitiveness conducted in 2009 showed that Brazilians currently have a lower supply of energy per capita than all other BRICM countries except India (see Figure 14).

13 Ethanol, Climate Protection, Oil Reduction, Issue XII, 19 January 2001

Figure 14: Total Primary Energy Supply Per Capita, 1980-2006
Source: OECD



Brazilians have, on average each year, a supply of energy equal to approximately one ton of oil, which is similar to other BRICM countries except Russia, whose citizens have more than 4 times as much energy per capita. For comparison, the United States' supply of energy, measured on a per capita basis, hovers just under 8 tons of oil equivalent each year per person. This is almost eight times the amount the average Brazilian has over the course of a year, and nearly twice as much as the average Russian.

But participants in São Paulo and Silicon Valley agreed that energy competitiveness in the 21st century will not rest solely on oil. On the contrary, opportunities for gaining a competitive advantage globally will likely emerge not from fossil fuel production and consumption but from energy efficiency and renewable energy technologies.

John Lushetsky, U.S. Department of Energy

Pablo Ibañez
Director of Operations for Brazil, CH2M HILL

The public sector cannot be the sole player in promoting energy efficiency through cash rebates or tax structure. Indeed, more incentives for consumers to purchase technologies that improve energy efficiency, and to building—and building material—manufacturers will lead to a stronger market for energy efficiency technologies. But private sector funding for these projects must accompany government funds.

The breakout groups in São Paulo underscored that a culture of waste, in both the United States and Brazil, persists and hinders not only the creation of new, clean technologies but also the adoption of these new technologies. The key is to reverse the cultural view that production and consumption processes do not have negative environmental externalities. One near-term way to address this problem, as suggested by participants in São Paulo, is to use programs like the World Cup's "Green Goal 2014" to gain momentum for and market green building and other energy efficient technologies.

In Brazil, according to one participant, 42 percent of the electricity is used for commercial purposes. Retrofitting industrial buildings alone could conserve up to 40 percent of energy each year. In addition, São Paulo participants noted that government programs like Energy Star and others that incentivize the use of more efficient in-home appliances and electronics have seen a considerable amount of success in both countries in making buildings more efficient. But these programs must continually be evaluated and improved to remain competitive on a global scale. This requires near-constant reorganization and streamlining of official seals of approval for quality and energy efficiency.

The day following the Innovation Learning Laboratory in Silicon Valley, participants visited Serious Materials—a manufacturer of sustainable green building materials.

Next Steps: Featured Cross-Border Collaborations

Our challenge is great—remaining competitive in a rapidly developing and changing global playing field is not easy. But the tools to compete already exist. By strengthening the entrepreneurship profile and improving technology transfer capabilities, the United States and Brazil can emerge as hemispheric models of excellence and global leaders in innovation.

The learning laboratories in São Paulo and Silicon Valley laid forth the foundation for ground-breaking partnerships and new ways to promote entrepreneurship and technology transfer. Two cross-border, collaborative projects—focused on co-incubation

Spotlight: Serious Materials

Kevin Surace
President and CEO, Serious Materials

The built environment—houses, offices, apartment buildings—accounts for significantly more of the world's greenhouse gas emissions than emissions from cars and trucks. According to research conducted by Serious Materials, the built environment is responsible for 52 percent of greenhouse gas emissions worldwide, while cars and light trucks account for just 9 percent of emissions. Because of this, and coupled with a growing consciousness of climate change, new technologies and innovations enter the market almost daily to enhance a building's "greenness."

Serious Materials develops and manufactures sustainable green building materials that dramatically reduce the impact of the built environment on the climate. The world today produces more than 30 billion tons of greenhouse gas emissions per year. The 2015 U.S. auto emissions targets could save 500 million tons, but over the lifetime of all the cars and light trucks produced from 2011 to 2015. We aim, as a company, to save one billion tons, every year, as our contribution.

And by manufacturing our products in the United States, we are creating jobs at all four of our locations: Sunnyvale, Calif.; Newark, Calif.; Boulder, Colo.; and Vandergrift, Penn. We are driving to create thousands of green collar jobs here in the United States.

Opportunities to create similar success stories exist in Brazil. For example, in many parts of Brazil, solar panels can play a key role in reducing the carbon footprint of a structure, especially when alleviating peak energy needs. And through robust funding of entrepreneurial activity, the Brazilian public and private sectors can jumpstart companies like Serious Materials to create jobs, drive innovation and cut carbon emissions.

and creating a Cleantech Open in Brazil—emerged directly from the Innovation Learning Laboratories in São Paulo and Silicon Valley:

U.S.-Brazil Co-Incubation Collaboration

Leads

- **Julia Rosen**, Arizona State University—SkySong
- **Ary Plonski**, ANPROTEC

Goal: Create U.S.-Brazil Collaboration Among Incubators To Spur Entrepreneurship

Incubators in the United States and Brazil are hemispheric leaders in fostering entrepreneurship and innovation. From clean technology companies to biotech firms, U.S. and Brazilian incubators help startups take their technologies to the market, create jobs and drive national prosperity.

Incubators often play the role of business engineers, as well as bridges across the valley of death, key players in technology transfer and enablers of entrepreneurial activity across a wide array of sectors. The United States has much to learn from Brazil in best practices for incubation, innovative investment and revenue sharing models. But both nations need to work together to establish a network of incubators to spur entrepreneurial activity not just in the United States and Brazil, but in the hemisphere and beyond.

The U.S.-Brazil Co-Incubation Collaboration, a cross-border initiative between U.S. and Brazilian incubators, will highlight best practices, share networks of investors and entrepreneurs, and open a pipeline of innovative—and marketable—ideas between the United States and Brazil.

Cleantech Open Brazil

Leads

- **Ricardo Felizzola**, Federation of Industries of the State of Rio Grande do Sul (FIERGS)
- **Marc Gottschalk**, Wilson Sonsini Goodrich & Rosati

Goal: Host a Cleantech Open in Brazil

Cleantech Open is an organization of leading entrepreneurs, academics, investors and companies in California, Colorado and other northwest U.S. states, working together to accelerate the development of clean technology startups.

Cleantech Open Brazil would provide resources, education and support for clean tech entrepreneurs. Activities might include an annual business competition, mentoring, sustainability workshops, a series of public symposia and a resource directory.

Any inventor, technologist or clean tech enthusiast in Brazil with a great clean tech idea will be invited to submit an executive summary of his or her idea. After rounds of judging, finalists and winners would receive a “Startup-in-a-Box” package of cash and services, donated by high-profile sponsors. Packages could include cash, office space, legal services, accounting, insurance, public relations, recruiting, software and other business essentials.

SÃO PAULO / SILICON VALLEY

Learning Laboratory 3: São Paulo
Key Activities and Strategic Visits

Monday, July 13, 2009

Meetings and Workshops at the Getúlio Vargas Foundation
2:00–6:00 p.m.

Host: **Claudio Furtado**, Director, Getúlio Vargas Foundation Research Center for Venture Capital and Private Equity

Location: Getúlio Vargas Foundation

Brazilian and U.S. leaders from the public and private sectors and academia convened to lay the groundwork for emerging cross-border collaboration projects. John Lushetsky, acting deputy assistant aecretary for energy efficency at the U.S. Department of Energy (DOE), led a key discussion on initiatives to promote energy efficiency. He offered Brazilian firms and organizations the opportunity to learn about the new Save Energy Now program and engage with senior leadership from the DOE to learn how they can also participate and benefit.

Innovation Learning Laboratory Dinner
8:00–10:00 p.m.

Hosts: **Reginaldo Arcuri**, President, ABDI; and **Claudio Gastal**, President, MBC

Keynote: U.S. Ambassador to Brazil **Clifford Sobel**

Location: Restaurant Cantaloup

ABDI and MBC hosted Innovation Learning Laboratory participants and other leaders for an opening dinner, keynoted by Ambassador Clifford Sobel.

Tuesday, July 14, 2009

U.S.-Brazil Innovation Learning Laboratory 3
9:00 a.m.–5:30 p.m.

Host: **Maria Tereza Fleury**, Director, School of Business and Administration, Getúlio Vargas Foundation

Location: Getúlio Vargas Foundation

Brazilian and U.S. leaders from the public and private sectors and academia convened for the 3rd U.S.-Brazil Innovation Learning Laboratory focused on moving ideas out of the laboratory and into the marketplace.

Wednesday, July 15, 2009

Meeting with UNICA
9:00 a.m.–5:30 p.m.

Host: **Marcos Sawaya Jank**, President, UNICA

Location: UNICA Headquarters

Participants in the 3rd U.S.-Brazil Innovation Learning Laboratory met with the leadership of UNICA—Brazil's national sugarcane industry association—to discuss cutting-edge research in and the commercialization of biofuel technologies, as well as exploring possible cross-border partnerships.

SÃO PAULO / SILICON VALLEY

Learning Laboratory 4: Silicon Valley
Key Activities and Strategic Visits

Wednesday, August 5, 2009

California Cleantech Open Lunch Meeting
12:30–2:00 p.m.

Host: **Marc Gottschalk**, Partner—Clean Tech Practice, Wilson Sonsini Goodrich & Rosati

Location: Wilson Sonsini Goodrich & Rosati

Wilson Sonsini hosted participants in the 4th U.S.-Brazil Innovation Learning Laboratory at their headquarters to explore ways to create a Cleantech Open in Brazil.

Strategic Site Visit to Serious Materials
3:00–5:00 p.m.

Host: **Kevin Surace**, President and CEO, Serious Materials

Location: Serious Materials Headquarters

Kevin Surace hosted participants in the 4th U.S.-Brazil Innovation Learning Laboratory at the headquarters of Serious Materials—a success story of private sector investment in cutting-edge research leading to breakthrough technologies, business development, and ultimately job creation and high-value economic activity.

Innovation Learning Laboratory Dinner
7:00–9:30 p.m.

Host: **Brian Goncher**, Clean Tech Investor Manager, Deloitte & Touche, LLP

Location: The Straits Cafe, Palo Alto

Deloitte & Touche in San Jose, represented by Brian Goncher, Clean Tech investor manager, hosted Silicon Valley Learning Laboratory participants at the Straits Cafe for an opening dinner on the eve of the Learning Laboratory.

Thursday, August 6, 2009

U.S.-Brazil Innovation Learning Laboratory 4
8:45 a.m.–5:00 p.m.

Host: **Marc Gottschalk**, Partner–Clean Tech Practice, Wilson Sonsini Goodrich & Rosati

Location: Wilson Sonsini Goodrich & Rosati

Wilson Sonsini hosted at their headquarters the 4th U.S.-Brazil Innovation Learning Laboratory, which brought together leaders from the public and private sectors, academia and national laboratories at their headquarters to explore how to take ideas out of the lab and into the marketplace.

Sidebar Conversation with Commissioner Dian Grueneich
5:00–5:30 p.m.

Location: Wilson Sonsini Goodrich & Rosati

The Council on Competitiveness was honored to have Dian Grueneich, Commissioner of the California Public Utilities Commission, meet with Innovation Learning Laboratory participants for a candid, roundtable discussion on the role utilities can play in spurring technology development. She discussed with Brazilian and U.S. participants areas where U.S. utilities can collaborate with Brazilian utilities, universities and companies to form high-value partnerships.

Innovation Learning Laboratory Closing Reception
5:30–7:00 p.m.

Hosts: **Erik Stenehjem**, Director–Industrial Partnerships Office, Lawrence Livermore National Laboratory; and **Marc Gottschalk**, Partner–Clean Tech Practice, Wilson Sonsini Goodrich & Rosati

Location: Wilson Sonsini Goodrich & Rosati Courtyard

Following the U.S.-Brazil Innovation Learning Laboratory, participants met in the Wilson Sonsini Goodrich & Rosati courtyard for the official closing reception.

Friday, August 7, 2009

Strategic Site Visit, Lunch and Roundtable Discussion with the San Jose BioCenter
12:00–2:00 p.m.

Host: **Melinda Richter**, Executive Director, Environmental Business Cluster and San Jose BioCenter

Location: San Jose BioCenter

Silicon Valley Innovation Learning Laboratory participants met with the San Jose BioCenter leadership for a VIP tour of the facilities and a roundtable discussion over lunch to highlight the powerful role that incubators can have in helping to move ideas from the lab into the marketplace.

VIP Tour of Applied Materials, Inc.
2:30–4:00 p.m.

Host: **Mark Pinto**, Senior Vice President, General Manager of Energy and Environmental Solutions and Display, and Chief Technology Officer, Applied Materials, Inc.

Location: Applied Materials headquarters

Applied Materials representatives led Silicon Valley Learning Laboratory participants on a VIP tour of the manufacturing facility to learn about how the company leverages its technology from its display business to develop its SunFab thin film production line. The tour also included a visit to the Apps Lab where the company conducts R&D activities for its display and thin film solar products.

Saturday, August 8, 2009

VIP Behind-the-Scenes Tour of the California Academy of Sciences
10:00 a.m.–12:00 p.m.

Host: **Scott Moran**, Senior Project Manager, Greening of Building Design and Construction, California Academy of Sciences

Location: The California Academy of Sciences

Scott Moran led Innovation Learning Laboratory participants on a behind-the-scenes tour of the California Academy of Sciences new green building—one of the greenest buildings in the United States—to showcase the technologies and design innovations that investment in energy efficiency and renewable energy can create.

SÃO PAULO / SILICON VALLEY

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U.S.-Brazil Innovation Learning Laboratories

Rio de Janeiro / Golden

Rio de Janeiro
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Golden, Colo.
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RIO DE JANEIRO / GOLDEN

Leveraging Innovation Capacity to Drive Competitiveness and Prosperity

Prosperity—including job creation and the formation of new firms and industries—depends upon the ramp up of manufacturing and production capabilities, as well as the workforce and economic development strategies that regions develop to leverage resources and competencies.

The Rio de Janeiro and Golden, Colo., Innovation Learning Laboratories addressed several questions—the answers to which lie at the heart of prosperity:

- How do the United States and Brazil begin to design and implement a new foundation for high-performance production?
- What are the new human, organizational, financial and policy models needed for a robust manufacturing future in the United States and Brazil?
- What are the benchmarks for success in regional economic development?

