

**21ST CENTURY LEAPFROG ECONOMIC STRATEGY:
RIO GRANDE DO SUL BECOMES THE MOST SUSTAINABLE AND INNOVATIVE
PLACE IN LATIN AMERICA BY 2030**

**A Report to the Rio Grande do Sul State Government (AGDI) and the
World Bank, by Global Urban Development (GUD) and Unisinos, applying
GUD's Metropolitan Economic Strategy, Sustainable Innovation, and
Inclusive Prosperity Framework**

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Porto Alegre, Brazil

March 24, 2015

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EXECUTIVE SUMMARY

Since November 2011, Global Urban Development has been working with the Rio Grande do Sul (RS) state government and with the Federation of Industries (FIERGS) to apply GUD's Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity strategic policy and action framework. For the past year GUD has been collaborating with Unisinos and AGDI to produce a statewide economic strategy for Rio Grande do Sul, with funding provided by the World Bank. This lengthy report represents the fruits of our efforts.

Rio Grande do Sul has been an economic leader in Brazil for a long time. In the 20th century RS became one of the first states to successfully industrialize, and today it remains the third biggest industrial economy among Brazil's states. More than a dozen RS industries are either the largest or second largest in Brazil compared to similar industries in other states.

Yet Rio Grande do Sul is facing considerable economic challenges in the coming decades: relatively slow economic growth, decreasing workforce population, modest productivity improvement, increasing global competition, and insufficient resources to upgrade infrastructure and education, among others.

The alternative to this projected slow growth future is to vigorously promote a much more dynamic, high-growth future, with broad-based employment and income gains. The best way for Rio Grande do Sul to achieve a new level of prosperity and quality of life for Gaúcho families and communities is by becoming the most sustainable and innovative place in Latin America by 2030. We call this approach the 21st century Rio Grande do Sul "Leapfrog" Economic Strategy, because it involves jumping ahead of the present into a more technologically advanced future.

The proposed Leapfrog Economic Strategy for Rio Grande do Sul to become the most sustainable and innovative place in Latin America by 2030 directly addresses five key economic challenges: 1) the Leapfrog Economic Strategy doubles the RS economic growth rate to an average of 4 percent annual per capita GDP growth over 16 years; 2) the Leapfrog Economic Strategy dramatically increases productivity by upgrading skills and technologies; 3) the Leapfrog Economic Strategy expands the working age population by retaining and attracting a more educated and talented workforce; 4) the Leapfrog Economic Strategy strengthens global competitiveness by producing technologically advanced and innovative goods and services that compete more effectively with imports and are in greater demand as exports; 5) the Leapfrog Economic Strategy improves infrastructure and education by attracting substantial international and private sector investments, and by enhancing resource efficiency.

The best part about this strategy is that it makes full use of the traditional strengths of the RS economy, enabling them to grow even stronger. The main engine of

economic growth over the next 16 years will continue to be the massive Food Production Value Chain of Rio Grande do Sul, which represents nearly one-third of the state's economy in terms of agriculture, livestock, food processing, marketing, distribution, and the many closely related business activities in manufacturing and services. Because global food demand will increase 50 percent by 2030, the RS Food Production Value Chain will have even better opportunities to be “the rising tide that lifts all boats.”

The central thrust of the RS Leapfrog Economic Strategy will be to become a 21st century leader in Sustainable Innovation by developing, producing, and marketing a very advanced generation of Precision Production, Smart Machines, and Digital Technology, comprehensively applied to agriculture, industry, and services. This approach builds on existing RS assets and strengths in metal-mechanics and electric-electronics, from agricultural machinery/equipment/implements and transportation equipment/motor vehicles/auto parts, to automation and controls. It focuses on higher productivity through new methods of Precision Production, including Precision Agriculture, where Rio Grande do Sul already is becoming an international leader, and Precision Engineering, currently being introduced into RS shipyards constructing heavy-duty offshore oil exploration platforms, vessels, and equipment.

The emphasis on digital technology puts RS businesses ahead of the curve for the innovations of tomorrow, including both hardware and software components of goods, services, and production processes. RS can become more globally competitive in digital software by educating, attracting, and retaining high quality talent, which will facilitate faster economic and technological progress even before major improvements are completed in modern transportation mobility, efficient renewable energy, and broadband telecommunications infrastructure. This strategy maximizes existing RS strengths, even as it builds towards much greater capacity for Gaúchos to develop and use advanced technologies over the next 16 years.

The focus on Sustainable Innovation is vital for the success of the Leapfrog Economic Strategy. The future of the world will be about finding ways for billions of people to live and thrive in peace with each other and in peace with nature. And the good news is that in the 21st century, people, places, and organizations can literally “get richer by becoming greener” – earning and saving more money by conserving and reusing resources much more efficiently.

Many of the major technological advances of the coming decades will involve enabling people to enjoy economic prosperity and quality of life in ways that conserve and reuse natural resources and protect and enhance global ecosystems. The places in the world that Leapfrog into such a future, as some places already are doing, will have a huge economic competitive advantage over the rest of the world. And the first places among emerging economies in developing countries that can accomplish such technological breakthroughs definitely will Leapfrog into the front ranks of global competitiveness. This will happen for two main reasons. First,

because their expertise and experience, reflected in their products and services, will be of enormous value to the rest of the world, as it will be to their own people.

Second, because many global resources will flow to such places from elsewhere: talent, technologies, investors, entrepreneurs, students, scholars, traders, tourists, developers, donors, and much more. The world has a huge interest in supporting places committed to Sustainable Innovation, and this growing interest and the global resources that come with it will increase exponentially during the coming decade.

Rio Grande do Sul now has the opportunity, by committing in 2015 to become the most sustainable and innovative place in Latin America by 2030, to achieve exemplary, high-quality, and broad-based economic growth over the next 16 years. The following report outlines key strategies and features many detailed examples and opportunities. One of the most important of these is Sustainable Innovation Zones.

Sustainable Innovation Zones are a centerpiece of the RS 2030 Leapfrog Economic Strategy. These many special areas in municipalities throughout the state will be among the leading centers for research and development of new innovations and technologies; for promoting entrepreneurial startups and business incubation and acceleration; for experimenting with state-of-the-art methods for improving sustainability and resource efficiency in business and daily life; for enhancing creativity and collaboration; for reducing burdensome rules and regulations and creating a more supportive business-friendly environment; for establishing public-private collaboration in strategic investments and participatory community management; and much more.

Sustainable Innovation Zones in Rio Grande do Sul will be located in mixed-use communities near colleges and universities, technology parks, and technology business incubators, with commerce, housing, and other key amenities and services. They will be magnets for international talent and experiments in 21st century technology.

The goal of the RS Leapfrog Economic Strategy will be to dramatically improve the standard of living for many more people and places in Rio Grande do Sul, generating greater prosperity and quality of life for Gaúchos and enhancing livelihoods and wellbeing for families and communities throughout the state. This goal will be achieved through much more dynamic, rapid, broad-based, and long-term economic growth driven by Sustainable Innovation and Inclusive Prosperity. As the RS Leapfrog Economic Strategy successfully moves forward, jobs and incomes will grow for millions of people, and public and private resources will then expand to enable substantial new investments in cleaner water, more effective sanitation, better housing, and many other vital necessities of infrastructure and transportation, health and education, safety and security, stores and services, for all income levels statewide.

The RS Leapfrog Economic Strategy maximizes everyone's economic contributions by fully utilizing their talents and expertise through productive employment and competitive business opportunities, and by ensuring that such contributions are rewarded with rising incomes and asset ownership. One of the best ways to accelerate economic growth in RS is to develop a highly productive workforce, both by enhancing education, skills training, and advanced technologies for the state's residents and involving them more actively in dynamic economic activities, and by attracting and retaining energetic entrepreneurs and professionals from other states and countries.

ACKNOWLEDGEMENTS

This report by Global Urban Development (GUD) and Unisinos was researched and written by Dr. Marc A. Weiss (GUD Chairman and CEO, and former Unisinos International Professor of Economics and Business Management), Nancy J. Sedmak-Weiss, Esq. (GUD Secretary-Treasurer and Chief Legal Officer), and Dr. Elaine Yamashita Rodriguez (GUD Vice President). Research assistance was provided by three graduate students from Unisinos, and we deeply appreciate the excellent work of Rosangela Viegas Maraschin (Management Adviser, SINDUSCOM-SL), Vivian Sebben Adami (Associate Consultant, Produttare), and Nilso Francio (Professor, UNEMAT). This document is a follow-up to a GUD report in December 2012 for FIERGS, AGDI, and the M. Stortti Business Consulting Group on *Local and Regional Economic Development Opportunities Related to the Implementation of the São José do Norte EBR Shipyard in Rio Grande do Sul*.

Dr. Marc Weiss served as International Professor of Economics and Business Management at Unisinos from March to December 2014. He appreciates the involvement of his faculty colleagues in this project. Marcelo Machado, Unisinos project coordinator, accompanied us on a three-day site visit to Bagé, Pelotas, Rio Grande, and São José do Norte; Jorge Verschoore accompanied us on a one-day site visit to Capão da Canoa and Osório; and they both participated in numerous meetings, particularly with AGDI. André Azevedo organized two key meetings with FEDERASUL, and Oscar Rudy Kronmeyer arranged an important meeting with ABINEE. Other Unisinos faculty colleagues also provided advice and assistance, including Tiago Wikstrom Alves, Junico Antunes, Patricia Fagundes Cabral, Filipe Costa, Artur Jacobus, Susana Kakuta, Dorotea Kersch, Tania Calovi Pereira, Edilar Predabon, Daniel Puffal, Eduardo Rodrigues, Miriam Schaeffer, and Yeda Swirski. We are grateful to the Rector of Unisinos, Marcelo Fernandes de Aquino, for strongly supporting this research project.

Many professors and administrators at other colleges, universities, institutes, research institutions, technology parks, tech poles, NEPIs, APLs, and business incubators throughout Rio Grande do Sul – federal, state, municipal, private, and community – also played a vital role in advising and assisting this project.

The GUD-Unisinos team is grateful for extensive information sources, strategic advice, and technical assistance provided by senior Rio Grande do Sul (RS) state government officials from SDECT, AGDI, SDPI, SEPLAN, SEPLAG, DEPLAN, FEE, BRDE, BADESUL, CDES, SCIT, CIENTEC, FAPERGS, SESAMPE, METROPLAN, SEMA, RS Sustentável, International Relations, and many other departments and agencies.

We were greatly assisted by many statewide and national business and industry organizations, industry federations, and local business groups, including ABINEE, ABTP, AGS, AMCHAM, ASSESPRO, ASSINTECAL, CIC, CNI, FARSUL, FECOMERCIO, FEDERASUL, FIERGS, IBRAVIN, MBC, PROAMB, SEBRAE, SENAI, SINDIEÓLICA, SINDILOJAS, SINDIMÓVEIS, SINDUSCOM, and numerous others.

We also appreciate the cooperation of a wide range of civic organizations, including Agapan, Agenda 2020, CITE, Nós Coworking, UrbsNova/Distrito Criativo, and Vila Flores. We are particularly grateful to the 28 Regional Development Councils (COREDES-RS) for sharing ideas, information, experiences, and regional strategies with us.

We want to thank Brazil's federal Ministry of Development, Industry and Trade (MDIC), the Brazilian Agency for Industrial Development (ABDI), the RS Department of Development and Investment Promotion (SDPI), the RS Gaúcho Agency for Development and Investment Promotion (AGDI), the RS Department of Economic Development, Science, and Technology (SDECT), and the Global Federation of Competitiveness Councils (GFCC) for encouraging and supporting this project, and we want to especially thank the World Bank for funding the project. In addition to our Unisinos colleagues, we particularly appreciate many other people who played key roles in helping to create this project, including Roberto Alvarez, Junico Antunes, Jorge Audy, Helena Backes, Pedro Bandeira, Luciane Bergue, Jorge Boeira, Edgar Bortolini, Aline Bueno, Ana Bulow, César Busatto, Erik Camarano, Otávio Camargo, Antonio Cargnin, Hugo Marques Chimenes, Marcus Coester, Angela Danilevicz, Ivan De Pellegrin, Jackson De Toni, Marcus Falleiro, Julio César Ferst, Cibele Figueira, Marco Franceschi, Banning Garrett, Tarso Genro, Danilo Giroldo, Thaise Graziadio, Fernando Guimarães, Carlos Henrique Horn, Sérgio Kapron, Thomas Kenyon, Mauro Knijnik, Mauro Borges Lemos, Rafael Lucchesi, Ernani Machado, Álvaro Magalhães, Andréia Martins, José Cesar Martins, Vanessa Marx, Eber Marzulo, Walker Massa, Sebastião Melo, Francisco Milanez, João Motta, James Nixon, Aloísio Nóbrega, Moema Nunes, Tarson Núñez, Luiz Carlos Pinto, Jorge Piqué, João Pedro Roth, Fernanda Scur, Phillip Singerman, Erik Soderberg, Werner Trieloff, Jorge Ussan, Daniely Votto, Antonia Wallig, Deborah Wetzels, Deborah Wince-Smith, and Simone Zerbinato.

Finally, we dedicate this report to our dear friend, colleague, and mentor, Sir Peter Hall, Global Urban Development's Co-Founder and Vice Chair since 2001, and Bartlett Professor of Planning and Regeneration at University College London. Peter Hall passed away in London on July 30, 2014. He was 82 years old. We greatly miss him. Peter graciously provided wise and experienced advice for GUD's work in Rio Grande do Sul. His vision and spirit are well reflected in this strategic report. For more information about Sir Peter Hall, please review the following links: http://www.globalurban.org/Peter_Hall_Tribute.pdf; http://www.globalurban.org/Built_Environment_Peter_Hall_article.pdf.

INTRODUCTION

This project began in early September 2011, when Dr. Marc Weiss was graciously invited by the Brazilian Agency for Industrial Development (ABDI), the Brazilian Competitiveness Movement (MBC), and the US Council on Competitiveness to participate in the US-Brazil Innovation Learning Laboratory later that month at Duke University in Durham, North Carolina.

Dr. Mauro Borges Lemos, President of ABDI (later he became federal Minister of Development, Industry, and Trade, and now he is President of CEMIG in Minas Gerais), and Roberto Alvarez, ABDI's International Affairs Manager (currently he is Executive Director of the Global Federation of Competitiveness Councils in Washington, DC) met with Dr. Marc Weiss at the US-Brazil Innovation Learning Laboratory and asked him if GUD would be willing to apply its Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity framework for the State of Rio Grande do Sul (http://www.globalurban.org/Harvard_MES_article.pdf).

At that time GUD was working with the government of Brazil and the US government on the Energy and Climate Partnership of the Americas (ECPA). GUD helped organize for ECPA an international conference on Sustainable Economic Development, hosted by the city of Curitiba in June 2011 (http://www.globalurban.org/ECPA_Conference_Agenda.pdf; http://www.globalurban.org/Green_Capitalism.pdf).

In addition, GUD was working with the Federation of Industries of the State of Minas Gerais (FIEMG) on a future-oriented Sustainable Innovation economic strategy, culminating in GUD's October 2012 report for FIEMG on *Advanced Manufacturing and Sustainable Innovation: The Third Wave of Industrial and Urban Economic Growth for Minas Gerais* (available in English and Portuguese on GUD's website): ([http://www.globalurban.org/Advanced_Manufacturing_and_Sustainable_Innovation -- Economic Growth for Minas Gerais.pdf](http://www.globalurban.org/Advanced_Manufacturing_and_Sustainable_Innovation_-_Economic_Growth_for_Minus_Gerais.pdf); http://www.globalurban.org/Manufatura_Avancada_e_Inovacao_Sustentavel_em_Minas_Gerais.pdf).

Also, GUD was working with the São Paulo city and state governments, Brazil's Ministry of Cities, and the US Department of Housing and Urban Development (HUD) on two major sustainable urban development, economic regeneration, and affordable housing initiatives, "Cidade Compacta" and "Casa Paulista" (http://www.globalurban.org/Sao_Paulo_2011_International_Congress_for_Housing_&_Urban_Development.pdf).

GUD accepted Dr. Lemos' request to work with Rio Grande do Sul, and in November 2011, Dr. Weiss traveled to Porto Alegre to speak at the US-Brazil Innovation Learning Laboratory hosted by PUCRS (http://www.globalurban.org/INNOVATION_LEARNING_US-

[Brazil 2011 Porto Alegre.pdf](#)) and to participate in the annual meeting of the Global Federation of Competitiveness Councils (GFCC), held at the Plaza São Rafael Hotel. At the GFCC meeting, Dr. Lemos introduced Dr. Weiss to Mauro Knijnik, RS Secretary of Development and Investment Promotion (SDPI), Junico Antunes, SDPI Deputy Secretary, Marcus Coester, AGDI President, Ivan De Pellegrin, AGDI Director of Planning and Programs (he became AGDI President in 2013), and other RS government and business leaders. GUD agreed to work with FIERGS and the M. Stortti Business Consulting Group, with funding provided by AGDI, to apply our Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity framework to the cities and region of the Polo Naval (Naval/Offshore Industry), especially Rio Grande, Pelotas, and São José do Norte.

In February 2012, Ivan De Pellegrin and Moema Nunes, AGDI's Director and Deputy Director of Planning and Programs, gave a lecture about RS economic development and industrial policy in the graduate course taught by Dr. Marc Weiss on "Global Urban Policy and Development" at Columbia University's School of International and Public Affairs (SIPA) in New York City (http://www.globalurban.org/GUD_Columbia_University_SIPA_Course.pdf).

Dr. Weiss and Nancy Sedmak-Weiss returned to Porto Alegre for three weeks from late October to mid-November 2012. Dr. Weiss was a featured speaker at the FIERGS Innovation Conference

(<http://fiergs.org.br/inovacao2012/programacao.asp?link=p7&dia=1>).

Later he and Ms. Sedmak-Weiss spent several days, accompanied by Marco Franceschi, AGDI Director of Infrastructure and Energy, conducting interviews and site visits in Rio Grande, Pelotas, and São José do Norte. Dr. Weiss and Ms. Sedmak-Weiss also conducted interviews and participated in various meetings in Porto Alegre with RS state government officials and business leaders. In December 2012, Dr. Weiss, Ms. Sedmak-Weiss, and Dr. Elaine Yamashita Rodriguez produced a report on *Local and Regional Economic Development Opportunities Related to the Implementation of the São José do Norte EBR Shipyard in Rio Grande do Sul* (available in English and Portuguese on GUD's website:

[http://www.globalurban.org/Local and Regional Economic Development Opportunities Related to the Implementation of the Sao Jose do Norte EBR Shipyard in Rio Grande do Sul.pdf](http://www.globalurban.org/Local_and_Regional_Economic_Development_Opportunities_Related_to_the_Implementation_of_the_Sao_Jose_do_Norte_EBR_Shipyard_in_Rio_Grande_do_Sul.pdf);

[http://www.globalurban.org/Oportunidades de Desenvolvimento Local e Regional Relacionados a Implementacao do Estaleiro EBR de Sao Jose do Norte.pdf](http://www.globalurban.org/Oportunidades_de_Desenvolvimento_Local_e_Regional_Relacionados_a_Implementacao_do_Estaleiro_EBR_de_Sao_Jose_do_Norte.pdf)).

Prior to our return visit to Porto Alegre in late October 2012, GUD organized a Networking Event in September 2012 at the United Nations World Urban Forum in Naples, Italy on "Metropolitan Economic Strategy and Sustainable Economic Development in Brazil" that included Dr. Mauro Borges Lemos, Marcus Coester, and Dr. Marc Weiss among the featured speakers

([http://www.globalurban.org/Metropolitan Economic Strategy and Sustainable Economic Development in Brazil.pdf](http://www.globalurban.org/Metropolitan_Economic_Strategy_and_Sustainable_Economic_Development_in_Brazil.pdf);

http://www.globalurban.org/UN_Rio_Grande_do_Sul_Presentation.pdf).

During 2013 and 2014, GUD continued working as consultants for FIERGS to help plan their 2014 Innovation Conference. This involved organizing an international Brazil Sustainable Innovation Advisory Group and holding a major meeting for FIERGS in Washington, DC in August 2013 (http://www.globalurban.org/Brazil_Sustainable_Innovation_International_Advisory_Group.pdf). GUD then recommended several international speakers for the FIERGS 2014 Innovation Conference, including Banning Garrett and Alfred Watkins from Washington, DC, and Florian Lennert from Berlin and London (<http://fiergs.org.br/inovacao2014/programacao.asp?link=p7&dia=1>).

Also, in September 2013, Dr. Weiss was a Leading Speaker on “Applying New Technologies for Greater Mobility” at the 3rd US-Brazil Innovation Summit hosted by BNDES in Rio de Janeiro (http://www.globalurban.org/US-Brazil_Innovation_Summit.pdf; http://www.globalurban.org/US_Brazil_Innovation_Summit_Agenda_complete_final_version.pdf).

Upon completion of GUD’s December 2012 report, SDPI and AGDI asked GUD to prepare a statewide economic strategy for Rio Grande do Sul, and obtained funding from the World Bank for a one-year project. It was agreed that Unisinos would receive the funding and pay GUD to collaborate on the project, including hiring Dr. Marc Weiss as an International Professor of Economics and Business Management. In preparation, GUD organized several meetings for AGDI in Washington, DC with the US State Department, National Governors Association, US Chamber of Commerce, Atlantic Council, Wilson Center, and other organizations. AGDI’s new President, Ivan De Pellegrin, gave a presentation on RS to the Brazil-US Business Council in Washington during March 2013: (http://www.globalurban.org/Rio_Grande_do_Sul_Presentation_to_Brazil-US_Business_Council.pdf).

This RS statewide economic strategy project officially commenced on March 10, 2014. Due to the October 2014 elections, it was agreed that the long-term (16-year) Leapfrog Economic Strategy based on this report would be developed for the new RS state government executive administration that would take office beginning in 2015. Accordingly, all of our strategic policy and action advice and recommendations have been developed directly for Governor José Ivo Sartori and his senior leadership team, including Carlos Búrigo, Secretary-General of the Government (SGG), Fábio Branco, Secretary of Economic Development, Science, and Technology (SDECT), Cristiano Tatsch, Secretary of Planning and Regional Development (SEPLAN), and Susana Kakuta, President of the Development Bank of Rio Grande do Sul (BADESUL), among many others.

In conducting our research and analysis of Rio Grande do Sul’s economic past, present, and potential future, we were assisted by many government, business, and academic sources, all of which are mentioned in the Acknowledgements for this

report. We profoundly appreciate the advice and information we received throughout this year-long process. In particular, we were pleased to use extensive research by our Unisinos colleagues who compiled substantial data for the Technical Report to AGDI, *Economic and Spatial Development of Rio Grande do Sul*, which provides key background information as a companion document to our report.

Further, we obtained considerable information and insights from AGDI staff, including the 27 business sectors of the RS Industrial Policy, the APLs and NEPIs, renewable energy and strategic infrastructure, and many other issues. Also, major research by DEPLAN and FEE for SEPLAG on regional planning was quite valuable, especially their excellent three-volume 2014 joint report, *RS 2030: Agenda for Territorial Development*. Finally, we obtained numerous ideas and statistics from the 28 Regional Development Councils, including the important 2014 COREDES book, *Pro-RS V: Proposed Strategies for Regional Development in the State of Rio Grande do Sul, 2015-2018*.

Dr. Weiss and Ms. Sedmak-Weiss have primarily lived and worked in Porto Alegre and Rio Grande do Sul for the past year. Dr. Rodriguez, who is a native of Rio de Janeiro, currently lives with her husband and son in New York City, and her active participation in this project has been through frequent telephone/Skype conversations and email correspondence combined with excellent Internet-based research.

Over the past year, Dr. Weiss and Ms. Sedmak-Weiss, frequently accompanied by Rosangela Viegas or Vivian Adami, and sometimes by other colleagues from Unisinos and AGDI, conducted interviews and meetings with hundreds of people from government, business, academia, and civil society throughout Rio Grande do Sul. During our research process we visited 34 cities around RS, including Alvorada, Bagé, Bento Gonçalves, Cachoeira do Sul, Cachoeirinha, Campo Bom, Canoas, Capão da Canoa, Caxias do Sul, Cruz Alta, Erechim, Gramado, Gravataí, Guaíba, Ijuí, Lajeado, Não-Me-Toque, Nova Santa Rita, Novo Hamburgo, Osório, Passo Fundo, Pelotas, Porto Alegre, Rio Grande, Santa Cruz do Sul, Santa Maria, Santa Rosa, São Borja, São José do Norte, São Leopoldo, São Miguel das Missões, Sapucaia do Sul, Triunfo, and Viamão.

Dr. Weiss presented a draft of the statewide strategy – “21st Century Leapfrog Economic Strategy: Rio Grande do Sul Becomes the Most Sustainable and Innovative Place in Latin America by 2030” – to the 12th Annual Meeting of the 28 Regional Development Councils (COREDES-RS) in Santa Cruz do Sul on November 12, 2014, with more than 100 leaders in the audience, including senior RS state government officials. This 78-slide PowerPoint presentation is currently available as a free downloadable PDF file on the Publications page of GUD’s website (http://www.globalurban.org/COREDES-RS_Presentation_November_2014.pdf), and it is included as an integral part of this report.

Part of this project involved Dr. Weiss conducting four days of professional training on GUD's Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity research methodology and strategic policy and action framework for Unisinos faculty and students, and for senior officials from AGDI and other RS state government agencies. These training sessions took place on April 29 and May 23 at Unisinos in Porto Alegre, and during November 19 and 20 at BRDE in Porto Alegre. At the November 19-20 training, mainly for AGDI staff, Dr. Weiss spent an entire day explaining and discussing his November 12th COREDES presentation in considerable detail.

Dr. Weiss also made two other presentations during the November 19-20 training, both of which are available on GUD's website: "Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity: Methodology and History" (http://www.globalurban.org/AGDI_Training_Presentation_November_2014_Methodology_and_History.pdf) and "NoMa and the 4th District" (http://www.globalurban.org/NoMa_and_the_4th_District.pdf). The former presentation covers the historical evolution and strategic details of GUD's methodology and framework. The latter presentation is a case study of the successful 1998 strategic economic development plan for Washington, DC, comparing the internationally recognized NoMa (North of Massachusetts Avenue) initiative to opportunities for a potential Sustainable Innovation Zone in Porto Alegre's 4th District. Dr. Weiss also presented "NoMa and the 4th District" at a community meeting at Nós Coworking in Porto Alegre on June 9, 2014, and at a conference on urban planning and design for Porto Alegre's Floresta neighborhood, held at Unisinos in Porto Alegre on December 19, 2014.

OVERVIEW OF THE RIO GRANDE DO SUL 21st CENTURY LEAPFROG ECONOMIC STRATEGY

As the global pace of technological change has rapidly accelerated over the last half-century, and especially during the past two decades, experts in business, government, and academia have increasingly adopted the “leapfrog” idea for the potential future growth of emerging economies in developing countries. This concept recognizes that advanced technologies will enable these rising nations to more rapidly catch up and even surpass the developed world in terms of modern infrastructure and innovation.

The classic example of a modern technology and infrastructure “leapfrog” is in telecommunications. Even as recently as 10 years ago in many countries, most people did not have access to telephone service because there were very few landlines. Today, in many cases, landline infrastructure is not much improved, but this is no longer a major problem, because the vast majority of people now have access to relatively inexpensive mobile telephones and wireless services.

Combining wireless mobile telecommunications with the Internet, and with the rapidly increasing availability of massive cloud computing capacity, it is now possible for businesses of all sizes, even with limited financial resources, to affordably compete in markets on a global scale, producing and spreading technological innovations in products, processes, and services, as the current exponential explosion of software applications (“apps”) for billions of electronic devices clearly demonstrates.

The McKinsey Global Institute highlights a good example for Brazil: “The growth of smartphones and the mobile Internet is striking. In the 2008 survey, virtually no one mentioned a smartphone as a means of accessing the Internet; by 2012, more than 21 percent of Brazilians surveyed cited it as one of their main means of going online. *The expansion of 3G networks is creating a **leapfrog development** favoring the mobile Internet, especially in urban areas.*” (emphasis added)

Similarly, places without massive electric power generation infrastructure can increasingly utilize renewable energy technologies such as solar and wind power, with more decentralized and efficient distributed generation and storage, for sufficient energy to enable their businesses to compete globally and for Inclusive Prosperity to grow substantially.

Our proposed Leapfrog Economic Strategy for Rio Grande do Sul represents an international breakthrough in advanced technology-based strategic action. The main goal of the Leapfrog Economic Strategy is for RS to dynamically generate much higher and more broad-based economic growth by becoming the most sustainable and innovative place in Latin America by 2030, and one of the most sustainable and innovative places in the entire world. This cutting-edge approach is by far the best

way, and perhaps even the only way, to successfully solve five key economic challenges the state currently faces:

- 1) Growth
- 2) Productivity
- 3) Demographics
- 4) Competitiveness
- 5) Infrastructure and Education.

First Key RS Economic Challenge: GROWTH

Brazil ranks number seven in the world in national GDP (Gross Domestic Product), though in measuring GDP per capita, Brazil ranks a much lower number 63 among the world's nations, according to recent World Bank data. Since the goal of Leapfrog Economic Strategy should be to generate increased prosperity and quality of life for every person, and to improve the livelihood and well-being of all families and communities, in this report we will use GDP per capita as a key statistical indicator of economic growth.