RIO DE JANEIRO / GOLDEN

Executive Summary

Climate change, energy insecurity, economic crisis and rapidly shifting social demographics are issues that now confront both the United States and countries throughout the world. This is an age of ever-accelerating change, where the old rules do not necessarily apply and people must think outside the box to generate new solutions in real time to the world's most pressing issues. In an increasingly globalized world, countries are neither alone in the challenges they face, nor should they seek resolutions as isolated nations. It is rather by cross-border collaboration that answers will be found through sharing knowledge and experience and establishing partnerships to work toward solutions together.

It is in this spirit of collaboration that the Council on Competitiveness, The Brazilian Agency for Industrial Development (ABDI) and the Brazilian Competitiveness Movement (MBC), in partnership with the U.S. Department of Energy and the National Renewable Energy Laboratory, launched the U.S.-Brazil Innovation Learning Laboratory series. The Learning Laboratories were designed to engage thought leaders and innovators from across the public and private sectors and academia to share best practices and experiences, spark partnerships and explore pathways to resolving some of both nations' current challenges.

Theme 3, which was explored at the Innovation Learning Laboratories held in Rio de Janeiro, Brazil and Golden, Colo., asked participants to look at the innovation environment in their countries and investigate possible responses to issues involving workforce deployment, manufacturing in the 21st century and regional development of innovation hotspots.

Enabling Environment for Innovation, Competitiveness and Prosperity

The Learning Laboratory in Rio de Janeiro kicked off by exploring what is the ideal legal, regulatory and financial environment for innovation, and making an assessment of the current environment in the United States and Brazil. Discussants then examined the strengths of each country's innovation structure that could be shared, and challenges that must be addressed to improve competitiveness.

Workforce Deployment and Economic Development

Moving out from the enabling environment, participants then shared best practices and explored innovative ideas for ways in which organizations can hire, train, retain and deploy a skilled and flexible workforce in a competitive and ever-changing global marketplace. This included looking at the role played by technologies, networking and infrastructure models, and how advances in energy efficiency and clean tech can lead to economic benefits and job creation.

21st Century Manufacturing

In Golden, participants examined how companies and regions leverage innovation assets (from fundamental research to entrepreneurial ventures) to create and deploy new manufacturing capacity in the United States and Brazil. The dialogue highlighted growing opportunities in both the United States and Brazil for green industry and examined ways to develop an energy efficiency program with major Brazilian manufacturing companies in order to reduce industrial energy intensity and identify key opportunities for savings.

Innovation Hotspots and Regional Development in the United States and Brazil

Discussants from regional hotspots in Brazil and the United States shared the development history and current trends in their regions and explored leadership strategies, best practices and tools that can help regional leaders better leverage assets within a regional innovation ecosystem to create Regional Innovation Hotspots.

Partnerships, Collaboration and Presentations

Throughout the Learning Laboratory series, participants sought the application of dialogue findings through the development and advancement of several cross-border collaborations, including the U.S. Department of Energy's Energy Efficiency Program and the National Renewable Energy Assessment (which are further described in this report); the Smart Grid Collaboration Initiative birthed in the Porto Alegre Innovation Learning Laboratory; the U.S.-Brazil Co-Incubation concept launched in the São Paulo and Silicon Valley Innovation Learning Laboratory; and the Cleantech Open Brazil concept surfaced in the Silicon Valley Innovation Learning Laboratory. **Helena Chum**, NREL research fellow at the National Renewable Energy Laboratory, and **Paulo Freire**, vice president of Johnson Controls Brazil, also contributed further understanding of the renewable energy and energy efficiency landscape with special presentations on their cross-country initiatives.

RIO DE JANEIRO / GOLDEN

Highlights from Rio de Janeiro and Golden

The Legal, Regulatory and Financial Environment for Innovation, Competitiveness and Prosperity

Focus Question

- What are the characteristics of a legal and regulatory environment that are favorable to business development?

A nation's capacity for innovation and prosperity stems directly from the soil in which its businesses seeds are sown. Intellectual property protection, availability of seed funds and flexible business regulations are vital to the health of a strong innovation environment. Legal entities protect investment in other countries, and through this legal protection, investment in innovation is freer flowing, explained **Alexandre Couto**, partner at Barbosa, Müssmich & Aragão Attorneys at the Lab in Rio de Janeiro. A relatively strong and stable stock market makes Brazil a strong place for investment. Today, money is displaced much more rapidly, and Brazil attempts to treat its innovators well in order to attract investment. The legal and regulatory environment in Brazil is transparent, and the strong stock market is a sign of this.

Since 2001, the United States has ranked at or near the top of the Global Competitiveness Index Rankings, propelled by strong innovation and a friendly business environment. During the same time period, Brazil's competitiveness ranking has risen to among the top in Latin America, and has surpassed Russia and Mexico among BRICM countries.

Ted Rogers, managing partner at PPI Ventures, added that Brazil is doing a number of things right. Their incubators are quite strong and often more effective than those in the United States. FINEP is a driving force in innovation through their work with seed funds. Meanwhile, the United States is facing several problems, where commercializing technology can be quite tough and plaintiff attorneys can be anti-business.

The next decade may well be Brazil's decade—it is a commodity rich country in a time of commodity scarcity. However, they still need to overcome some disincentives for entrepreneurs in Brazil to truly capitalize on opportunities. Among these issues is the exaggerated expense of hiring employees, which often leads to the hiring of independent contractors instead. It costs 60-80 percent of salary expenses to pay benefits and incentives. Brazil's regulations for

Deborah L. Wince-Smith, Council on Competitiveness

A Time Ripe with Opportunity

Deborah L. Wince-Smith, president of the Council on Competitiveness, emphasized the importance in responding to our current environment, pointing out that: "Everyone is competing for everything, every minute, all over the world. This is an opportune moment—kairos—for seizing possibilities, and we must do this through change, through leadership and through relationships."

starting and closing businesses are also not as flexible as in United States. Intellectual property protection is lacking in Brazil, while IP protection is written into the U.S. constitution. This is a major obstacle, because why innovate if money can not be made off of a new technology? **Marcos Vinicius de Souza** of the Brazilian Ministry of Industry, Development and Foreign Trade asserted that Brazil is getting very serious about addressing IP issues, but it is still an evolving situation. New arrests are made each year to cut down on piracy, and several hundred new patent inspectors have been hired to expedite the process, which used to take six to seven years. Brazil hopes to become a member of the Madrid Protocol next year.

Ricardo Felizzola, FIERGS

Dennis Maia, Choice Energy Intelligence

Snapshots from the Dialogue

The right environment requires a positive and open mindset…

Ricardo Felizzola, FIERGS
There is a different cultural approach between Brazil and the United States. In Brazil, the center of innovation is the Ministry of Science and Technology, while in the United States, it is the entrepreneur. In Brazil, people do not think that the common citizen is an entrepreneur. Brazil needs this mindset, though. Brazil needs to focus on the entrepreneur—on the person behind the idea. In Brazil, heroes are people in times of war who destroy things. In the United States, heroes (with some exceptions) are people who create things.

Monica Cordeiro, CEMIG
Too often when we talk about doing business we focus on problems—we really need to focus on concrete opportunities. There is a favorable environment—we are all here…around the table…and the smart grid demonstration project is an example of a clear opportunity. We need to bring in legal and regulatory environment people, who need to give to the project answers/opportunities, not problems or roadblocks. Brazil is more capitalistic than mercantilist. Let's build the demonstration project boldly, and we cannot wait for all of the money to come upfront.

Dennis Maia, Choice Energy Intelligence
We should not just discuss obstacles, we should talk about opportunities. Choice is working with IBM to leverage our tech in India. Brazil has a unique grid system, interconnected with the continent, not just by country. We should incentivize R&D collaboration between U.S. and Brazilian companies. For software, you do not need much to get started, but for solar, wind, hydro—initial investment is huge. Forty-six percent of Brazil is using renewable energy, and the country is moving rapidly forward in other renewable sources, like biomass, and partnering with Europe. We currently have 441 bids for new renewable energy projects which will provide 13 gigawatts of power; 7 gigawatts have been installed in Brazil already.

And financial support…

Claudio Furtado, GVcepe
The venture capital industry in 2008-2009 invested $11 billion. Venture capital in Brazil is more focused on large-scale business expansion, and more than 40 percent of venture capital deals in Brazil are more than $25 million. Only 6 percent of the money is at the seed stage, but they account for 40 percent of transactions. The number of managing firms has grown from 65 to 135 in the last three years. This means that the cultural difference between Brazil and the United States vis-à-vis entrepreneurship is being addressed.

Patrícia Freitas, FINEP
FINEP has created an angel network model you cannot find in many other countries. They have 50 investors that they would not have had it not been for the seed program. We also sponsor a national program for entrepreneurship—you cannot teach entrepreneurship, but people can learn the skills.

National Renewable Energy Laboratory

Presentation Spotlight: U.S.-Brazil MOU to Advance Cooperation on Biofuels

Helena Chum
NREL Research Fellow
National Renewable Energy Laboratory

Helena Chum shared her experience in leading a long-term, joint project between the United States and Brazil to advance multilateral cooperation on biofuel research and production. The project commenced in March 2007 with the U.S. Secretary of State and the Brazilian Foreign Minister signing a Memorandum of Understanding designed to facilitate greater comprehension of available land resources for biofuel production.

Since 2007, the project has actively engaged in a number of activities, including:

- Publishing a white paper on Internationally Compatible Biofuel Standards;
- Multiple meetings, facilitated by UNICA, between U.S. and Brazilian biofuels and sugarcane ethanol producers;
- U.S.-Brazil Higher Education Council sponsorship of short courses for Fulbrights scholars in São Paulo;
- A Brazilian delegation visit to NREL; and
- A U.S. delegation visit to Brazilian biofuels facilities.

The initiative first worked for a bilateral advancement of R&D of next generation biofuel technology, which was then expanded to a select group of third party countries. Efforts are now focused on expanding the biofuels marketplace through cooperation on establishing codes and standards, on the development of an International Biofuels Forum (IBF) to facilitate multilateral activities and on creating a Global Bioenergy Partnership.

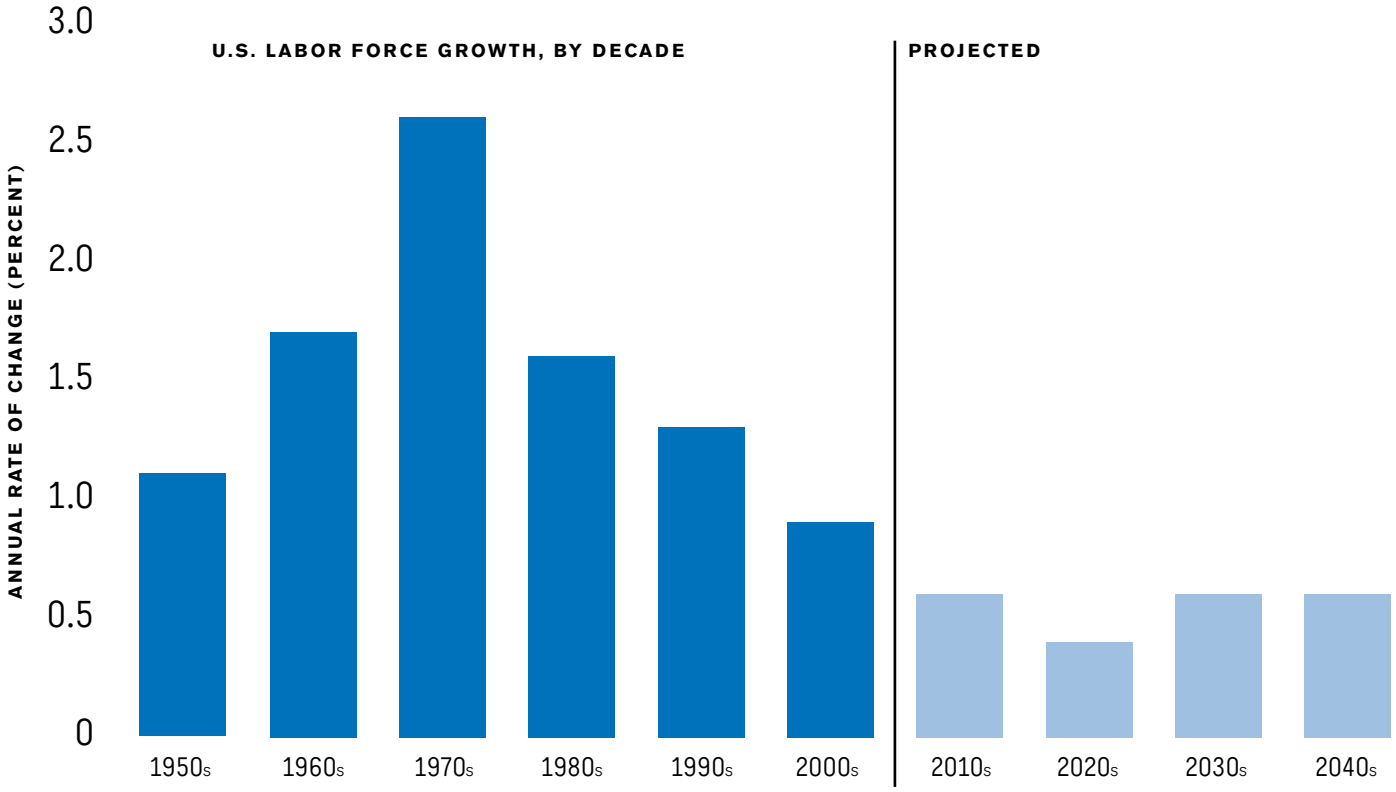
Workforce Deployment and Economic Development

Focus Questions

- How do organizations hire, train, retain and deploy a skilled and flexible workforce in a competitive and ever-changing global marketplace?
- What technologies, networking and infrastructure models and approaches can organizations employ in order to develop a more efficient and sustainable workforce deployment?
- How do organizations combine best practices in innovation-intensive fields, such as energy efficiency and clean tech, with meaningful economic benefits and job creation?