Rio Grande do Sul is facing a serious economic growth challenge. Per capita GDP growth averaged just 2.1 percent annually from 2001 to 2010, and it has dropped since then, with reduced commodities demand (especially from China), declining debt-driven domestic consumption, and slower workforce growth. Even during the years of more robust economic expansion that peaked in 2010, RS lagged behind national trends, as Brazil's average GDP per capita growth in those years was 2.5 percent (during those same years, China was growing 11 percent annually, India more than 6 percent, and Chile nearly 3 percent). Since 2003 the RS share of national GDP has dropped from 7 percent to 6.4 percent. Despite its recent slower economic growth, Rio Grande do Sul is still one of the most prosperous states in Brazil; GDP per capita in RS remains 15 percent higher than the national rate.

McKinsey Global Institute forecasts future per capita GDP growth in Brazil over the next two decades to average less than 2 percent annually, based on projected population and productivity increases. According to the RS state government's Foundation for Economics and Statistics (FEE), Rio Grande do Sul's estimated future population growth is slower than most of Brazil, and though recent productivity growth in RS agriculture is well ahead of the rest of Brazil, RS lags behind average national productivity growth in industry and services. Therefore it is reasonable to assume, based on current trends, that RS per capita GDP growth will be no more than 2 percent annually over the next 20 years. Indeed, even such modest economic performance is based on a continuing rise in agricultural production and global demand. Recession in China, drought in RS, and many other potential setbacks could result in even slower statewide economic growth in future years.

This means that under the current trajectory, Rio Grande do Sul's economy may not be growing fast enough even to stabilize and protect the significant income and employment gains successfully realized during the past decade, let alone being able

to generate substantial new opportunities for future expansion of earnings and jobs that will benefit the vast majority of the state's population. Currently the RS unemployment rate is around 5 percent, which is relatively good, though job growth could be much stronger with an aggressive, forward-looking Leapfrog Economic Strategy.

The Leapfrog Economic Strategy for RS to become the most sustainable and innovative place in Latin America by 2030 will double the GDP per capita growth rate up to an average of 4 percent annually over the next 16 years, and potentially much higher. Sustainable Innovation will improve technology and resource efficiency to make companies and workers far more productive, generating growth in wages, salaries, and profits. Better quality, more competitive, and higher value products and services will reach new markets and increase sales revenues. The RS workforce will expand by receiving an influx of international talent, and RS infrastructure and education will attract additional private sector and international investment and resources.

The bottom line is that the 21st Century Leapfrog Economic Strategy is by far the best way to generate dynamic, rapid, and broad-based economic growth for Rio Grande do Sul. Indeed, it is the only way that such an ambitious goal can realistically be accomplished.

Second Key RS Economic Challenge: PRODUCTIVITY

Output per worker, or productivity, in RS industry and services lags behind Brazil as a whole (though RS is significantly higher than the national rate for agricultural productivity). Based on recent FEE data, industrial productivity growth in RS from 2003 to 2012 was 1.3 percent lower than the Brazilian national average. This is not good news, because Brazil's productivity has been growing only 1.2 percent annually for the past 25 years. During this same time period, productivity grew annually by 8.4 percent in China, 4.4 percent in India, and 2.6 percent in Chile. Today Brazil's overall rate of productivity is still relatively low by global standards. According to the Conference Board, in 2013 productivity in Mexico was nearly twice as high as in Brazil.

Rapidly increasing productivity over the next 16 years is absolutely vital for Rio Grande do Sul's people, businesses, and communities to become much more prosperous. Becoming the most sustainable and innovative place in Latin America by 2030 will generate dramatic improvements in overall productivity in agriculture, industry, and services.

Third Key RS Economic Challenge: DEMOGRAPHICS

From 1990 to 2012, 60 percent of Brazil's GDP growth came from a major expansion of the workforce, both from the growth of the working-age population and from women entering into paid employment (the female percentage of the workforce

rose from 31 percent in 1981 to 45 percent in 2011). Between now and 2030, workforce growth will decline by two-thirds relative to the previous two decades, because the birthrate is declining, the population is aging, and women's workforce participation rates will increase modestly, not exponentially.

This somewhat challenging national picture is notably exacerbated for Rio Grande do Sul, where the population and workforce trends are less favorable. In 2014 FEE and DEPLAN documented that the percentage of the state's population under the age of 15 has been falling since 2000 and is projected to continue declining to 2030. The working age population between 15 and 64 years old will reach its peak within the next five years, and will begin to significantly drop after 2025 when retirements start accelerating. Further, the rate of outmigration by Gaúcho and Gaúcha young adults (20 to 35 years old) to other Brazilian states and other countries has more than doubled in the past two decades, and this demographic trend, while still relatively modest in absolute numbers, is growing fast.

The Leapfrog Economic Strategy for RS to become the most sustainable and innovative place in Latin America by 2030 will enable RS to reverse the outflow of talented young professionals, keeping them in the state as productive and innovative workers and entrepreneurs. In addition, this strategy will turn Rio Grande do Sul into a global magnet for talented and ambitious people, greatly enhancing both the size and quality of the overall workforce. Finally, to the extent that the workforce does not grow as rapidly as in the recent past, this trend will be offset by substantially raising productivity per employed person through advanced technologies, improved workforce skills, and more efficient use and reuse of existing resources.

Fourth Key RS Economic Challenge: COMPETITIVENESS

Rio Grande do Sul was one of the first states in Brazil to industrialize, capitalizing on European metal-mechanic crafts skills to generate manufacturing industries in capital goods, agricultural machinery/equipment/implements, transportation equipment/motor vehicles/auto parts, shoes and leather, and much more. RS industries were able to serve large domestic producer and consumer markets in Brazil as they grew substantially in the 20th century, particularly since the 1940s. Brazil's industrial growth was fueled in part by the federal government's policies of high tariffs on imported goods, domestic content requirements, and many other key policies, which has somewhat diminished the global competitiveness of many (though not all) of Brazil's products, as evidenced by relatively limited export activities. For example, in the World Economic Forum's *The Global Competitiveness Report 2014-2105*, Brazil ranks number 140 out of 144 countries in exports. Brazil's total exports are just 12.5 percent of its GDP. Most of these are commodities such as soy, rice, and other grains, coffee, sugar, meat, fruit and juices, ethanol, crude oil, iron ore, gold, and other minerals. Exports of manufactured products are fewer, with much of it going to nearby South American countries.

During the past decade the situation has become even more difficult for manufacturers since the commodities boom caused the value of Brazil's currency to rise, making Brazil's industrial and consumer goods relatively more expensive. From 2005 to 2012 exports of manufactured goods from Brazil declined by 16 percent at the same time that commodities exports were growing by nearly 30 percent annually. In 2014 Brazil's international manufacturing trade deficit exceeded US\$ 50 billion, according to FUNCEX. In addition to declining exports, many Brazilian producers are struggling with rising competition from a growing number and range of imported products, from footwear to electronics.

Brazil is globally competitive in many aspects of agriculture, livestock, and food processing, and many RS companies in these fields are increasingly active in national and global markets. Similarly, Embraer's success in aircraft production has pointed the way to global manufacturing competitiveness for Brazil, and numerous RS manufacturers are thriving in global markets, though by locating production facilities in other states and countries, the positive impacts on employment growth in RS are more limited.

Through Sustainable Innovation, RS can become a major producer of advanced technologies rather than a purchaser from elsewhere. Gaúchos should be selling many locally produced innovative goods and services to Europe, East Asia, North America, and other places, instead of buying from them. According to World Bank data, less than 10 percent of Brazil's total annual manufacturing exports are high-technology products with substantial R&D intensity, such as aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.

The Leapfrog Economic Strategy will enable RS goods and services to become much more technologically advanced and globally competitive, highly capable of producing, marketing, and distributing products that are both more attractive and less expensive for people in Rio Grande do Sul, in Brazil, and throughout the entire world.

Fifth Key RS Economic Challenge: INFRASTRUCTURE AND EDUCATION

Rio Grande do Sul is fortunate to have built a better than average infrastructure for Brazil, along with one of the best higher education systems in the country. These Fundamental Assets have served the economy well over the past decades. However, RS will only be able to accelerate the pace of economic growth in the future if billions of reais are invested in improving infrastructure and education over the next decade and beyond. Being able to efficiently move people, goods, and information within the state as well as to and from the rest of Brazil and the world is a vital economic necessity. Educating a productive and innovative workforce, and advancing technologies through cutting-edge research and development, depends on high quality education and training at all levels, from pre-kindergarten to post-doctorate.

The Leapfrog Economic Strategy will enable Rio Grande do Sul to make major progress on infrastructure and education in two ways: 1) because of the ambitious global appeal of the Sustainable Innovation approach, RS will achieve an excellent competitive position for attracting substantial international investments and resources from the private sector, from governments and international agencies, and from donors and philanthropists; 2) by emphasizing Sustainable Innovation both in processes and in results, RS can Leapfrog directly into far more modern and resource-efficient infrastructure and education, with considerable savings on capital costs and operating expenses, including through extensive utilization of smart machines and digital technology. (RS infrastructure and education are discussed in Slides 48-61 below.)

Why the Leapfrog Economic Strategy will Work for Rio Grande do Sul

The proposed Leapfrog Economic Strategy for Rio Grande do Sul to become the most sustainable and innovative place in Latin America by 2030 directly addresses five key economic challenges: 1) the Leapfrog Economic Strategy doubles the RS economic growth rate to an average of 4 percent annual per capita GDP growth over 16 years; 2) the Leapfrog Economic Strategy dramatically increases productivity by upgrading skills and technologies; 3) the Leapfrog Economic Strategy expands the working age population by retaining and attracting a more educated and talented workforce; 4) the Leapfrog Economic Strategy strengthens global competitiveness by producing technologically advanced and innovative goods and services that compete more effectively with imports and are in greater demand as exports; 5) the Leapfrog Economic Strategy improves infrastructure and education by attracting substantial international and private sector investments, and by enhancing resource efficiency.

The best part about this strategy is that it makes full use of the traditional strengths of the RS economy, enabling them to grow even stronger. The main engine of economic growth over the next 16 years will continue to be the massive Food Production Value Chain of Rio Grande do Sul, which represents nearly one-third of the state's economy in terms of agriculture, livestock, food processing, marketing, distribution, and the many closely related business activities in manufacturing and services. Because global food demand will increase 50 percent by 2030, the RS Food Production Value Chain will have even better opportunities to be "the rising tide that lifts all boats."

Further, the continued growth of the Food Production Value Chain in Rio Grande do Sul, given its vital connections with metal-mechanic and electric-electronic manufacturing of capital goods, agricultural machinery/equipment/implements, and transportation equipment/ motor vehicles/auto parts in the state, will be the Key Driver of Sustainable Innovation in hardware and software, and in production processes, products, and services. This will enable the RS economy, rapidly modernizing based on the accelerated pace of its Food Production Value Chain, to become a global cutting-edge leader in Advanced Manufacturing, Precision

Production, Smart Machines, Digital Technology, Renewable Energy, Precision Agriculture, Biotechnology, Precision Engineering, Clean Technology, Polymers, and many other aspects of 21st century Sustainable Innovation.

Building from Strength: Agriculture, Livestock, Food Processing, and Metal-Mechanic Manufacturing

The Leapfrog Economic Strategy is not intended to supplant the many traditional strengths of Rio Grande do Sul's economy; in fact, it will be the best way to strengthen these existing sectors and enable them to grow even more vigorously in the future. Dr. Weiss was involved first-hand with the growth of Silicon Valley beginning in 1968 when he was a Stanford University student, and especially during 1981-82 when he served as Deputy Director of the California Commission on Industrial Innovation.

In 1968, agribusiness was a big part of California's economy. Today, nearly a half-century later, agribusiness still is a large sector of California's economy, representing in value nearly 20 percent of total US agricultural production. Information technology, telecommunications, and many other technologies in Silicon Valley and around the state emerged as a welcome addition to California's traditional industries, not as a replacement of them. The "New Economy" grew up together with the older version, with each one supporting and enhancing the continued growth of the other.

What was true for California several decades ago is equally true for Rio Grande do Sul today. Agriculture, livestock, food processing, and distribution will continue to be the main driver of the RS economy, especially because global demand for food will rise 50 percent by 2030. RS is well poised to provide a significant share of the necessary world food supply, especially by improving productivity and yields through Sustainable Innovation, Precision Agriculture, Biotechnology, Smart Machines, and Digital Technology. Agribusiness in RS pulls along many other major industries, from machinery and equipment, to business and professional services, to retail trade, collectively representing nearly one-third of the state's overall GDP.

In particular, metal-mechanic manufacturing and its entire value chain in RS is closely linked to agribusiness. The expansion of Sustainable Innovation in production processes and products will enable these industries to become much more productive and globally competitive. The McKinsey Global Institute highlights this important economic value chain relationship between agriculture and industry: "The removal of protection, support, and subsidies initially caused distress for Brazilian farmers and agribusinesses. But they eventually responded by taking steps to boost their efficiency and productivity—and their improved performance generated positive spillover effects in other industries, including fertilizer production, food processing, and retail. *As Brazilian agriculture has incorporated greater use of modern machinery, production of tractors and other agricultural equipment has quadrupled in the past three decades. Brazil, previously an importer,*

*has become an exporter of these machines—in fact, its exports of these products have increased 24-fold since 1970. Brazilian manufacturers now produce tractors that can harvest wider areas and with greater power than ever before. **This is an example of capitalizing on Brazil's comparative advantage in resources to build capabilities in adjacent industries, an area of potential broader opportunity.***”
(emphasis added)

Generating Dynamism: Precision Production, Smart Machines, and Digital Technology

The central thrust of the RS Leapfrog Economic Strategy will be to become a 21st century leader in Sustainable Innovation by developing, producing, and marketing a very advanced generation of Precision Production, Smart Machines, and Digital Technology, comprehensively applied to agriculture, industry, and services. This approach builds on existing RS assets and strengths in metal-mechanics and electric-electronics, from agricultural machinery/equipment/implements and transportation equipment/ motor vehicles/auto parts, to automation and controls. It focuses on higher productivity through new methods of Precision Production, including Precision Agriculture, where Rio Grande do Sul already is becoming an international leader, and Precision Engineering, currently being introduced into RS shipyards constructing heavy-duty offshore oil exploration platforms, vessels, and equipment.

The emphasis on digital technology puts RS businesses ahead of the curve for the innovations of tomorrow, including both hardware and software components of goods, services, and production processes. RS can become more globally competitive in digital software by educating, attracting, and retaining high quality talent, which will facilitate faster economic and technological progress even before major improvements are completed in modern transportation mobility, efficient renewable energy, and broadband telecommunications infrastructure. This strategy maximizes existing RS strengths, even as it builds towards much greater capacity for Gaúchos to develop and use advanced technologies over the next 16 years.

Precision Production, Smart Machines, and Digital Technology is a primary focus of the RS 2030 Leapfrog Economic Strategy, which also emphasizes many other Key Economic Drivers, including the Food Production Value Chain; Advanced Manufacturing Sustainable Innovation Technologies; Renewable Energy and Clean Technologies; Sustainable Innovation in Precision Agriculture and Biotechnology for Food, Health, and Environment; Precision Engineering and Naval/Offshore Industry Value Chain; Sustainable Innovation in Chemicals, Polymers, and New Materials; and Global Branding and Marketing in Fashion and Design, Culture and Creativity, Arts and Tourism, and Sports and Entertainment. All of the Key Economic Drivers are discussed in Slides 36-76.

Sustainable Innovation

The focus on Sustainable Innovation is vital for the success of the Leapfrog Economic Strategy. The future of the world will be about finding ways for billions of people to live and thrive in peace with each other and in peace with nature. And the good news is that in the 21st century, people, places, and organizations can literally “get richer by becoming greener” – earning and saving more money by conserving and reusing resources much more efficiently.

Many of the major technological advances of the coming decades will involve enabling people to enjoy economic prosperity and quality of life in ways that conserve and reuse natural resources and protect and enhance global ecosystems. The places in the world that Leapfrog into such a future, as some places already are doing, will have a huge economic competitive advantage over the rest of the world. And the first places among emerging economies in developing countries that can accomplish such technological breakthroughs definitely will Leapfrog into the front ranks of global competitiveness. This will happen for two main reasons. First, because their expertise and experience, reflected in their products and services, will be of enormous value to the rest of the world, as it will be to their own people.

Second, because many global resources will flow to such places from elsewhere: talent, technologies, investors, entrepreneurs, students, scholars, traders, tourists, developers, donors, and much more. The world has a huge interest in supporting places committed to Sustainable Innovation, and this growing interest and the global resources that come with it will increase exponentially during the coming decade.

Rio Grande do Sul now has the opportunity, by committing in 2015 to become the most sustainable and innovative place in Latin America by 2030, to achieve exemplary, high-quality, and broad-based economic growth over the next 16 years. The following report outlines key strategies and features many detailed examples and opportunities. One of the most important of these is Sustainable Innovation Zones.

Sustainable Innovation Zones

Sustainable Innovation Zones are a centerpiece of the RS 2030 Leapfrog Economic Strategy. These many special areas in municipalities throughout the state will be among the leading centers for research and development of new innovations and technologies; for promoting entrepreneurial startups and business incubation and acceleration; for experimenting with state-of-the-art methods for improving sustainability and resource efficiency in business and daily life; for enhancing creativity and collaboration; for reducing burdensome rules and regulations and creating a more supportive business-friendly environment; for establishing public-private collaboration in strategic investments and participatory community management; and much more.

Sustainable Innovation Zones in Rio Grande do Sul will be located in mixed-use communities near colleges and universities, technology parks, and technology business incubators, with commerce, housing, and other key amenities and services. They will be magnets for international talent and experiments in 21st century technology. Sustainable Innovations Zones for RS are discussed in Slides 62-76.

Inclusive Prosperity

The goal of the RS Leapfrog Economic Strategy will be to dramatically improve the standard of living for many more people and places in Rio Grande do Sul, generating greater prosperity and quality of life for Gaúchos and enhancing livelihoods and wellbeing for families and communities throughout the state. This goal will be achieved through much more dynamic, rapid, broad-based, and long-term economic growth driven by Sustainable Innovation and Inclusive Prosperity. As the RS Leapfrog Economic Strategy successfully moves forward, jobs and incomes will grow for millions of people, and public and private resources will then expand to enable substantial new investments in cleaner water, more effective sanitation, better housing, and many other vital necessities of infrastructure and transportation, health and education, safety and security, stores and services, for all income levels statewide.

The city of Cape Town, South Africa eloquently summarizes this type of inclusive, win-win approach: “It is not a question of choosing global competitiveness *or* the reduction of poverty — Cape Town will achieve both or neither. Reducing poverty will strengthen global competitiveness, and global competitiveness will permit reduction of poverty through economic growth and job creation.”

The RS Leapfrog Economic Strategy maximizes everyone’s economic contributions by fully utilizing their talents and expertise through productive employment and competitive business opportunities, and by ensuring that such contributions are rewarded with rising incomes and asset ownership. One of the best ways to accelerate economic growth in RS is to develop a highly productive workforce, both by enhancing education, skills training, and advanced technologies for the state’s residents and involving them more actively in dynamic economic activities, and by attracting and retaining energetic entrepreneurs and professionals from other states and countries.

Moving Forward

This report outlines the broad concepts of the 16-year Leapfrog Economic Strategy, and also recommends initial key steps for Rio Grande do Sul to move forward along the path to becoming the most sustainable and innovative place in Latin America by 2030. As the ancient Chinese philosopher, Lao Tzu, wisely observed, even very long journeys begin with just a single step. The initial steps of the Leapfrog Economic Strategy will lead to many future actions over the next 16 years, including

unexpected setbacks and frequent adjustments, before finally reaching the 2030 goal. Let's begin the journey by taking the first steps together in 2015, and then we will all learn much more about how this forward movement can lead Rio Grande do Sul in an exciting new economic direction.

**RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY
AND KEY RECOMMENDATIONS**



Narrative for Slide 1:

The following section extensively discusses the Rio Grande do Sul Leapfrog Economic Strategy for generating far more dynamic and broad-based long-term economic growth through becoming the most sustainable and innovative place in Latin America by 2030. The rationale for our proposed strategy is explained in the previous section entitled “Overview of the Rio Grande do Sul 21st Century Leapfrog Economic Strategy.” Please read the prior section before proceeding further.

This next section of our report on “Rio Grande do Sul Leapfrog Economic Strategy and Key Recommendations” includes 78 slides from a speech and slide presentation that Dr. Marc Weiss made in Santa Cruz do Sul on November 12, 2014 to the annual meeting of the state’s 28 Regional Development Councils (COREDES-RS). This slide presentation is available on GUD’s website:

http://www.globalurban.org/COREDES-RS_Presentation_November_2014.pdf.

The format for our report is to display each slide, followed by a narrative explanation of the key points. In some cases the written narrative is much lengthier and more elaborate than the November 12 speech, though still expressing the same basic ideas and content. The narratives in this section of the report also include

Internet links to key publications and documents on GUD's website and other international websites that are pictured in the slides and mentioned in the written narrative discussion.

The presentation is organized in two parts:

Part One – Slides 2-27 – describes GUD's Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity methodology and framework, explaining the major concepts. It also covers the evolution of this framework since the 1990s, with key publications, articles, and reports, and a brief history of selected applications in the US and globally, including in Brazil since 2001 and in Rio Grande do Sul since 2011.

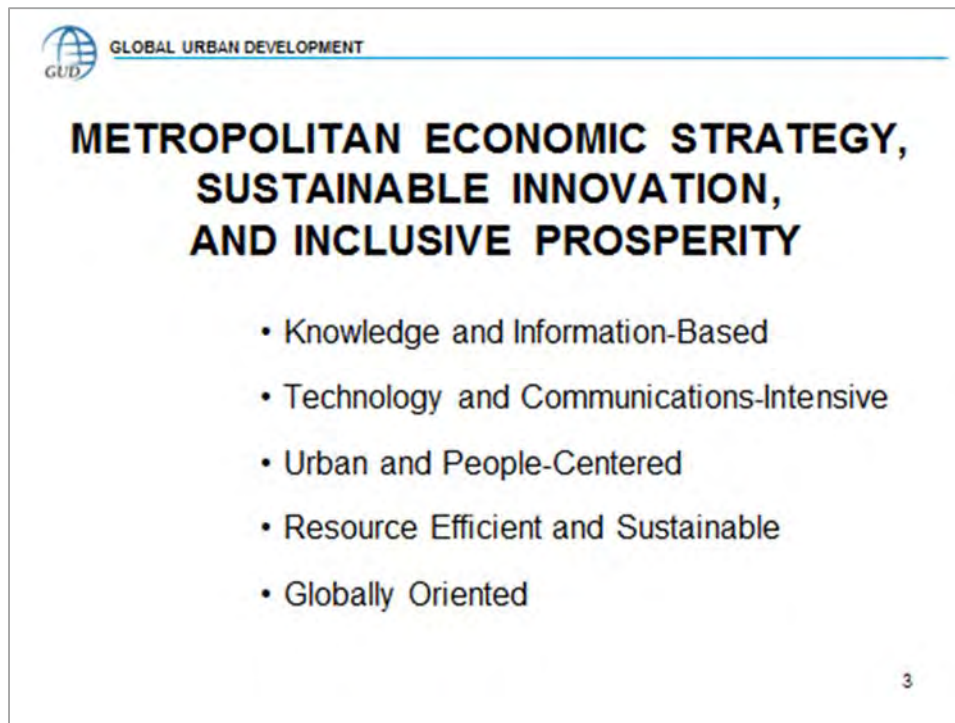
Part Two – Slides 28-76– provides a very detailed discussion of the proposed RS Leapfrog Economic Strategy.




Narrative for Slide 2:

Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity is the research methodology and strategic policy and action framework that Global Urban Development has been applying throughout the world since 2001. It is one of the most advanced and effective strategic economic development approaches, having proved its value in the US since the 1970s and 80s in California and the 1990s in Washington, DC and Baltimore, Maryland, among other places. Since 2001

it has been adopted in various forms by the UN, World Bank, OECD, Inter-American Development Bank, and many other international organizations, and has been applied in many countries, including Australia, Brazil, Canada, China, Czech Republic, India, Singapore, South Africa, Spain, Sweden, UK, US, and Virgin Islands. The image in this slide is from a 2006 article by Dr. Marc Weiss in the *Harvard Economics Review* (http://www.globalurban.org/Harvard_MES_article.pdf).



 GLOBAL URBAN DEVELOPMENT

**METROPOLITAN ECONOMIC STRATEGY,
SUSTAINABLE INNOVATION,
AND INCLUSIVE PROSPERITY**

- Knowledge and Information-Based
- Technology and Communications-Intensive
- Urban and People-Centered
- Resource Efficient and Sustainable
- Globally Oriented

3

Narrative for Slide 3:

Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity is designed to be fully aligned with five of the most important economic trends of the 21st century, that dynamic economic growth and development is increasingly: 1) knowledge and information-based; 2) technology and communications-intensive; 3) urban and people-centered; 4) resource efficient and sustainable; and 5) globally oriented.

For Brazil, including Rio Grande do Sul, aligning with these vital trends will involve somewhat of a paradigm shift. Traditionally, Brazil's wealth has been based on a wide variety of relatively abundant natural resources, and these resources generally have been regarded as being even more valuable than people as productive workers. RS success in accomplishing the Leapfrog Economic Strategy will involve recognizing that in the 21st century, people are becoming the world's most valuable economic asset.

Also, because Brazil is so rich in multiple resources, these resources often have been used with considerable inefficiency and waste. In the future, it will be necessary for RS to become more frugal and efficient in conserving and reusing resources, as the recent water shortage in many parts of Brazil painfully reminds us.

Finally, though Brazil has been significantly inward-focused for much of its history, through the Leapfrog Economic Strategy RS will become increasingly internationalized, welcoming many talented and innovative people from around the world, and engaging in more extensive economic, social, and cultural relationships globally.



GLOBAL URBAN DEVELOPMENT

**METROPOLITAN ECONOMIC STRATEGY:
4 PILLARS**

1. Innovation
2. Urban & Regional Development
3. Sustainability
4. Inclusiveness

4

Narrative for Slide 4:

Metropolitan Economic Strategy is based on four key pillars: urban and regional development; innovation; sustainability; and inclusiveness.

GUD combines these four pillars together into one unified approach, because it is the best way in the 21st century to generate dynamic and rapidly accelerating prosperity and quality of life for every family and community.

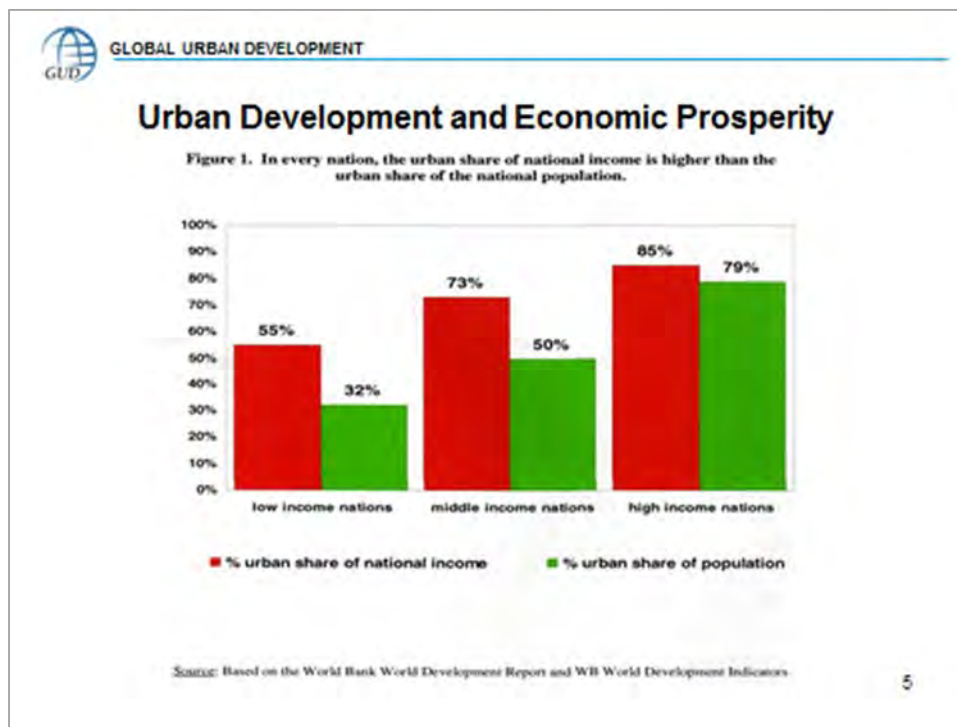
Dr. Marc Weiss has been a leading expert on technological innovation and economic development since he served during 1981-82 as Deputy Director of the California Commission on Industrial Innovation (CCII), established by Governor Jerry Brown.

The Commission's Co-Chairs were David Packard, co-founder of Hewlett-Packard (HP), and Steve Jobs, Apple's co-founder.
(<http://www.globalurban.org/State and Local Innovation.pdf>).

With respect to urban and regional development, Dr. Weiss is the coauthor of the world's best-selling English language university textbook on property development, published by the Urban Land Institute (*Real Estate Development Principles and Process*, Washington, DC: ULI, 4th edition, 2007), and he is author of a landmark study of the major role of the private sector in urban and regional development, *The Rise of the Community Builders: The American Real Estate Industry and Urban Land Planning* (New York: Columbia University Press, 1987).

Through Sustainable Innovation, people, places, and organizations can literally “get richer by becoming greener” – earning and saving more money by conserving and reusing resources more efficiently
(<http://www.globalurban.org/Green Capitalism.pdf>).

Inclusive Prosperity is designed to enable every person and community both to contribute their most innovative solutions and to fully benefit from the expanded prosperity and enhanced quality of life that people create together
(<http://www.globalurban.org/Community Productivity Project Proposal.pdf>).



Narrative for Slide 5:

Metropolitan Economic Strategy focuses on cities and urban regions as dynamic engines of economic growth for states, provinces, and nations, including Rio Grande do Sul, because urban regions are the most economically productive geographic units in the world today

(<http://www.globalurban.org/Issue1PIMag05/Weiss%20PDF.pdf>).

This classic graph based on World Bank data clearly demonstrates that in every country worldwide, urban regions generate more than half of the national income. These percentages range from an average of 55 percent in low-income countries, all the way up to an average of 85 percent in high-income countries.

What is more noteworthy about these statistics is that in every case the percentage of national income generated by urban areas exceeds the percentage share of the national population that is urbanized. This shows that urban areas are higher in economic productivity than rural areas, even in places that are rich in natural resources like Brazil.

In the case of low-income developing countries where urban areas account for an average of 55 percent of the national income, the urban share of the population averages 32 percent. In middle-income countries, the urban share of national income averages 73 percent, and the urban share of the population averages 50 percent. For high-income countries, the average urban contribution to national income is 85 percent, yet the urban proportion of the national population is 79 percent.

This shows that the greater the level of urbanization in a nation, the higher is its level of prosperity, and conversely, the more prosperous a country is, the more urbanized it is.



Why Urban Areas are More Economically Productive

They combine **SPECIALIZATION** and **DIVERSITY**:

- the critical mass of skills and resources;
- the necessary population density and concentration of market incomes;
- the range of specialized knowledge and institutions;
- the wide diversity of vitally needed facilities and services;
- and the fully developed physical and human infrastructure that are prerequisites for new ideas, products and production methods, technological and organizational innovations, and dynamic economic growth and investment.

6

Narrative for Slide 6:

As the global World Bank data in slide 5 shows, urban regions are more economically productive. They also are the major sources of innovation. Why? Because they have lots of people – smart, talented, hard-working, energetic, creative, innovative – with a very wide range of knowledge, education, and experience and with many diverse, advanced, and specialized skills. Mix them all together in one large place, with the right entrepreneurial incentives and livelihood opportunities, and you get a dynamic, fast-growing economy. This is especially true when you put those talented and motivated workers together with good infrastructure and institutions, with extensive value chains and distribution networks, and with large markets.



Investing in Fundamental Assets and Building Dynamic Industry Networks

A good economic strategy consists of two key elements:

- 1) building from strength — investing in the fundamental assets and activities that make people more productive and places more valuable;*
- 2) generating dynamism — promoting modern, globally competitive industry networks that accelerate the pace of innovation and growth.*

7

Narrative for Slide 7:

Metropolitan Economic Strategy is based on two core strategic ideas: the first is Building from Strength. Like good sports teams, places become more competitive by strategically emphasizing and effectively employing the best features of their people and places. By identifying the most important Fundamental Assets, places can strategically invest in strengthening, improving, and expanding them in order to become more innovative, productive, and globally competitive. These Fundamental Assets then become the foundation for the second core strategic idea: Generating Dynamism through the growth of thriving Industry Networks whose productive activities lead to rising incomes and to more and better jobs. Taking action to strengthen Fundamental Assets is a vital prerequisite for growing dynamic Industry Networks (also called industry clusters).



PEOPLE are the most vital economic asset in the world

INVESTING IN FUNDAMENTAL ECONOMIC ASSETS:

- Transportation
- Infrastructure
- Education
- Workforce Development
- Research
- Technology
- Markets
- Capital
- Health
- Safety
- Environment and Amenities
- Culture
- Quality of Life

8

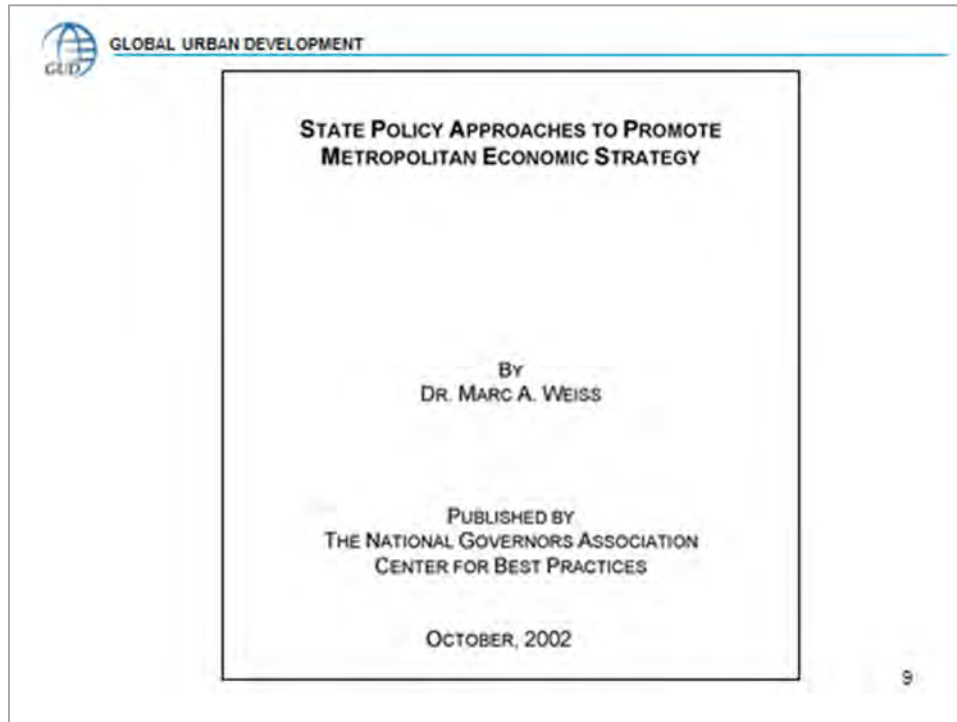
Narrative for Slide 8:

Fundamental Assets are the big important things that enable daily life to function well, such as transportation and infrastructure. For an economy to be innovative and productive, investing in research and technology, education and workforce development, and many other key assets, is essential.

Though physical assets are both necessary and valuable, the most important economic asset in the 21st century is people. Places need many talented, skilled, and motivated people to be economically dynamic, as the continued success of Silicon Valley constantly reminds us. In order for places to compete and grow, they must first educate a large and talented workforce, and retain them, and they also need to attract and retain many talented people from elsewhere. Since skilled people often can choose where they want to live and work, it is necessary to create and sustain a high quality of life in order to attract and retain the skilled workforce necessary for dynamic economic growth.

Anything can be seen as either an asset or a liability, depending on the strategic viewpoint. When Apple was in deep financial trouble, the general market opinion was that it had three big problems: 1) an expensive product; 2) a closed operating system; and 3) a small market-share. Then Steve Jobs returned to rescue the company he had founded, and he declared that those three problems were actually major advantages, comparing Apple to Mercedes-Benz and BMW. We all know how well his business strategy succeeded. So it is important to recognize that things not generally seen as “economic” such as culture, or health, and many other aspects of

life, can potentially be Fundamental Assets for generating businesses, jobs, revenues, products, and services.

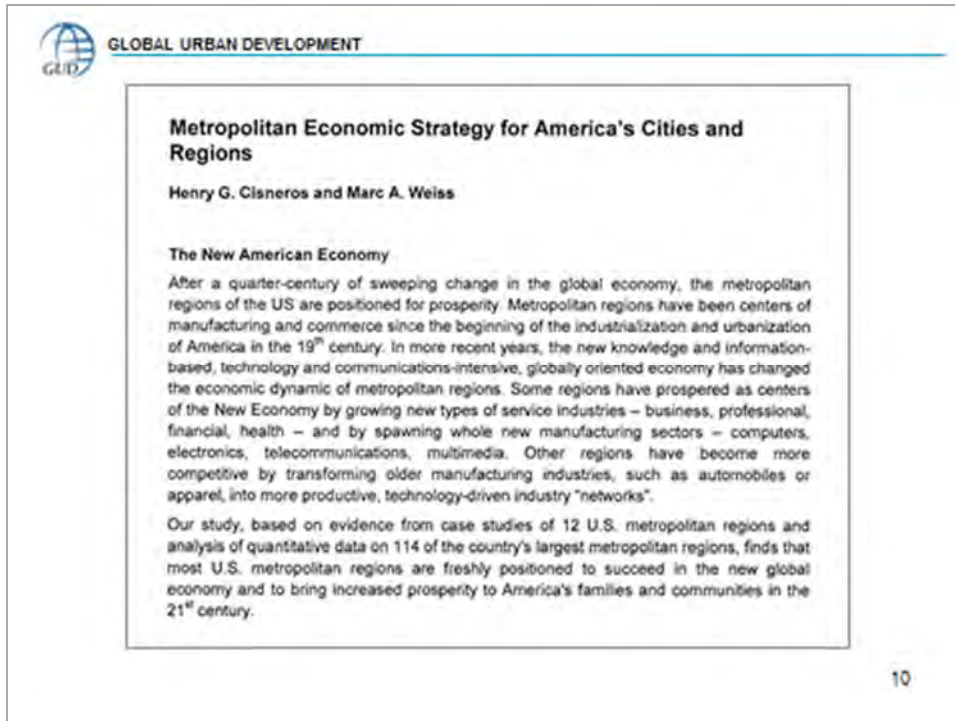


Narrative for Slide 9:

This 2002 GUD report for the National Governors Association in the US (the NGA represents the 50 state governors) is a detailed explanation of how a state government can apply the Metropolitan Economic Strategy framework to generate innovation and prosperity. In 2011, Dr. Mauro Borges Lemos, President of the Brazilian Agency for Industrial Development (ABDI) in Brasília, believed that GUD's approach could successfully be applied in every state in Brazil, starting with Rio Grande do Sul.

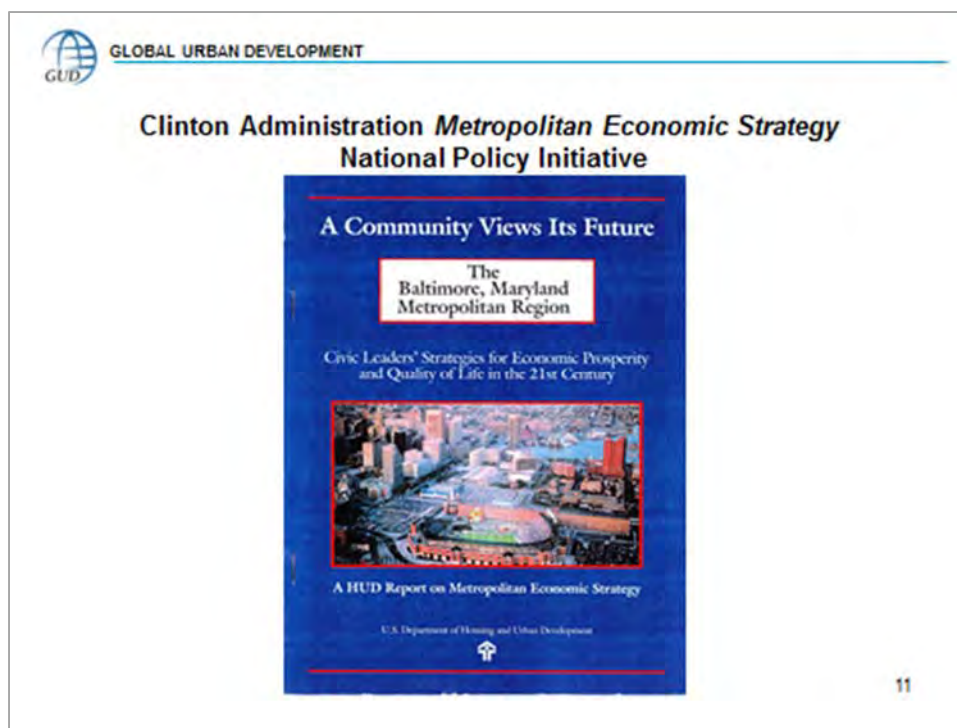
State Policy Approaches to Promote Metropolitan Economic Strategy is an important document from the US

([http://www.globalurban.org/National Governors Association Report -- State Policy Approaches to Promote Metropolitan Economic Strategy.pdf](http://www.globalurban.org/National_Governors_Association_Report_-_State_Policy_Approaches_to_Promote_Metropolitan_Economic_Strategy.pdf)). This NGA report sheds light on some aspects of our approach for Rio Grande do Sul, though we have significantly adapted it to include custom-designed Gaúcho and Brazilian perspectives.



Narrative for Slide 10:

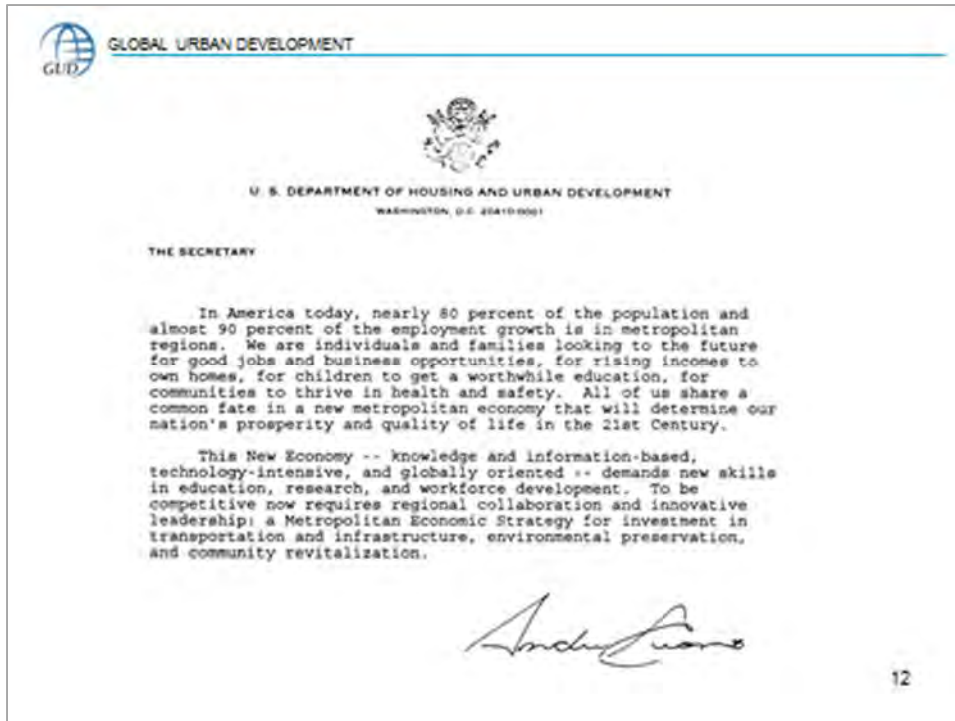
Metropolitan Economic Strategy became a US national policy in 1996 under President Clinton. Dr. Marc Weiss coordinated and developed this new policy while serving as Special Assistant to Housing and Urban Development (HUD) Secretary Henry Cisneros. In addition to HUD, many other agencies were involved, including the President's Council on Sustainable Development, the US Department of Commerce Economic Development Administration, and the White House National Economic Council. The policy was described in two major reports, *America's New Economy and the Challenge of the Cities: A HUD Report on Metropolitan Economic Strategy*, in 1996 ([http://www.globalurban.org/Portland Metropolitan Economic Strategy Report.pdf](http://www.globalurban.org/Portland%20Metropolitan%20Economic%20Strategy%20Report.pdf)), and *Comeback Communities: The Revival of America's Cities*, in 1997 ([http://www.globalurban.org/Comeback Communities.pdf](http://www.globalurban.org/Comeback%20Communities.pdf)), as well as in several articles written by Henry Cisneros and Marc Weiss, including “The Wealth of Regions and the Challenge of Cities” in 1997 ([http://www.globalurban.org/The Wealth of Regions and the Challenge of Cities.pdf](http://www.globalurban.org/The%20Wealth%20of%20Regions%20and%20the%20Challenge%20of%20Cities.pdf)), and “Metropolitan Economic Strategy for America's Cities and Regions” in 1999, which is a good summary of our 1996 HUD report ([http://www.globalurban.org/Metropolitan Economic Strategy for America's Cities and Regions.pdf](http://www.globalurban.org/Metropolitan%20Economic%20Strategy%20for%20America's%20Cities%20and%20Regions.pdf)).



Narrative for Slide 11:

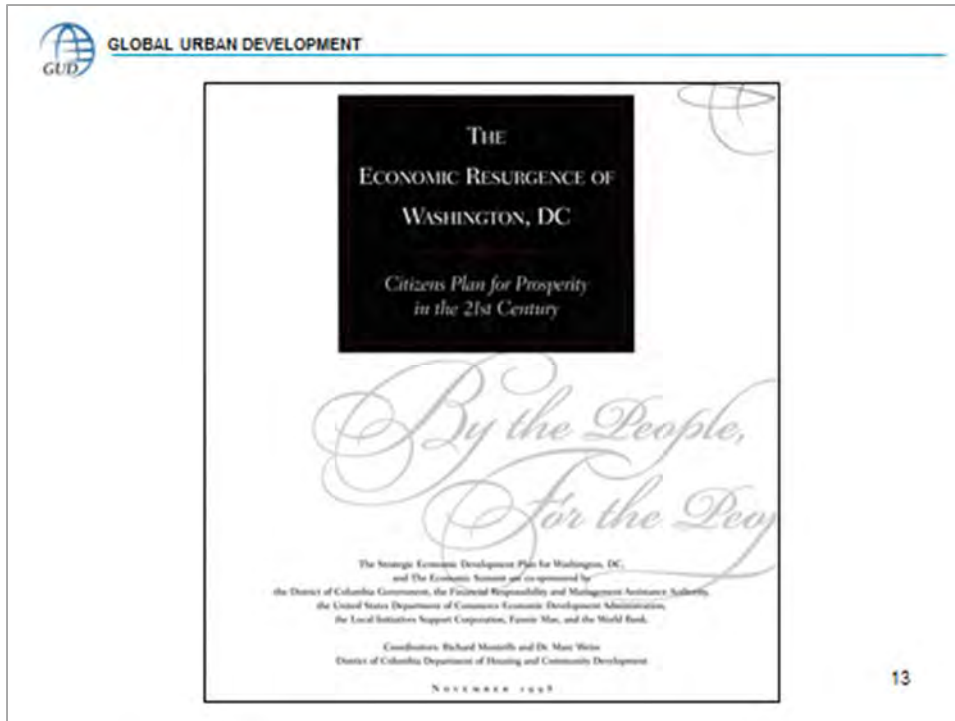
After Metropolitan Economic Strategy became a US national policy in 1996, the following year HUD decided to apply this strategic policy and action framework in metropolitan Baltimore by working with the region's government, business, and civic leaders (including the Baltimore Metropolitan Council and the Greater Baltimore Committee) to produce a major strategic report discussed extensively at a large regional leadership conference in May 1997. HUD's Baltimore Metropolitan Economic Strategy Report, *A Community View its Future: Civic Leaders' Strategies for Economic Prosperity and Quality of Life in the 21st Century*, written by Dr. Marc Weiss and Matthew Weinstein, with excellent research assistance from an ICF International consulting team, became a model for how to apply this new approach in US regions, and later through GUD, in many other countries ([http://www.globalurban.org/A Community Views Its Future.pdf](http://www.globalurban.org/A%20Community%20Views%20Its%20Future.pdf)).

The 1997 metropolitan Baltimore report, combined with the 1999 *Baltimore Economic Growth Strategy* that Dr. Marc Weiss and Daniel Rosan produced for the Baltimore city government, Baltimore Development Corporation, and Center for National Policy ([http://www.globalurban.org/Baltimore Economic Strategy.pdf](http://www.globalurban.org/Baltimore%20Economic%20Strategy.pdf)), had a genuinely positive impact in helping shape economic development in the city and region over the following decade.



Narrative for Slide 12:

HUD Secretary Andrew Cuomo, who succeeded Henry Cisneros in 1997, was an enthusiastic supporter of Metropolitan Economic Strategy. This is an excerpt from his Preface to HUD's 1997 metropolitan Baltimore report. Andrew Cuomo later was elected Governor of New York state in 2010 and reelected in 2014. Since 2011, Governor Cuomo has created 10 Regional Economic Development Councils, which together with Start-Up New York and other initiatives, are based on the Metropolitan Economic Strategy framework that he helped develop as HUD Secretary in the late 1990s.



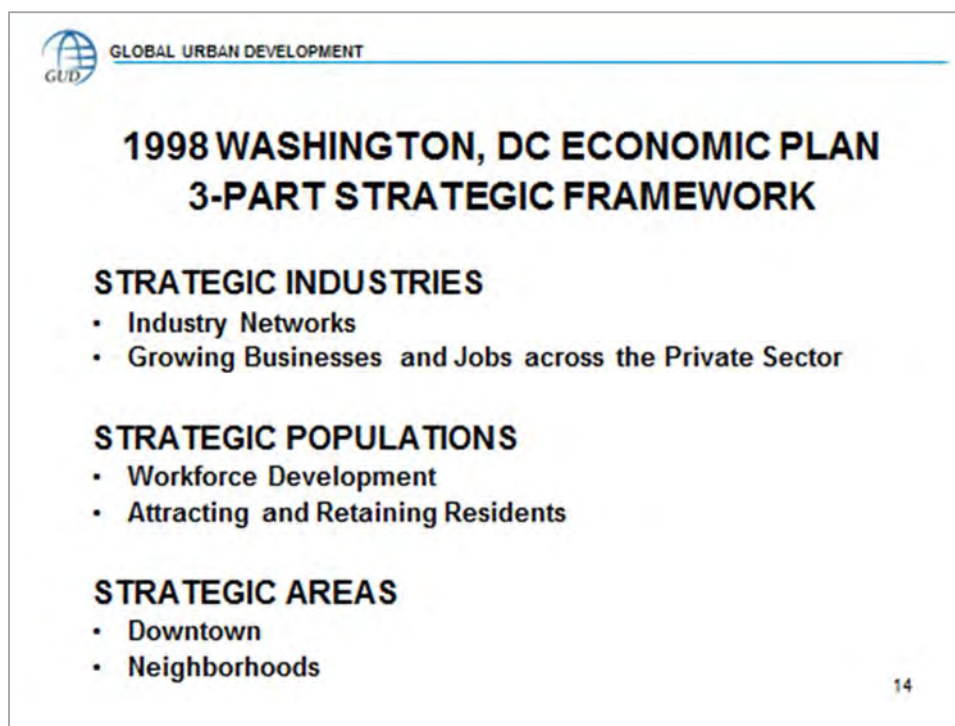
Narrative for Slide 13:

After the May 1997 metropolitan Baltimore conference and report, HUD Secretary Cuomo encouraged Dr. Marc Weiss to take on a bigger challenge: to apply Metropolitan Economic Strategy in Washington, DC. The District of Columbia government was in considerable fiscal stress, and was temporarily being governed by the President and Congress through the Financial Responsibility and Management Assistance Authority (“Control Board”). In August 1997 the US Congress passed and President Clinton signed the National Capital Revitalization Act, which among other things mandated that Washington, DC produce a private sector-oriented strategic economic development plan. Dr. Marc Weiss was appointed to coordinate the development of this strategic plan, which in November 1998, at a major Economic Summit hosted by the World Bank, was published as *The Economic Resurgence of Washington, DC: Citizens Plan for Prosperity in the 21st Century* ([http://www.globalurban.org/The Economic Resurgence of Washington, DC.pdf](http://www.globalurban.org/The_Economic_Resurgence_of_Washington,_DC.pdf)).

In addition to the US and DC governments, the plan was co-sponsored and partly funded by several other organizations, including Fannie Mae (home mortgage finance corporation), Local Initiatives Support Corporation (LISC promotes inclusive community development), and the World Bank, making it a true public-private-civic partnership. Large numbers of people actively participated in creating and implementing this strategy and its 40 key actions, which succeeded in turning what had been an ailing urban economy into a dynamic growth engine that continues to thrive and prosper 17 years later. By all accounts, the Washington, DC strategic plan

was one of the most successful urban economic development initiatives in the US over the past two decades, and it clearly demonstrated the effectiveness of the Metropolitan Economic Strategy framework.

Metropolitan Economic Strategy is based on the principle of Inclusive Prosperity: encouraging active and extensive citizen/stakeholder involvement and promoting broad participation in economically productive activities such that everyone has an opportunity to contribute to and benefit from employment and income growth. The excellent results of the 1998 Washington, DC strategic plan are strong proof of the economic value of inclusiveness.



GLOBAL URBAN DEVELOPMENT

**1998 WASHINGTON, DC ECONOMIC PLAN
3-PART STRATEGIC FRAMEWORK**

STRATEGIC INDUSTRIES

- Industry Networks
- Growing Businesses and Jobs across the Private Sector

STRATEGIC POPULATIONS

- Workforce Development
- Attracting and Retaining Residents

STRATEGIC AREAS

- Downtown
- Neighborhoods

14

Narrative for Slide 14:

A key part of the Metropolitan Economic Strategy framework that was central to the 1998 Washington, DC plan was the three-part approach focusing on Strategic Industries, Strategic Populations, and Strategic Areas, addressing the dynamic interrelationships between businesses, people, and places. This is one of the key features that made the plan so comprehensive in scope and concept, yet very focused on implementing strategic actions. Under Strategic Populations, we innovatively emphasized that attracting and retaining residents was just as important as attracting and retaining businesses, because talented and skilled people are a vital economic asset.

The Washington, DC strategy targeted six Industry Networks that we identified and targeted as the main generators of business, employment, and income growth for the city and the metropolitan region:

- Business/Professional/Financial/Association Services;
- Hospitality/Entertainment/Tourism/Specialty Retail;
- Universities/Educational/Research Institutions;
- Biomedical Research/Health Services;
- Media/Publications;
- Information Technology/Telecommunications.

These choices were very specific, reflecting the reality that every place is different in terms of its Fundamental Assets, and the dynamic Industry Networks must represent such diversity between one place and another. For example, “Association Services” is a major industry only in national capital cities like Brasília. Each strategy, therefore, must be customized to fit uniquely distinct populations and locations. Our proposed strategy for Rio Grande do Sul is entirely in that spirit.

GLOBAL URBAN DEVELOPMENT

NoMa - DC's Newest Neighborhood **NOMA**

At Full Build-Out:

26 million SF planned

- 14 million SF office
- 10,000 residential units
- 1,300 hotel rooms
- 1 million SF of retail

\$9 billion private investment

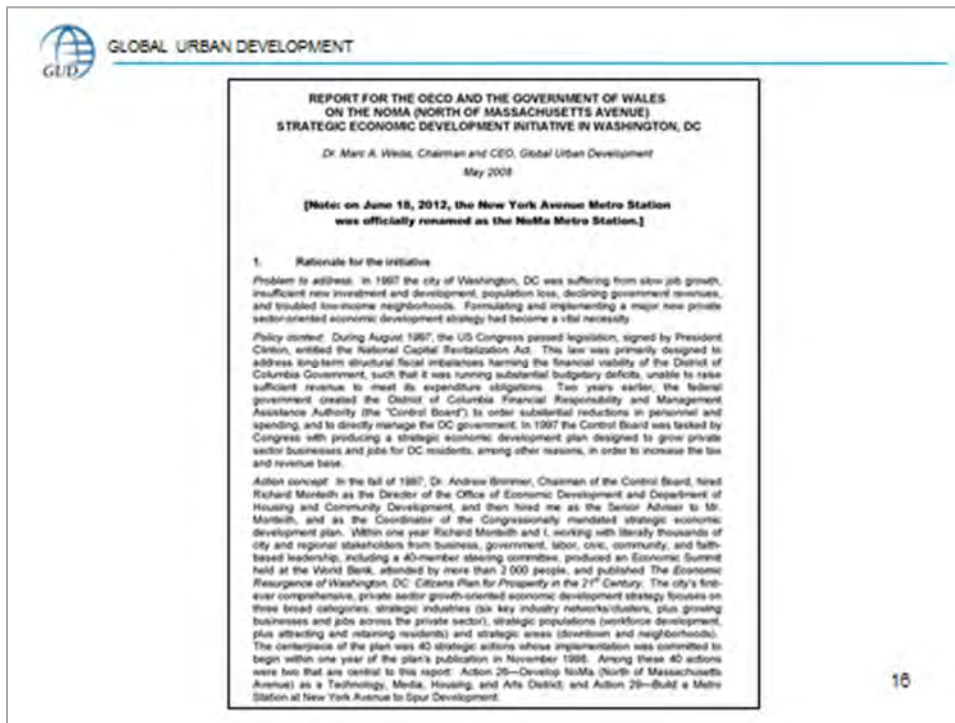
16 15

Narrative for Slide 15:

The 1998 Washington, DC economic strategy was a major success, with transformational impacts on many parts of the city, including downtown, Columbia Heights, the Southeast/Southwest Waterfront, Anacostia, and much more. One of

the most notable accomplishments was the dramatic regeneration of an area near the East End of downtown and extending behind Union Station, site of the main Amtrak train terminal. This area is now called NoMa (North of Massachusetts Avenue), a name that was invented in June 1998 as part of the initiative, to bring a new image to a deteriorated area full of vacant land and abandoned buildings, without a clear cultural identity. The new name was intended to draw comparisons with SoHo and TriBeCa in New York City, which had become attractive and vibrant neighborhoods by redeveloping decaying industrial loft buildings.

The 1998 Washington strategic plan included two key actions directly focused on NoMa: Action 26 – Develop NoMa as a Technology, Media, Housing, and Arts District; and Action 29 – Build a Metro Station at New York Avenue to Spur Development. When we started in 1997, all of this seemed quite impossible. Yet today, precisely as the strategy envisioned, there is a fast-growing and thriving mixed-use neighborhood anchored by the new NoMa Metro Station (financed by a very innovative public-private partnership), with a projected total of US\$ 9 billion in new investment and development at full build-out, generating more than 40,000 jobs and attracting over 12,000 new residents.