Both the United States and Brazil face workforce challenges that, depending on the manner in which they are answered, will have far-reaching effects on both nations' prosperity and innovation capacity. Rising unemployment rates, the looming retirement of baby boomers, a shortage of middle-skills workers and the need for re-training and additional education to keep up with technology are all issues that the United States is now facing. While Brazil has not felt the effects of the economic crisis as severely, it is dealing with its own mounting educational and deployment needs as the nation hurries to support its growing economy with a skilled workforce.

Figure 15: Slowing Workforce Growth Could Impeded Economic Growth
Source: U.S. Bureau of Labor Statistics, *Monthly Labor Review*, 2007



Changing Economies, Changing Workforce Needs

The current economic crisis has delivered a strong blow to the U.S. economy and has sent unemployment rates sky-rocketing. U.S. unemployment rates hit 10.2 percent in November 2009—the highest rate in 26 years.[14] However, the Brazilian workforce has not been similarly affected by the economic crisis, as the Brazilian unemployment rate has continued its steady decline since 2004. The rate fell further to 8.1 percent in June as signs that the Brazilian economy was recovering prompted companies to rehire workers.[15]

Looking forward, each country faces unique workforce challenges based on changing demographics. In the United States, both workforce growth and higher education rates are slowing while competition from skilled workers around the word and the off-shoring of manufacturing and services are increasing.[16]

During the second half of the 20th century, the baby boom generation and the large-scale entry of women into the workplace helped propel economic growth through a steady increase in the strength of the workforce. However, during the next decade, workforce growth will drop to 0.5 percent (see Figure 15).[17] Fewer workers will mean that those entering the workforce need to be more productive in order to maintain economic growth. This, combined with the increase in overseas competition, places a higher emphasis on developing an educated and skilled workforce.

On the opposite end of the spectrum, Brazil's working age population is rapidly increasing, meaning both more man power for the workforce, but also additional competition for jobs. Brazil will benefit from a 20 percent increase in the working age population between 2005 and 2025.[18]

Green Industries Driving Job Creation and Economic Growth

The last decade has seen a growth in green industry and the jobs it creates. As this trend continues, as many as one in four workers in the United States will be working in renewable energy or energy efficiency industries by 2030. The 40 million jobs are not just engineering related, but also include millions of new jobs in manufacturing, construction, accounting and management.[19]

Today, in the midst of an economic crisis of historic dimensions, the U.S. government is taking a closer look at energy research and the opportunities it offers for economic recovery and for laying the foundations for future prosperity for the nation. President Barack Obama has said his administration's plans to invest heavily in energy research during hard times

Figure 16: U.S. Stimulus Bill Funding for 2009-2019

Source: American Recovery and Reinvestment Act of 2009

Total Stimulus Spending	$575,000,000,000
Total Research Spending	$35,200,000,000
Total Energy Research Spending	$17,100,000,000
Renewable Energy R&D Spending	$700,000,000

14 U.S. Bureau of Labor Statistics

15 IBGE (Instituto Brasileiro de Geografia e Estadística)

16 *Thrive: The Skills Imperative*, The Council on Competitiveness, 2008

17 U.S. Bureau of Labor Statistics

18 DBResearch, Deutsche Bank, 2008

19 EESI Factsheet, 2008

Dan Arvizu, National Renewable Energy Laboratory

NREL and Green Jobs

Dan Arvizu, director of the National Renewable Energy Laboratory and host of the Golden, Colo., Innovation Learning Laboratory, is at the forefront of turning stimulus dollars into renewable energy-based jobs. He noted that: "$38 billion has been allocated to NREL in the last few months through the stimulus package. This as a down payment on future investment—moving forward, this R&D will have a positive impact on the marketplace. We are now looking at job creation and economic development that can grow out of renewable energy investment."

will create the kinds of jobs and technology the United States needs to survive economically (see Figure 16).[20]

The renewables sector provides more jobs per USD and megawatt than conventional energy, and globally at least 2.3 million people worldwide were working in renewables in 2007. Brazil employs more people in the renewables sector than the United States, with 500,000 and 406,600, respectively.[21] This investment will ensure a steady flow of highly-skilled, highly-paid local jobs.[22]

There are already programs in motion to increase these numbers. For example, in Brazil the U.S. Agency for International Development sponsored a program to train students from the poorest neighborhoods in building renewable energy capacity. The program has been a huge success—more than 60 percent of the graduates from the eight-month program now have jobs or are attending university full-time, and rural communities are benefiting from the new access to electricity.[23]

Partners in the Field

Several organizations represented at the Rio de Janeiro and Golden Innovation Learning Laboratories —like NREL, FINEP and CAEL—are working with industries in both the United States and Brazil to identify and map these skills needs and find the funding and support to back solutions.

A startup venture is based on ownership and is built around a core team. For the investor, the No. 1 thing is the team, the talent and commitment of the team.

Economic development means identifying holes in the market and bringing in companies to fill the holes via incentives. But this is not sustainable. Ecosystems need to be self-sustaining. It also takes universities and students who are willing to take risks, and on-the-ground assets—like the Golden-based National Renewable Energy Laboratory (**NREL)**. But energy is not like pharmaceuticals or software in that the investment timeline and returns are not as struc-

20 Babington, Charles, Obama: Investment in energy research creates jobs

21 International Labor Organization, Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World (2008)

22 Renewable Energy Policy Network for the 21st Century, http://www.ren21.net/atStake/forum.asp?id=13

23 EESI Factsheet, 2008

tured. NREL is exploring how to incentivize utilities to sell less of their product through the Renewable Energy Assessment, which serves as a validating source for insurance, utilities, policymakers and companies.

The Brazilian Innovation Agency (**FINEP**) is a powerhouse in workforce development. **Patrícia Freitas**, superintendent of investments for FINEP, explained that innovation is people and knowledge. The organization focuses on integrating projects and empowering people through providing endowments for companies to conduct research and development and supporting universities and research centers. They also work with fund managers and create seed funds to develop new businesses, through which they have started 22 seed funds. The world is an unstable place and companies must be able to adapt to attract and keep talent. FINEP starts at younger ages in schools to promote innovation in young people and continues this through all stages of education.

The Council for Adult and Experiential Learning (**CAEL**) is a national, non-profit organization which creates and manages effective learning strategies for working adults through partnerships with employers, higher education, the public sector and labor. Vice President **Jo Winger De Róndon** explained that the Denver office started a special model in 1998, first with the communications industry, then with the energy industry. They created a task force to identify needed skills, and the colleges and universities that could deliver contextual and online programs for these skills. The model is complimentary to other companies' ways of upgrading the workforce. An online education model is available for the communications and renewable energy industry programs. Online classes have a 94 to 96 percent course completion rate. Corporations need to have a clear idea of where they are going, and employees need to have access to information on career paths, educational solutions and career advising.

Claudio Gastal, MBC

Roberto Alvarez, ABDI

Ravishankar Iyer, University of Illinois at Urbana-Champaign

Melinda Richter, Environmental Business Cluster

Snapshots from the Dialogue

Workforce deployment will require both education….

Claudio Gastal, MBC
In Brazil, there is a large gap between universities and the private sector. We need to improve the quality of primary education and keep students going to university. There is also a very strong need for leadership for innovation and the need to change our mindsets about how we do business.

Roberto Alvarez, ABDI
At top Brazilian engineering schools, 50 percent of undergraduate students are going abroad for internships. What can we do to improve this? These are government-funded exchange programs with other countries.

Marcos de Souza, Brazilian Ministry of Industry, Development and Foreign Trade
In Brazil, the best universities are public universities. Private universities are of far inferior quality. How can we combine private universities with market needs? There is a strong demand that has not been addressed by the private or public sectors. They have decreased technical training programs (even at the high school level). Now there is a gap and need for more workers and schools. We need computer programmers, analysts, etc. The government has responded, along with the private sector, to train workers. IBM, for example, has been very involved.

Ravishankar Iyer, University of Illinois at Urbana-Champaign
Power engineering classes at UIUC have gone from 15 students to 150. CTO's and CEO's come in to talk with the students on the importance of the field. There are many ways to make a course of study more attractive to students (grants, part-time work, internships). Companies like Motorola used to have their own training programs. Indian programs have now copied this. Many companies have campuses where they can train 30,000-40,000 people.

Melinda Richter, Environmental Business Cluster and San Jose BioCenter
Incubation does not work without education. The Biotech Institute and Cleartech Institute run training programs with universities and offer skills training programs with different themes each month, reinforced with career development, counselors and career fairs.

Deborah Magid, IBM Venture Capital Group

…and flexibility in training styles.

Gilberto Teixeira, Elo Electronic Systems
There is diversity in the United States, cultural and temporal diversity in Brazil. People are living in completely modern cities like São Paulo. And at the same time, people are living like cave men in the Amazon. People will have to re-skill and up-skill throughout their careers to keep up with changing technology and needs. If you are going to compete, you need to educate.

Deborah Magid, IBM Venture Capital Group
IBM has developed a social program through which high-performing workers can apply for a two-year leave to go work in a developing country. When they come back, they have had incredible experiences and have a more flexible, broader world view. There is a need for people with varied skills. And IBM is now helping develop curriculum for multi-skills programs at universities.

Ted Rogers, PPI Ventures
Sometimes we also need to focus on "getting out of the way." Training is very important, but we also need to think about how to let innovation breathe and grow. We need to "water the roots, not the orange" in areas like tax policy. If you discourage this, you are not creating an environment for entrepreneurship.

21st Century Manufacturing

Focus Questions

- What are the most critical factors driving the competitiveness of your nation's manufacturing industry (e.g. cost, infrastructure quality, taxation/legal/regulatory environment, effective public-private sector collaboration, etc.)?
- How do companies and regions leverage innovation assets (from fundamental research to entrepreneurial ventures) to create and deploy new manufacturing capacity in the United States and Brazil?
- How can we develop an energy efficiency program with major Brazilian manufacturing companies in order to reduce industrial energy intensity and identify key opportunities for savings?

U.S. manufacturing has long been a key factor in maintaining the United States' competitive advantage in the global arena and a traditional source of strength in the domestic economy. Manufacturing generates $1.6 trillion annually, roughly 12 percent of the GDP; represents approximately two-thirds of the nation's total exports; supports more than 20 million high-paying jobs; and accounts for 11 percent of total U.S. employment. Additionally, manufacturing accounts for nearly three-quarters of the nation's industrial research and development, spurring innovation and advancements in production methodology and product design.

As the production instrument of the world's leading industrial power, the U.S. manufacturing sector produces an array of highly diversified and technologically advanced goods, including petroleum, steel, motor vehicles, aerospace technology, telecommunications, chemicals, electronics, basic consumer goods and processed foods. The diversity and scope of the United States' industrial output allow it to remain at the forefront of an increasingly crowded field of international competition. Continued innovation and evolution in the manufacturing sector will ensure that this trend will endure.

Manufacturing as an Economic Driver

Much like in the United States, the manufacturing sector in Brazil is central to its economic viability and long-term growth. Brazilian manufacturing represents a greater share of the GDP than in the United States, accounting for close to 20 percent, and employs a comparable 10 percent of the labor force. Brazil boasts one of the most diversified industrial sectors in the region, producing a variety of goods from electronics, automobiles and machinery to chemicals, cement and metals. This broad industrial spectrum is central to Brazil's position of increasing strength in the global market.

The southeastern and southern regions of Brazil are the dominant manufacturing centers, employing close to 80 percent of the nation's industrial workers. Specifically, the state of São Paulo is responsible for more than 40 percent of the country's manufacturing output, while the greater São Paulo

metropolitan area is the largest industrial center in Latin America. This region has been critical to Brazil's recent rise in economic stature and will continue to remain important in both regional and global contexts.

21st Century Challenges in the United States and Brazil

Business depends on differential sales—unless a business is growing, there are no new opportunities for building plants. A successful 21st century manufacturing operation will require finding businesses that have positive second differentials in a growing industry where disruptive technology is developed to change the status quo.

The critical factors for success are crossing the valley of death, capital formation and keeping up with the increasing pace of change for technology development. This U.S. model urgently needs organizations that help companies cross the valley of death, in which technology could come into the organization's support network, spend one to two years and be deployed. NREL provides support to companies crossing the valley of death, but ideally there should be an organization to provide these services in all fields.

CH2M HILL builds manufacturing plants, engages in research and is the No. 1 designer of advanced manufacturing plants worldwide. CH2M HILL's director of technology, **Michael O'Halloran**, explained that after conducting a study on why some companies were successful and others were not, they determined that the majority of U.S. companies follow the university model. In the United States, research is performed in universities, then entrepreneurs search for a venture capitalist or angel to provide the funding for project development. In Asia, the focus is on manufacturing, not R&D, but they still have a valley of death to cross when they try to transfer research from U.S. universities to their countries for deployment.

Meanwhile, one of the main challenges facing the Brazilian system is that 60-70 percent of research investment comes from the government. **Marcos Vinicius de Souza** of the Brazilian Ministry of Industry, Development and Foreign Trade noted that the system would be enhanced by additional involvement of the academic and private sector. However, the private sector does not yet see innovation's relevancy in improving the success of their companies and their overall competitiveness.

In 2004, Brazil launched an innovation law. Previously, it was forbidden to use public funds for R&D in universities. The law allowed government investment in universities and encouraged partnership with the private sector. From 2007-2010, $6 billion was allotted for the Innovation Plan, with part of that allocated to universities and the private sector. The nation's Industrial Policy goals for 2008-2010 are to fix capital capacity, increase technopark capabilities, increase Brazil's participation in global trade and increase private sector investment in R&D. Brazil is also working to use innovation to improve the competitiveness of companies. The Ministry of Foreign

Ken Polasko, Arizona Technology Enterprises

Jonathan Pickering, Applied Materials, Inc.

Snapshots from the Dialogue

To be successful in the 21st century, we need to innovate and support…

Ravishankar Iyer, University of Illinois at Urbana-Champaign
At universities, we see increasingly more undergrads and young professors launching startups. In the United States, people are not seen as a failure for creating startups that do not take off. At universities, involvement with startups is seen as a valuable academic pursuit, the same as publishing papers.