Narrative for Slide 16:

A decade after the launching of NoMa, the Organization for Economic Cooperation and Development (OECD) in Paris, which represents 34 middle-income and high-

income countries, was asked by the government of Wales in the UK to identify the 12 most impressive economic development initiatives worldwide that could potentially be applied in Wales. The OECD chose NoMa as part of this select group, and then commissioned GUD to write a brief report summarizing the process and results in NoMa as of 2008. This report is the definitive analysis of how and why the NoMa initiative succeeded (http://www.globalurban.org/GUD_OECD_NoMa_Report.pdf).



Narrative for Slide 17:

GUD's 2008 NoMa report is available in Portuguese on the Publications page of GUD's website (http://www.globalurban.org/GUD_OECD_NoMa_Report_in_Portuguese.pdf).



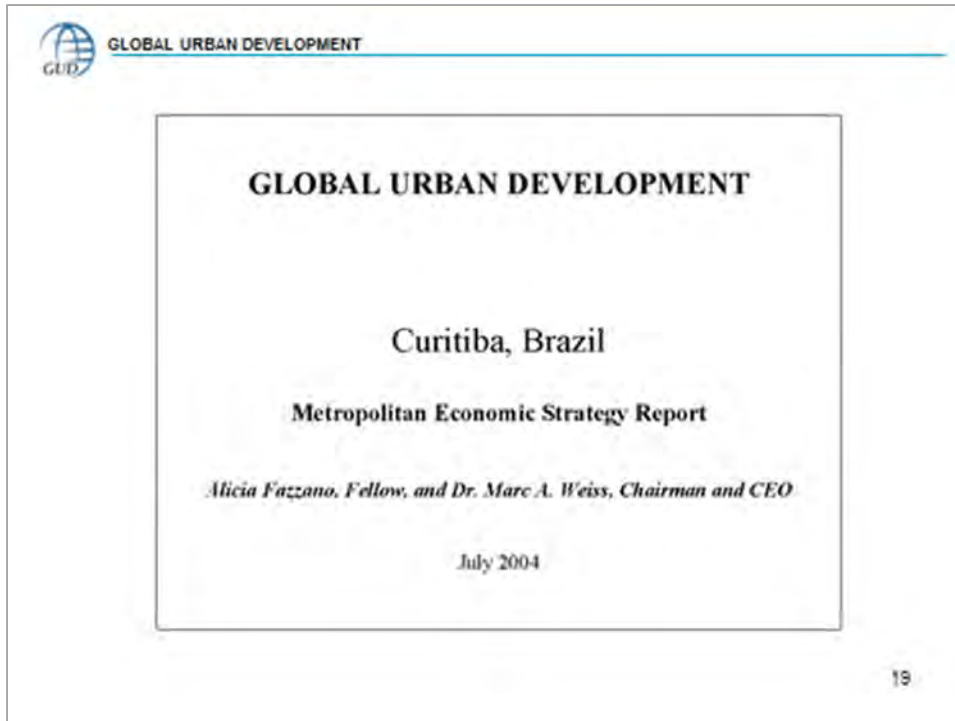
KEY LESSONS FOR ECONOMIC DEVELOPMENT

- LESSON 1: THINK AND ACT STRATEGICALLY
- LESSON 2: CREATE COMMON IDENTITY AND SENSE OF PURPOSE
- LESSON 3: INVOLVE EVERYONE
- LESSON 4: TAKE ACTION AND PRODUCE RESULTS
- LESSON 5: BUILD ON THE FUNDAMENTALS
- LESSON 6: FOCUS ON THE BIG RESOURCES
- LESSON 7: BE YOURSELF
- LESSON 8: COLLABORATE WITH AND SUPPORT THE PRIVATE SECTOR
- LESSON 9: BE COMPREHENSIVE – LINK GROWTH OF BUSINESSES,
JOBS, AND INCOMES TO PEOPLE AND PLACES
- LESSON 10: CONNECT TO THE DYNAMICS OF THE REGIONAL ECONOMY
- LESSON 11: WORK WITH AND STRENGTHEN CIVIL SOCIETY
- LESSON 12: IMPROVE QUALITY OF LIFE – SUSTAINABILITY AND
INCLUSIVENESS

18

Narrative for Slide 18:

These 12 lessons are key insights for strategic policy and action in the Metropolitan Economic Strategy framework, particularly drawn from the Baltimore and Washington, DC experiences. Dr. Marc Weiss originally put this list together in 2006 for a two-day training on Local Economic Development for senior field officers at the US Agency for International Development (USAID) in Washington, DC. More recently, Dr. Weiss teaches these key lessons as part of his graduate course on “Global Urban Policy and Development” in the School of International and Public Affairs at Columbia University.
http://www.globalurban.org/2013_GUD_Columbia_University_Course.pdf.



Narrative for Slide 19:

Since 2001, GUD has been globalizing Metropolitan Economic Strategy, applying it in many countries, including Brazil. For example, in 2004 GUD produced a Curitiba Metropolitan Economic Strategy Report (http://www.globalurban.org/GUD_Curitiba_MES_Report.pdf).

GUD has been actively involved in Curitiba over the past decade. Jaime Lerner, former Mayor of Curitiba, former Governor of Paraná, former President of the International Union of Architects, and planner/designer of Porto Alegre's waterfront redevelopment, is a Vice Chair of GUD. Rodrigo Loures, founder and President of Nutritional Corporation, former President of the Federation of Industries of the State of Paraná (FIEP), current Vice President of the National Confederation of Industry (CNI), and co-founder of the Brazilian Foundation for Sustainable Development (FBDS), is a member of GUD's Board of Directors.



Narrative for Slide 20:

GUD has been on the forefront of promoting Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity as one of the best ways for developing countries to foster economic growth that is innovative, sustainable, and inclusive. As a solution to the worldwide risks and potential dangers of catastrophic climate change and other potential environmental crises, GUD collaborated with the United Nations in 2009 to develop the Global Climate Prosperity Agreement, encouraging the private sector to make substantial for-profit investments in renewable energy and clean technology products and infrastructure in Brazil and many other emerging markets

([http://www.globalurban.org/Global Climate Prosperity Agreement -- The One Trillion Dollar Deal.pdf](http://www.globalurban.org/Global%20Climate%20Prosperity%20Agreement%20--%20The%20One%20Trillion%20Dollar%20Deal.pdf);

[http://www.globalurban.org/Global Climate Prosperity Scoreboard Media Release 12-4-09.pdf](http://www.globalurban.org/Global%20Climate%20Prosperity%20Scoreboard%20Media%20Release%2012-4-09.pdf);

[http://www.globalurban.org/Frequently Asked Questions by Potential Investors about the Global Climate Prosperity Agreement.pdf](http://www.globalurban.org/Frequently%20Asked%20Questions%20by%20Potential%20Investors%20about%20the%20Global%20Climate%20Prosperity%20Agreement.pdf)).

We believe that this approach will prove to be very successful in enabling Rio Grande do Sul's Leapfrog Economic Strategy to successfully generate a more dynamic and faster growing economy through becoming the most sustainable and innovative place in Latin America by 2030.

 GLOBAL URBAN DEVELOPMENT

**Planning for
Sustainable Economic
Development Across the Americas**

schedule

07th June | Thursday

09:30 | Registration

09:30 | Opening and Welcome
Cid Blanco Junior, Cultural Infrastructure Director, Ministry of Culture
Stewart Barkley-Benacoff, Department of Housing and Urban Development
 Washington, DC, USA
W. Paul Farmer, American Planning Association - Washington, DC, USA
Luciano Dantas, Mayor of Curitiba
Edson Ravelin, President, Associação Comercial do Paraná (ACP) - Curitiba, Brazil
Edvaldo Goy de Menezes, President of the Regional Council on Administration, American Curitiba
Cláudia Farias Martins, Coordinating Vice-President of Concea-PR, ACP - Curitiba, Brazil

10:00 | Coffee Break

10:30 | Keynote Speaker: A Vision for Urban Sustainability
Jaime Lerner, Urban Planner

11:00 | Sustainable Economic Development: An Overview
 Panelists
Maria Wicks, Global Urban Development - Washington DC, USA
Emilia Queiroga Barros, President, Brasil 2020 Agenda - Laura de Freitas, Bahia, Brazil
 Moderator: **Edvaldo Guimarães**, Municipal Secretary for International Relations and Ceremonies - Curitiba, Brazil

14:00 | Case Studies: Planning for Sustainable Economic Development in the Americas - Part 1
 Panelists
Ruby Bennett, Executive Director, Portland Sustainability Institute - Oregon, USA
Stephanie McLeish, Clean Energy Economy Policy Advisor, Office of the Secretary,
 Department of Natural Resources and Environmental Control, State of Delaware - Dover,
 Delaware, USA
Sil Faldutski, President, Coordenação de Regiões Metropolitanas de Curitiba (Cormec)
 Moderator: **W. Paul Farmer**, CEO, American Planning Association

16:00 | Coffee Break

16:30 | Case Studies: Planning for Sustainable Economic Development in the Americas - Part 2
 Panelists
Larry Zion, Chairman, San Antonio Green Jobs Leadership Council - San Antonio, Texas, USA
Paul Kurlitz, President and CEO, SPWRM, (former Chief Development Officer of the City of San
 Jose, and current Secretary Treasurer of the International Economic Development Council) - Ann
 Arbor, Michigan, USA
Kan Weatherington, Executive Director, Southeast Florida Regional Planning Council
 Fort Myers, Florida, USA
 Moderator: **Rodrigo Rocha Loures**, President, Indústria Federação for the State of Paraná (FIEP) -
 Curitiba, Brazil

18:00 | Cocktail Reception

21

Narrative for Slide 21:

Beginning in 2010, Global Urban Development began working with the Brazil and US governments through the Energy and Climate Partnership of the Americas (ECPA). GUD helped ECPA organize the world's first international conference on Sustainable Economic Development, hosted by the city of Curitiba in June 2011 (http://www.globalurban.org/ECPA_Conference_Agenda.pdf).

This conference, which drew on recent experience in the US, Brazil, and other Latin American countries, substantially contributed to advancing the Sustainable Innovation elements of the Metropolitan Economic Strategy framework.

GLOBAL URBAN DEVELOPMENT

The Four Greens

- **Green Savings** — cutting costs for businesses, families, communities, and governments by efficiently using renewable resources and by reducing and reusing waste
- **Green Opportunities** — growing jobs and incomes through business development and expanding markets for resource efficiency, sustainability, and clean technologies
- **Green Talent** — investing in fundamental assets such as education, research, technological innovation, and modern entrepreneurial and workforce skills, because people are now the world's most vital green economic resource
- **Green Places** — establishing sustainable transportation and infrastructure, and protecting and enhancing the natural and built environment, to create more attractive, livable, healthy, vibrant, prosperous, productive, and resource-efficient areas and communities.

22

Narrative for Slide 22:

GUD's Sustainable Economic Development/Sustainable Innovation strategies are state-of-the-art globally, based on the concept of "getting richer by becoming greener" and our four-part strategic framework: Green Savings, Green Opportunities, Green Talent, and Green Places

(http://www.globalurban.org/Green_Capitalism.pdf;
[http://www.globalurban.org/Sustainable Economic Development Strategies.pdf](http://www.globalurban.org/Sustainable_Economic_Development_Strategies.pdf);
[http://www.globalurban.org/AMCHAM BRASIL August 2014.pdf](http://www.globalurban.org/AMCHAM_BRASIL_August_2014.pdf)).

GUD has been on the forefront of recent advanced approaches in the US. GUD's 2011 report, *Prosperity in Paradise: Growing the Sustainable Economy in Sarasota County*, funded by the US Department of Energy and the Sarasota County government, set a new standard for this type of strategy

([http://www.globalurban.org/Sarasota County Strategic Recommendations Report.pdf](http://www.globalurban.org/Sarasota_County_Strategic_Recommendations_Report.pdf)), as did the path-breaking 2009 report by the Silicon Valley Climate Prosperity Council, *Climate Prosperity: A Greenprint for Silicon Valley*, in which GUD provided vital strategic advice
([http://www.globalurban.org/Silicon Valley Climate Prosperity Strategy.pdf](http://www.globalurban.org/Silicon_Valley_Climate_Prosperty_Strategy.pdf)).

Similarly, since 2007 GUD has been advising and working with San Jose
([http://www.globalurban.org/San Jose ECPA Curitiba Presentation.pdf](http://www.globalurban.org/San_Jose_ECPA_Curitiba_Presentation.pdf)),
San Antonio

([http://www.globalurban.org/San Antonio ECPA Curitiba Presentation.pdf](http://www.globalurban.org/San_Antonio_ECPA_Curitiba_Presentation.pdf)),

Denver

([http://www.globalurban.org/Denver Business Journal Climate Prosperity article.pdf](http://www.globalurban.org/Denver_Business_Journal_Climate_Prosperty_article.pdf); [http://www.globalurban.org/GUD Denver Seeds Best Practices Report.pdf](http://www.globalurban.org/GUD_Denver_Seeds_Best_Practices_Report.pdf)),

metropolitan Portland

([http://www.globalurban.org/Portland ECPA Curitiba Presentation.pdf](http://www.globalurban.org/Portland_ECPA_Curitiba_Presentation.pdf)),

southwest Florida

([http://www.globalurban.org/Southwest Florida Climate Prosperity Strategy.pdf](http://www.globalurban.org/Southwest_Florida_Climate_Prosperty_Strategy.pdf)),

and the state of Delaware

([http://www.globalurban.org/Delaware ECPA Curitiba Presentation.pdf](http://www.globalurban.org/Delaware_ECPA_Curitiba_Presentation.pdf);

[http://www.globalurban.org/Delaware Climate Prosperity Media Release 2 16 09.pdf](http://www.globalurban.org/Delaware_Climate_Prosperty_Media_Release_2_16_09.pdf)), among others.

GLOBAL URBAN DEVELOPMENT

United Nations World Urban Forum 6
Naples, Italy, September 2-6, 2012

Networking Event 101:

Metropolitan Economic Strategy and Sustainable Economic Development in Brazil

Wednesday, September 5 / Pavilion 5, Room 13 / 1400 to 1600 hours (2 to 4 pm)

This Networking Event will highlight a comprehensive framework for growing and developing productive, innovative, competitive, sustainable, inclusive, and prosperous cities, regions, and states in Brazil. Global Urban Development (GUD) is working with the Federation of Industries of Minas Gerais and the Federation of Industries of Rio Grande do Sul, the States of Minas Gerais and Rio Grande do Sul, the Cities of Belo Horizonte and Porto Alegre, and Brazil's Federal Government, to apply GUD's framework for promoting Metropolitan Economic Strategy and Sustainable Economic Development. Speakers include key business and government leaders from Brazil.

Moderator: **Marlene Fernandes**, International Advisor, Brazilian Institute for Municipal Administration (IBAM), **Rio de Janeiro**

Presenters:

Mauro Borges Lemos, President, Brazilian Agency for Industrial Development (ABDI), **Brasilia**

Olavo Machado Jr., President, Federation of Industries of Minas Gerais (FIEMG), **Belo Horizonte**

Marcus Coester, President, Rio Grande do Sul Development Agency (AGDI), **Porto Alegre**

Marc Weiss, Chairman and CEO, Global Urban Development, **Washington, DC**

Discussants:

Ines Magalhaes, National Secretary of Housing, Ministry of Cities, **Brasilia**

Cid Blanco Jr., Director of Culture, Communications, and Events, Olympic Public Authority, **Rio de Janeiro**

Fabio Veras, Deputy Secretary of Economic Development, State of Minas Gerais, **Belo Horizonte**

Emilia Queiroga Barros, Vice President, Global Urban Development, **Belo Horizonte**

23

Narrative for Slide 23:

GUD's work in Brazil shifted its focus from Curitiba and São Paulo to Minas Gerais and Rio Grande do Sul during 2011 and 2012, connected to the national advisory work GUD was doing for the Brazilian Agency for Industrial Development (ABDI). In September 2012 GUD organized a major Networking Event on "Metropolitan Economic Strategy and Sustainable Economic Development in Brazil" at the UN World Urban Forum in Naples, Italy, with AGDI President Marcus Coester as the featured speaker from Rio Grande do Sul

([http://www.globalurban.org/Metropolitan Economic Strategy and Sustainable Economic Development in Brazil.pdf](http://www.globalurban.org/Metropolitan_Economic_Strategy_and_Sustainable_Economic_Development_in_Brazil.pdf);

[http://www.globalurban.org/UN Rio Grande do Sul Presentation.pdf](http://www.globalurban.org/UN_Rio_Grande_do_Sul_Presentation.pdf)).



**Advanced Manufacturing and Sustainable Innovation:
The Third Wave of Industrial and Urban Economic Growth
for Minas Gerais**

*A Report to the Federation of Industries of Minas Gerais (FIEMG)
by Global Urban Development (GUD)*

October 2012

Executive Summary

Minas Gerais has succeeded in its first century-long wave of economic growth through industrialization and urbanization, made great strides over the past decade in the second wave of economic growth through rising incomes and growing consumer demand, and is now poised for a third wave of globally competitive prosperity and productivity driven by Sustainable Innovation. Minas Gerais already has developed several new Sustainable Innovation Pipelines, from biomedical to information technology. The next great surge for the Third Wave, the newest and most dynamic and productive Sustainable Innovation Pipeline for Minas Gerais, will be in Advanced Manufacturing. Brazil can compete directly with Advanced Manufacturing public policies and private companies throughout the world; and Minas Gerais can become one of Brazil's national leaders in this rapidly growing industrial technology field.

24

Narrative for Slide 24:

In 2011 and 2012, GUD worked with the Federation of Industries of the state of Minas Gerais (FIEMG) and the Minas Gerais state government to apply the Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity framework as a catalyst for generating a more dynamic and technologically innovative economy. In October 2012, GUD completed a major report, *Advanced Manufacturing and Sustainable Innovation: The Third Wave of Industrial and Urban Economic Growth for Minas Gerais* ([http://www.globalurban.org/Advanced Manufacturing and Sustainable Innovation -- Economic Growth for Minas Gerais.pdf](http://www.globalurban.org/Advanced_Manufacturing_and_Sustainable_Innovation_--_Economic_Growth_for_Minas_Gerais.pdf)).



**Manufatura Avançada e Inovação Sustentável:
A Terceira Onda de Crescimento Industrial
em Minas Gerais**

Relatório para a Federação das Indústrias do Estado de Minas Gerais (FIEMG)

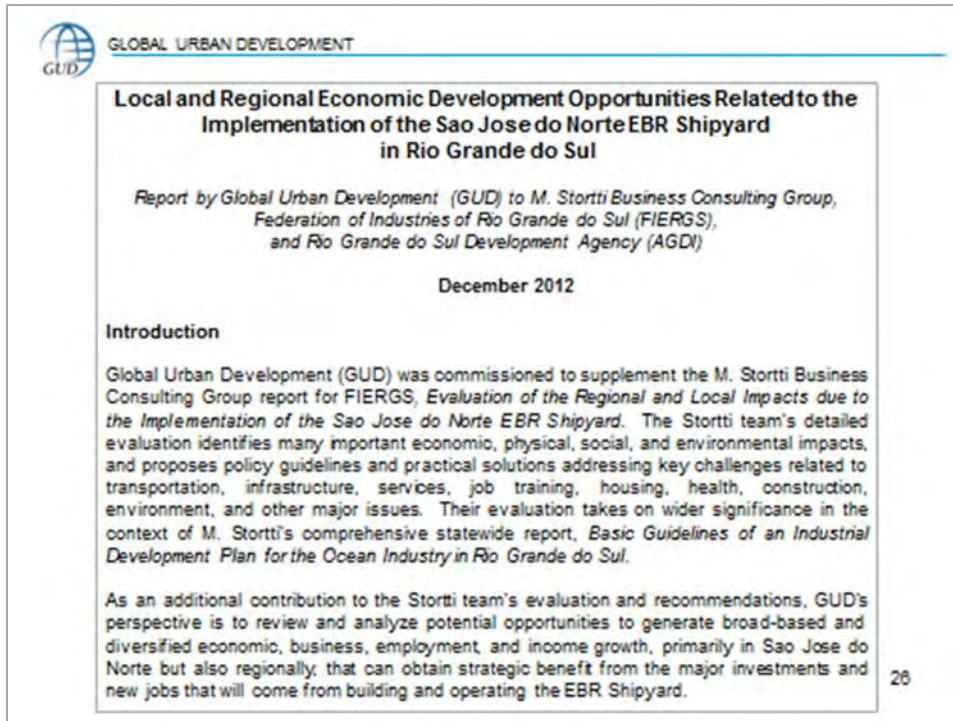
por Global Urban Development (GUD)

Outubro de 2012

Narrative for Slide 25:

GUD's 2012 Minas Gerais report for FIEMG is available in Portuguese on the Publications page of GUD's website:

(http://www.globalurban.org/Manufatura_Avancada_e_Inovacao_Sustentavel_em_Minis_Gerais.pdf).



Narrative for Slide 26:

During 2011 and 2012, GUD worked with FIERGS, AGDI, and the M. Stortti Business Consulting Group on studying the Naval/Offshore Industry in Rio Grande, Pelotas, São José do Norte, and the surrounding region, and recommending ways to use the contracts to build ships, platforms and heavy drilling equipment for offshore oil exploration and extraction, and related investments in shipyard improvements, to upgrade technology, infrastructure, and workforce skills and generate more diversified long-term sustainable economic growth. In December 2012 GUD produced a report, *Local and Regional Economic Development Opportunities Related to the Implementation of the São José do Norte EBR Shipyard in Rio Grande do Sul* ([http://www.globalurban.org/Local and Regional Economic Development Opportunities Related to the Implementation of the Sao Jose do Norte EBR Shipyard in Rio Grande do Sul.pdf](http://www.globalurban.org/Local_and_Regional_Economic_Development_Opportunities_Related_to_the_Implementation_of_the_Sao_Jose_do_Norte_EBR_Shipyard_in_Rio_Grande_do_Sul.pdf)).

This report is an excellent example of how GUD is applying our Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity framework for Rio Grande do Sul. GUD emphasizes four key areas of economic opportunities for São José do Norte, as well as for Rio Grande, Pelotas, and the surrounding region: 1) Commercial Fishing (especially artisanal cooperatives); 2) Tourism, Culture, and Creative Industries (including a Center for Gaúcho Maritime Culture); 3) Wind Power and Green Technologies; and 4) Zero Waste and Clean Technology Industries. Since 2013 GUD has been working with the city of Rio Grande and the Rio Grande Regional Naval/Offshore Industry Network (Polo Naval e Offshore de Rio Grande e Entorno APL) to implement key aspects of our 2012 report.



**Oportunidades de Desenvolvimento Local e Regional
relacionados a Implementação do Estaleiro EBR de São
José do Norte, no Rio Grande do Sul**

*Relatório do Global Urban Development (GUD) para o Grupo Empresarial M. Stortti
Consultores, Federação das Indústrias do Rio Grande do Sul (FIERGS) e para a Agência
de Desenvolvimento e Promoção do Investimento do Rio Grande do Sul (AGDI)*

Dezembro de 2012

Narrative for Slide 27:

GUD's 2012 report for FIERGS/AGDI/Stortti is available in Portuguese on GUD's website

(http://www.globalurban.org/Oportunidades_de_Developimento_Local_e_Regional_Relacionados_a_Implementacao_do_Estaleiro_EBR_de_Sao_Jose_do_Norte.pdf).



Narrative for Slide 28:

As previously mentioned in this report, Rio Grande do Sul is at a crossroads. The current economic growth path will yield, at best, modest growth, due to the ongoing strength of agribusiness and its long Food Production Value Chain, including machinery/equipment/implements, logistics, services. This slow and stable, though somewhat cyclical growth will take place in the context of a declining working-age population and a gradual reduction in several major industries.

The alternative path is a fast growing economy that is creating many new jobs, business opportunities, and rising incomes across the state, benefiting large numbers of people in every region. In order to accomplish these results, Rio Grande do Sul will need to move beyond business-as-usual and enthusiastically pursue a world-class transformational strategy over the next 16 years. This Leapfrog Economic Strategy is for RS to become the most sustainable and most innovative place in Latin America by 2030. Vigorously moving forward with this strategy will enable RS to modernize agriculture and livestock, food processing, and distribution, and the wide range of related metal-mechanic and electric-electronic industry value chains, in agricultural machinery/equipment/implements, transportation equipment/ motor vehicles/auto parts, retailing, business and professional services, and many other key industry networks. At the same time, in order to accomplish Sustainable Innovation in these fields that are at the heart of the RS economy, it will be vitally necessary to generate new advanced skills in manufacturing, information/digital technology (especially software), telecommunications, and numerous other fields.

The energetic pursuit of upgrading skills, technologies, and infrastructure in order to become highly innovative and sustainable, particularly in terms of resource efficiency, will enable RS agriculture, industry, and services to become much more productive and globally competitive – increasing revenues and market share, expanding investment and employment – that will enable Rio Grande do Sul to Leapfrog into the front ranks of technologically advanced countries worldwide. The future of innovation and technology is about sustainability, and by moving to become Latin America’s leader, RS also can become a world leader. It will be the best way to retain future generations of talented Gaúchos and Gaúchas, and become a magnet for attracting and retaining top talent from throughout Brazil and the entire world. The young Gaúcho diaspora in the US, Europe, Australia, and other places will be enthusiastic about returning home to RS. At the same time, Americans, Europeans, Australians, and people from many other places will want to travel to RS for tourism, education, working, and living, as skilled professionals, entrepreneurs, and investors, thus reversing the current outflow and creating a dynamic new population inflow benefiting Rio Grande do Sul.



Narrative for Slide 29:

In developing the statewide Leapfrog Economic Strategy for Rio Grande do Sul to become the most sustainable and innovative place in Latin America by 2030, we conducted detailed research and site visits for 34 cities and nine functional regions. The RS state government has divided the state into nine functional regions, as

shown in the map on Slide 30. Two of the nine function regions – Regions 4 and 5 – have one Regional Development Council for the entire area. The other seven functional regions contain two or more Regional Development Councils within their boundaries, each one covering part of the region’s geography.

The 28 Regional Development Councils are collaborative partnerships of business, government, academia, and civil society leadership within each region. They produce strategic plans with recommendations for key investments to modernize infrastructure and institutions, expand R&D and technology transfer, improve education and workforce development, extend public services, protect and enhance the environment, and many other initiatives. They also play a key role in organizing the state government’s Participatory Budgeting process for their regional area, working with the RS Department of Planning and Regional Development (SEPLAN).

In working on this project, we met with many Regional Development Council leaders at their monthly meetings in the RS Legislative Assembly and at their various regional offices. We learned a great deal from their vital work.

The map for Slide 30 identifies the Regional Development Council boundaries and situates them within the nine functional regions. In addition, the map illustrates their relative economic position measured in annual Gross Value Added (VAB) for 2010, with the highest productive output generated in the Jacuí Delta Metropolitan region (Porto Alegre and nine other municipalities) and the Serra region (Caxias do Sul and 30 other municipalities); [http://www.globalurban.org/GUD CIC Caxias do Sul speech.pdf](http://www.globalurban.org/GUD_CIC_Caxias_do_Sul_speech.pdf).

Region 1

Municipalities

Metropolitano do Delta do Jacuí

Porto Alegre (office); Alvorada, Cachoeirinha, Eldorado do Sul, Glorinha, Gravataí, Guaíba, Santo Antônio da Patrulha, Triunfo, Viamão.

Centro-Sul

São Jerônimo (office); Arambaré, Arroio dos Ratos, Barão do Triunfo, Barra do Ribeiro, Butiá, Camaquã, Cerro Grande do Sul, Charqueadas, Chuvisca, Cristal, Dom Feliciano, Mariana Pimentel, Minas do Leão, Sentinela do Sul, Sertão Santana, Tapes.

Vale do Caí

São Sebastião do Caí (office); Alto Feliz, Barão, Bom Princípio, Brochier, Capela de Santana, Feliz, Harmonia, Linha Nova, Maratá, Montenegro, Pareci Novo, Salvador do Sul, São José do Hortêncio, São José do Sul, São Pedro da Serra, São Vendelino, Tupandi, Vale Real.

Vale do Rio dos Sinos
Canoas (office); Araricá, Campo Bom, Dois Irmãos, Estância Velha, Esteio, Ivoti, Nova Hartz, Nova Santa Rita, Novo Hamburgo, Portão, São Leopoldo, Sapiranga, Sapucaia do Sul

Paranhana-Encosta da Serra
Taquara (office); Igrejinha, Lindolfo Collor, Morro Reuter, Parobé, Presidente Lucena, Riozinho, Rolante, Santa Maria do Herval, Três Coroas.

Region 2

Vale Rio do Pardo
Santa Cruz do Sul (office); Arroio do Tigre, Boqueirão do Leão, Candelária, Encruzilhada do Sul, Estrela Velha, General Câmara, Herveiras, Ibarama, Lagoa Bonita do Sul, Mato Leitão, Pantano Grande, Passa Sete, Passo do Sobrado, Rio Pardo, Segredo, Sinimbu, Sobradinho, Tunas, Vale do Sol, Vale Verde, Venâncio Aires, Vera Cruz.

Vale do Taquari
Lajeado (office); Anta Gorda, Arroio do Meio, Arvorezinha, Bom Retiro do Sul, Canudos do Vale, Capitão, Colinas, Coqueiro Baixo, Cruzeiro do Sul, Dois Lajeados, Doutor Ricardo, Encantado, Estrela, Fazenda Vilanova, Forquetinha, Ilópolis, Imigrante, Marques de Souza, Muçum, Nova Bréscia, Paverama, Poço das Antas, Pouso Novo, Progresso, Putinga, Relvado, Roca Sales, Santa Clara do Sul, Sério, Tabaí, Taquari, Teutônia, Travesseiro, Vespasiano Corrêa, Westfália.