Helena Chum, National Renewable Energy Laboratory
The U.S. government has acknowledged the need for help regarding the valley of death. It has gone back to funding and guiding boards. For example, there is a guiding board that meets quarterly on biomass modeling.

…see the growing value in green innovation…

Ken Polasko, Arizona Technology Enterprises
The supply of ideas exceeds demand—there are many great ideas but few are commercially viable. Universities do not have funding and infrastructure to take companies across the valley of death and to the next level. When investors have the choice to liquidate faster with one type of investment or getting in for the long-haul with building manufacturing facilities, they are typically not usually choosing manufacturing. This is where green incentives can make a difference.

Jonathan Pickering, Applied Materials, Inc.
Applied Materials is very interested in renewable development in Brazil and is currently determining its level of investment. Thanks to a huge cost reduction in photovoltaics since January, the pricing is now sustainable for solar panel production. We can have a slow brown future or a fast green one. Green plants are generators of economic activity. You can measure the benefits of renewable technology.

…and look outside the box.

Ted Rogers, PPI Ventures
Creating more competitive American and Brazilian companies is going to come through innovation, not protectionism. Rapid prototyping manufacturing—printers that manufacture parts—is technology that exists now and will someday be widespread. We should be looking at the next generation of manufacturing, not be concerned with the old model and where it is going.

Deborah Magid, IBM Venture Capital Group
We also need to look at specialization and decommoditization. At IBM, the semiconductor business is very specialized, and we are doing much more R&D on nanotechnology and semiconductor technology. Through decommoditization, we need to find ways to take something thought of as a commodity and give it new value (eg. bottling of water)—find hidden value in old things (not just disruptive technology).

Trade will create a Secretariat of Innovation, which will partner with ABDI, to ensure that the country excels in its dedication to improving innovation across the board.

Innovation Hotspots—Regional Development in the United States and Brazil

Focus Questions

- What are the leadership strategies, best practices and tools that can help regional leaders better leverage assets within a regional innovation ecosystem to create Regional Innovation Hotspots?
- Why are some regions more successful than others in competing against, in many cases, lower-cost, global competition?
- What is the definition of regional leadership? What are examples of effective 21st century regional leadership?

While innovation is a national concern for both the United States and Brazil, much of the research, development and entrepreneurship is focused in central hubs in each country. Nurturing these innovation hotspots will help to accelerate the rate of change by bringing together intellectual power, research ability and funding. **Claudio Gastal**, president of MBC, noted that there is a huge difference in Brazil between the regions on how to benchmark. There is a need to work with many systems—centralized, decentralized—because everyone is different. From difference springs even more opportunities for diverse innovation.

Gilberto Teixeira, Elo Electronic Systems: Regional Development in São Paulo

Brazil used to be an exporter of only a few items and imported everything else. During the first and second World Wars, they had to replace many imported products with domestic ones to fill needs. They saw that this was an important part of economic development. This process was repeated with energy when Brazil was being choked by the cost of petroleum. They realized that ethanol was the solution. The country already had a mature sugar cane production industry (and had since the 16th century). The ethanol project launched with strong support. The automobile industry followed suit and adapted models for biofuels. This change was a tool to give the country freedom using a centuries-old industry. It was so successful because they had strong government financing and the technical experience existed (having created planes in World War II that flew on ethanol). Innovation was focused in São Paulo, the hub for banking and industry. Why was ethanol adopted so quickly by society? Because it was cost effective and the model was successful. There are several hotspots in Brazil—at least 50 regional clusters have been established (mostly based on agribusiness and biofuels).

Presentation Spotlight: Industrial Energy Efficiency at Johnson Controls

Paulo Freire
Vice President Brazil, Johnson Controls

During the Laboratory in Rio de Janeiro, Paulo Freire of Johnson Controls presented the most recent findings of energy efficiency research, clearly showing that energy efficiency has never been more important in business. The Energy Efficiency Indicator (EEI) survey, a research report targeting professionals responsible for energy management, revealed barriers to investing in energy efficiency including limited funding, uncertainty about future energy prices, government incentives and energy legislation.

These findings highlight the fact that business leaders are increasingly aware of the need for energy efficiency and its potential to reduce operating costs while cutting greenhouse gas emissions. Economic and regulatory uncertainty, however, is inhibiting organizations from investing in proactive measures.

Johnson Controls conducted the survey of more than 100 Brazilians executives who are responsible for managing energy use within their organizations. The majority of respondents were chief executive officers, general managers or facility directors.

- 55 percent of business leaders are paying more attention to energy efficiency than they were one year ago.
- 57 percent responded that energy management was extremely or very important.
- Of the organizations planning new construction or retrofit projects, 98 percent identified energy efficiency as a priority.
- Sustainability continues as a focus in new construction as 47 percent are seeking green building certification, while 41 percent plan to incorporate green elements but not certify their facilities.
- 63 percent expect to make investment in energy efficiency.
- 50 percent expect to see payback in less than two years.
- 87 percent have switched labels for energy efficient lighting.
- 50 percent say energy management initiatives are driven by cost savings, 50 percent by environment.

Steve Petersen, CH2M HILL: Regional Development in Oregon

In order to develop a cluster, you need leadership and long-term commitment, a good product and a viable industry. It is also vital to get all sectors involved early on and committed. In Oregon, this played out when the wood industry went away. They surveyed the area's resources and found that the state had power, water, a place people liked to live and a focus on R&D. They determined that the semiconductor industry would be a good fit. Usually job growth in a cluster is spurred on by spin-off support industries. In Oregon, they have never been able to generate venture capital, so they did not get spin-offs.

An organization can also approach lawmakers to adjust the legislative environment to encourage greater business investment. For example, in Oregon, Intel approached CH2M HILL, noting that the company would invest in the state if the state's depreciation rates were changed. At the same time, Japanese investors interested in Oregon expressed a need for changes to be made in certain tax rules. In both cases, lawmakers in Oregon responded—re-shaping the state's investment climate and attracting Intel and the Japanese investors.

Amy Reichert, Colorado Office of Economic Trade and Development: Regional Development in Colorado

There are similar stories between Oregon and Colorado. Colorado is known for R&D and product development. The focus on industry clusters has spurred growth. The governor set an agenda focusing on four industries: bioscience, aerospace, renewable energy and tourism. There are many strong research universities and labs, and a strong business community that have supported growth. Natural resources were looked at, and they mapped potential based on these. There is strong interest in investment from overseas (esp. Europe—eg. Vestus Wind building four facilities in Colorado). Now R&D is generating more manufacturing, and the renewable energy sector pulls in from other strong sectors in the state. The Metro Denver Economic Development Corporation comprises 70 partners and organizations (cities, counties and development groups). Their philosophy is putting development first (not pitting cities against each other; development is the most important factor) because all development benefits the whole region. Another important regional organization is the Collaboratory, which is made up of NREL and two major Colorado universities. Entrepreneurs can approach one member of the group and get support from the whole network

Alison Wise, NREL: Cyber Models for Hotspot Development

Technology, by virtue of how it is, will only succeed in certain environments. There are unique ways to understand techniques for developing technologies. NREL is looking at regional economic development as renewable energy needs to have a regional focus. This includes exploring policies for technology development, working with many innovations

that could accelerate projects and working to get creative in engaging cyberspace in real-world applications. The City of Berkeley is ready to adopt cyber applications using the Property Assessment Clean Energy Model. Through this model, the city takes out a bond whenever a citizen wants to use alternative energy and is then paid back through property taxes.

Having communication with other communities allows sharing of challenges and benefits of programs, which increases the learning curve. A second model addresses the demand for solar energy. Customers who want solar energy are mapped online then grouped with others who also want solar energy in their area. Another online project is the Clean Energy Economy Registry, wherein data on products and services, networking organizations and financing organizations is available on an open source platform. These are just several examples of how lessons in cyberspace can be expanded from regional hotspots.

Next Steps: Featured Cross-Border Collaborations

Energy Efficiency Program

Leads

- **Tod Perry**, National Renewable Energy Laboratory
- Representatives from Johnson Controls, Electrobrás and Grupo Gerdau

Goal: Encourage Brazilian manufacturing companies to adopt more energy efficient production practices, or apply for a Save Energy Now energy assessment.

This project will develop an energy efficiency program with major Brazilian manufacturing companies in order to reduce industrial energy intensity and identify key opportunities for savings by focusing on energy-intensive systems such as process heating, steam, pumps, fans and compressed air.

The U.S. Department of Energy has developed a program in the United States called Save Energy Now—a national initiative of the Industrial Technologies Program (ITP)—to drive a 25 percent reduction in industrial energy intensity in 10 years. Companies nationwide can participate in no-cost energy assessments and utilize ITP resources to reduce energy use while increasing profits.

Assessments help companies identify key opportunities for savings by focusing on energy-intensive systems such as process heating, steam, pumps, fans and compressed air. Several U.S.-based firms

in the Gerdau Group, chaired by Jorge Gerdau—who also chairs MBC—have already undergone Save Energy Now energy assessments. U.S. manufacturing companies that have participated in Save Energy Now energy assessments have saved an average of $2 million, or 8 percent of their total energy costs.

National Renewable Energy Assessment

Leads

- **Dario Azevedo**, Pontifical Catholic University of Rio Grande do Sul
- Representatives from the U.S. Department of Energy and the Brazilian Ministry of Mines and Energy

Goal: Develop a nationwide assessment of Brazil's renewable energy portfolio.

During the next 20 years, Brazil's demand for energy will increase dramatically. And while a robust infrastructure for hydroelectricity exists throughout the country, more is needed in other forms of renewable energy to meet this growing demand.

In this project, the Brazilian government would—in collaboration with the U.S. Department of Energy and the U.S. National Renewable Energy Laboratory—develop a National Renewable Energy Assessment of Brazil's renewable energy portfolio to prioritize renewable energy investment and anticipate future energy demand.

RIO DE JANEIRO / GOLDEN

Learning Laboratory 5: Rio de Janeiro
Key Activities and Strategic Visits

Joint Delegation Reception and Dinner

Host: **Paulo Freire**, Vice President Brazil, Johnson Controls

Location: Térèze Restaurant

Johnson Controls, Inc., a global multi-industrial leader in energy efficiency, presented research commissioned within the Brazilian business community to examine perceptions of energy efficiency and sustainability. The Energy Efficiency Indicator (EEI) survey includes responses from executives responsible for managing, reviewing or monitoring energy use within their organizations. The survey examines the impacts on management of energy within companies, including financing strategies, expected return-on-investment, incentives, certification, renewable energy strategies and the outlook on building efficiency trends.

Joint Delegation Visit to CEPEL—Eletrobrás' Electric Energy Research Center for Side Meetings on Bilateral Energy Opportunities

The Research Center CEPEL—Centro de Pesquisas de Energia Elétrica—is a technological center of the Brazilian electric power sector, having Electrobrás as its main sponsor, and holds the mission of contributing to the permanent enhancement of electric power sector services in the country, reaching new standards of quality and costs through extensive actions of research, development, promotion and transfer of technology. CEPEL has also been granting support to the insertion of renewable sources of energy in the country, with priority to the increase of its research and development capacity in that area.

Lunch and Side Visit at INMETRO—the National Institute of Metrology, Standardization and Industrial Quality

INMETRO was created in 1973 to support Brazilian enterprises to increase their productivity and the quality of goods and services. Its major task is to improve the quality of life of citizens as well as to seek the competitiveness of the economy through metrology and quality.

This side visit included INMETRO's facilities dedicated to energy efficiency and a tour to the Institute's Technological Park in Xerém (PTX), which encompasses a Business Park, Incubator and the Training Center in Basic Industrial Technology.

RIO DE JANEIRO / GOLDEN

Learning Laboratory 6: Golden
Key Activities and Strategic Visits

Visit to Xcel Energy Control Room

Xcel leadership presented their smart grid philosophy, followed by a roundtable discussion and a tour of the operations and control center. Xcel Energy and CURRENT Group, LLC, along with other Consortium members, are partnering on the SmartGridCity™, a ground-breaking project in responsible energy solutions. The advanced smart grid system will provide the city of Boulder, Colo., (population of approximately 100,000 people) a portfolio of smart grid technologies designed to provide environmental, financial and operational benefits. Xcel Energy believes the results will be a greatly improved delivery system that optimizes the impact on the environment, ensures the most efficient delivery and maximizes reliability.

Welcome Reception and Dinner

Host: **Lee A. McIntire**, CEO, CH2M HILL and Council on Competitiveness Executive Committee Member

Location: Denver Country Club

CEO Lee McIntire hosted a welcome reception and dinner for Learning Laboratory participants at the Denver Country Club. An important partner in the Innovation Learning Laboratory series and a leader in their field, CH2M HILL builds manufacturing plants, engages in research and nano-research. They are the No. 1 designer of advanced manufacturing plants worldwide.

National Renewable Energy Laboratory Tour

Host of the Golden Innovation Learning Laboratory, the National Renewable Energy Laboratory (NREL) is the nation's primary laboratory for renewable energy and energy efficiency research and development. NREL's mission and strategy are focused on advancing the U.S. Department of Energy's and the United States' energy goals. The laboratory's scientists and researchers support critical market objectives to accelerate research from scientific innovations to market-viable alternative energy solutions.

Lunch and Tour of Smart Grid Demo House, Sponsored by CURRENT Group, LLC

CURRENT Group leadership led a tour of a smart grid demo house, followed by a discussion on smart grid applications and technologies and hosted lunch. A leader in smart grid technology, CURRENT OpenGrid™ Smart Grid solution is being fully integrated in Xcel Energy's SmartGridCity, serving 100,000 homes in the Boulder area. This solution combines advanced sensing technology, two-way high-speed communications, 24/7 monitoring and enterprise analysis software and related services to provide location-specific, real-time data about the status of the electric grid. The CURRENT smart grid solution also serves more than 100,000 homes and businesses with Oncor Electric Delivery Company in the Dallas-Fort Worth area, the fifth largest U.S. metropolitan statistical area.