Region 3

Campos de Cima da Serra
Vacaria (office); André da Rocha, Bom Jesus, Campestre da Serra, Esmeralda, Ipê, Monte Alegre dos Campos, Muitos Capões, Pinhal da Serra, São José dos Ausentes.

Hortências
Canela (office); Cambará do Sul, Gramado, Jaquirana, Nova Petrópolis, Picada Café, São Francisco de Paula.

Serra
Caxias do Sul (office); Antônio Prado, Bento Gonçalves, Boa Vista do Sul, Carlos Barbosa,

Coronel Pilar, Cotiporã, Fagundes Varela, Farroupilha, Flores da Cunha, Garibaldi, Guabiju, Guaporé, Montauri, Monte Belo do Sul, Nova Araçá, Nova Bassano, Nova Pádua, Nova Prata, Nova Roma do Sul, Paraí, Pinto Bandeira, Protásio Alves, Santa Tereza, São Jorge, São Marcos, São Valentim do Sul, Serafina Corrêa, União da Serra, Veranópolis, Vila Flores, Vista Alegre do Prata.

Region 4

Litoral Norte

Osório (office); Arroio do Sal, Balneário Pinhal, Capão da Canoa, Capivari do Sul, Caraá, Cidreira, Dom Pedro de Alcântara, Imbé, Itati, Mampituba, Maquiné, Morrinhos do Sul, Mostardas, Palmares do Sul, Terra de Areia, Torres, Tramandaí, Três Cachoeiras, Três Forquilhas, Xangri-lá.

Region 5

Sul

Pelotas (office); Amaral Ferrador, Arroio do Padre, Arroio Grande, Canguçu, Capão do Leão, Cerrito, Chuí, Herval, Jaguarão, Morro Redondo, Pedras Altas, Pedro Osório, Pinheiro Machado, Piratini, Rio Grande, Santa Vitória do Palmar, Santana da Boa Vista, São José do Norte, São Lourenço do Sul, Tavares, Turuçu.

Region 6

Campanha

Bagé (office); Aceguá, Caçapava do Sul, Candiota, Dom Pedrito, Hulha Negra e Lavras do Sul. Acegua, Cacapava do Sul, Candiota, Dom Pedrillo, Hulha Negra, Lavras do Sul.

Fronteira Oeste

São Borja (office); Alegrete, Barra do Quaraí, Itacurubí, Itaquí, Macambará, Manoel Viana, Quaraí, Rosário do Sul, Santa Margarida do Sul, Santana do Livramento, São Gabriel, Uruguaiana.

Region 7

Celeiro

Três Passos (office); Barra do Guarita, Bom Progresso, Braga, Campo Novo, Chiapeta, Coronel Bicaco, Crissiumal, Derrubadas,

	Esperança do Sul, Humaitá, Inhacorá, Miraguaí, Redentora, Santo Augusto, São Martinho, São Valério do Sul, Sede Nova, Tenente Portela, Tiradentes do Sul, Vista Gaúcha.
Fronteira Noroeste	Santa Rosa (office); Alecrim, Alegria, Boa Vista do Buricá, Campina das Missões, Cândido Godói, Doutor Maurício Cardoso, Horizontina, Independência, Nova Candelária, Novo Machado, Porto Lucena, Porto Mauá, Porto Vera Cruz, Santa Rosa, Santo Cristo, São José do Inhacorá, Senador Salgado Filho, Três de Maio, Tucunduva, Tuparendi.
Missões	Santo Ângelo (office); Bossoroca, Caibaté, Cerro Largo, Dezesseis de Novembro, Entre-Ijuís, Eugênio de Castro, Garruchos, Giruá, Guarani das Missões, Mato Queimado, Pirapó, Porto Xavier, Rolador, Roque Gonzales, Salvador das Missões, Santo Antônio das Missões, São Luiz Gonzaga, São Miguel das Missões, São Nicolau, São Paulo das Missões, São Pedro do Butiá, Sete de Setembro, Ubiretama, Vitória das Missões.
Noroeste Colonial	Ijuí (office); Ajuricaba, Augusto Pestana, Bozano, Catuípe, Condor, Coronel Barros, Joia, Nova Ramada, Panambi, Pejuçara.
<u>Region 8</u>	
Alto Jacuí	Cruz Alta (office);): Boa Vista do Cadeado, Boa Vista do Incra, Colorado, Fortaleza dos Valos, Ibirubá, Lagoa dos Três Cantos, Não-Me-Toque, Quinze de Novembro, Saldanha Marinho, Salto do Jacuí, Santa Bárbara do Sul, Selbach, Tapera.
Central	Santa Maria (office); Agudo, Dilermando de Aguiar, Dona Francisca, Faxinal do Soturno, Formigueiro, Itaara, Ivorá, Jari, Júlio de Castilhos, Nova Palma, Pinhal Grande, Quevedos, São João do Polesine, São Martinho da Serra, São Pedro do Sul, Silveira Martins, Toropi, Tupanciretã.
Jacuí Centro	Cachoeira do Sul (office); Cerro Branco, Novo Cabrais, , Paraíso do Sul, Restinga Seca, São Sepé, Vila Nova do Sul.

Vale do Jaguari Santiago (office); Cacequi, Capão do Cipó, Jaguari, Mata, Nova Esperança do Sul, São Francisco de Assis, São Vicente do Sul, Unistalda.

Region 9

Alto da Serra do Botucaraí Soledade (office); Alto Alegre, Barros Cassal, Campos Borges, Espumoso, Fontoura Xavier, Gramado Xavier, Ibirapuitã, Itapuca, Jacuizinho, Lagoão, Mormaço, Nicolau Vergueiro, São José do Herval, Tio Hugo, Victor Graeff.

Médio Alto Uruguai Frederico Westphalen (office); Alpestre, Ametista do Sul, Caiçara, Cristal do Sul, Dois Irmãos das Missões, Erval Seco, Gramado dos Loureiros, Iraí, Jaboticaba, Nonoai, Novo Tiradentes, Palmitinho, Pinhal, Pinheirinho do Vale, Planalto, Rio dos Índios, Rodeio Bonito, Seberi, Taquaruçu do Sul, Trindade do Sul, Vicente Dutra, Vista Alegre.

Nordeste São José do Ouro (office); Água Santa, Barracão, Cacique Doble, Capão Bonito do Sul, Caseiros, Ibiaçá, Ibiraiaras, Lagoa Vermelha, Machadinho, Maximiliano de Almeida, Paim Filho, Sananduva, Santa Cecília do Sul, Santo Expedito do Sul, São João da Urtiga, Tapejara, Tupanci do Sul, Vila Lângaro.

Norte Erechim (office); Aratiba, Áurea, Barão do Cotegipe, Barra do Rio Azul, Benjamin Constant do Sul, Campinas do Sul, Carlos Gomes, Centenário, Charrua, Cruzaltense, Entre Rios do Sul, Erebang, Erval Grande, Estação, Faxinalzinho, Floriano Peixoto, Gaurama, Getúlio Vargas, Ipiranga do Sul, Itatiba do Sul, Jacutinga, Marcelino Ramos, Mariano Moro, Paulo Bento, Ponte Preta, Quatro Irmãos, São Valentim, Sertão, Severiano de Almeida, Três Arroios, Viadutos.

Produção Passo Fundo (office); Almirante, Tamandaré do Sul, Camargo, Carazinho, Casca, Chapada, Ciríaco, Coqueiros do Sul, Coxilha, David Canabarro, Ernestina, Gentil, Marau, Mato Castelhano, Muliterno, Nova Alvorada, Nova Boa Vista, Passo

Fundo, Pontão, Santo Antônio do Palma, Santo Antônio do Planalto, São Domingos do Sul, Vanini, Vila Maria.

Vale Rio da Várzea

Palmeira das Missões (office); Barra Funda, Boa Vista das Missões, Cerro Grande, Constantina, Engenho Velho, Lajeado do Bugre, Liberato Salzano, Novo Barreiro, Novo Xingu, Ronda Alta, Rondinha, Sagrada Família, São José das Missões, São Pedro das Missões, Sarandi, Três Palmeiras.

 GLOBAL URBAN DEVELOPMENT

RIO GRANDE DO SUL FUNDAMENTAL ASSETS

- European Immigrant Craft Skills
- Independent Businesses and Family Farming
- Gaucho History and Traditions
- Educated Middle-Income Population
- Urban-Industrial Heritage
- Higher Education and Research Institutions
- Energy and Infrastructure, including Ports and Waterways
- Quality Health Care
- High Ranking on Human Development Index (HDI)
- Collaborative Business Support Organizations
- Workforce Development System
- Participatory Governance and Citizenship
- Creativity and Innovation-Oriented
- Pro-Sustainability
- Vibrant Culture and Quality of Life
- Temperate Seasonal Climate
- Fertile Land and relatively Abundant Water
- Strategic Location (Mercosul)

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Narrative for Slide 31:

The bullet points in Slide 31 represent just a partial list of Rio Grande do Sul's many Fundamental Assets, though these are ones we believe are particularly important and valuable in enabling the Leapfrog Economic Strategy to succeed in RS becoming the most sustainable and innovative in Latin America by 2030.

The first two items, European Immigrant Craft Skills, and Independent Businesses and Family Farming, reflect the economic history of RS over the past two centuries, as waves of immigrants from Portugal, Spain, Italy, Germany, Austria, the Netherlands, Poland, Ukraine, Lebanon, and many other countries brought with them various agricultural, food processing, metal-mechanic, electrical, chemical, and other skills that formed the basis for many productive activities, from beef to wine,

from furniture to shoes, from leather to tools, and much more. Rio Grande do Sul is one of the only states in Brazil where major companies have grown from small independent enterprises, especially in the colonial “Gringo” regions of the northeastern and north central parts of RS.

Three other items – Educated Middle Income Population, Urban-Industrial Heritage, and Higher Education and Research Institutions – are vital for making the Leapfrog jump into technologically advanced Sustainable Innovation in products, services, production processes, infrastructure, and development. RS consistently ranks highest among Brazil’s states in the percentage of its university-educated population, including people with advanced degrees (see Slide 49).

Another important RS asset, Participatory Governance and Citizenship, is best reflected by Porto Alegre’s international recognition for its innovative Participatory Budgeting program (<https://openknowledge.worldbank.org/handle/10986/8042>).

The entire list really speaks for itself. It essentially states that in our view, RS already possesses the basic capabilities necessary to achieve the 2030 Leapfrog vision, though it will require a massive and determined collaborative effort over the next 16 years to actually reach the goal.



Narrative for Slide 32:

Slide 32 demonstrates Rio Grande do Sul’s great success over the past century in becoming one of the main industrial production centers of Brazil and Latin America.

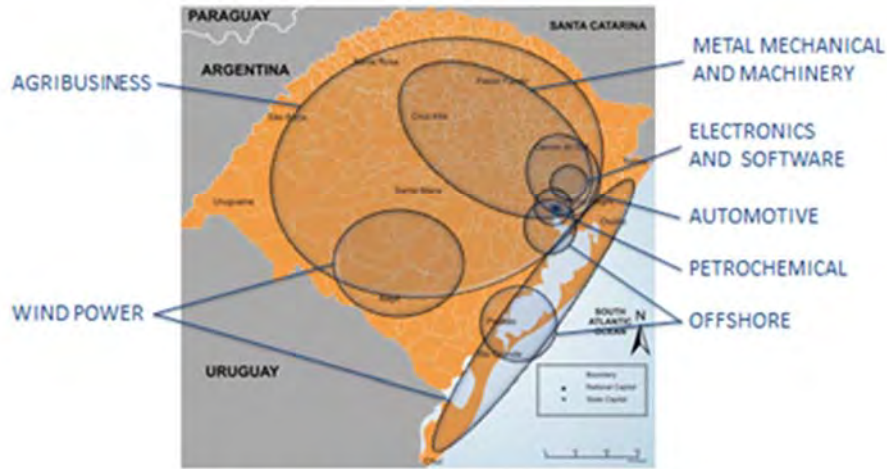
From the viewpoint of advanced technology and Sustainable Innovation, three of these industries, Automation and Controls, Biodiesel, and Wind Energy are relatively new and cutting-edge. All of the industries on this list will require substantial modernization, including digital technology or biotechnology, in order to remain economically competitive and to exponentially increase productivity and resource efficiency.



Narrative for Slide 33:

Slide 33 identifies by geographic location where in RS there are businesses and workers producing medium technology and high technology equipment. The darker brown colors represent larger numbers of employees and higher concentration of firms, located by COREDES (Regional Development Council areas). Primarily these are in the eastern and northern parts of the state. The technology categories come from the National Classification of Economic Activities (NCEA). The manufacturing industries categorized as medium technology include chemical products; machinery and equipment; electrical appliances, machines, and materials; motor vehicles (cars, trucks, and buses), trailers, and containers; and other transportation equipment (except vehicles). Industries categorized as high technology are manufacturing of pharmaceuticals and chemicals, and manufacturing of computer equipment, electronics, and optical products.

Rio Grande do Sul Illustrative Economic Geography

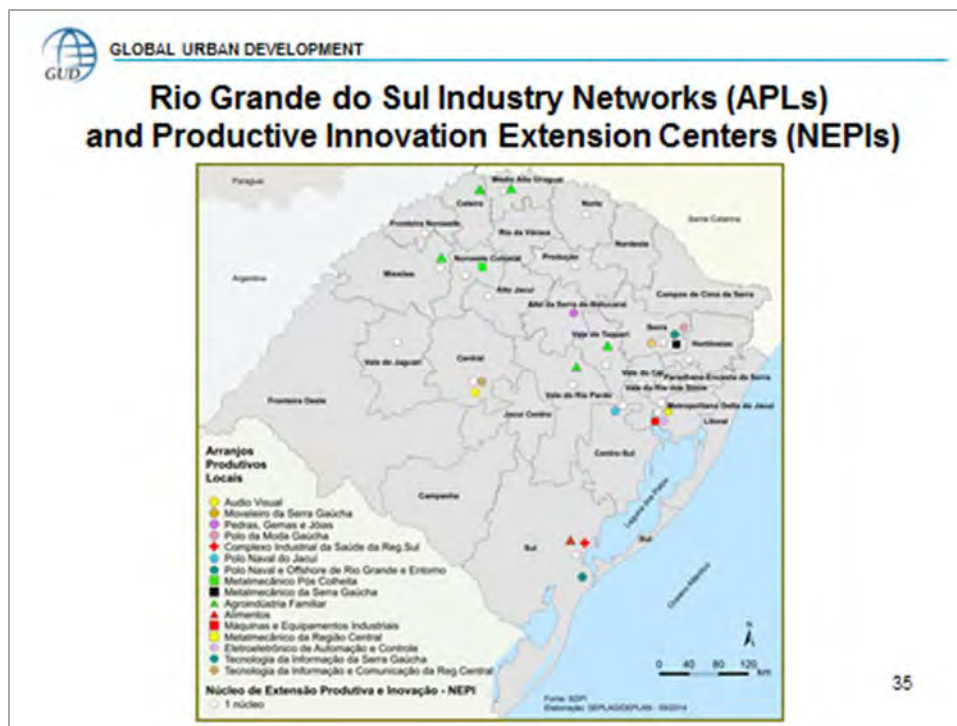


Source: AGDI, 2012

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Narrative for Slide 34:

Slide 34 provides a geographic overview of some of the key industries in RS and where they are located within the state. It highlights Metal Mechanical and Machinery, Electronics and Software, Agribusiness, Automotive, Petrochemical, Offshore, and Wind Power, which demonstrates that RS has a diversified economic base, a good asset to build on over the next 16 years.



Narrative for Slide 35:

The map pictured in Slide 35 shows the location of Rio Grande do Sul's 16 APLs (Local Production Chains/Clusters) and 20 NEPIs (Productive Innovation Extension Centers).

APLs are groups of related businesses in particular industries. In many countries they are called Industry Clusters, and GUD refers to them as Industry Networks. AGDI, with funding from the World Bank, provides financial support and technical assistance to promote the formation and growth of APL business organizations and industry networks.

Currently there are 20 APLs in RS, and they reflect both present and potential future economic strengths. They are organized geographically and by sector, and they include businesses, universities, financial institutions, local governments, and other participants.

These APLs (and their main locations) are:

- Audio Visual (metropolitan Porto Alegre)
- Clothing and Accessories (Serra Gaúcha);
- Electric-Electronics, Automation, and Controls (metropolitan Porto Alegre)
- Family Agribusiness (Celeiro)
- Family Agribusiness (Médio Alto Uruguai)
- Family Agribusiness (Missões)
- Family Agribusiness (Vale do Rio Pardo)

- Family Agribusiness (Vale do Taquari)
- Food Processing (Southern Region)
- Furniture (Serra Gaúcha)
- Industrial Machinery and Equipment (metropolitan Porto Alegre)
- Information and Communication Technology (Santa Maria/Central Region)
- Information Technology (Serra Gaúcha)
- Medical Supplies, Equipment, and Services (Pelotas/Southern Region)
- Metal-Mechanic Manufacturing (Santa Maria/Central Region)
- Metal-Mechanic Manufacturing (Serra Gaúcha)
- Metal-Mechanic Production for Post-Harvest Grain Cleaning, Drying, Handling, and Storage (Colonial Northwest Region)
- Naval/Offshore Industry Value Chain (metropolitan Porto Alegre)
- Naval/Offshore Industry Value Chain (metropolitan Rio Grande)
- Stones, Gems, and Jewelry (Alto da Serra do Botucari)

Productive Innovation Extension Centers (NEPIs) provide strategic advice and technical assistance to more than 3,000 small and medium-sized businesses (SMEs) in Rio Grande do Sul. Currently there are 20 centers operated by 14 RS universities throughout the state, receiving financial support from AGDI, with funding from the World Bank. Generally university business school faculty and graduate students serve as Extension Agents working with participating firms for a period of six months.

The 113 RS Extension Agents conduct diagnostic studies to benchmark the companies compared to national and international best practices, and then advise these firms about how to become much more productive, efficient, innovative, and sustainable, with an emphasis on cleaner production and waste reduction. In some cases the Extension Agents recommend that the companies make new investments in plant and equipment, both hardware and software, including smart machines and digital technology.

The NEPI program is free to the businesses, though they are responsible for paying the costs of any investments, improvements, and personnel training. NEPIs operate similar to a very successful US government initiative, the Manufacturing Extension Partnerships (MEPs) (<http://www.nist.gov/mep/>), though MEPs charge participating businesses a modest fee for advisory services from university extension agents and professional consultants.

14 RS universities currently operate the state's 20 NEPIs, each of which serves different regions:

- Region 1 – Faccat, Feevale, PUCRS, ULBRA, Unilasalle, and Unisc
- Region 2 – Unisc and Univates
- Region 3 – UCS
- Region 4 – Faccat
- Region 5 – UCPel

- Region 6 – UCPel and URI
- Region 7 – Unijuí and URI
- Region 8 – Unicruz, Unifra, and URI
- Region 9 – UPF and URI

The slide is titled "RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY" with the subtitle "KEY DRIVER: Precision Production, Smart Machines, and Digital Technology". It features the GUD logo in the top left. The main content consists of several images and logos: altus, Implet, FISL15 (Fórum Internacional de Inovação), boxbrazil, and CEITEC S.A. (semiconductors). There are also images of industrial buildings and a control room.

Narrative for Slide 36:

This Key Driver of business, employment, and income growth is not one industry, but an extensive network of different industries and job skills, of academic research, business support services, and much more. Indeed, Precision Production, Smart Machines, and Digital Technology is a centerpiece of the entire Leapfrog Economic Strategy to transform Rio Grande do Sul into a more dynamic and faster-growing economy through Sustainable Innovation. For this Key Driver to succeed over the next 16 years, it will require concentrated efforts involving focused leadership and widespread collaboration between many different people, places, and institutions.

Precision Production, Smart Machines, and Digital Technology builds on many existing strengths of RS: the capabilities to manufacture good quality metal and electronic machinery and equipment for agricultural and industrial production, and other uses. These capabilities can be substantially enhanced through digital technology, drawing on other key fields such as computer software, telecommunications, and automation and controls.

RS can become more globally competitive and highly productive in agriculture, industry, and services by innovating new ways to build and operate machinery and equipment with advanced digital technology. Successful examples of RS companies with expertise in smart machines are Altus Automation Systems in São Leopoldo and ImPLY Electronic Technology in Santa Cruz do Sul, both pictured in Slide 36.

Altus Automation Systems was founded in 1982 by computer scientists from UFRGS. Its headquarters has been located at Tecnosinos in São Leopoldo since 2003, with an ongoing relationship to the Computer Science Department at Unisinos (see Slide 48). Altus has offices and production facilities in Porto Alegre and Sapucaia do Sul in RS, including a manufacturing subsidiary, Teikon. It also maintains facilities in São Paulo, Rio de Janeiro, Belo Horizonte, Curitiba, Salvador, and Macaé.

Altus develops and produces electronic automation and process control machines and equipment based on state-of-the-art technologies, including Programmable Logic Controllers, Human-Machine Interfaces, Frequency Inverters, Power Multimeters, and Power Supply. Also, Altus designs systems integration solutions for three major industries: Electrical Energy, Oil and Gas, and Transportation.

In the 2015 Brazil “Champions of Innovation” rankings by *Amanhã Magazine* and Edusys, with technical support from the Fundação Dom Cabral and PwC, Altus was selected as one of the top 20 most innovative and creative companies in the south of Brazil (consisting of three states: Rio Grande do Sul, Paraná, and Santa Catarina). Altus will receive an award from *Amanhã* in April 2015 at a Porto Alegre event. What is most noteworthy about these innovation rankings is that RS has 13 of the top 20 companies, and 32 of the top 50 companies, that are located in these three south Brazilian states.

ImPLY Electronic Technology was founded in 2003. It develops smart machines using digital technology for a wide variety of information and entertainment systems, including video games, bowling equipment, sports scoreboards, full color displays, information displays, road displays, voting systems, access systems, self-service parking meters, and many other electronic products. Eight of the 2014 World Cup stadiums in Brazil used ImPLY products, and in recent years ImPLY has exported its products to more than 50 countries on five continents.

ImPLY develops new technologies in partnership with major universities, including Unisc in Santa Cruz do Sul and UFSM in Santa Maria. The ImPLY Technology Park in Santa Cruz do Sul combines hardware manufacturing and software development facilities in a 180,000 square-foot “green building” with many Sustainable Innovation features, both of the physical space and in the production processes. ImPLY has won numerous innovation, technology, and export awards.

The RS state government should provide leadership in research and development (R&D), higher education, university-industry partnerships, business acceleration, and many other methods of expanding financial and intellectual resources such that

there will be hundreds of companies like Altus and Impley, with thousands of employees, suppliers, and customers.

Parit Group, the parent company of Altus and Teikon, is a joint venture partner with the South Korean firm, Hana Micron, in the new US\$ 200 million HT Micron factory at Tecnosinos that began operations in September 2014 (pictured in Slide 36). Currently HT Micron is manufacturing three million semiconductors per month for computers, smart phones, digital TVs, and other electronic devices. Ricardo Felizzola, Chairman of Altus and CEO of HT Micron, stated at the grand opening: “Our vision is to create a technology hub for Rio Grande do Sul.” In 2016 Tecnosinos will open a Semiconductor Technology Institute specializing in chip encapsulation and testing, to further expand the R&D and advanced engineering capabilities of an RS microelectronics industry network.

HT Micron has been able to build on previous efforts in RS by CEITEC, the National Center for Advanced Electronic Technology owned by Brazil’s federal government. CEITEC has built a new microelectronics factory in Porto Alegre to produce semiconductors for Digital Multimedia, Wireless Communication, and Radio Frequency Identification (CEITEC’s logo is pictured on Slide 36). This state-of-the-art facility opened in 2013 and will eventually produce 70 million integrated circuits annually for markets ranging from Brazilian passport microchips to electronic “earrings” designed to track livestock. CEITEC includes a Design Center with more than 120 engineers capable of developing complex semiconductors with advanced performance specifications. It is located near the UFRGS Campus do Vale, with strong links to the university’s Information Technology Institute and School of Engineering.

The recent emergence of a relatively small but rapidly growing Microelectronics Industry Network in RS is another good indication that Rio Grande do Sul can be innovative, productive, and globally competitive in the advanced fields of Precision Production, Smart Machines, and Digital Technology. Similarly, the fact that large international corporations have located major Latin American software development centers in RS, including SAP at Tecnosinos in São Leopoldo, and Dell, HP, Microsoft, and ThoughtWorks at Tecnopuc in Porto Alegre (see Slide 48), is an indication that Rio Grande do Sul already has considerable Digital Technology talent for competing globally as a software innovator (Dell, HP, and SAP are pictured in Slide 36). In addition, because Rio Grande do Sul borders Argentina and Uruguay, Gaúchos have a somewhat closer relationship to Spanish language and culture than most of Brazil, which makes RS a strategically located software R&D and marketing center for serving both Brazilian and Latin American markets, including through Mercosul countries.

Since 2000, Porto Alegre has annually hosted the world’s largest International Free Software Forum (FISL), organized by the city’s Free Software Association (ASL) with many partners and sponsors (FISL is pictured in Slide 36). Free software essentially is open source software enabling all users to study, modify, and share the program’s

source codes. The presence in RS of numerous independent software firms and organizations participating in FISL and ASL, such as MateHackers (located at Vila Flores in Porto Alegre's 4th District, <http://www.globalurban.org/Post-Industrial-Brazilian-Neighborhood-Aims-to-be-Latin-American-Silicon-Valley.pdf>; see Slides 62-64), suggests that Rio Grande do Sul has considerable potential as a global creative software hub, Another strong indication of this emerging Digital Technology business specialization in RS is the recent growth of computer games developers and audio-visual studios, including Box Brazil, a multi-platform online digital media entertainment and information company (pictured in Slide 36), located at Tecnopuc.

GLOBAL URBAN DEVELOPMENT

RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY

KEY DRIVER:

Food Production Value Chain

Global Food Demand Will Increase 50% by 2030 37

Narrative for Slide 37:

The vital fact is that global demand for food will increase 50 percent in the next 16 years, so agriculture, livestock, food processing, distribution, and related industries will continue to be a major economic growth engine for Rio Grande do Sul. The challenge will be to infuse food production with greater Sustainable Innovation, resource efficiency, and advanced technology, such that both productivity and health will substantially increase, and new business activities, like software and digital technology, can grow rapidly as part of the overall Food Production Value Chain.

The upper photos in Slide 37 reflect RS competitive advantages at the first stage of food production: growing animals for meat, dairy, and other byproducts (in this picture, beef cattle); growing fruits, vegetables, and plants (in this picture, grapes for food and beverages, including juice and wine); and growing grains (in this picture, soy – RS is the third largest soy-producing state in Brazil, and is projected to grow an all-time high of nearly 15 million tons of soy in 2014/15).

The following three paragraphs are reproduced verbatim from this report's introductory section:

The best part about this strategy is that it makes full use of the traditional strengths of the RS economy, enabling them to grow even stronger. The main engine of economic growth over the next 16 years will continue to be the massive Food Production Value Chain of Rio Grande do Sul, which represents nearly one-third of the state's economy in terms of agriculture, livestock, food processing, marketing, distribution, and the many closely related business activities in manufacturing and services. Because global food demand will increase 50 percent by 2030, the RS Food Production Value Chain will have even better opportunities to be “the rising tide that lifts all boats.”

Further, the continued growth of the Food Production Value Chain in Rio Grande do Sul, given its vital connections with metal-mechanic and electric-electronic manufacturing of capital goods, agricultural machinery/equipment/implements, and transportation equipment/motor vehicles/auto parts in the state, will be the Key Driver of Sustainable Innovation in hardware and software, and in production processes, products, and services. This will enable the RS economy, rapidly modernizing based on the accelerated pace of its Food Production Value Chain, to become a global cutting-edge leader in Advanced Manufacturing, Precision Production, Smart Machines, Digital Technology, Renewable Energy, Precision Agriculture, Biotechnology, Precision Engineering, Clean Technology, Polymers, and many other aspects of 21st century Sustainable Innovation.

In particular, metal-mechanic manufacturing and its entire value chain in RS is closely linked to agribusiness. The expansion of Sustainable Innovation in production processes and products will enable these industries to become much more productive and globally competitive. The McKinsey Global Institute highlights this important economic value chain relationship between agriculture and industry: “The removal of protection, support, and subsidies initially caused distress for Brazilian farmers and agribusinesses. But they eventually responded by taking steps to boost their efficiency and productivity—and their improved performance generated positive spillover effects in other industries, including fertilizer production, food processing, and retail. As Brazilian agriculture has incorporated greater use of modern machinery, production of tractors and other agricultural equipment has quadrupled in the past three decades. Brazil, previously an importer, has become an exporter of these machines—in fact, its exports of these products have increased 24-fold since 1970. Brazilian manufacturers now produce tractors

that can harvest wider areas and with greater power than ever before. This is an example of capitalizing on Brazil's comparative advantage in resources to build capabilities in adjacent industries, an area of potential broader opportunity."

Brazil's large-scale breakthroughs in agricultural productivity and its "tropicalization" of agriculture over the past four decades, by adapting scientific research methods and motorized mechanization to much different environments, vegetation, soil conditions, topography, climate, and infrastructure than most of Europe or the US, is increasingly becoming an instructive and attractive model for the Global South. Many emerging economies in developing countries, especially in Africa, now look to Brazil as a source of ideas and technologies, of goods and services, to improve their own Food Production Value Chains. Agricultural machinery/equipment/implements and many related manufactured products from RS are being sold all over Brazil, in much of Latin America, particularly Mercosul countries, and also now in many African and Middle Eastern nations.

The lower photos in Slide 37 reflect the important agriculture-industry economic relationship in Rio Grande do Sul by highlighting four major RS metal-mechanic manufacturers from the Food Production Value Chain: Randon, Agrale, John Deere, and Mor. We also highlight Fruki, a major RS beverage producer, as an example of a successful food processing enterprise in the Food Production Value Chain.