RIO DE JANEIRO / GOLDEN

Participants

RIO DE JANEIRO

Dr. Katia Aguiar
Coordinator
Rio de Janeiro Incubators Net (ReINC)

Mr. Janio Itiro Akamatsu
Advisor to the Technology Directors Board
Eletrobrás

Mr. Tiago M. Alves
Chief Executive Officer
CSEM Brasil

Ms. Rosy Alvares
Finance and Administrative Manager
Wilhelmsen Ships Service Brazil

Dr. Weber Amaral
Professor
Luiz de Queiroz Superior School of Agriculture (ESALQ)

Dr. José Alberto Sampaio Aranha
Director
Genesis Institute (PUC-Rio Incubator)
Board Member
ANPROTEC

Dr. Reginaldo Arcuri
President
Brazilian Agency for Industrial Development (ABDI)

Dr. Roberto dos Reis Alvarez
International Affairs Manager
Brazilian Agency for Industrial Development (ABDI)

Dr. Dario Francisco Guimarães de Azevedo
Dean for International and Institutional Affairs
Pontifical Catholic University of the State of Rio Grande do Sul (PUCRS)

Mr. Leonardo Barreira
Ambidados

Dr. Antônio José Junqueira Botelho
Professor
PUC-RIO

Ms. Elizabeth Cairns
Intern
U.S. Consulate—Rio de Janeiro

Mr. Clayton Campanhola
Director
Brazilian Agency for Industrial Development (ABDI)

Ms. Deborah Carvalho
Global Ciência e Tecnologia Bio S/A (GCTBio)

Dr. Priscila Perillier O'Reilly de Araujo Castro
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Dr. Armando Clemente
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Rio de Janeiro Technology Net (REDETEC)

Ms. Monica Neves Cordeiro
Superintendent, New Business
Companhia Energética de Minas Gerais/ Energy Company of Minas Gerais (CEMIG)

Ms. Regina Cunha
Senior Commercial Specialist
U.S. Commercial Service
U.S. Consulate—Rio de Janeiro

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U.S. Patent and Trademark Office U.S. Consulate—Rio de Janeiro

Mr. Chad Evans
Senior Vice President, Strategic Initiatives
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Mr. Diógenes Feldhaus
INVENTTA

Mr. Ricardo Menna Barreto Felizzola
President, Teikon;
Vice President, Altus;
Vice President & Coordinator—Council of Innovation & Technology, FIERGS

Mr. Rubens Francisco Junior
Technology Superintendent
Aquamec

Mr. Paulo Freire
Vice President BE Brazil
Johnson Controls

Dr. Cláudio Vilar Furtado
Director
GVcepe (Getúlio Vargas Foundation Research Center on Venture Capital and Private Equity)

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Energy Communications Consultant to
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy

Mr. Raphael Machado
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Ms. Deborah Magid
Director, Software Strategy
IBM Venture Capital Group

Mr. Denis Maia
Chief Executive Officer
Choice Energy Intelligence

Mr. Rui Mano
Director
Choice Technologies

Mr. Richard Marking-Camuto
Director, International Programs
Aclara

Mr. Angelo Fares Menhem
Executive Vice-President
Concert Technologies S.A

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Energy Development
Ministry of Mines and Energy

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Applied Materials, Inc.

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Financiadora de Estudos e Projetos / Brazilian Innovation Agency (FINEP)

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Ativa Tecnologia e Desenvolvimento

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Mr. Nathan Monosoff
Technologist
CH2M HILL

Mr. Michael O'Halloran
Director of Technology
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Ms. Jo Winger de Róndon
Vice President
CAEL

Ms. Alison Wise
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National Renewable Energy Laboratory

APPENDIX A

Agenda: Porto Alegre
Research and Development—The Seedcorn for Innovation

Wednesday, April 22, 2009

Investment in—and the protection of—frontier research, along with support for cutting-edge researchers, has always been the bedrock of national innovative activity.

This inaugural U.S.-Brazil Innovation Learning Laboratory seeks to answer questions—focused on investment, talent and policy infrastructure—aimed at stimulating the research capacity in the United States and Brazil.

Attention will focus on innovation challenges and opportunities neither country can meet alone—particularly in the strategic areas, like energy efficiency and renewables.

MORNING

9:00-9:30
Lab Opening and Kick-off Remarks

Ricardo Menna Barreto Felizzola
Vice President, Altus

Vice President, CIERGS (Center of Industries of the State of Rio Grande do Sul) and Coordinator, Council of Innovation and Technology, Federation of Industries of the State of Rio Grande do Sul (FIERGS)

Claudio Leite Gastal
President
Movimento Brasil Competitivo / The Brazilian Competitiveness Movement (MBC)

Reginaldo Arcuri
President
Agência Brasileira de Desenvolvimento Industrial / Brazilian Agency for Industrial Development (ABDI)

Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

Thomas D. Perry IV
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

Erik Camarano
Executive Secretary
State of Rio Grande do Sul

9:30-11:00
Driving Investments in Frontier Research

Given the need to remain at the cutting edge of research—and to develop, attract and retain the best scientists and engineers—what national strategies are in place in Brazil and the United States to bolster high-level investments in frontier research, like energy efficiency and renewables?

Moderator
Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

9:30-9:50
Priorities, Challenges and New Directions in Frontier Research: Views from the Public and Private Sectors

Kick-off Speakers
Luis Gerbase
President
Altus Automation

Thomas D. Perry IV
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

Questions to Explore

- What national strategies are in place in Brazil and the United States to bolster high-level investments in frontier research?
- What is the status of public and private sector investments in science and engineering—especially in multidisciplinary areas such as biotechnology, biofuels, nanotechnology, information technology, computer sciences and aerospace? Are there funding gaps to address? Are there partnership opportunities to leverage in critical areas?

9:50-10:10
Pushing the Research Envelope in Universities and National Laboratories

Kick-off Speakers

Ravishankar K. Iyer
Interim Vice Chancellor for Research
University of Illinois at Urbana-Champaign

Elizabeth Ritter
Coordinator, Technology Transfer Office (ETT) at the Pontifical Catholic University of Rio Grande do Sul (PUCRS)

Questions to Explore

- How are leading universities in Brazil and the United States turbocharging investments, research opportunities and educational opportunities in and between both countries?
- In terms of innovation and competitiveness, can you identify candidate research areas that would benefit from U.S.-Brazil collaboration—for example, in the clean tech space? Are there strategic, best practices to attract public and private sector funding in these areas?

10:10-11:00
Round-Robin Discussion

Identifying Priorities and Opportunities for U.S.-Brazil Cooperation / Building the Bridge to Future Research and Collaborations

11:00–Noon
Building the Talent Base for Frontier Research

The innovation process begins with curiosity-driven research, then moves through the development of applications that are commercialized, creating new businesses and jobs.

But this all depends on talent—the human dimension of innovation. How do we ensure both nations develop the next generation of researchers and innovators? Can we identify clear avenues for cooperation and hemispheric leadership in strengthening educational opportunities—both formal and informal; in universities and in companies—across both nations? Are there research disciplines that demand greater attention in the 21st century—like energy efficiency and renewables?

Moderator

Claudio Leite Gastal
President
Movimento Brasil Competitivo / The Brazilian Competitiveness Movement (MBC)

Kick-off Speakers

Jeffery D. Bell
Mission Director
United States Agency for International Development Brazil / Agência dos Estados Unidos para o Desenvolvimento Internacional Brasil (USAID)

Wrana Panizzi
Vice President
CNPq (National Council of Technology and Scientific Development)

Questions to Explore

- With stimulus packages in mind—and the resurgence of funding in the physical sciences, including alternative energy research—can we identify greater opportunities for undergraduate and graduate student/researcher exchanges between the United States and Brazil? If so, in what areas?
- What are the impediments to/incentives for multidisciplinary studies and training at universities in the United States and Brazil? What institutions are getting this right—and how?
- Are there issues related to foreign student participation in U.S. and Brazilian universities? What specific programs need to be in place to enhance the exchange of U.S. students, researchers and professors?
- What are specific strategies to better link K-12 education and undergraduate education in both the United States and Brazil? Are there programs in either country that would be good models to expand or emulate?
- Would it be helpful to establish science teacher training exchanges between the two countries in specific areas? Are there useful programs to educate the public on research and energy challenges?

Round-Robin Discussion: Identifying Priorities and Opportunities for U.S.-Brazil Cooperation

AFTERNOON

Noon–2:00
Lunch

2:00–3:00
Building a 21st Century Research Hotspot—Leveraging Research, People and Policy

In order to create an environment conducive to frontier research and innovation, stakeholders must address both their physical as well as their legal and policy underpinnings. What policies and legal frameworks optimize the environment for frontier research?

Moderator
Ricardo Menna Barreto Felizzola
Vice President, Altus
Vice President, CIERGS (Center of Industries of the State of Rio Grande do Sul) and Coordinator, Council of Innovation and Technology, Federation of Industries of the State of Rio Grande do Sul (FIERGS)

Kick-off Speaker
Nuno Simões
Director of Corporate Affairs for Latin America
Intel Semicondutores do Brasil, Ltda.

Round-Robin Discussion: Identifying Priorities and Opportunities for U.S.-Brazil Cooperation

3:00–3:15
Coffee Break

3:15–4:45
Key Findings: U.S.-Brazilian Collaboration Opportunities and Challenges

Signing of Technical Cooperation Agreement between ABDI and MBC on the development of an international training program with the International Computer Science Institute (ICSI) of Berkeley, CA.

Moderator
Roberto dos Reis Alvarez
Gerente de Assuntos Internacionais / International Affairs Manager
Agência Brasileira de Desenvolvimento Industrial / Brazilian Agency for Industrial Development (ABDI)

Thomas J. White
Consul General
U.S. Consulate General, São Paulo

4:45–5:00
Next Steps

Ricardo Menna Barreto Felizzola
Vice President, Altus
Vice President, CIERGS—Center of Industries of the State of Rio Grande do Sul and Coordinator—Council of Innovation and Technology, Federation of Industries of the State of Rio Grande do Sul (FIERGS)

Claudio Leite Gastal
President
Movimento Brasil Competitivo / The Brazilian Competitiveness Movement (MBC)

Reginaldo Arcuri
President
Agência Brasileira de Desenvolvimento Industrial / Brazilian Agency for Industrial Development (ABDI)

Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

Thomas D. Perry IV
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

8:00–10:30
Dinner hosted by the Government of the State of Rio Grande do Sul

Palácio Piratini (Galpão Crioulo)

Thursday, April 23, 2009

Strategic Site visits—organized and arranged by FIERGS, ABDI, MBC and the Council on Competitiveness

MORNING

9:00
Reception at TECNOPUC

Prof. Roberto Moschetta
Director
TECNOPUC

9:15
TECNOPUC Presentation

Location: CEPAC Auditorium

Prof. Roberto Moschetta
Director
TECNOPUC

David Johnston

10:00
CEPAC (Centre of Excellency in Research on Carbon Storage) Presentation

Rafael Bianchini
Researcher

10:30
CB SOLAR (Brazilian Center for the Development of Photovoltaic Solar Energy) Presentation

Adriano Moehlecke

11:00
CEPAC Installation Visit

Rafael Bianchini

11:15
TECNOPUC Walking Tour

Roberto Moschetta
Edemar de Paula
David Johnston

11:45
CB Solar Installation Visit

Adriano Moehlecke

AFTERNOON

12:15
Lunch

2.00
Closing

APPENDIX B

Agenda: Chicago
Research and Development—The Seedcorn for Innovation

Tuesday, May 12, 2009

Investment in—and the protection of—frontier research, along with support for cutting-edge researchers, has always been the bedrock of national innovative activity.

This second U.S.-Brazil Innovation Learning Laboratory, a sister event to the inaugural Learning Laboratory held in Porto Alegre on April 22, seeks to answer questions—focused on investment, talent and policy infrastructure—aimed at stimulating the research capacity in the United States and Brazil.

Attention will focus on innovation challenges and opportunities neither country can meet alone—particularly in the strategic areas, like energy efficiency and renewables.

MORNING

8:00–8:15
Introductions and Opening Remarks

Richard H. Herman
Chancellor
University of Illinois at Urbana-Champaign

Deborah L. Wince-Smith
President
Council on Competitiveness

Reginaldo Arcuri
President
Agência Brasileira de Desenvolvimento Industrial / Brazilian Agency for Industrial Develoent (ABDI)

Claudio Leite Gastal
President
Movimento Brasil Competitivo / The Brazilian Competitiveness Movement (MBC)

David Rodgers
Director for Strategic Planning and Analysis,
Office of Energy Efficiency and Renewables
U.S. Department of Energy

Thomas D. Perry, IV
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

8:15–10:10
Investments in Frontier Energy Research

Questions to Explore
- What are the priorities, challenges and new directions?
- How do we push the envelope in Universities and National Laboratories?
- What future research and collaborations do we foresee?

Moderator
Thomas D. Perry, IV
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

8:15–8:50
Bioenergy

Stephen Long
Deputy Director, Energy Biosciences Institute
University of Illinois at Urbana-Champaign

Hans Blaschek
Assistant Dean, Biobased Research Initiatives, Office of Research, College of Agricultural, Consumer and Environmental Sciences and Director, Center for Advanced Bioenergy Research
University of Illinois at Urbana-Champaign

Albert F. Wagner
Interim Deputy Associate Laboratory Director for Energy Sciences and Engineering (ESE)
Argonne National Laboratory

Ruth Scotti
Biofuels Regulatory Affairs Manager
BP Biofuels

8:50–9:25
Sequestration Technology

Robert J. Finley
Director, Energy and Earth Resources Center
Illinois State Geological Survey
University of Illinois at Urbana-Champaign

John Tombari
Vice President, North and South America
Schlumberger

9:25–10:10
Smartgrid Technologies

Rick Smith
Manager, R&D
Ameren

Monica Neves Cordeiro
Superintendent, New Business
CEMIG (State of Minas Gerais Energy Company)

George Gross
Professor of Electrical and Computer Engineering and Professor in the Institute of Government and Public Affairs
University of Illinois at Urbana-Champaign

Prabhakar Nair
Marketing Manager, UOP Renewables Energy & Chemicals Business Unit
UOP LLC, a wholly-owned subsidiary of Honeywell International

William D. Goran
Director, Center for the Advancement of Sustainability Innovations
Construction Engineering Research Laboratory

10:10–10:25
Summary

10:25–10:40
Break

10:40–12:00
Building the Talent Base for Frontier Research

Questions to Explore

- How do we ensure that both the United States and Brazil develop the next generation of researchers and innovators?
- Can we identify clear avenues for cooperation and hemispheric leadership?
- Are there research disciplines that demand greater attention than others in the 21st century?

Moderator
Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

Ravishankar Iyer
Interim Vice Chancellor for Research
University of Illinois at Urbana-Champaign

Carlos Eduardo Pereira
Vice-Dean, School of Engineering, and Professor, Electrical Engineering Department, Federal University of Rio Grande do Sul (UFRGS), and Technical Director—CETA-SENAI/RS (Applied Research Institute)

Karen Holbrook
Vice President for Research and Innovation
University of South Florida

Bruce Koel
Interim Vice President and Associate Provost for Research and Graduate Studies
Lehigh University

AFTERNOON

12:00–1:00
Lunch

Stephen Long
Deputy Director, Energy Biosciences Institute, and Professor of Plant Biology and Department of Crop Sciences
University of Illinois at Urbana-Champaign

1:00–2:30
Building a 21st Century Innovation Hotspot: Leveraging Research, People and Policy

Questions to Explore
- What policies and legal freworks optimize the environment for frontier research?

Moderator
Reginaldo Arcuri
President
Agência Brasileira de Desenvolvimento Industrial / Brazilian Agency for Industrial Develoent (ABDI)

Kenan Sahin
President and Founder
TIAX LLC

Cláudio Vilar Furtado
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Edward J. Daniels
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Eric H. Jackson
CEO, CP Holdings, LLC
Senior Carbon Expert of the Environmental Change Institute, University of Illinois at Urbana-Champaign

Eugene S. Meieran
Intel Senior Fellow, Technology and Manufacturing Group and Director, Manufacturing Strategic Support
Intel Corporation

Don Fullerton
Professor of Finance
University of Illinois at Urbana-Champaign

2:30–3:00
Wrap-up & Next Steps

Richard H. Herman
Chancellor
University of Illinois at Urbana-Champaign

Reginaldo Arcuri
President
Agência Brasileira de Desenvolvimento Industrial / Brazilian Agency for Industrial Develoent (ABDI)

Claudio Leite Gastal
President
Movimento Brasil Competitivo / The Brazilian Competitiveness Movement (MBC)

Deborah L. Wince-Smith
President
Council on Competitiveness

7.00–9.00
Dinner at the Park Grill

Wednesday, May 13, 2009

Visit to the University of Illinois at Urbana-Champaign

AFTERNOON

12:00
Lunch at the Institute for Genomic Biology (IGB)

1:30–3:00
Tour of IGB and the Energy Biosciences Institute (EBI)

3:00
Break and move to the Coordinated Sciences Laboratory

3:30
Welcome

Bill Sanders
Interim Director

3:45
Image Formation and Processing Research

Tom Huang

4:15
SmartGrid and Trusted Cyberinfrastructure for the PowerGrid

Pete Sauer

Tom Overbye

Himanshu Khurana

6:00
Dinner in Beckman Institute Tower Room

APPENDIX C

Agenda: São Paulo

Moving Ideas out of the Lab and into the Marketplace: the Role of Tech Transfer and Entrepreneurship in Innovation Economies

Monday, July 13, 2009

MORNING

2:00–6:00
Meetings and Workshops at the Getúlio Vargas Foundation

2:00–3:30
Brazilian Delegation Workshop Pre-Meeting

3:00
U.S. Delegation meets in Renaissance São Paulo Hotel lobby to depart for Workshop at Getúlio Vargas Foundation

3:30–4:00
How Can We Innovate, Drive Down Costs and Save Energy Now?

An Opportunity: The U.S. Department of Energy Save Energy Now program—an initiative of the Industrial Technologies Program (ITP)—aims to drive a 25 percent reduction in industrial energy intensity over 10 years. Companies around the world can participate in energy assessments and use ITP resources to reduce energy use while increasing profits. These assessments help companies identify key opportunities for savings by focusing on energy-intensive systems such as process heating, ste, pumps, fans, and compressed air. For example, U.S. manufacturing companies that have participated in Save Energy Now energy assessments have saved an average of $2 million, or 8 percent of their total energy costs.

A Proposal: Brazilian firms and organizations can learn about the Save Energy Now program and engage with senior leadership from the United States Department of Energy to learn how they can also participate and benefit.

4:00–4:30
How Can We Assess and Optimize the National Renewable Energy Portfolios in Brazil and the United States?

An Opportunity: Brazil and the United States stand to gain considerably from working together to create and optimize national renewable energy assessments/ benchmarks. Engaging the private and public sectors, as well as academia from both countries, to develop new metrics and build comprehensive benchmarks will create the basis for a robust U.S.-Brazil collaborative model.

A Proposal: Representatives from Brazilian organizations can engage with senior leadership from the U.S. Department of Energy and other organizations to scope out real opportunities to find and create national renewable energy assessments.

4:30–6:00
Joint U.S.-Brazil Workshop

"Build-out of the Western Hemisphere Renewable Energy Education Coalition'"

Co-Chairs

Ravishankar K. Iyer
Interim Vice-Chancellor for Research
University of Illinois at Urbana-Champaign

Carlos Eduardo Pereira
Vice-Dean, School of Engineering, and Professor, Electrical Engineering Department, Federal University of Rio Grande do Sul (UFRGS), and Technical Director, CETA-SENAI/RS (Applied Research Institute)

8:00
Delegation Dinner

Location: Cantaloup Restaurante

Tuesday, July 14, 2009

An innovation economy that drives economic growth and job creation will be fueled by research and new ideas—and those will start from curiosity-based research, then move to application and finally to commercial exploitation. The United States and Brazil must certainly retain and enhance their research at the frontiers—a key theme from Innovation Learning Laboratories 1 and 2.

But both nations must also improve the processes that evolve these ideas into new products, new services or new solutions. By many measures, the U.S. economy leads the world in knowledge creation and entrepreneurship—but it is also clear that good ideas are left on the shelf, and new strategies are needed to develop the next generation of innovative workers who will bring ideas to the marketplace. This Laboratory hopes to explore ways both nations can accelerate knowledge and technology transfer, spur entrepreneurship and catalyze the next generation of innovators in the Western Hemisphere's two largest economies.

Attention will focus on innovation challenges and opportunities neither country can meet alone—as well as cross-sector learnings—particularly in strategic areas, like energy efficiency and renewables, and information and communications technologies.

MORNING

9:00—9:30
Introductions and Opening Remarks

Deborah L. Wince-Smith
President
Council on Competitiveness

Maria Tereza Fleury
Director
School of Business and Administration Getúlio Vargas Foundation (FGV-SP)

Reginaldo Braga Arcuri
President
Brazilian Agency for Industrial Development

Claudio Gastal
President
Movimento Brasil Competitivo

9:30–9:45
Innovation Learning Labs 1 & 2: Recap

Tod Perry
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

Ravishankar K. Iyer
Interim Vice Chancellor for Research
University of Illinois at Urbana-Champaign

Carlos Eduardo Pereira
Vice Dean, School of Engineering, and Professor, Electrical Engineering Department, Federal University of Rio Grande do Sul (UFRGS), and Technical Director, CETA-SENAI/RS (Applied Research Institute)

9:45–10:45
Exploring the Technology Transfer Profile in Brazil and the United States—Case Study: Energy Efficiency and Renewables

A moderated conversation with two kick-off discussants (5 min. each)

Moderator
Claudio Gastal
President
Movimento Brasil Competitivo

Kick-off Discussants
Kenneth Polasko
Vice President of Business Development
Arizona Technology Enterprises

Monica Neves Cordeiro
Superintendent, New Business
Companhia Energética de Minas Gerais/ Energy Company of Minas Gerais (CEMIG)

Focus Questions
- Is the ecosystem favorable for innovation, tech transfer and commercialization activities?
- What are the main features and key elements of the innovation ecosystem—regional and national—that facilitate technology transfer?
- Are there key policy/regulatory barriers to overcome to optimize the transfer of technology into the marketplace?

10:45–11:00
Break

11:00–12:00
Exploring the Entrepreneurship Profile in Brazil and the United States

A moderated conversation with two kick-off discussants (5 min. each)

Moderator
Ted Rogers
Managing Partner
PPI Ventures

Kick-off Discussants
Michael Nicklas
Managing Director
SocialSmart Ventures | NYC & SP

Silvio Meira
Chief Scientists
C.E.S.A.R.

Focus Questions
- How are entrepreneurship and risk-taking encouraged (or discouraged)—for students, researchers and employees within a lab or firm?
- Are there model entrepreneurship progrs/best practices to leverage across both Brazil and the United States?

AFTERNOON

12:00–1:30
Brainstorm Lunch

Kick-off Discussant
Julia Rosen
Associate Vice President for Innovation and Entrepreneurship
Arizona State University

Participants will engage in a table brainstorm: each table will be challenged to generate at least one actionable, bi-national idea/partnership to drive entrepreneurship and risk-taking. Table representatives will "report" key ideas in a moderated conversation before breakout sessions after lunch.

1:30–1:45
Brainstorm Lunch Report to Plenary

Moderator
Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

1:45–3:15
Encouraging Risk-taking in Research and Entrepreneurship: Cross-Sector Learnings

Kick-off Discussant
Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

Opportunities exist in both the United States and Brazil to leverage—across multiple industry sectors—a focus on energy efficiency and renewables to drive entrepreneurship, knowledge creation and investment.

Innovation Learning Lab participants will break into three, moderated, sector-focused discussion groups—Renewable Energy; Green Building; and, Information and Communications Technologies—to identify tangible projects and partnerships across both countries that could optimize entrepreneurial activity and investment around energy opportunities and challenges.

Each discussion group will be moderated and launched by a kick-off discussant. The goal of each discussion group is to address the following questions; and prepare a report back to the larger group on priorities and recommendations to boost entrepreneurially-focused activities within and between both countries, and promote knowledge creation and technology transfer activities.

Assess the current environment

- What policies are in place—at the local, regional and national levels—that support entrepreneurship?
- What top 3 priorities are needed to enable greater entrepreneurial activity?
- How are viable projects and investments currently funded—what are the successful private and public funding models?
- What is the status of seed and venture funding? Are there "funding gaps" ("valley of death")?
- What are the barriers to creating a thriving venture capital investment environment in this field?

Share best practices

- What are the best practices in (as well as challenges to) promoting knowledge and technology transfer? Driving entrepreneurial activity? Attracting investment?
- Are there successful models—in the United States and Brazil—that can be scaled and replicated in either country?

Breakout A: Renewable Energy

Breakout B: Green Building/Energy Efficiency

Breakout C: Information and Communications Technologies

3:15–3:30
Break

3:30–5:00
Seizing on Opportunities: Reports from the Breakouts and Next Steps

A moderated conversation with one kick-off discussant from each breakout group.

Moderator
Roberto Alvarez
International Affairs Manager
Brazilian Agency for Industrial Development

5:00–5:30
Wrap-up & Next Steps

Moderator
Roberto Alvarez
International Affairs Manager
Brazilian Agency for Industrial Development

Reginaldo Braga Arcuri
President
Brazilian Agency for Industrial Development

Claudio Gastal
President
Movimento Brasil Competitivo

Maria Tereza Fleury
Director
School of Business and Administration Getúlio Vargas Foundation (FGV-SP)

Deborah L. Wince-Smith
President
Council on Competitiveness

Wednesday, July 15, 2009

MORNING

10:00-11:00
Meeting with UNICA Leadership

Marcos Sawaya Jank
President
UNICA

Eduardo Leão
Director
UNICA

Carolina Costa
Public Affairs
UNICA

APPENDIX D

Agenda: Silicon Valley
Moving Ideas Out of the Lab and Into the Marketplace: the Role of Tech Transfer and Entrepreneurship in Innovation Economies

Wednesday, August 5, 2009

MORNING

10:30–12:30
Brazilian Delegation meeting

Location: Wilson Sonsini Goodrich & Rosati

12:30–2:00
Joint Delegation Lunch Meeting—California Cleantech Open

Presentation of clean technology business accelerator

Location: Wilson Sonsini Goodrich & Rosati

Marc Gottschalk
Partner—Clean Tech Practice
Wilson Sonsini Goodrich & Rosati

Rex Northern
CTO—Executive Director
Wilson Sonsini Goodrich & Rosati

AFTERNOON

3:00–5:00
Serious Materials Site Visit

Host: Kevin Surace, President and CEO

Location: Serious Materials Corporate Headquarters and R&D Facility

7:00–9:30
Joint Delegation Reception and Dinner

Host: Deloitte—San Jose

Location: Straits Cafe

Thursday, August 6, 2009

An innovation economy that drives economic growth and job creation will be fueled by research and new ideas—and those will start from curiosity-based research, then move to application and finally to commercial exploitation.

The United States and Brazil must certainly retain and enhance their research at the frontiers—a key theme from Innovation Learning Laboratories 1 and 2 in Porto Alegre and Chicago.

But both nations must also improve the "platforms" that drive new products, services and solutions to the marketplace—the key focus from Innovation Learning Laboratory 3 in São Paulo.

By many measures, the United States leads the world in knowledge creation and entrepreneurship—but it is also clear that even in this robust environment good ideas are left on the shelf.

This Laboratory—a bridge between Labs 3 and 5 in São Paulo and Rio de Janeiro—will explore ways in which both nations can accelerate knowledge and technology transfer, spur entrepreneurship and catalyze the next generation of innovators in the Western Hemisphere's two largest economies.

Attention will focus on innovation challenges and opportunities neither country can meet alone—as well as cross-sector learnings—particularly in strategic areas, like energy efficiency and renewables, and information and communications technologies.