Hercílio and Raul Randon made metal agricultural tools in Caxias do Sul, and in 1950 the two brothers founded Mecânica Randon Ltd. and began producing air brakes and third axles for trucks to carry larger and heavier loads traveling through the steep slopes of the Serra Gaúcha. A decade later the Randon company developed a third axle and equalizer suspension system for semi-trailers, enabling timber logs and other heavy duty goods to be transported from RS to São Paulo on the newly constructed BR-116 federal highway. From this business Randon grew to become the largest manufacturer of commercial trailers in Brazil, with technical quality and durability able to handle long distances, rugged terrain, and often unpaved roads in the Brazilian countryside.

Nearly 60 percent of all goods in Brazil move by truck. And based on our informal survey of statewide travel within RS, at least three-fourths of the truck trailers are made by Randon, transporting cargo from every element of the Food Production Value Chain. The picture in Slide 37 of a Randon trailer is a very well-known site in RS. Randon also is a major manufacturer of railroad cars, off-road trucks, and motor vehicle parts. It is one of the biggest homegrown industrial companies in RS and in Brazil, with major global corporate partnerships including ArvinMeritor in the US and Jost Werke in Germany, and with plants, warehouses, and offices in Algeria, Argentina, Chile, China, Dubai, Egypt, Germany, Kenya, Mexico, South Africa, and the US. Randon does extensive export business, primarily to Latin America, Africa, and the Middle East. Its various subsidiaries and partnerships produce suspension and brake systems and many other automotive parts and systems. In 1996 Randon acquired control of another major international company in Caxias do Sul, Fras-Le.

Agrale began making tractors in Caxias do Sul in the 1960s. In the 1980s they started making trucks, and the following decade they added minibuses to their production line. Today, with three large factories in Caxias do Sul, Agrale is a major manufacturer of tractors, trucks, buses, off road utility vehicles, engines, and components. They also have a factory in Argentina producing tractors, vehicles, and parts.

In 2006 Agrale began manufacturing the first tractors in Brazil fueled by biodiesel (pictured in Slide 37). Since 2009 they also have a joint venture with Siemens to develop hybrid-fuel buses. Since 2008 Agrale has participated in the national Mais Alimentos (More Food) program, helping family farmers obtain federally subsidized low-interest loans to invest in expanding production and improving productivity by purchasing modern new machinery and equipment. Agrale is certified by a federal agency, Pronaf, to provide technical assistance and after-sales service to eligible farmers. More than 80,000 tractors and nearly 50,000 vehicles have been sold in Brazil through Mais Alimentos during the past six years, including by Agrale.

In April 2014 Agrale became the first company in Brazil to sign a commercial agreement under Mais Alimentos Internacional, selling 320 tractors to family farmers in Zimbabwe with aid provided by Brazil's federal government. "The objective of the program is to increase production and productivity of family-run businesses in the countries covered by it [also including Ghana, Mozambique, and Senegal], and to strengthen the agricultural machinery and equipment industry in Brazil by encouraging technological research and innovation."

John Deere has two major facilities in RS: a 1989 factory in Horizontina producing harvesters and planters, and a 2008 factory in Montenegro making tractors. The Horizontina factory started in 1945 as a local blacksmith shop, Schneider, Logemann and Company (SLC). In 1965 SLC began producing the first automotive harvesters made in Brazil, and in 1979 John Deere made a major investment in SLC, which soon became Brazil's largest agricultural machinery manufacturer. John Deere purchased SLC in 1999. The modern Horizontina factory employs 1,700 people, with another 1,800 working at the state-of-the-art Montenegro plant. These two major facilities produce John Deere tractors, harvesters, and planters for all of Brazil and much of Latin America.

In the Sustainable Innovation field of Precision Agriculture, John Deere is an international leader with its digital technology Solutions in Agricultural Management (AMS) system: "Autopilot, Harvest Monitor, the Productivity Map and other AMS system products ensure greater accuracy and efficiency of agricultural operations. They combine the advances of information technology with satellite positioning of resources to improve the management of the properties, reducing operating costs and increasing productivity in the field."

Mor in Santa Cruz do Sul, produces skewers, grills, and barbecues for the great Gaúcho meat-cooking tradition of churrasco, as pictured in Slide 37. Mor began 50

years ago making agricultural products, though now it focuses on manufacturing a wide range of outdoor and recreational equipment and gear, together with home goods. In all, Mor produces 1,200 items for home, leisure, beach, and camping, including folding tables, lawn and beach chairs, tents, backyard swimming pools, toys, cookware, ironing boards, clothes racks, and stepladders. Mor is among the largest leisure products manufacturers in Brazil, with extensive distribution in retail stores throughout Latin America. Some of its products are now sold on five continents worldwide. Mor's barbecue grills – churrasqueiras – play a major role in household cooking and consumption of meat, making this RS industrial company a key player in the Food Production Value Chain.

Fruki in Lajeado has been operating since 1924 in a region with plenty of good fresh water, surrounded by fresh farm produce – fruits and grains – in a strategically accessible location. From modest origins as a local brewery, Fruki has evolved into a very large independent soft drink producer of 380 million liters annually, with an elaborate distribution system and value chain. In addition to soft drinks (pictured in Slide 37), Fruki also is a major producer of bottled water under the label of Agua da Pedra. The company is committed to sustainability and built the first wastewater treatment plant in the Taquari Valley region.

RS should continue to explore a wide variety of ways to add value to the state's agricultural production, such as the Serra Gaúcha's shift in recent decades from growing grapes to making wine, or with the growth of "premium" foods and beverages, to cite just two examples. Becoming a more sophisticated and complete food production center, with greater value added to beef, soy, milk, and a vast spectrum of other foods, including more sustainably produced and healthier products, can be an important and effective component of the RS Leapfrog Economic Strategy.

For example, at FENASOJA, the major annual 10-day National Soy Fair in Santa Rosa, promotion and enjoyment of foods prepared with soy ingredients is featured through the Soy Kitchen (Cozinha da Soja). At FENASOJA, soy food is cooked, displayed, and served, recipe books are distributed, and there even is a regional soy cooking competition. All of these activities help encourage new ways of making healthy and tasty soy dishes to a wider world of potential clients, customers, and consumers.

Another example is the new business venture by *Zero Hora*, a major RS newspaper owned by RBS Group, the large RS radio/TV broadcasting and multimedia communications company, with Intemperate (Destemperados) Food Experiences in Porto Alegre, to develop an innovative center and multi-media platform of culinary information and education, gastronomical experiences, creative and quality products, social events and business networking. In addition to frequent written material in *Zero Hora*, information will be available in many other media, including radio and TV, social media online and on mobile devices, and there will be various other publications, such as pocket guidebooks.

Finally, because chimarrão is a traditional Rio Grande do Sul drink, and an important Gaúcho cultural symbol, we included a photo in Slide 37. More can be done to internationally promote a distinctive RS brand of quality food and beverages, and the interesting social experience of drinking chimarrão the Gaúcho way is one example. Everything is locally produced in RS – the attractively designed bowls (cuia), the metal straws (bomba), and most importantly, the erva mate tea leaves, of which there are many growers and varieties, including the organic farmers of Ecobio who produce Matecológica.

The slide is titled "RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY KEY DRIVER: Sustainable Innovation in Precision Agriculture and Biotechnology for Food, Health, and Environment". It features the GUD logo at the top left. Below the title, there are three main visual elements: a collage of food and farm scenes on the left, the Natureis logo in the center, and the Stara logo with an image of a tractor on the right. The Stara logo includes the text "Stara Evolução Constante". The slide number "38" is located in the bottom right corner.

Narrative for Slide 38:

Given that world food demand will be rising by 50 percent over the next 16 years, Sustainable Innovation in Precision Agriculture and Biotechnology for food, health, and environment will be a major economic growth engine, and one of the main ways that RS can become the most sustainable and innovative place in Latin America by 2030. Stara in Não-Me-Toque, a homegrown RS success story, is a good example of Precision Agriculture, infusing agricultural machinery/equipment/implements with digital technology that enables major productivity increases through more targeted utilization. Stara's sophisticated software enables users to control multiple agricultural machines with mobile electronic communications from smart phones and tablets. Stara's corporate motto is "constant evolution." Numerous other competitors in RS offer comparable innovations.

Rio Grande do Sul has a great opportunity for the state to become a global center for Precision Agriculture, both in producing technologically advanced machines, equipment, and implements, and in developing innovative farming practices, such as zero tillage, micro irrigation, advanced crop rotation, integrated pest control, organic production, agricultural intensification, and much more. This vital industry and its value chain can grow much larger in RS, exporting a rising share of its products and methods to other places in Brazil, Latin America, and globally.

Recently (March 9-13) in Não-Me-Toque, near Passo Fundo, was the big 13th annual RS Agricultural Technology Fair, Expodireto Cotrijal. This year, many of the 530 exhibitors displayed, demonstrated, and sold state-of-the-art agricultural machinery/equipment/implements infused with cutting-edge digital technology, information technology, telecommunications, energy efficiency, and other advanced innovation capabilities. More than 230,000 people visited Expodireto this year, including delegations from 70 countries such as Germany, Morocco, and South Africa, with thousands of visitors engaging in business deals highly beneficial to RS companies and industries. Last year Expodireto generated R\$ 3.2 billion in sales revenue for RS businesses, including US\$ 472 million in international contracts. Expodireto's exhibitors are experiencing a recent major increase in global commerce, such that this year's event already has generated trade missions to Europe, Angola, and Nigeria later in 2015.

Remarkably, Expodireto is not even the largest annual agricultural event in RS. Expointer, the international exposition of livestock, machines, equipment, implements, and agricultural products currently held every year during late August/early September in Esteio (near Porto Alegre), received more than 450,000 visitors in 2014. Expointer became an annual RS event in 1984, and it is currently one of the largest agricultural fairs in Latin America.

The fields of biotechnology and life sciences offer promising opportunities for RS researchers, engineers, and entrepreneurs to develop new ways of growing and using plants and other organic substances for producing more and better food, helping people, plants, and animals become healthier, protecting and improving the environment, reducing and reusing waste, and much more. This can become a major economic growth engine in RS, especially tied to agribusiness and health care.

A good example is Naturoils, a pioneering RS "nutraceutical" (natural and herbal pharmaceuticals for nutrition and health) company incubated in the Unitec technology business incubator at Tecnosinos, and now rapidly growing there. Naturoils works with ITT Nutrifor, the Unisinos Technology Institute of Food for Health.

Naturoils conducts research on herbal substances and produces skin care treatments that provide nutrition and healing. Their main product is Soothing Gel, made with chamomile extract, which reduces swelling and accelerates healing for a variety of skin problems, including mosquito bites and blisters.

Another good example of this approach is Folhito in Lajeado, producing organic fertilizers for more sustainable and higher yield agricultural uses. Folhito's business philosophy – "Ecological, Economic, Profitable" – applies to their customers as well as to their own company.

GLOBAL URBAN DEVELOPMENT

Rio Grande do Sul Leapfrog Economic Strategy

KEY DRIVER:

Strengthening Value Chains

- Diversifying Products and Services
- Adding Value to Production
- Expanding Local and Regional Supplier and Distributor Networks

AmBev



BS BIOS
BIOFUELS & BIOPRODUCTS

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Narrative for Slide 39:

Three major strategies that apply statewide and in every RS region and municipality are 1) Diversifying Products and Services; 2) Adding Value to Production; and 3) Expanding Local and Regional Supplier and Distributor Networks. Each one of these three strategies will make better use of existing human and natural resources in Rio Grande do Sul, and generate a higher value economy with expanding businesses, jobs, and incomes.

From our site visits and interviews, we have seen many examples of each of these types of economic development and business initiatives. In Passo Fundo, we found all three:

First, BSBIOS helped develop alternative uses for soybeans and canola by producing biodiesel fuels for the rapidly growing Brazilian market, beginning in 2007. The following year, BSBIOS became the first company authorized by the federal government to export biodiesel fuel, and now it is one of the largest biodiesel producers in Brazil. Such diversification has enhanced business opportunities and

revenues for soy and canola growers and their value chain, helped create a new biofuels production and distribution industry in Rio Grande do Sul, and developed a new source of renewable energy for Gaúchos and other consumers.

In addition, BSBIOS recycles and reuses the waste from the soybean oil extraction process and turns it into roasted soy bran food. Both the biodiesel and the roasted bran are part of the RS path toward Sustainable Innovation.

Second, AmBev takes a raw grain, barley, and processes it to produce 110,000 tons of barley malt annually. Barley malt is a key ingredient for brewing beer, and AmBev uses it at their many breweries in Brazil, where they produce Brahma, Bohemia, Skol, Corona, Stella Artois, and other brands (pictured in Slide 39). AmBev's barley malt production facility in Passo Fundo is a good example of adding value, creating more jobs and incomes by going beyond growing and selling raw barley as an agricultural commodity.

With respect to barley malt, a logical next step could be for RS to use its agricultural products in innovative new ways such as becoming a global center of local microbreweries. RS already has the very popular Dado Bier (Brazil's first microbrewery), with its four pub and restaurant locations in Porto Alegre, a growing statewide retail brand, and a major brewery in Santa Maria. Specialty microbreweries are part of the global urban culture currently attracting and retaining young educated professionals and entrepreneurs, and they can help RS Sustainable Innovations Zones succeed in becoming magnets for such talent (see Slides 62-76).

Third, the Metasa factory in Passo Fundo was established in 1997 to manufacture agricultural machinery/equipment/implements (pictured in Slide 39). One of its first tasks was to build an extensive local and regional metal-mechanic supply chain and a widespread distribution network for their products, which spread economic opportunities and benefits to other businesses and workers throughout the region and the state.

In 2005 Kuhn, a major French multinational corporation, purchased the Metasa plant in Passo Fundo, now named Kuhn Agricultural Machinery. This was Kuhn's first major acquisition in a developing country. It reflected Metasa's value in terms of efficient production and product quality, and of its success in organizing a well-functioning system of suppliers and distributors over the previous eight years.



RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY

KEY DRIVER:

**Advanced Manufacturing
Sustainable Innovation Technologies**

- Advanced Sensing, Measurement, and Process Control
- Advanced Materials Design, Synthesis, and Processing
- Visualization, Informatics, and Digital Manufacturing Technologies
- Sustainable Manufacturing
- Nano-manufacturing
- Flexible Electronics Manufacturing
- Bio-manufacturing and Bio-informatics
- Additive Manufacturing (including 3-D Printing)
- Advanced Manufacturing and Testing Equipment
- Industrial Robotics
- Advanced Forming and Joining Technologies

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Narrative for Slide 40:

If Rio Grande do Sul is to Leapfrog into the global front ranks of advanced technology and Sustainable Innovation by 2030, given its longstanding traditions and current strengths in industrial production, it will be vitally necessary for RS to become a leader in Advanced Manufacturing. This rapidly rising new field is fast becoming on the leading edge of productivity and competitiveness, innovation and technology, and sustainability and resource efficiency. From the Fraunhofer Institutes in Germany, to the High Value Manufacturing Catapult in the UK, to the Advanced Manufacturing National Program Office at the National Institute of Standards and Technology (NIST) and the President's Advanced Manufacturing Partnership in the US, and similar efforts in many other countries including China, Denmark, Finland, France, Japan, the Netherlands, South Korea, and Sweden, Advanced Manufacturing is moving to the front lines of technological change.

July 2012, President Obama's Advanced Manufacturing Partnership, Co-Chaired by the President of MIT and the Chairman and CEO of Dow Chemical, published the landmark *Report to the President on Capturing Domestic Competitive Advantage in Advanced Manufacturing* (https://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_amp_steering_committee_report_final_july_17_2012.pdf).

With active participation by the Manufacturers Alliance for Productivity and Innovation, the National Center for Manufacturing Sciences, and the Association of Public and Land-Grant Universities, the Advanced Manufacturing Partnership

conducted extensive survey research, interviews, and regional meetings with industry and academic experts to identify the most promising and valuable opportunities for US firms in Advanced Manufacturing technologies. These 11 areas are listed in Slide 40.

Some of these 11 areas can fit well with industry and university capabilities, technology, and infrastructure in Rio Grande do Sul, including Sustainable Manufacturing, which the US Advanced Manufacturing Partnership strongly encourages: “In addition to savings in energy consumption and higher profitability, many accompanying benefits can aid the competitiveness of industry.”

The state government should provide leadership and resources for Rio Grande do Sul to become a major Latin American and global center of Advanced Manufacturing by 2030. This will generate much higher productivity and enable RS firms to become far more competitive.

To support an RS focus on the Key Driver of Precision Production, Smart Machines, and Digital Technology, other areas on this list – Advanced Sensing, Measurement, and Process Control (including Cyber-Physical Systems); Visualization, Informatics, and Digital Manufacturing Technologies; Flexible Electronic Manufacturing; Industrial Robotics; and Additive Manufacturing (including 3-D Printing) should be promoted through various high-priority initiatives.

Also, RS manufacturers can reduce their dependence on lengthy, time-consuming, and costly supply chains for obtaining certain types of steel and other heavy metals due to insufficient transportation infrastructure and other challenges, by using lighter weight composite materials developed through Advanced Manufacturing. Therefore, Advanced Materials Design, Synthesis, and Processing; Bio-manufacturing and Bio-informatics; and Nano-manufacturing can make very important and innovative economic contributions. According to the Advanced Manufacturing Partnership, “Advanced materials will fuel emerging multi-billion dollar industries.” Bio-manufacturing and Bio-informatics also will be important for Sustainable Innovation in food, health, and the environment.

Because RS is a major manufacturer of capital goods and the second largest producer of Industrial Machinery and Equipment in Brazil, a strong focus on Advanced Manufacturing and Testing Equipment can generate substantial results, as the Partnership emphasizes: “local firms can maintain significant global competitive advantage through the production and supply of high-value manufacturing equipment, such as bioreactors, CNC machine tools, or other high-technology production tools. Being the supplier of choice for advanced capital equipment will continue to yield advantages in terms of innovation and advanced engineering, as well as economic benefits.”

Finally, Advanced Forming and Joining Technologies can be very beneficial to the metal-mechanic industries of RS: “Most current mechanical manufacturing

processes continue to depend largely on traditional technologies, mainly for metals, such as casting, forging, machining, and welding. These technologies will continue to be mainstays of future production processes. However, there are new and expanding needs for joining a wider variety of materials with greater energy conservation and resource efficiency. In addition, improved performance requires continued innovation and the search for transformative technologies that will help maintain competitiveness in industries ranging from transportation to infrastructure.”



Narrative for Slide 41:

Rio Grande do Sul can begin to create Advanced Manufacturing Sustainable Innovation Centers in regions throughout the state to promote technological breakthroughs and productivity enhancement that will grow competitive businesses and industries, both existing and new, and expand jobs and incomes. SENAI’s future Innovation Institute for Integrated Metal-Mechanic Solutions, which will be located in São Leopoldo, can become an applied R&D technology center for Advanced Manufacturing and a major innovation resource for RS.

One good model is America Makes (<https://americamakes.us/>), the National Additive Manufacturing Innovation Institute in Youngstown, Ohio, winner of a nationwide competition in August 2012 for more than US\$ 45 million in funding from the US government. America Makes combined those resources with another

US\$ 40 million from 40 private companies, including large corporations such as Boeing, General Dynamics, GE, Honeywell, IBM, Johnson Controls, Lockheed Martin, Northrup Grumman, and Westinghouse, as well as smaller innovative firms like M-7 Technologies, Applied Systems and Technology Transfer (AST2), and ExOne. Today more than 70 companies are members of America Makes, at different funding levels (Platinum, Gold, and Silver).

The America Makes research consortium initially involved nine major research universities including Akron, Carnegie Mellon, Case Western Reserve, Kent State, Lehigh, Penn State, Pittsburgh, Robert Morris, and Youngstown State, plus five community colleges and 11 non-profit technology research, engineering, and economic development organizations. This list has now greatly expanded with additional universities, government agencies, research institutions, industry associations, and non-profit organizations.

The view from the White House is that America Makes provides “the innovation infrastructure needed to support new additive manufacturing technology and products in order to become a global center of excellence in additive manufacturing.” It “bridges the gap between basic research and product development for additive manufacturing, provides shared assets to help companies, particularly small manufacturers, access cutting-edge capabilities and equipment, and creates an environment to educate and train workers in advanced additive manufacturing skills.”

America Makes is housed in the newly renovated Youngstown Business Incubator, with state-of-the-art advanced manufacturing machines and equipment, a software center, and research laboratories for scientists and engineers. The facility’s urban location is helping regenerate a deteriorated area of the city center by attracting talented professionals that generate consumer demand for stores and services, bars and restaurants, housing and public transportation. In 2014 the University Business Incubator Index, a global research and benchmarking initiative, ranked the Youngstown Business Incubator as the best university-associated business incubator in the world (<http://ubiindex.com/ranking/ranking-2014/#globaluabi2014>).

America Makes offers a wide range of advanced professional training courses, conferences, events, online forums, internships, and other business and professional networking and educational opportunities. Providing substantial funding for advanced R&D through “Directed Projects” is a key part of the overall mission. For example, currently America Makes is soliciting bids for two Directed Projects on Additive Manufacturing of Heat Exchangers for Propulsion Applications, with each project to receive funding of US\$ 1.35 million from the US Air Force Research Laboratory.

Since establishing America Makes in 2012, during the past two years the US government also has helped to establish four more Advanced Manufacturing

Institutes: the Digital Manufacturing and Design Innovation Institute in Chicago, Illinois; Lightweight Innovations for Tomorrow (LIFT) in Detroit, Michigan; Power America (ultra-efficient “wide bandgap” WBG semiconductors) in Raleigh, North Carolina; and the Institute for Advanced Composites Manufacturing Innovation in Knoxville, Tennessee. This year the US government is soliciting bids to create three more Advanced Manufacturing Institutes: Flexible Hybrid Electronics Manufacturing Innovation Institute, Integrated Photonics Institute for Manufacturing Innovation, and Clean Energy Innovation Institute on Smart Manufacturing.

All of these institutes are (or will become) part of the US government’s National Network for Manufacturing Innovation (<http://manufacturing.gov/nnmi.html>). Each of them follows the America Makes model of national and regional partnerships between business, academia, and government.

Narrative for Slide 42:

The key economic driver of Renewable Energy and Clean Technologies (Cleantech) is essential for Rio Grande do Sul to become the most sustainable and innovative place in Latin America by 2030. Currently RS is the third state in Brazil in terms of wind power generation, and as the recent *Rio Grande do Sul Wind Atlas 2014* published by SDPI, AGDI, Eletrobras, Eletrosul, and many other public and private sector supporters, including the industry association, SINDIEOLICA-RS, clearly

illustrates, RS has sufficient wind power capacity to become first in Brazil and generate a major proportion of its electrical energy from wind. Various RS municipalities including Osório (pictured in Slide 42), Cassino, Chuí, Palmares do Sul, Santa Vitória do Palmar, Santana do Livramento, Tramandaí, and Xangri-lá already are experiencing the job creation and revenue benefits of wind power, and there are many more opportunities for this business to grow as a leader in Sustainable Innovation for the state's economy.

Solar power, ranging from rooftop photovoltaic cells to solar hot water heaters, represents great potential in sunny RS, and should be vigorously pursued. Metalurgica Fratelli, an RS company manufacturing both solar panels and wind turbines in Santa Rosa, exemplifies such future economic growth opportunities. Fratelli also produces "hybrid systems" like the Barcelona Building in Santa Rosa that combines solar energy with wind power.

Biofuels, including biodiesel, is another promising source of renewable energy for RS, and a major economic growth opportunity, given the highly productive agricultural base. The International Energy Agency estimates that Brazil will account for 40 percent of global biofuels exports by 2035. BSBIOS in Passo Fundo is an RS company already benefiting from this increased demand, and many other firms also can benefit. Recently AGDI has been working with Embraer and Boeing on the possibilities for RS agribusiness to produce biofuels for aviation, which could become a major breakthrough in sustainable airplane transportation, and a big economic growth opportunity for RS.

Also, Scania is experimenting with using cattle and poultry manure to produce biomethane as fuel for their 120-passenger Euro 6 diesel buses. Using this renewable biofuel is a highly sustainable solution for bus transportation and for recycling animal waste. RS bus manufacturers such as Marcopolo could follow a similar approach to growing new and expanding markets for their products. RS bus companies can use biomethane-powered buses to save on energy costs and reduce pollution and emissions, while RS cattle ranchers and chicken farmers can earn extra revenue by selling their animal waste – a true win-win solution.

Given the current water crisis in São Paulo, and the possible national disruption of electricity generation from hydropower, it will be vital both to produce more energy from other renewable sources such as wind, solar, geothermal, and biomass. Equally important will be developing new methods and technologies for conserving and reusing water and consuming it much more efficiently for agricultural, industrial, commercial, and residential uses. RS can become Latin America's leader in advancing Sustainable Innovation for one of the world's most precious natural resources, fresh water. Gisele Bundchen, the Gaúcha supermodel from Horizontina (site of the large John Deere factory) in northwest RS, has been working since 2004 with her father, Unijuí Sociology Professor Valdir Bundchen, and his faculty colleagues, on the Clean Water Project (Projeto Água Limpa) to protect and improve the community's water quality.

As Ray Anderson, founding Chairman and CEO of Interface Corporation in Atlanta, former Co-Chair of the US President's Council on Sustainable Development, and a co-founder of the US Green Building Council, explained in his 2009 book, *Confessions of a Radical Industrialist: Profits, People, Purpose – Doing Business by Respecting the Earth*, Interface since the early 1990s got richer by becoming greener, earning and saving more money by conserving and reusing resources more efficiently. Their revenues, market share, and profits all rose dramatically, and they saved US\$ 405 million over a decade through the industrial corporation's various Zero Waste programs. The DuPont Corporation, inspired by Interface, saved more than US\$ 3 billion through its subsequent Zero Waste and Sustainability initiatives.

Zero Waste can become a major theme of government, business, and civil society in Rio Grande do Sul, and a Key Driver of economic growth through Sustainable Innovation. For example, in 2012 GUD recommended a Zero Waste program for EBR, Ecovix, Quip, and other shipyards in Rio Grande and São José do Norte.

Gerdau, a major RS steel manufacturing corporation in Porto Alegre with more than 45,000 employees in 14 countries, has been for the past half-century an international leader in the highly resource-efficient and cost-effective mini-mill production process, and is now one of the world's largest metal recyclers. Every year Gerdau recycles millions of tons of scrap steel, transforming this industrial waste into new products, including flat steel and specialty long steel. Gerdau's extensive recycling operations represent "its commitment to sustainable development in the regions where it operates."

Gerdau collaborated with the Environmental Excellence Business Network, the US Business Council for Sustainable Development, and the US Environmental Protection Agency (EPA) to develop a By-Product Synergy (BPS) trading network. Through this BPS network, involving Gerdau, Harley-Davidson Motor Company, Hallmark Cards, Lafarge Cement, Kansas City Power & Light, Boulevard Brewing Company, and many other firms, manufacturers exchanged their various industrial waste byproducts and reused them as inputs for new production, achieving substantial energy and resource savings, and significantly reducing air pollution and greenhouse gas emissions. Perhaps similar BPS Zero Waste Sustainable Innovation initiatives can be implemented in Rio Grande do Sul, with the benefit of learning from Gerdau's recent US experience.

The private sector and academia can provide technical expertise and management experience in Rio Grande do Sul to enable the Key Driver of Renewable Energy and Clean Technologies to succeed. One major resource is SENAI's National Center for Clean Technologies (CNTL) hosted by FIERGS in Porto Alegre. Another major resource is the biennial International Environmental Technology Exposition (FIEMA Brasil) in Bento Gonçalves sponsored by PROAMB, a business organization promoting sustainable solutions and technologies, primarily for solid waste management. Banrisul, BRDE, Caixa Econômica Federal, Gerdau, Petrobras, SENAI,

and many other public and private entities provided financial support for FIEMA in 2014.

Smart Growth, Green Buildings, and Sustainable Urban Development is another important aspect of Sustainable Innovation-led economic growth and resource efficiency for Rio Grande do Sul. The Green Building Council Brasil is working with the US Green Building Council (USGBC) (<http://www.usgbc.org/>) to encourage green buildings and development using the USGBC's Leadership in Energy and Environmental Design (LEED) standards. A July 2014 USGBC publication, *LEED in Motion: Brazil*, highlights this growing movement and its vital efforts to improve urban sustainability and resource efficiency. Numerous RS firms, including Cótica Engineering and Construction, and Joal Teitelbaum Engineers, provide expertise in green buildings and sustainable development practices.

Several of the 2014 World Cup stadiums, including Maracanã in Rio de Janeiro, Arena Fonte Nova in Salvador, and Arena Pernambuco in Recife, are LEED-certified. Coca-Cola now has five LEED-certified buildings in Brazil. SAP's two buildings at Tecnosinos are LEED-certified. Rio de Janeiro's Museu do Amanhã (Museum of Tomorrow), designed by Spanish architect Santiago Calatrava, will be an iconic green building and sustainable tourist attraction.

Odebrecht is building two very green mixed-use commercial/residential development projects in São Paulo: Praça São Paulo and Parque da Cidade. Parque da Cidade is a state-of-the-art Climate Positive Development candidate (net zero carbon emissions) with innovative waste recycling, renewable energy, and water and energy conservation technologies. The Climate Positive Development Program (http://www.c40.org/networks/climate_positive_development) is supported by C40 Cities, USGBC, and the Clinton Climate Initiative (Clinton Foundation), with professional experts providing technical advice to participating developers and builders.

Another C40/CCI/USGBC Climate Positive Development candidate in Brazil is Pedra Branca, located in Palhoça (near Florianópolis), and developed by Espirito Santo Property Brasil. Pedra Branca is a new urban community anchored by a large new campus for the University of Southern Santa Catarina (Unisul). The master plan was designed by DPZ-Latin America (headed by Andres Duany and Elizabeth Plater-Zyberk in Miami, DPZ is an international leader of the "New Urbanism" movement in architecture and planning), and supplemented with additional urban planning and community design ideas by various experts, including such well-known innovators as Jan Gehl and Jaime Lerner. Pedra Branca emphasizes sustainable urbanism, a culture and economy of creativity, and a walkable quality of life.

The newest USGBC certification is LEED-ND (Neighborhood Development). This designation emphasizes the sustainability of the overall land-use plan, so that green buildings are located within a green development project. The first LEED-ND project in Brazil and Latin America is Ilha Pura in Rio de Janeiro, which is being

developed by Odebrecht as the 2016 Olympic Athletes Village, with 31 residential towers and a 775,000 square-foot public park. All of the buildings will be LEED-certified. These apartments will be sold after the 2016 Olympics are concluded.

Smart Growth, Green Buildings, and Sustainable Urban Development can become a signature economic feature and distinctive national and global attraction and marketing brand for Rio Grande do Sul over the next 16 years, as part of the Key Driver of Renewable Energy and Clean Technologies.

GLOBAL URBAN DEVELOPMENT

SUSTAINABLE INNOVATION BUSINESS ADVISORY SERVICES

Creating A Partnership: Energy / Resource Efficiency + Sustainability

REV
FORMERLY
True Market Solutions

Participating small- and medium-sized
businesses save \$350,000 per year
(on average)

43

Narrative for Slide 43:

One of the most important arenas for economic progress in RS will be for businesses of all sizes to become more sustainable and resource efficient, following the success of Ray Anderson's Interface Corporation and many other excellent private sector examples. Larger businesses have the financial and human resources to devote intensive efforts toward becoming more sustainable. Small and medium-sized enterprises (SMEs), on the other hand, face difficulty in finding the time, money, and personnel to make such internal changes in management, technology, and production processes. They need external help at an affordable price if they are to cut costs and increase revenues through sustainability and resource efficiency, such as a Zero Waste program. As previously mentioned, in Rio Grande do Sul the National Center for Clean Technologies (CNTL) and the Productive Innovation Extension Centers (NEPIs) provide strategic advice and technical assistance for small and medium-sized enterprises (SMEs) to improve their productivity, competitiveness, and resource efficiency through Sustainable Innovation.

Manufacturing Extension Partnerships in the US are a very effective example of this approach (<http://www.nist.gov/mep/services/sustainability/index.cfm>).

Another excellent model is REV (formerly True Market Solutions) (<http://revsustainability.com/>) in California. Led by longtime experts in effective business sustainability within their own enterprises, including GUD Board Member Elliot Hoffman and GUD President James Nixon, REV has developed an affordable and timely model for SMEs to “get richer by becoming greener.” Companies with fewer than 100 employees participate in intensive training programs called Sustainability Circles. Each circle includes between two and six senior executives from 10 different businesses, who spend one day per month for six months meeting together to learn about how to apply Sustainable Innovation in their respective companies. The circles conclude with each of the 10 different businesses developing their own custom-designed Sustainability Action Plan to be implemented in various phases over the next few years.

The track record of success by REV is quite impressive. Businesses participating in its training programs save an average of US\$ 350,000 dollars per year after implementing their Sustainability Action Plans, in many cases through process improvements that do not require significant new capital expenditures.

REV is so effective in helping SMEs reduce their energy and water utilization that their program is subsidized by large electric power companies such as Pacific Gas and Electric (PG&E) and Southern California Edison (SCE) paying three-quarters of the cost of the Sustainability Circles. The individual companies pay just US\$ 2,500, one-quarter of the overall tuition expenses. Participating firms in REV realize an amazing return on their modest investment by saving many thousands of dollars annually and becoming more profitable after completing their training. In addition to the monthly one-day sessions for six months, REV provides on-site and telephone coaching during the training period, followed by ongoing technical assistance and strategic advice during implementation of the Sustainability Action Plans.

REV is now expanding its training programs to Iowa and other US states, with electric utility companies also subsidizing REV activities in those states. Rio Grande do Sul can become the first place in Brazil and Latin America to introduce the REV model, perhaps working with FIERGS, CIC, SENAI, SEBRAE, PROAMB, and many other business groups, as well as with Eletrosul, CEEE, and other energy companies.

As Amory Lovins stated many years ago, the cheapest, fastest, easiest, and safest form of power is the energy you don't use. He called this type of conservation and efficiency “Negawatts.” Today in California and many other US states, mainstream business practices known as Demand Management are now quite typical. California businesses, households, and governments saved a total of US\$ 56 billion between 1973 and 2006 through increased energy efficiency. Electric power companies find it highly cost-effective to subsidize businesses and households to make product and process improvements that conserve energy and use it more efficiently, because this

method is far less risky and expensive than major time-consuming capital expenditures to increase peak-load electricity generation capacity.



**RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY
KEY DRIVER:**

**Precision Engineering and
Naval/Offshore Industry Value Chain**

*Centro Tecnológico de
Mecânica de Precisão*

44

Narrative for Slide 44 :

The national policy of Petrobras purchasing ships and vessels, platforms and cranes, hulls and modules, and related metal and electronic equipment for its pre-sal offshore oil exploration, some of which are manufactured, assembled, and repaired in Rio Grande, São José do Norte, Porto Alegre, Cachoeirinha, Charqueadas, Taquari, Guaíba, and other RS port cities, with an extensive industrial value chain throughout Rio Grande do Sul, has been very positive for the state's economy in recent years ([http://www.globalurban.org/An Oil Discovery Revives a Dwindling Brazilian Port.pdf](http://www.globalurban.org/An%20Oil%20Discovery%20Revives%20a%20Dwindling%20Brazilian%20Port.pdf)).

Large capital investments, thousands of jobs, business expansion, rising incomes, multiplier impacts of producer and consumer spending – all this and much more has helped fuel new economic growth for RS. However, recent legal and financial difficulties faced by Petrobras, including temporarily frozen payments to its contractors, could cause future cutbacks in new contracts to RS companies. It may become increasingly risky for RS to rely on Petrobras as a major source of procurement for local production in the coming years.

Therefore it is even more important for RS to maximize the economic benefits from the existing Petrobras contracts, both for the items already completed, and for those currently in progress. This means using key capital investments to substantially upgrade and modernize production technology and related infrastructure, and also investing heavily in education and training to significantly improve a wide range of workforce skills. Strengthening technology, infrastructure, and workforce skills will increase productivity and capabilities, enhancing global competitiveness and economic opportunity far beyond the direct value of Petrobras contracts.

RS universities and other research, education, and training institutions, such as SENAI's state-of-the-art Precision Engineering Technology Center (CETEMP) in São Leopoldo, can make major contributions to this economic capacity-building process. For example, CETEMP's services include a Technological Development Center with high-end equipment, a modern testing, calibration, radiology, and optical analysis laboratory, business advice and consultation, and mid-level technical courses on Precision Engineering, Industrial Automation, Instrumentation, Industrial Electronics, and other specialties.

On November 5-6, 2014 at the Federal University of Rio Grande (FURG), the Naval/Offshore Industry Network (APL) held an International Workshop and strategic planning meeting, where Dr. Marc Weiss was one of the featured speakers (<http://www.globalurban.org/Development Plan Polo Naval-Offshore APL Rio Grande Nov 2014.pdf>). Two other speakers, one from Mitsubishi Heavy Industries, a Japanese conglomerate, and another from IMG, a German engineering services firm, made presentations on Precision Engineering and Lean Manufacturing as applied to shipbuilding and related activities. These state-of-the-art techniques and technologies are part of the new wave of Advanced Manufacturing, and the ability of the RS workforce to utilize such innovative skills will be very valuable for future RS productivity and competitiveness in many aspects of engineering, construction, manufacturing, and related services.

Upgrading industrial skills and capabilities across the entire RS metal-mechanic and electric-electronic value chains currently producing and selling goods and services to support Naval/Offshore Industry operations, including such fields as automation and controls, is a major opportunity for RS that should be aggressively pursued with substantial state government support in the near future.

Resource efficiency is an essential element of Precision Engineering, and the Naval/Offshore Industry companies can provide statewide leadership in advancing Sustainable Innovation through major Zero Waste initiatives.

The recent Development Plan adopted by the Naval/Offshore Industry Network (APL) in Rio Grande includes many useful suggestions about how to maximize the economic and technological benefits and opportunities for Sustainable Innovation through the Polo Naval. Their ideas deserve to be carefully studied and strongly supported.

GLOBAL URBAN DEVELOPMENT

RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY

KEY DRIVER:

Sustainable Innovation in Chemicals, Polymers, and New Materials




COFIP^{RS}
Comitê de Fomento Industrial do Polo

SENAI
Cetepo

45

Narrative for Slide 45:

Another Key Driver for Rio Grande do Sul's future Leapfrog Economic Strategy can be Sustainable Innovation in Chemicals, Polymers, and New Materials. The presence of a major Petrobras refining facility in Canoas, the large Petrochemical Pole industrial park in Triunfo (bordering Montenegro and Nova Santa Rita) managed by COFIP and including Braskem, John Deere, Innova, and seven other companies producing polymer-based materials and products, plus many polymer companies in RS, SENAI's Polymer Technology Center (Cetepo, a new national Innovation Institute) in São Leopoldo, and other important Fundamental Assets, all represent significant economic growth opportunities.

A vital challenge will be to move away from petroleum as the main ingredient in plastics and other polymers, replacing it with alternative organic substances. An excellent example is the recent development by Braskem of green polyethylene made from sugar cane ethanol, a renewable resource. Based on an extensive R&D process, Braskem created green polyethylene ("I'm Green") for manufacturing plastic products. Braskem then built a R\$ 300 million factory that opened in Triunfo during September 2010, which now annually produces 200,000 tons of green polyethylene. This is a path-breaking RS success story for Sustainable Innovation in the rapidly growing field of polymer science and engineering.

Ford Motor Company currently uses vehicle seat cushions made from soy foam instead of from petroleum-based polyurethane foam. Given that RS is a major soya

producer, developing soy-based polymers can become another major Sustainable Innovation economic growth opportunity.

Another future economic opportunity for polymers will be developing them into new materials that are more lightweight and durable, and potentially can become a cost-effective alternative to using steel and other heavy and expensive metals in many manufactured products. These new materials can be locally produced in RS, with substantial savings in transportation costs for Gaúcho manufacturers, in addition to cost savings in parts production and acquisition, and in the assembly process.

Finally, Sustainable Innovation in chemicals can play a major role in human health, plant and animal health, healthy food, and many other aspects of agriculture, industry, services, and quality of life.

GLOBAL URBAN DEVELOPMENT

RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY

KEY DRIVER:

Global Branding and Marketing

- Fashion and Design
- Culture and Creativity
- Arts and Tourism
- Sports and Entertainment

46

Narrative for Slide 46:

Rio Grande do Sul has a very distinctive culture, featuring churrasco and chimarrão, though RS is not well known globally. It is time for the Gaúchos and Gaúchas to develop and communicate a more consistent image and message for people throughout Brazil and around the world. We believe it will be possible, and highly beneficial, for RS to project its own brand and style highlighted in a wide-ranging variety of products, services, experiences, and venues. Clearly becoming the most

sustainable and innovative place in Latin America by 2030 will be a centerpiece of this global brand. In addition, a South Brazilian fashion and design sensibility, infused with a hybrid European influence, especially from Portugal, Spain, Italy, and Germany, presents great opportunities for growing a wide range of RS businesses, from leather and shoes to furniture and wine.

For example, though the overall growth of the RS shoe industry, once dominant in the Brazilian national market as well as being a major exporter, has been much slower recently due to international competition from China and elsewhere, the strongest market segment for RS producers remains in higher-priced and more fashionable women's footwear. The photo in Slide 46 of women's shoes and handbags by Cristofoli, a Novo Hamburgo company founded in 1979, suggests that the RS fashion branding idea for leather goods – footwear, clothing, and accessories – can become a core element of the RS global branding and marketing strategy. RS should invest more heavily in promoting a unified and powerful image across many different industries and products.

In the 2015 Brazil “Champions of Innovation” rankings by *Amanhã Magazine* and Edusys, Grendene ranks number 4 out of the top 50. Grendene, a Farroupilha shoe manufacturer, uses Sustainable Innovation as a centerpiece of their designs, production, and global marketing strategy. Grendene's Rider Sandals are totally recyclable, and they are made from 30 percent recyclable materials. Grendene recycles and reuses 99 percent of industrial waste from its Rider manufacturing process, recycling 11,500 tons of material annually. Rider Sandals directly use sustainable Brazilian imagery in their marketing appeal, and Grendene actively promotes environmentally sustainable practices with its customers through Rider Eco: “Because they're made in a country that holds one of the planet's most expansive and ecologically sensitive ecosystems, environmental sustainability is an integral part of both the company's and Brazil's culture” This suggests that the Sustainable Innovation brand can become a key feature of global marketing success for RS industries and communities.

ASSINTECAL, the Brazilian Association of Leather Components and Shoe Manufacturers in Novo Hamburgo, has developed in partnership with IBB (Instituto By Brasil) a state-of-the-art Seal of Sustainability, inspired by the Sustainable Apparel Coalition in San Francisco (<http://www.apparelcoalition.org>), “a trade organization comprised of brands, retailers, manufacturers, government, and non-governmental organizations and academic experts, representing more than a third of the global apparel and footwear market...The focus of the Sustainable Apparel Coalition is The Higg Index – a suite of assessment tools that standardizes the measurement of the environmental and social impacts of apparel and footwear products across the product lifecycle and throughout the value chain.” ASSINTECAL and IBB collaborated with faculty and students from USP and MIT to create the Seal of Sustainability following a similar methodology to the Sustainable Apparel Coalition's Higg Index. The Seal of Sustainability is enabling RS and Brazil footwear and leather components producers to compete more effectively in the US and other

countries by exporting goods that are independently certified as of good environmental quality. Such cooperative methods of internationally recognized Sustainable Innovation brand appeal are becoming a major economic asset, and should increasingly be used by RS businesses to more aggressively market their products and services throughout Brazil and worldwide.

In addition to leather goods and footwear, RS companies can apply a similar approach to another major industry, wood furniture. Todeschini in Bento Gonçalves is, according to their website, “one of the largest manufacturers of tailored furniture in Latin America.” A picture of their products is included in Slide 46 as another example of how fashion and design – style – can contribute to dynamic RS economic growth by creating a strong global brand. Serra Gaúcha furniture companies and suppliers can work together through the SINDMÓVEIS industry association and other public and private organizations to globally market a distinct fashion image that blends with leather and footwear, and other RS products.

Tramontina, a large RS manufacturing and retailing corporation from Carlos Barbosa in the Serra Gaúcha, best known internationally for its high-quality silverware, cookware, and other home goods, is now producing creatively designed wood and plastic furniture. Recently Tramontina, which currently exports its products to 120 countries on five continents, has launched a global advertising campaign based on a Brazilian-style brand of “joy.” Their innovative fashion and design approach combines many different lifestyle elements of modern kitchens, from pots and pans to tables and chairs.

A smaller furniture company from Bento Gonçalves, Allê Design, combines Sustainable Innovation with cutting-edge fashion branding through its Zero Waste furniture, “reducing waste and turning what would be waste into vibrant and intriguing products.” Allê successfully markets Zero Waste furniture products not only in Brazil, but also in the UK and continental Europe, where it exports through its recently established London office.

The furniture industry can use advanced technology and new materials, both in the production process and in its products, to become more globally competitive through Sustainable Innovation in Fashion and Design. CETEMO, SENAI’s Furniture Technology Center in Bento Gonçalves, and Incmove!, the Furniture Industry Technology Incubator co-sponsored by SENAI and the Bento Gonçalves city government, can make valuable contributions to promoting innovative business practices and products. CETEMO’s role can be strengthened when it receives new national funding to become a Wood and Furniture Technology Institute intended to accelerate the process of technological innovation among furniture producers, suppliers, and distributors.

In the past few decades Rio Grande do Sul has emerged as a rising wine producer. According to Ibravin, the national Brazilian Wine Institute founded in RS in 1998, Brazil is the third largest wine producer in Latin America (behind Argentina and

Chile), and most of Brazil's national production comes from Rio Grande do Sul, including sparkling wines. Four of Brazil's six main wine-producing regions are located in RS: Serra Gaúcha, Campanha, Serra do Sudeste, and Campos de Cima da Serra. In 2013 Brazil's wine exports grew by 236 percent and domestic consumption rose by 185 percent, and these numbers are continuing to increase.

The Vale do Vinhedos in the Serra Gaúcha is becoming a major visitor attraction, with tourism increasing by 315 percent in the past decade. Many institutions, from the 5-star Marriott Legacy Hotel & Spa do Vinho in Bento Gonçalves, to the Festa do Uva in Caxias do Sul, Caminho do Moscatel in Farroupilha, Compassos da Mérica Mérica in Flores da Cunha, and much more, have benefited from this exponential growth. A photo of Cave Geisse is included in Slide 46 to represent one of the numerous premium sparkling wines from RS. Cave Geisse is an example of the many successful and rapidly growing wineries in this state that can become a major global symbol of the sophistication and fashionable style of Rio Grande do Sul.

More generally, the experience of hosting World Cup matches in Porto Alegre during June and July 2014 clearly demonstrates the international appeal of RS, as does Porto Alegre's frequent hosting of the World Social Forum and many other significant international meetings and conferences. As the picture in Slide 46 illustrates, the substantial success of Gramado and neighboring Canela is an example of untapped potential statewide economic opportunities to attract more visitors and tourists on a regular basis. The historical missions in RS (featured in the 1986 film "The Mission" starring Robert De Niro, Jeremy Irons, Cherie Lunghi, Liam Neeson, and Aidan Quinn) are another major Gaúcho tourist attraction, represented in Slide 46 by the photo of São Miguel das Missões.

RS creativity and culture, arts and entertainment, and sports and recreation already are or definitely can become Fundamental Assets for the Global Branding and Marketing of RS. The annual Book Fair in Porto Alegre highlighting RS writers like Mário Quintana and Moacyr Scliar, the Iberê Camargo Art Museum, vibrant music, visual arts, and performing arts scenes in various RS cities, creativity in film and video games, organic farmer's markets and street fairs, the state's healthy outdoors lifestyle and active recreational culture, and many other things far too numerous to mention, all point to how RS can build on its solid foundation to enhance the attractiveness of its people, places, and products in the global marketplace.

In order to accomplish this important goal, however, it will be necessary, as discussed in Slide 47, for RS to become more welcoming to international guests, with more directional signs and local citizens communicating to visitors in English, Spanish, and many other languages. Also, it will be essential for RS (and Brazil) to improve regulatory systems for international people-to-people, educational, tourism, and business-to-business relationships.



Narrative for Slide 47:

Slide 47 features the cover of a landmark May 2014 McKinsey Global Institute (MGI) report, *Connecting Brazil to the World: A Path to Inclusive Growth* (http://www.mckinsey.com/insights/south_america/brazils_path_to_inclusive_growth). While this brilliant and insightful report is about the entire country of Brazil, every word of it applies equally strongly to Rio Grande do Sul. Indeed, RS is in a better position than many other states in Brazil to wisely follow all of the strategic economic advice and key recommendations of this important publication. We urge every major public and private sector policymaker to carefully read MGI's entire report. As an encouragement, we include their report's 15-page Executive Summary as an Appendix to our report.

MGI's main argument is explained clearly in the report's preface: "...after a decade of rapid growth and falling poverty rates, the economy has been losing momentum. Millions who are striving to attain a real middle-class life remain frustrated by weak income growth and the high price of consumer goods. To raise their living standards, Brazil needs to find a new formula for accelerating growth. Building deeper connections with the rest of the global economy could provide the opening to do just that. This will involve shifting the focus from protecting local industries to strengthening their competitiveness in global markets—a shift that will challenge Brazilian companies to evolve. The imperative to become more connected is not solely a question of trade and finance, however. Brazil also needs to tap into advanced skills, knowledge, technology, talent, and best practices from around the world. Focusing on innovation could allow Brazil to develop new strengths in

higher-value-added products and services, eventually becoming a more diversified and resilient economy.”

Becoming the most sustainable and innovative place in Latin America by 2030 is the best possible and most viable Rio Grande do Sul Leapfrog Economic Strategy because it will provide a huge boost to growth, productivity, and competitiveness. To accomplish this, RS needs to welcome and engage with the world in trade, technology, travel, tourism, talent, and many other ways. RS must become a magnet for attracting and retaining international investors, entrepreneurs, professionals, and university students, as well as innovative ideas and best practices.

Not only is it vitally necessary that RS aggressively “internationalize” by actively reconnecting with its immigrant roots across the Atlantic Ocean and elsewhere. More importantly, such connections are one of the key reasons why the Leapfrog Economic Strategy of becoming one of the world’s most sustainable and innovative places will succeed. Because of the threat of catastrophic climate change and related environmental challenges, business, government, and academia in the developed world are eagerly searching for emerging economies that are generating and expanding prosperity and quality of life by emphasizing Sustainable Innovation – “getting richer by becoming greener” – enabling everyone to benefit from expanding jobs and incomes without overburdening and damaging global ecosystems. The first places in the developing world to step forward with a serious commitment to promoting economic growth through Sustainable Innovation will receive considerable positive attention and substantial resources and support from experts, innovators, investors, and donors worldwide.

Global Urban Development (GUD) already is experiencing major interest in Rio Grande do Sul’s potential sustainable and innovative Leapfrog Economic Strategy from many key leaders in OECD nations. Once the state’s leaders begin moving forward to visibly implement this 2030 Leapfrog agenda, RS will soon become internationally recognized as a vital destination for talent, trade, technology, investment, expertise, entrepreneurship, and much more, not just from the rest of the world, but also from the rest of Brazil. Indeed, many Gaúchos will want to return home from São Paulo and Rio de Janeiro, from New York and San Francisco, from London and Paris, and from dozens of other major cities where they are currently living, working, and studying, to help enable this exciting vision for RS to come a reality over the next 16 years, thus ensuring a much better Gaúcho future for their children and grandchildren.

One sign of progress is that many RS universities currently are internationalizing. PUCRS is well-known for aggressively promoting international student exchange programs, as well as sharing global innovation ideas and best practices through Tecnopuc, including frequent international conferences, seminars, and courses offered to RS entrepreneurs by NAGI, the Support Center for Innovation Management.

Similarly, both Unisinos and UFRGS actively engage in multiple international initiatives. For example, Unisinos students and faculty participate in the University of North Carolina at Chapel Hill's Global Business Project (GBP). In May 2014 Dr. Marc Weiss represented Unisinos as an international speaker for a major GBP event held at Tecnosinos (<http://www.globalurban.org/Unisinos GBP Presentation May 2014.pdf>), and he advised a group of international and RS graduate business students collaborating on a GBP research project for SAP, the global software corporation with large facilities at Tecnosinos. At UFRGS Dr. Weiss gave a lecture in October 2014 for the Center for International Studies on Government (CEGOV), on "Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity for Rio Grande do Sul." (<http://www.globalurban.org/CEGOV-UFRGS presentation.pdf>; <http://www.globalurban.org/CEGOV-UFRGS presentation article Port.pdf>).

When our research team visited the newly built university library and performing arts center at Univates in Lajeado, we were surprised to find something not typical in RS: in addition to Portuguese, many of the directional signs also are in English. We were told these signs are in English because Univates is actively recruiting international students, even providing special university housing and services for them.

Hopefully many of these international students will participate in the RS economy in the future, working in the private sector on various sustainable and innovative technologies. RS university students clearly benefit from learning about global perspectives to advance their own knowledge and experiences, and they can practice their foreign language skills more effectively by communicating with international classmates. This is a win-win approach for the state's economy and culture.

These three university examples and many others in RS can and should be multiplied by the thousands across the entire state in the next few years. This will be one of the very best ways for Rio Grande do Sul to generate a much more dynamic and fast-growing Leapfrog economy and become the most sustainable and innovative place in Latin America by 2030.

GLOBAL URBAN DEVELOPMENT
RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY
KEY DRIVER:
HIGHER EDUCATION, RESEARCH, AND
WORKFORCE DEVELOPMENT

TECNOPUC

CETA
 Centro de Excelência em Tecnologias Avançadas

TECNOSINOS
 Parque Tecnológico São Leopoldo

SENAI Centro Tecnológico de Mecatronica, Caxias do Sul

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Narrative for Slide 48:

Since in the 21st century, people are the most valuable economic asset, and a thriving economy needs a wide diversity and large numbers of people with advanced and highly specialized skills, it is vital that Rio Grande do Sul invest in and strongly promote higher education, research, and workforce development.

In the following slides we will discuss RS universities, technology poles, and technology parks. First we want to highlight four RS institutions that are key to advancing the Leapfrog Economic Strategy through an agenda of promoting Sustainable Innovation.

TECNOPUC

Tecnopuc in Porto Alegre is one of the oldest and best-known university-based technology parks in Brazil, and has become a major international crossroads for experts involved in technological innovation and creative entrepreneurship. Founded in 2001 by PUCRS, it is now home to 120 organizations, including international corporations (Dell, HP, Microsoft, Accenture, ThoughtWorks, and Tlantic/Sonae), major Brazilian companies (DBServer and RBS Group), and industry associations, such as ABINEE (electronics), ASSESPRO (information technology), and PMI (project management). Together these organizations employ more than 6,000 people at Tecnopuc.

Tecnopuc also houses INOVAPUCRS, promoting innovation and entrepreneurship through a range of institutions, including a business incubator (Raiar), an Innovation Center with Microsoft, an Entrepreneur Center, a Research and Development Center (IDEA) with technology laboratory facilities, specialized electronics laboratories, technology and project management services, a Technology Transfer office, and an Innovation Management support center (NAGI). The business incubator, Raiar, houses up to 21 startup companies, and has helped launch more than 60 businesses that have already “graduated” and moved on to larger facilities. For example, Cliever Technology, the first manufacturer of 3-D printers in Brazil, will soon be graduating and moving to larger facilities. Raiar now offers innovative pre-incubator programs such as Startup Garage and Garage Creative. INOVAPUCRS is the most extensive business incubation initiative in Rio Grande do Sul.

In 2013 Tecnopuc opened a second technology park located at a PUCRS facility in Viamão, a 15-minute drive from Tecnopuc’s Porto Alegre site. There are now 25 technology companies located at Tecnopuc-Viamão, which also includes the Audio-Visual Technology Center (TECNA) and the Production and Post-Production Center for Creative Digital Content, a R\$ 26.5 million state-of-the-art digital production studio, with R\$ 11.5 million from the RS state government (7.7 million from FAPERGS and 3.8 million from SDECT), and R\$ 11 million from Brazil’s federal government (FINEP). Studio construction will be completed later this year.

TECNOSINOS

Tecnosinos in São Leopoldo was founded in 1999 by Unisinos. The city of São Leopoldo helped the university attract companies in the early years by providing various city tax incentives, especially for computer-related firms. Today Tecnosinos is home to 61 technology-based companies employing 5,200 people; 36 of these firms are in the field of Business Information Technology. The largest is SAP, the German software corporation, with more than 1,000 employees at Tecnosinos, where SAP has built two LEED-certified green buildings, providing leadership on Sustainable Innovation, saving money on energy and water utilization, and recycling waste.

Other technology companies at Tecnosinos are in Automation and Engineering (11 companies, including Altus, SKA, and HT Micron -- the first private semiconductor manufacturer in RS, a local joint venture with Hana Micron from South Korea), Communication and Digital Convergence (10 companies, including Digistar and Vargas D’Avila), Social, Environmental, and Energy Technologies (Control Agro Bio, Ventura, and E-RECYCLE), and Functional Food and Nutraceuticals (Naturoids).

The Unitec Technological Complex at Tecnosinos includes four technology research institutes: ITT Fuse (materials and product testing), ITT Chip (semiconductors), ITT Nutrifor (food for health), and ITT Performance (civil construction); university management offices; condominium office space for technology companies; and a technology business incubator, home to 30 startup firms, including Naturoids,

profiled in Slide 38. Fifteen companies already have graduated from the Unitec incubator, including API Software, Biota, Tecsisstel, and Web Global.

In 2010 Tecnosinos won an award for Best Technology Park in Brazil, and in 2011 it received second place national recognition for Best Science-Based Incubator. Soon Tecnosinos will be making a major capital investment by adding several new buildings: Inova Towers, Unitec2, and Unitec3, enabling many more companies to be located in the technology park. Further, Tecnosinos plans to build five additional office towers over the next 15 years.