MORNING

8:45–9:15
Introductions and Opening Remarks

Marc Gottschalk
Partner—Clean Tech Practice
Wilson Sonsini Goodrich & Rosati

C. William Booher, Jr.
Chief Operating Officer and Treasurer
Council on Competitiveness

Claudio Gastal
President
Movimento Brasil Competitivo

Roberto Alvarez
International Affairs Manager
Brazilian Agency for Industrial Development

Tod Perry
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

9:15–9:30
Innovation Learning Labs 1-3: Recap

Ellen Luttrell
Energy Communications
Consultant to U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy

Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

9:30–10:15
The Role of "Business Engineers" in Technology Transfer and Entrepreneurship

A moderated conversation with two to three kick-off discussants (5 min. each).

Focus Questions

- What role can "business engineers"—those who both understand technologies and have the business know-how to take technologies to market—play in technology transfer?
- Is the ecosystem favorable for moving ideas out of the lab and into the marketplace? What barriers exist?
- Are there key policy/regulatory barriers to overcome to optimize the transfer of technology into the marketplace?

Kick-off Discussants
Julia Rosen
Associate Vice President for Innovation and Entrepreneurship
Arizona State University

Denis Maia
CEO
Choice, Energy Intelligence

10:15–11:00
Crossing the "Valley of Death" in Brazil and the United States

A roundtable conversation with two to three kick-off discussants (5 min. each).

Focus Questions

- What are the barriers to crossing the "valley of death"—loosely defined as the stage after a technology exits the lab but before it is a marketable product?
- Are there model angel or seed investment progrs/best practices to leverage across both Brazil and the United States?

Kick-off Discussants
Ted Rogers
Managing Partner
PPI Ventures

Simon Olson
Partner
DFJ FIR Capital

11:00–12:00
Platforms for Innovation and Entrepreneurship

A roundatble conversation with two to three kick-off discussants (5 min. each).

Focus Questions

- What systems of support—legal, regulatory, marketing, etc—are necessary to enable entrepreneurs?
- How do you build and nurture these platforms for innovation and entrepreneurship?
- What roles should the government—local, regional, state and/or national—the private sector and academia play in creating this innovation and entrepreneurship platform?

Kick-off Discussants

Marc Gottschalk
Partner—Clean Tech Practice
Wilson Sonsini Goodrich & Rosati

Raul Suster
Coordinator, Center for Technological Information
National Institute of Industrial Property (INPI)

AFTERNOON

12:00–1:00
Lunch: Brainstorming and Sharing

Participants will engage in a table brainstorm: each table will be challenged to generate at least one actionable, bi-national idea/partnership to drive entrepreneurship and risk-taking. Table representatives will "report" key ideas in a moderated conversation before the afternoon sessions.

1:00–2:45
Connecting Ideas with the Market

Moderator
Tod Perry
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

Startup leaders will showcase: what it takes to build a business in the United States; and business products and services ready for deployment in Brazil.

1:00–1:45
Startup Presentations

Zach Gentry
Chief Strategy Officer
Adura Technologies, Inc.

Kyle McCue
Chief Executive Officer
Ternion Bio Industries, Inc.

Mark Mitchell
Chief Operating Officer
Serious Materials

Jim Sanfilippo
President
Nila Environmentally Sustainable Lighting

1:45–2:45
Roundtable Conversation: Breaking Down Barriers—How Can Entrepreneurs Tap into the Opportunities in the United States and Brazil?

2:45–3:00
Break

3:00–4:00

The Road Ahead for Technology Transfer and Entrepreneurs in Clean, Renewable and Efficient Energy

Opportunities exist in both the United States and Brazil to leverage—across multiple industry sectors—a focus on energy efficiency and renewables to drive entrepreneurship, knowledge creation and investment.

Innovation Learning Lab participants will break into three, moderated discussion groups—Cutting-edge Collaborations: Smartgrid; New Consumer Understanding: Utilities; and New Energy Technologies: The Gechangers—to identify tangible projects and partnerships across both countries that could optimize entrepreneurial activity and investment around energy opportunities and challenges.

Each discussion group will be moderated and launched by a kick-off discussant. The goal of each discussion group is to address the following questions; and prepare a report back to the larger group on priorities and recommendations to boost entrepreneurially-focused activities within and between both countries, and promote knowledge creation and technology transfer activities.

Assess the current environment

- What policies are in place—at the local, regional and national levels—that support entrepreneurship, risk-taking and cross-sector collaboration?
- What top three priorities are needed to enable greater entrepreneurial activity?
- How are viable projects and investments currently funded—what are the successful private and public funding models?
- What is the status of seed and venture funding? Are there "funding gaps" ("valley of death")?
- What are the barriers to creating a thriving venture capital investment environment in this field?

Share best practices

- What are the best practices in (as well as challenges to) promoting knowledge and technology transfer? Driving entrepreneurial activity? Attracting investment? Increasing collaboration?
- Are there successful models—in the United States and Brazil—that can be scaled and replicated in either country?

Breakout A: Cutting-edge Collaborations and New Consumer Understanding: Smart Grid and Utilities

Kick-off Discussants
Monica Neves Cordeiro
Superintendent, New Business Companhia Energética de Minas Gerais/ Energy Company of Minas Gerais (CEMIG)

Jonathan C. Pickering
Global Marketing and Business Development
Solar Business Group
Applied Materials, Inc.

Breakout B: New Energy Technologies—The Gechangers

Kick-off Discussants
Omkaram Nalamasu
Deputy Corporate CTO & Vice President
Applied Materials, Inc.

Ricardo Menna Barreto Felizzola
Vice President, Altus
Vice President & Coordinator—Council of Innovation & Technology, Federation of Industries of the State of Rio Grande do Sul (FIERGS)

4:00–4:30
Seizing on Opportunities: Reports from the Breakouts and Next Steps

A moderated conversation with one kick-off discussant from each breakout group.

Moderator
Roberto Alvarez
International Affairs Manager
Brazilian Agency for Industrial Development

4:30–5:00
Wrap-up & Next Steps

Marc Gottschalk
Partner—Clean Tech Practice
Wilson Sonsini Goodrich & Rosati

Claudio Gastal
President
Movimento Brasil Competitivo

Roberto Alvarez
International Affairs Manager
Brazilian Agency for Industrial Development

Tod Perry
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

5:00–5:30
Sidebar Conversation with Commissioner Dian Grueneich from the California Public Utilities Commission

Location: Wilson Sonsini Goodrich & Rosati

5:15–7:00
Council on Competitiveness Courtyard Closing Reception

Host: Lawrence Livermore National Laboratory, Wilson Sonsini Goodrich & Rosati and Council on Competitiveness

Location: Wilson Sonsini Goodrich & Rosati Courtyard

Friday, August 7, 2009

AFTERNOON

12:00–2:00
Joint Delegation Site Visit and Roundtable

Discussion with San Jose Bio Center

Location: San Jose Bio Center

2:30–4:00
VIP Tour of Applied Materials, Inc.

Tour Applied Materials AKT Facility to learn about how the company leverages its technology from its display business to develop its SunFab thin film production line. The tour will also visit the Apps Lab where the company conducts R&D activities for its display and thin film solar products.

Location: Applied Materials, Inc.

7:30–9:00
No-Host Joint Delegation Dinner

Saturday, August 8, 2009

MORNING

10:00–12:00
VIP Behind-the-Scenes Tour of the California Academy of Sciences Green Building

Tour Lead
Scott Moran
Senior Project Manager
Greening of Building Design & Construction

APPENDIX E

Agenda: Rio de Janeiro
Leveraging Innovation Capacity to Drive Competitiveness and Prosperity

Wednesday, August 19, 2009

EVENING

7:30–9:30
Joint Delegation No-Host Dinner at Porcão Rio

Thursday, August 20, 2009

MORNING

8:30–10:00

Ultimate prosperity and competitiveness in both the United States and Brazil depend not only on fundamental research, the creativity of each country's workforce, the ability to create and transfer knowledge, and an entrepreneurial spirit—themes explored in Labs 1-4.

Prosperity—especially job creation and the formation of new firms and industries—depends upon the ramp-up of manufacturing and production capabilities. How do both nations begin to design and implement a new foundation for high-performance production? What are the new human, organizational, financial and policy models needed for a robust manufacturing future in the United States and Brazil?

Attention will focus on solutions and collaborations—as well as cross-sector learnings—particularly in strategic areas, like energy efficiency and renewable and information and communications technologies.

Location: Finep
Praia do Flamengo, 200—Flamengo
Rio de Janeiro, RJ

8:30–9:00
Registration

9:00–9:30
Host Introductions and Opening Remarks

Claudio Gastal
President
Movimento Brasil Competitivo

Deborah L. Wince-Smith
President
Council on Competitiveness

Maria Luisa Leal
Director
Brazilian Agency for Industrial Development

Luís Fernandes
President
The Brazilian Innovation Agency (FINEP)

9:30–10:00
The Legal, Regulatory and Intellectual Property Environment for Innovation, Competitiveness and Prosperity

A moderated conversation …

Focus Questions
- What are the characteristics of a legal and regulatory environment that are favorable to business development?

Kick-off Discussants
Alexandre Couto
Partner
Barbosa, Müssmich & Aragão Attorneys

Ted Rogers
Managing Partner
PPI Ventures

10:00–11:00
Workforce Deployment and Economic Development

A moderated conversation…

Focus Questions

- How do organizations hire, train, retain and deploy a skilled and flexible workforce in a competitive and ever-changing global marketplace?
- What technologies, networking and infrastructure models and approaches can organizations employ in order to develop a more efficient and sustainable workforce deployment?
- How do organizations combine best practices in innovation-intensive fields, such as energy efficiency and clean tech, with meaningful economic benefits and job creation?

Kick-off Discussants
Eduardo Costa
Director of Innovation
The Brazilian Innovation Agency (Finep)

Tod Perry
Program Manager, Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

11:00–12:15
Connecting Ideas with the Market: A Presentation of Brazilian Startups

Moderator
José Alberto Sampaio Aranha
Director, Genesis Institute (PUC-Rio)
Board Member, ANPROTEC

Startup leaders will showcase what it takes to build a business in Brazil—as well as business products and services ready for deployment in Brazil and the United States.

AFTERNOON

12:15–12:45
Lunch

12:45–1:00
Presentation and Q&A by Johnson Controls: An Energy Efficiency Study of Brazil and the United States

1:00–1:15
The Road to the Second U.S.-Brazil Innovation Summit 2010: A Review of Joint Initiatives Generated in the U.S.-Brazil Innovation Learning Laboratories

Roberto Alvarez
International Affairs Manager
Brazilian Agency for Industrial Development

Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

1:15–5:45
Afternoon Working Sessions

Creating Pathways to Implementation
Participants will discuss opportunities for bi-national partnerships within specific sectors—and craft plans for tangible results and activities that will be presented in the sixth and final U.S.-Brazil Innovation Learning Laboratory, September 9-10, 2009, at the U.S. National Renewable Energy Laboratory.

1:15–2:30
Workshop A: Smart Grid Collaboration Initiative

Leads
Monica Cordeiro
CEMIG

Asghar Mirarefi
University of Illinois at Urbana-Champaign

Goal: Establish a Renewable Energy and Smart Grid Demonstration Project through education exchange and institutional collaboration focused on smart grid technologies

This project will develop a joint proposal to public and private sector funders in Brazil and the United States to develop a tangible Demonstration Project of Renewable Energies and

Intelligent Grids, incorporating student, faculty, business leader and idea exchange between leading research institutions, utilities and private sector companies in both countries.

The Demonstration Project will be designed to assist the Brazilian distributed power industry in the development and testing of distributed power systems, focusing on technologies available to generate energy from renewable sources (e.g. wind, solar) and the systems needed to integrate the power generated to the grid (such as smart grid infrastructure, power line communication, wireless infrastructure, etc.). Through an Open Invitation and a Project Commission, selected Brazilian and U.S. companies and sponsoring distribution companies can work together—with leading research institutions in both countries—on different themes in order to structure a demonstration project in two or three sites that supply a minimum of 60,000 consumers.

In addition to CEMIG, the University of Illinois at Urbana-Champaign and the Federal University of Rio Grande do Sul, the Smart Grid Collaboration and Education Exchange will engage other institutions and organizations in the United States and Brazil, including:

- The current exchange program between the Getúlio Vargas Foundation and the University of Colorado at Boulder's Leeds School of Business
- Deere & Company's employee education opportunities
- Other companies and universities who are members of the Council on Competitiveness and the Brazilian Competitiveness Movement

2:30–4:00
Workshop B: U.S.-Brazil Co-Incubation

Leads
Kátia Aguiar
Rio de Janeiro Incubators Network and Bio Rio

Priscila Perillier O'Reilly de Araujo Castro
Genesis Institute (PUC-Rio Incubator)

Ted Rogers
PPI Ventures

Goal: To create U.S.-Brazil collaboration of incubators to spur entrepreneurship and business development.

Incubators in the United States and Brazil are hemispheric leaders in fostering entrepreneurship and innovation. From clean technology companies to biotech firms, U.S. and Brazilian incubators help startups take their technologies to the market, create jobs and drive national prosperity.

A cross-border collaboration between incubators will highlight best practices, share networks of investors and entrepreneurs and open a pipeline of innovative—and marketable—ideas between the United States and Brazil.

4:15–5:45
Workshop C: Cleantech Open Brazil

Leads
Ricardo Felizzola
Federation of Industries of the State of Rio Grande do Sul (FIERGS)

Ellen Luttrell
Energy Communications Consultant to the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy

Goal: To create, host and launch a Cleantech Open in Brazil.

The Cleantech Open is an organization of leading entrepreneurs, academics, investors and companies in California, Colo., and other U.S. states, working together to accelerate the development of clean technology startups.

Cleantech Open Brazil would provide resources, education and support for clean tech entrepreneurs. Activities might include an Annual Business Competition, Mentoring, Sustainability Workshops, a series of Public Symposia and Resource Directory.

Any inventor, technologist or clean tech enthusiast in Brazil with a great clean tech idea will be invited to submit an Executive Summary of his or her idea. After rounds of judging, Finalists and Winners would receive a "Startup-in-a-Box" package of cash and services, donated by high-profile sponsors. Packages could include: cash, office space, legal services, accounting, insurance, public relations, recruiting, software, and other business essentials.

5:45–6:00
Wrap-up & Next Steps

Claudio Gastal
President
Movimento Brasil Competitivo

Deborah L. Wince-Smith
President
Council on Competitiveness

Maria Luisa Leal
Director
Brazilian Agency for Industrial Development

8:00–10:00
Joint Delegation Reception and Dinner

Host: Johnson Controls, Inc.

Location: Térèze Restaurant

Paulo Freire
Vice President BE Brazil
Johnson Controls, Inc.

Johnson Controls, Inc., a global multi-industrial leader in energy efficiency, commissioned research within the Brazilian business community to examine perceptions of energy efficiency and sustainability. Named the Energy Efficiency Indicator (EEI), this survey includes responses from executives responsible for managing, reviewing or monitoring energy use within their organizations. The survey examines the impacts on management of energy within companies, including financing strategies, expected return-on-investment, incentives, certification, renewable energy strategies and the outlook on building efficiency trends.

Friday, August 21, 2009

MORNING

8:00
Joint Delegation visit to CEPEL—Eletrobrás' Electric Energy Research Center for Side Meetings on Bilateral Energy Opportunities

Location: CEPEL

9:00–10:00
Energy Efficiency Program Side Meeting

Leads
Dario Azevedo
Pontifical Catholic University of Rio Grande do Sul (PUCRS)

Tod Perry
National Renewable Energy Laboratory

Representatives from Johnson Controls, Eletrobrás and Grupo Gerdau

Goal: Develop an energy efficiency program with major Brazilian manufacturing companies in order to reduce industrial energy intensity and identify key opportunities for savings by focusing on energy-intensive systems such as process heating, steam, pumps, fans, and compressed air.

The DOE has developed a program in the United States called Save Energy Now—a national initiative of the Industrial Technologies Program (ITP), "to drive a 25 percent reduction in industrial energy intensity in 10 years. Companies nationwide can participate in no-cost energy assessments and utilize ITP resources to reduce energy use while increasing profits."

Assessments help companies identify key opportunities for savings by focusing on energy-intensive systems. Several U.S.-based firms in the Gerdau Group, chaired by Jorge Gerdau—who also chairs MBC—have already undergone Save Energy Now energy assessments. U.S. manufacturing companies that have participated in Save Energy Now energy assessments have saved an average of $2 million, or 8 percent of their total energy costs.

10:00–11:00
"National Renewable Energy Assessment"

Side Meeting

Leads
Hamilton Moss
Ministry of Mines and Energy

Janio Itiro Akamatsu
Eletrobrás

Tod Perry
National Renewable Energy Laboratory

Goal: Develop a nation-wide assessment of Brazil's renewable energy portfolio.

Over the next 20 years, Brazil's demand for energy will increase dramatically. And while a robust infrastructure for hydroelectricity exists throughout the country, more is needed in other forms of renewable energy to meet this growing demand.

In this project, the Brazilian government would—in collaboration with the U.S. Department of Energy and the U.S. National Renewable Energy Laboratory—develop a National Renewable Energy Assessment of Brazil's renewable energy portfolio to prioritize renewable energy investment and anticipate future energy demand.

11:00
Delegation Departs to INMETRO, in Xerém

Location: Campus do INMETRO em Xerém

AFTERNOON

12:00–3:00
Lunch and Side Visit at INMETRO (National Institute of Metrology, Standardization and Industrial Quality)

INMETRO was created in 1973 to support Brazilian enterprises to increase their productivity and the quality of goods and services. Its major task is to improve the quality of life of citizens as well as to seek the competitiveness of the economy through metrology and quality.

This side visit will include INMETRO's facilities dedicated to energy efficiency and a tour to the Institute's Technological Park in Xerém (PTX), which encompasses a Business Park and Incubator and the Training Center in Basic Industrial Technology.

APPENDIX F

Agenda: Golden
Leveraging Innovation Capacity to Drive Competitiveness and Prosperity

Wednesday, 9 September 2009

AFTERNOON

2:00
Delegation Meets in Denver Marriott West Hotel Lobby to Depart for Xcel Site Visit

3.00–5.00
Visit to Xcel Energy Control Room

Xcel leadership will present their smart grid philosophy, followed by a roundtable discussion and a tour of the operations and control center.

Location: Xcel TSB Building

6:30–8:30
Joint Delegation Opening Dinner

Hosted by Lee McIntire, CEO of CH2M HILL and a Council on Competitiveness executive committee member, at the Denver Country Club

6:30–7:00
Reception

7:00–8:00
Dinner

8:00–8:30
Dessert and Coffee

Thursday, 10 September 2009

Ultimate prosperity and competitiveness in both the United States and Brazil depend not only on fundental research, the creativity of each country's workforce, the ability to create and transfer knowledge, and an entrepreneurial spirit—themes explored in Labs 1-4.

Prosperity—especially job creation and the formation of new firms and industries—depends upon the rp-up of manufacturing and production capabilities, as well as the workforce and economic develoent strategies regions develop to leverage resources and competencies. How do both nations begin to design and implement a new foundation for high-performance production? What are the new human, organizational, financial and policy models needed for a robust manufacturing future in the United States and Brazil? What are the benchmarks for success in regional economic develoent?

Attention will focus on solutions and collaborations—as well as cross-sector learnings—particularly in strategic areas, like energy efficiency and renewable and information and communications technologies.

Location: National Renewable Energy Laboratory (NREL)

MORNING

9:00—9:30
Opening Remarks

Dan Arvizu
Director and Chief Executive
National Renewable Energy Laboratory

Deborah L. Wince-Smith
President
Council on Competitiveness

David E. Rodgers
Director of Strategic Planning and Analysis
U.S. Department of Energy

Claudio Gastal
President
Movimento Brasil Competitivo (MBC)

Clayton Campanhola
Director
Agência Brasileira de Desenvolvimento Industrial (ABDI—Brazilian Agency for Industrial Development)

9:30—10:45
Innovation Hotspots: What Is the Future of Regional Economic Development in an Increasingly Globalized Economy?

A moderated conversation…

Focus Questions

- What are the leadership strategies, best practices and tools that can help regional leaders better leverage assets within a regional innovation ecosystem to create Regional Innovation Hotspots?
- Why are some regions more successful than others in competing against—often lower cost—global competition?
- What is the definition of regional leadership? What are exples of effective 21st century regional leadership?

Kick-off Discussants
Alison Wise
Senior Strategic Analyst
National Renewable Energy Laboratory

Gilberto Teixeira
President
Elo Electronic Systems

Steve Petersen
Economic Development and Advanced Planning Specialist
Industrial and Advanced Technology Group
CH2M HILL

Amy Reichert
Director, Trade & Investment for the Americas
Colorado Office of Economic Development & International Trade

10:45—11:30
U.S.-Brazil Innovation Learning Laboratory Deliverables Preview: Cleantech Open Brazil

Leads
Marc Gottschalk
Partner—Clean Tech Practice
Wilson Sonsini Goodrich & Rosati

Richard Franklin
Rocky Mountain Cleantech Open

Thaise Graziadio
Project Area in IEL/RS
Federation of Industries of Rio Grande do Sul

Goal: To create, host and launch a Cleantech Open in Brazil.

The Cleantech Open is an organization of leading entrepreneurs, academics, investors and companies in California, Colorado and other U.S. states, working together to accelerate the develoent of clean technology startups.

Cleantech Open Brazil would provide resources, education and support for clean tech entrepreneurs. Activities might include an annual business competition, mentoring, sustainability workshops, a series of public symposia and resource directory.

Any inventor, technologist or clean tech enthusiast in Brazil with a great clean tech idea will be invited to submit an Executive Summary of his or her idea. After rounds of judging, Finalists and Winners would receive a "Startup-in-a-Box" package of cash and services, donated by high-profile sponsors. Packages could include: cash, office space, legal services, accounting, insurance, public relations, recruiting, software, and other business essentials.

11.30–12.45
Lunch

Discussant
Helena Chum
NREL Research Fellow
National Renewable Energy Laboratory

AFTERNOON

12:45–1:45
Workforce Deployment: How Do We Train and Deploy Talent in the 21st Century to Innovate?

A moderated conversation…

Focus Questions
- How do organizations hire, train, retain and deploy a skilled and flexible workforce in a competitive and ever-changing global marketplace?
- What technologies, networking and infrastructure models and approaches can organizations employ in order to develop a more efficient and sustainable workforce deployment?
- How do organizations combine best practices in innovation-intensive fields, such as energy efficiency and clean tech, with meaningful economic benefits and job creation?

Kick-off Discussants
Jo Winger de Róndon
Vice President
CAEL

Claudio Gastal
President
MBC

1.45–3.00
21st Century Manufacturing: What Is the Foundation for High-Performance Production and Wealth Creation in the United States and Brazil?

A moderated conversation…

Focus Questions
- What are the most critical factors driving the competitiveness of your nation's manufacturing industry (e.g., cost; infrastructure quality; taxation/legal/regulatory environment; effective public-private sector collaboration; etc.)?
- How do companies and regions leverage innovation assets (from fundental research to entrepreneurial ventures) to create and deploy new manufacturing capacity in the United States and Brazil?
- How can we develop an energy efficiency program with major Brazilian manufacturing companies in order to reduce industrial energy intensity and identify key opportunities for savings?

Kick-off Discussants
Michael O'Halloran
Director of Technology
CH2M HILL

Thomas D. Perry IV
Program Manager
Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

Marcos Vinícius de Souza
Industrial Technology Secretariat
Brazilian Ministry of Industry, Development and Foreign Trade

3.00–3.15
Break

3.15–3.45
Smart Grid Collaboration Initiative

Leads
Ravishankar Iyer
Interim Vice Chancellor for Research
University of Illinois at Urbana-Champaign

Anderson Fleming de Souza
Electric Transmission Projects Engineer
Companhia Energética de Minas Gerais/ Energy Company of Minas Gerais (CEMIG)

Goal: Establish a Renewable Energy and Smart Grid Demonstration Project through education exchange and institutional collaboration focused on smart grid technologies

This project will develop a joint proposal to public and private sector funders in Brazil and the United States to develop a tangible Demonstration Project of Renewable Energies and Intelligent Grids, incorporating student, faculty, business leader and idea exchange between leading research institutions, utilities and private sector companies in both countries.

The Demonstration Project will be designed to assist the U.S. and Brazilian distributed power industries in the develoent and testing of distributed power systems, focusing on technologies available to generate energy from renewable sources (e.g. wind, solar) and the systems needed to integrate the power generated to the grid (such as smart grid infrastructure, power line communication, wireless infrastructure, etc.). Through an Open Invitation and a Project Commission, selected Brazilian and U.S. companies and sponsoring distribution companies can work together—with leading research institutions in both countries—on different themes in order to structure a demonstration project in two or three sites that supply a minimum of 60,000 consumers.

In addition to CEMIG, the University of Illinois at Urbana-Champaign and the Federal University of Rio Grande do Sul, the Smart Grid Collaboration and Education Exchange will engage other institutions and organizations in the United States and Brazil.

3:45–4:15
U.S.-Brazil Co-Incubation

Leads
Ted Rogers
Managing Partner
PPI Ventures

Melinda Richter
Executive Director
Environmental Business Cluster and San Jose BioCenter

Dario Francisco Guimarães de Azevedo
Dean for International and Institutional Affairs
Pontifical Catholic University of the State of Rio Grande do Sul (PUCRS)

Goal: To create U.S.-Brazil collaboration of incubators to spur entrepreneurship and business development.

Incubators in the United States and Brazil are hemispheric leaders in fostering entrepreneurship and innovation. From clean technology companies to biotech firms, U.S. and Brazilian incubators help startups take their technologies to the market, create jobs and drive national prosperity.

A cross-border collaboration between incubators will highlight best practices, share networks of investors and entrepreneurs and open a pipeline of innovative—and marketable—ideas between the United States and Brazil.

4:15–4:45
National Renewable Energy Assessment

Leads
Dan Bilello
Partnerships Manager,
Strategic Energy Analysis Center
National Renewable Energy Laboratory

Jonathan C. Pickering
Global Marketing and Business Development
Solar Business Group
Applied Materials, Inc.

Clayton Campanhola
Director
Agência Brasileira de Desenvolvimento Industrial (ABDI—Brazilian Agency for Industrial Development)

4:45–5:00
Next Steps

Leads
Thomas D. Perry IV
Program Manager,
Clean Energy Entrepreneurship Center
National Renewable Energy Laboratory

Roberto Alvarez
International Affairs Manager
Agência Brasileira de Desenvolvimento Industrial (ABDI—Brazilian Agency for Industrial Development)

Chad Evans
Senior Vice President, Strategic Initiatives
Council on Competitiveness

5:00–5:30
Innovation Learning Laboratory Close

Claudio Gastal
President
Movimento Brasil Competitivo (MBC)

Clayton Campanhola
Director
Agência Brasileira de Desenvolvimento Industrial (ABDI—Brazilian Agency for Industrial Development)

Deborah L. Wince-Smith
President
Council on Competitiveness

Friday, 11 September 2009

MORNING

8:30–12:00
National Renewable Energy Laboratory Tour

AFTERNOON

1:00–3:00
Lunch and Tour of Smart Grid Demo House, Sponsored by CURRENT Group, LLC

CURRENT Group leadership will lead a tour of a Smart Grid Demo House, followed by a discussion on smart grid applications and technologies.

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ASME

Association of American Colleges and Universities

Association of American Universities

Association of University Related Research Parks

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WHO WE ARE

The Council's mission is to set an action agenda to drive U.S. competitiveness, productivity and leadership in world markets to raise the standard of living of all Americans.

The Council on Competitiveness is the only group of corporate CEOs, university presidents and labor leaders committed to ensuring the future prosperity of all Americans and enhanced U.S. competitiveness in the global economy through the creation of high-value economic activity in the United States.

Council on Competitiveness

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HOW WE OPERATE

The key to U.S. prosperity in a global economy is to develop the most innovative workforce, educational system and businesses that will maintain the United States' position as the global economic leader.

The Council achieves its mission by:

- Identifying and understanding emerging challenges to competitiveness
- Generating new policy ideas and concepts to shape the competitiveness debate
- Forging public and private partnerships to drive consensus
- Galvanizing stakeholders to translate policy into action and change

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