CETA

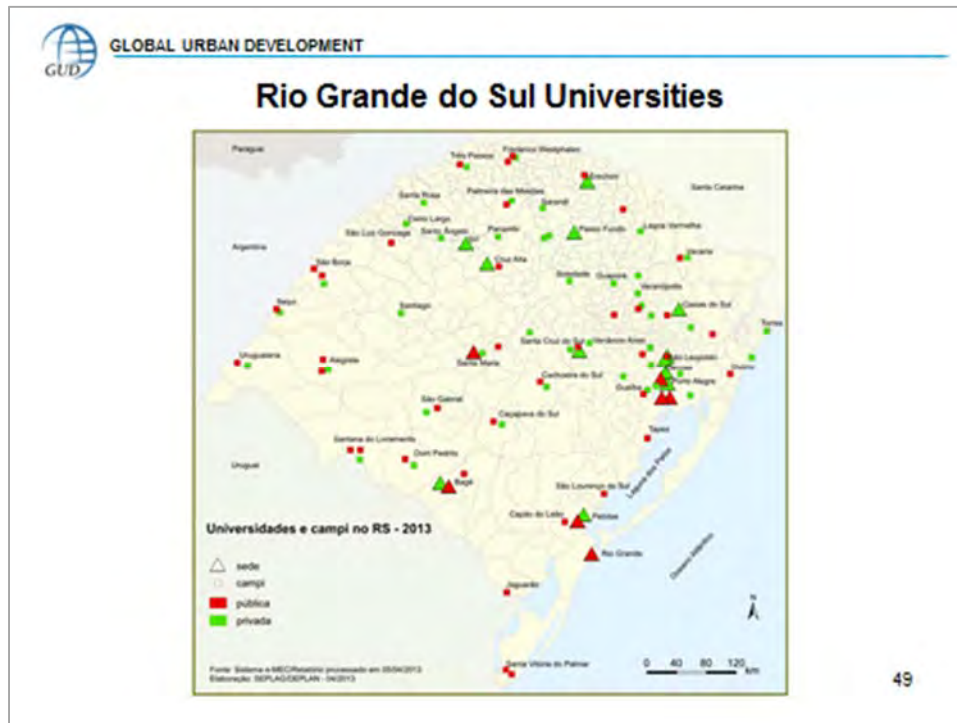
SENAI's Center of Excellence in Advanced Technology (CETA) is located at the SENAI Faculty of Technology in the FIERGS headquarters complex in Porto Alegre. CETA has been working since 2005 in partnership with the Fraunhofer Institutes in Germany applying advanced science and engineering research to promote technological innovation in products, production processes, and services for businesses and industries in Rio Grande do Sul. CETA provides major grants for collaborative and multidisciplinary applied research and development (R&D) on complex projects, working with universities, research institutes, other SENAI centers (such as the National Center for Clean Technologies), and private companies. Participating universities include UFRGS, PUCRS, Unisinos, and Univates. Among its core areas of operation are Materials, Equipment, and Manufacturing Processes; Information and Communication Technology; and Food, Beverages, and Pharmaceuticals. CETA works with industries such as electric-electronics, automotive, metallurgical, metal-mechanic, polymers, energy and environment, furniture, health care, leather and footwear, and biotechnology.

For example, in April 2014 CETA signed an agreement with Creare Systems, located in the Ulbratech Technology Park in Canoas, to develop Precision Agriculture through the use of Unmanned Aerial Vehicles (UAVs) with thermal cameras, high-resolution cameras, and image analysis software. These advanced technologies provide detailed, real-time information about the current status of growing crops in order to increase agricultural productivity, improve plant health, and reduce waste and spoilage (for example, through rapid identification of weeds and pests).

SENAI Mechatronics Technology Institute

The SENAI Mechatronics Technology Institute in Caxias do Sul focuses on innovative applied R&D, business advice, training, and product testing and certification in Metallurgy, Industrial Automation and Control Systems, Energy Efficiency, and Production Optimization. Recently it has been designated as a national SENAI Technology Institute, and it will add Plastics and Civil Construction to its agenda. The large facility is fully equipped with an Integrated Manufacturing Center, including laboratories for Robotics, Electronics, Hydraulics, and Pneumatics.

Generally regarded as one of SENAI's best facilities in Brazil, in three of the past four years the SENAI Mechatronics Technology Institute has won Gold Medals in the World Skills Competition: 2014 in Bogota, 2103 in Leipzig, and 2011 in London.



Narrative for Slide 49:

Rio Grande do Sul is blessed with many good quality higher education institutions, one of its most vital Fundamental Assets, which will be even more important over the next 16 years of implementing the Leapfrog Economic Strategy for RS to become the most sustainable and innovative place in Latin America by 2030.

RS currently has 96 colleges and 24 universities, with more than 370,000 students, including nearly 20,000 students enrolled in graduate programs. The map in Slide 49 illustrates that higher education institutions are spread around the state, geographically accessible to the entire population. Faith-based and community universities and colleges represent a major part of the total for RS, in addition to federal and state higher education institutions. Several are relatively new, including UERGS, the RS State University founded in 2001, and two new federal universities, Unipampa (founded in 2006) and UFFS (founded in 2009).

In 2013 (the most recent rankings) Brazil's Ministry of Education ranked the top 50 universities in the country (<http://www.pragmatismopolitico.com.br/2015/01/50-melhores-universidades-brasil.html>). Rio Grande do Sul has eight of these highest

ranked universities. The Federal University of Rio Grande do Sul (UFRGS) in Porto Alegre is ranked first, the nearby Federal University of Health Sciences (UFCSPA) in Porto Alegre is ranked 14, and the Federal University of Santa Maria (UFSM) is ranked 17. In addition, Unisinos is ranked 29, PUCRS is ranked 30, the Federal University of Pelotas (UFPel) is ranked 35, UERGS is ranked 47, and the Federal Institute of Education, Science, and Technology-South Rio Grande (IFSul) is ranked 48.

In addition to the fact that RS has eight of the 50 top ranked universities in Brazil, here are two other impressive facts: 1) Unisinos and PUCRS are the second and third ranked private universities in Brazil; and 2) four of the 30 highest rated universities in Brazil are located in metropolitan Porto Alegre: UFRGS, UFCSPA, Unisinos, and PUCRS.



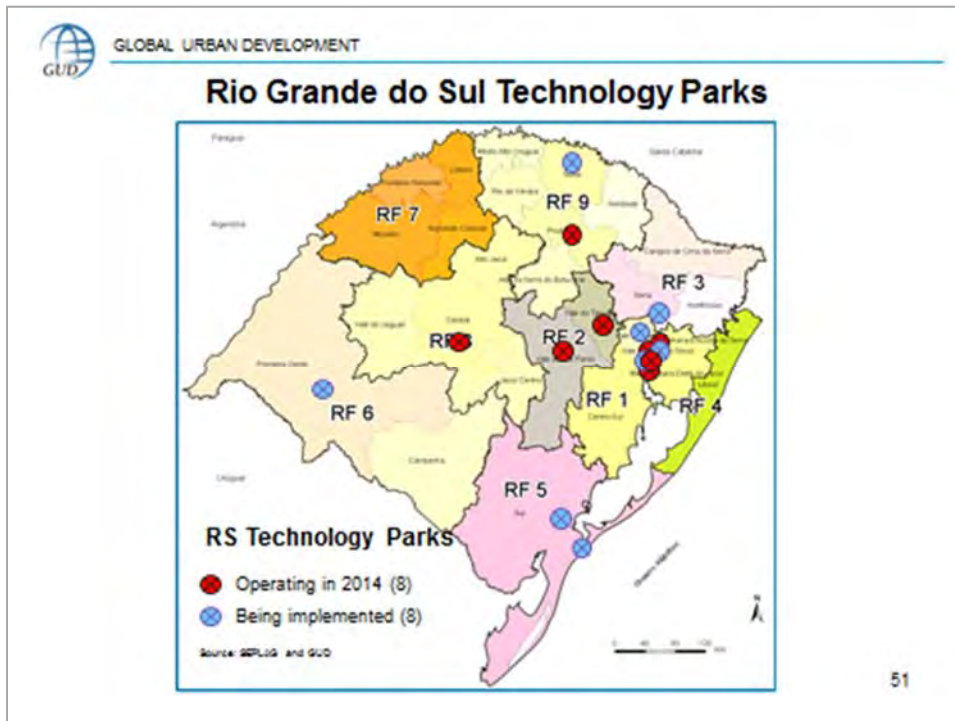
Narrative for Slide 50:

The Rio Grande do Sul state government created the Technology Poles program in 1989, providing funding to university research centers to work with local and regional industry groups to develop advanced technology innovations strengthening the productivity and competitiveness of RS industries. Currently there are 26 Technology Poles located in all nine regions throughout the state. They are doing important work in enabling RS to become the most sustainable and innovative place in Latin America by 2030. Below is the complete list:

RS Technology Poles

REGIONS/COREDES	UNIVERSITIES/PARTNERS	R&D/TECHNOLOGY INNOVATIONS/INDUSTRIES
1/CENTRO-SUL	FAFOPEE, FACCAT, ULBRA	Agroindustry
1/VALE DO CAÍ	UCS, UNISC	Ceramics, Floriculture, Fruit Cultivation, Furniture, Renewable Fuels
1/VALE DO RIO DOS SINOS	UNISINOS, UERGS, FEEVALE, UNILASALLE, LIBERATO	Agriculture and Livestock, Automation, Biotechnology, Design, Energy and Environment, Information Technology, Leather and Footwear, Telecommunications
1/PARANHANA-ENCOSTA DA SERRA	FACCAT	Automation, Environment, Information Technology
2/VALE DO RIO PARDO	UNISC	Biotechnology, Environment, Food Technology, Health, Information Technology, Materials Technology
2/VALE DO TAQUARI	UNIVATES, UFRGS, CIENTEC	Food Technology
3/CAMPOS DE CIMA DA SERRA	UCS, UERGS, FEPAGRO	Agroindustry, Agriculture and Livestock, Environment, Manufacturing, Tourism
3/SERRA	UCS	Agroindustry, Furniture, Mechatronics, Plastics
4/LITORAL NORTE	ULBRA, UERGS, UFRGS, UNISC, FEPAGRO, FACOS	Agroindustry, Agriculture and Livestock, Aquaculture and Fisheries, Clothing (Knitwear), Environment, Furniture, Information Technology, Tourism
5/SUL	FURG	Fishing Economy
	UFPEL	Food Technology
	UCPEL	Industrial Modernization
6/CAMPANHA	URCAMP, UNIPAMPA, IFSUL	Agroindustry, Agriculture and Livestock Technology, Carbo-Chemical Fertilizer Production, Chemical Engineering, Energy and Environment, Information Technology, Metal Nanostructures and Semiconductors, Physics, Production Engineering
6/FRONTEIRA OESTE	PUCRS, URCAMP, IFF/RS, UNIPAMPA, MARONNA	Agroindustry, Biotechnology, Dairy Production, Energy and Environment, Fish Farming, Horticulture and Plasticulture
7/FRONTEIRA NOROESTE	UNIJUÍ	Civil Construction, Metal-Mechanics, Food Technology
7/MISSÕES	URI	Agriculture and Livestock, Energy and Environment, Industrial information Systems and Quality Control, Projects and Products Engineering
7/NOROESTE COLONIAL	UNIJUÍ	Agriculture and Livestock, Electro-Electronics, Information Technology, Metal-Mechanics
8/ALTO JACUÍ	UNICRUZ	Agriculture and Livestock, Biotechnology

8/CENTRAL	UFSM, URI	Agroindustry, Agriculture and Livestock, Engineering, Health
8/VALE DO JAGUARI	URI	Agroindustry, Agriculture and Livestock, Agricultural and Forest Engineering, Architecture, Furniture, Health, Information Technology, Tourism
9/ALTO DA SERRA DO BOTUCARAÍ	UPF	Agriculture and Livestock, Food Processing, Gemstones and Jewelry, Tourism
9/MÉDIO ALTO URUGUAI	URI	Agroindustry, Agriculture and Livestock, Mineralogy
9/NORDESTE	UPF, UCS, URI	Agroindustry, Agriculture and Livestock, Environment, Manufacturing,
9/NORTE	URI	Agriculture and Livestock, Energy and Environment, Food Technology, Manufacturing,
9/PRODUÇÃO	UPF	Food Processing, Metal-Mechanics
9/RIO DA VÁRZEA	UFSM, UPF	Agroindustry, Agriculture and Livestock, Food Processing, Textiles
Source: SEPLAG, 2014		



Narrative for Slide 51:

Technology parks managed by universities and located adjacent to university campuses have become vital contributors to economic growth and business and

industry development ever since the success of the Stanford Industrial Park in the 1960s. Much has been written about this important trend for the past several decades, starting with *Technology in the Garden: Research Parks and Regional Economic Development* (Michael Luger and Harvey Goldstein, 1991), *Technopoles of the World: The Making of 21st Century Industrial Complexes* (Manuel Castells and Peter Hall, 1994), and *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Analee Saxenian, 1994). Technology parks are now essential for economic innovation.

As mentioned in the narrative of Slide 48, Rio Grande do Sul is fortunate to have two of the best technology parks in Brazil, Tecnopuc and Tecnosinos. For RS to become the most sustainable and innovative place in Latin America by 2030, it is necessary for both of these technology parks to continue expanding, and for many more technology parks throughout the state to grow in resources and influence. They are the necessary connectors for transforming new discoveries from university laboratories into innovative technologies, business products, and industrial production processes in the global marketplace. Through technology parks, science and engineering knowledge generates employment and income growth. They are a necessary element for generating Sustainable Innovation and Inclusive Prosperity. The recent creation by the RS state government of the newly combined Department of Economic Development, Science, and Technology (SDECT) is a clear recognition of this vital economic interrelationship.

In addition to Tecnopuc (including Viamão) and Tecnosinos, Rio Grande do Sul currently has six other technology parks: Parque Científico e Tecnológico UPF Planalto Medio (Passo Fundo/UPF), Tecnoparque (Santa Maria), TecnoUnisc (Santa Cruz do Sul/Unisc), Tecnovates (Lajeado/Univates), Ulbratech (Canoas/ULBRA), and Valetec (Campo Bom/Novo Hamburgo/Feevale). All six of these RS technology parks are very new, having opened just in the past few years. Public funding from the federal government in Brasília and from the RS state government has been a major resource for RS technology parks, including the six most recent ones.

Also, eight more RS technology parks are being planned: Parque Científico e Tecnológico de UFRGS (Porto Alegre), PCI (Parque Canoas de Inovação, Canoas), Oceantec (Rio Grande/FURG), PampaTec (Alegrete/Unipampa), Parque Científico e Tecnológico da URI (Erechim), Parque Científico e Tecnológico do Vale do Caí (Bom Princípio/UCS), Tecnosul (Pelotas), and TecnoUCS (Caxias do Sul/UCS).

During our research, we have conducted intensive site visits of RS technology parks. In our view, they are providing the necessary production space, technical and financial support, and intellectual stimulation required to advance Sustainable Innovation in RS agriculture, industry, and services. Much more needs to be done in the next 16 years, of course, and the good news is that RS is now building on a very solid foundation.



Advanced Manufacturing Sustainable Innovation Technology Parks



UK University of Sheffield Advanced Manufacturing Park

52

Narrative for Slide 52:

We recommend that RS establish one or more Advanced Manufacturing Sustainable Innovation Technology Parks. A good model to learn from is the Advanced Manufacturing Park of the University of Sheffield in the UK (<http://www.attheamp.com/>).

The University of Sheffield Advanced Manufacturing Research Centre (AMRC) with Boeing (<http://www.amrc.co.uk/>) is an internationally recognized center for advanced machining and materials research for aerospace and other high-value manufacturing industries.

AMRC is becoming an innovative model for Advanced Manufacturing research centers worldwide. In 2011, AMRC with Boeing became a partner in the UK government's High Value Manufacturing Catapult initiative, with funding from the UK government's Technology Strategy Board intended to create a new national network of advanced technological innovation.

AMRC identifies, researches, and resolves advanced manufacturing problems on behalf of its industrial business members. Eighty companies have joined as members, from global aerospace corporations to local small- and medium-sized enterprises. More than 200 researchers work with individual companies on specific projects, and collaborate on generic projects for the benefit of all members. The industrial members select AMRC's R&D projects. This ensures that work is focused on high-priority industrial and commercial requirements.

AMRC has five core areas of research:

Machining Research – The AMRC Process Technology Group (PTG) develops innovative techniques and optimized processes for the machining of high-performance materials. Within that scope, PTG focuses on process monitoring, machinability of materials, machining dynamics, process automation, process modeling, chip machining fundamentals, non-conventional machining, and integrated manufacturing.

Advanced Manufacturing Assembly – The AMRC Integrated Manufacturing Group (IMG) specializes in solving problems in low-volume, high-value assembly and difficult-to-handle components. IMG focuses on measurement-assisted assembly to develop new ways of automatically assembling complex systems for aerospace and other low-volume manufacturing industries. The Group brings together core expertise in robotics, metrology, and design of automation systems.

Composite Materials – AMRC's Composite Centre is a state-of-the-art facility for advanced composite manufacturing research and development, extending AMRC's traditional expertise in metals production into the new generation of carbon fiber composite materials increasingly used in aerospace, maritime, automotive, and other industries. With the new composite materials, the Composite Centre focuses on automated production, machining, and advanced curing technologies.

Structural Testing – The Advanced Structural Testing Centre (ASTC) is AMRC's testing and certification center. Product certification is critical to entering the supply chain with new methodologies and manufacturing materials in safety-critical components.

Design and Prototyping – The AMRC Design Prototyping and Testing Centre includes the Design and Prototyping Group, which was established in 2012 to develop a new generation of talented engineering designers, by closely integrating multi-disciplinary engineering design teams together with R&D, prototyping, and product testing for Advanced Manufacturing, including state-of-the-art visualization and rapid prototyping equipment.

The AMRC Design Prototyping and Testing Centre also includes the Medical AMRC, combining clinical expertise with high-value manufacturing capabilities and advanced innovation. Medical R&D teams, including engineers, software specialists, product designers, and materials scientists, work with cutting-edge equipment such as high-precision machining and additive manufacturing, in collaboration with private companies, to design new materials for orthopedic devices, new mobility aids for people with disabilities, and many other innovative new medical and health care technologies.

Research projects fall into three categories:

Generic research is conducted on behalf of AMRC's industrial members, with results distributed to every company.

Specific research is conducted for individual members. The members invest directly in the research and have exclusive access to any resulting intellectual property.

Innovation research is conducted on behalf of the entire industrial membership, with results presented to all members. These projects are usually funded by the Engineering and Physical Sciences Research Council (EPSRC), the main UK government agency for funding research and training in engineering and the physical sciences, by the European Commission's (EU) Framework Program, or through other external grants. These projects sometimes include collaborating with other research centers and corporations.

In addition to its European partnerships, AMRC is part of the Boeing Corporation's GlobalNet group of industry-oriented research centers, and the Rolls-Royce Corporation's AxRC, an international network of Advanced Manufacturing research centers.

The AMRC also provides technical, analytical, and management services to support the activities of its core research groups. Research support teams include microscopy, metrology, quality control, and virtual reality.

Background History

Sheffield's Advanced Manufacturing Park (AMP) is located in the South Yorkshire region that once was a major area for steel manufacturing. With the decline of steel production during the 1980s, Sheffield and South Yorkshire went into a decade-long slump as steel factories and coal mines in adjacent communities were closed. As a result of its economic challenges, South Yorkshire became a European Union "Objective One" region, becoming eligible for one billion GBP in EU funding to enable the region to regenerate its economy. One of the projects local governments invested in was a joint venture of UK Coal (which owned much of the contaminated former coal mines across the UK) and Yorkshire Forward, the Regional Development Agency, to develop the 100-acre Advanced Manufacturing Park near Sheffield.

The AMRC was established in 2001 as a partnership between the University of Sheffield and Boeing, with additional funding from Yorkshire Forward and the European Regional Development Fund. Total initial public-private investment was 15 million GBP. The University of Sheffield has a strong focus on metallurgy and engineering research, and a tradition of working closely with local and regional industries to develop new manufacturing technologies and processes. University executives and professors collaborated with Boeing to develop a concept for the

Advanced Manufacturing Research Centre designed to partner with businesses in finding new solutions for addressing the ultra-high tolerance precision required in advanced technology aerospace manufacturing.

In 2004, AMRC moved into a custom-designed facility as the anchor tenant of the Advanced Manufacturing Park. AMRC grew rapidly and, after securing additional funding, in 2008 officially opened the 48,000 square-foot AMRC Rolls-Royce Factory of the Future. In 2012, AMRC's Composite Centre moved to an expanded 19,000 square-foot facility in the Factory of the Future.

The Rolls-Royce Factory of the Future is built for Sustainable Innovation, according to Building Research Establishment Environmental Assessment Method (BREEAM) standards. The building is designed to make maximum use of natural lighting, heating, and ventilation. Also, it features significant renewable energy capabilities including ground source heat pumps and wind turbines. **Wind turbines are visible in the Slide 52 photograph of the Advanced Manufacturing Park.**

Currently under construction for AMRC is Factory 2050, a GBP 43 million facility to be completed by the end of 2015 at the Sheffield Business Park, AMRC's new expansion area one-half mile from its Advanced Manufacturing Park (because the AMP is now running out of available land for new development). Factory 2050 will become the anchor for a new Advanced Manufacturing Campus that will include up to one million square feet of new research facilities to be built over the next decade.

Factory 2050 will be the UK's first totally reconfigurable, digital factory, built to enable advanced manufacturers to make rapid changes in product design, responding more quickly to shifting customer demand. Factory 2050 is designed for machines and manufacturing modules to be easily moved around the shop floor. Sophisticated monitoring systems will generate large volumes of information to develop technologies that allow machine tools and processes to change the way they are working in order to maximize production rates, minimize tool wear, and maintain high quality. **Factory 2050 will incorporate advanced 'green' energy technology, including a major ground-source heat pump package, which eliminates the need for a boiler or chiller plant.**

The original 2004 AMRC building currently features the Advanced Structural Testing Centre, and will soon undergo a major upgrade and expansion for the Design Prototyping and Testing Centre.

Governance

AMRC is a membership-based organization with two tiers of membership:

Tier 1 membership costs 200,000 GBP per year. Tier 1 members get an individual vote on the board of members that makes key decisions about research priorities. Tier 1 members participate in and obtain the results of all generic projects (distinct

from separately funded proprietary research projects). Tier 1 members also have the opportunity to recommend specific projects that are presented to the board of Tier 1 members for ranking and approval as funds become available. There are currently 20 Tier 1 members including Airbus, BAE Systems, Boeing, and Rolls-Royce.

Tier 2 membership costs 30,000 GBP per year. Tier 2 members participate in and obtain the results of all generic research projects, and have privileged access to AMRC's resources and capabilities. Tier 2 partners collectively get one vote on the board of members. There are currently 60 Tier 2 members, including ABB, Mitsubishi Electric, IBM, and Mitsubishi Materials.

Other Facilities

The University of Sheffield is building on the success of its AMRC with Boeing by developing a larger group of industry-focused manufacturing R&D centers and supporting facilities, including:

Namtec

Established in 2002, the National Metals Technology Centre (Namtec) provides training and engineering advice to the UK metals manufacturing value chain. Namtec joined AMRC in 2012 to help promote Advanced Manufacturing innovation and improve competitiveness for the UK metals industry.

Knowledge Transfer Centre (KTC)

Opened in May 2012, the AMRC Knowledge Transfer Centre (KTC) provides dedicated conference, meeting, and training space to help engage businesses involved in the Advanced Manufacturing value chain. The building is based around a large training workshop where visitors can experience new Advanced Manufacturing, machining, and assembly techniques developed at AMRC. The KTC also offers highly flexible meeting and teaching rooms, equipped with the latest presentation and networking technology, and its facilities can host large conferences of up to 300 participants.

AMRC Training Centre

In October 2013, the AMRC Training Centre moved into a new 59,000 square-foot building at the Advanced Manufacturing Park. It focuses on high-level apprentice training in Advanced Manufacturing, including mechanical engineering, electrical and electronic engineering, fabrication and welding, engineering maintenance, and engineering technical support, for industries such as aerospace, automotive, and energy. It trains up to 250 apprentices per year, from member companies and other local businesses, in cooperative part-time programs.

Industrial Doctorate Centre

The Industrial Doctorate Centre (IDC) in Machining Science offers graduate students the opportunity to learn about cutting-edge Advanced Manufacturing engineering. The IDC is operated jointly by AMRC together with the University of Sheffield's Faculty of Engineering. It provides a four-year Engineering Doctorate program that includes applied R&D addressing real-world Advanced Manufacturing business challenges.

Advanced Manufacturing Innovation District

The AMRC is in the process of creating the UK's first Advanced Manufacturing Innovation District near the Advanced Manufacturing Park and the University of Sheffield campus. The Advanced Manufacturing Innovation District is intended to encourage greater ongoing collaboration between the region's research institutions, private companies, business incubators, and professionals, in order to strengthen aerospace, health care, transportation, energy, and other industries. In this way AMRC will move beyond the Advanced Manufacturing Park as a corporate and academic center, by integrating it more closely with the surrounding urban environment, including commerce, residential life, culture and entertainment, and other interactive community activities, in the best tradition of Silicon Valley. This approach is what GUD calls Sustainable Innovation Zones. We will discuss this idea in further detail in Slides 62-76.

GLOBAL URBAN DEVELOPMENT
RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY
KEY DRIVER:
ENTREPRENEURSHIP
AND STARTUPS



The image contains two photographs. The left photograph shows a black 3D printer with a blue filament spool, set against a blue background. The right photograph shows the entrance to the ITSM (Incubadora Tecnológica de Santo Maria) building, which has a sign with the ITSM logo and the text 'Incubadora Tecnológica de Santo Maria'. The building is surrounded by various logos of partner organizations.

Narrative for Slide 53:

For the Leapfrog Economic Strategy to succeed in enabling Rio Grande do Sul to become the most sustainable and innovative place in Latin America by 2030, RS needs to become a large-scale generator of Sustainable Innovation activity, including through new business formation and expansion. Strengthening an entrepreneurial culture and providing a wide range of supportive institutions will be vital for success. Colleges and universities, technology parks, and business incubators will play a major role in this process, and this level of activity in RS should increase exponentially from its current solid foundations. Previous slides have discussed higher education institutions, technology poles, and technology parks, including comprehensive approaches for promoting startups by Tecnopuc and Tecnosinos. In the following slides we will discuss technology business incubators and accelerators.

One very important recent trend in RS, representing a generational shift, is the growth of cooperative efforts by creative and innovative young entrepreneurs and technologists to generate new ideas, new businesses, collaborative culture, and supporting institutions. The rapid growth of CITE, Nós Coworking, Vila Flores, Distrito Criativo, Semente Negócios, Casa Liberdade, Catali.Se, Fábrica de Idéias, Cuento, Coletivo, 4ED, WOW, Ventur.net, Estarte.me, Pulsar, and many similar groups in RS, especially in Porto Alegre, is a hopeful sign for the future, particularly if they are scaled up, including with public funding from organizations such as Inovapoa and AGDI, to reach many more people and places throughout the state. Frequent activities to promote “innovation ecosystems” should be vigorously

encouraged, such as the series of training workshops organized by the Porto Alegre city government and CITE during September 2013. These pathbreaking three-hour workshops involved more than 300 invited local entrepreneurs, professionals, academic researchers, government officials, university students, and community leaders. The sessions were led by Silicon Valley venture capitalist Victor Hwang, CEO of T2 Venture Creation and coauthor of *The Rainforest: The Secret to Building the Next Silicon Valley*, and they took place at five different locations: Nós Coworking, Tecnopuc, Unisinos, UFRGS, and ESPM ([http://www.globalurban.org/Sustainable Innovation in Porto Alegre.pdf](http://www.globalurban.org/Sustainable_Innovation_in_Porto_Alegre.pdf); [http://www.globalurban.org/CITE Rainforest Initiative in Porto Alegre.pdf](http://www.globalurban.org/CITE_Rainforest_Initiative_in_Porto_Alegre.pdf)).

Venture capital, early-stage and expansion financing, and other private and public financial mechanisms to facilitate the growth of startups, will be key components of overall success. The federal and RS state governments, through various development banks and innovation agencies, already offer many programs and incentives, though significant expansion in the scale and scope of capital availability still is needed, especially involving private investors and lenders. Through the collaborative economy enthusiasts, crowdfunding is becoming increasingly popular as another potential source of startup and early-stage financing.

Slide 36 featured Altus and ImPLY as two dynamic and thriving RS companies in the field of Precision Production, Smart Machines, and Digital Technology, a Key Driver for the economic future of the state. Both of these are homegrown businesses that began as local startups. Altus maintains a facility at Tecnosinos. ImPLY currently maintains office space in TecnoUnisc, in addition to providing financial support to the university's on-campus technology park and business incubator in Santa Cruz do Sul. Clearly the goal is for RS to enable thousands of innovative firms like Altus and ImPLY to grow from colleges and universities, technology parks, and technology business incubators statewide.

Slide 53 pictures the Technology Incubator of Santa Maria (ITSM), located on the UFSM campus. ITSM is one of the oldest and most effective business incubators in RS. Among their current tenants is Weevee Electronic Solutions, an advanced software and electronic design startup founded by two UFSM engineering students.

In 2013 Weevee developed an innovative P-Sensor for Tire Pressure Monitoring Systems, consisting of hardware and software devices continuously monitoring via wireless sensors the pressure and temperature in motor vehicle tires. This new technology is particularly valuable for tractor-trailer trucks and other heavy industrial, commercial, and agricultural vehicles, providing energy savings by helping to reduce fuel consumption, management savings by cutting maintenance and repair costs, and enhancing vehicle safety by preventing tire damage and deterioration. Improving energy efficiency and vehicle safety is a major contribution to Sustainable Innovation, especially because with Weevee's P-Sensor, tire pressure and temperature can be easily monitored on smart phones and other user-friendly wireless communication devices.

Weevee Electronic Solutions belongs to the Centrossoftware APL, an industry network of Information and Communication Technology companies in Santa Maria and the Central Region of RS, supported by AGDI.

Another emerging startup is Cliever Technology, currently located at Raiar, Tecnopuc's business incubator. Cliever has designed an innovative 3-D Printer, and this new company is the first manufacturer of 3-D Printers in Brazil. Cliever's products enhance Sustainable Innovation and resource efficiency by conserving the use of materials through the additive manufacturing process, by encouraging on-site production and reducing logistics costs through electronic communications and local supply chains, and because many plastic filaments used in their printers are fully biodegradable. Cliever's 3-D Printers are "100 percent Brazilian" with no imported hardware or software.

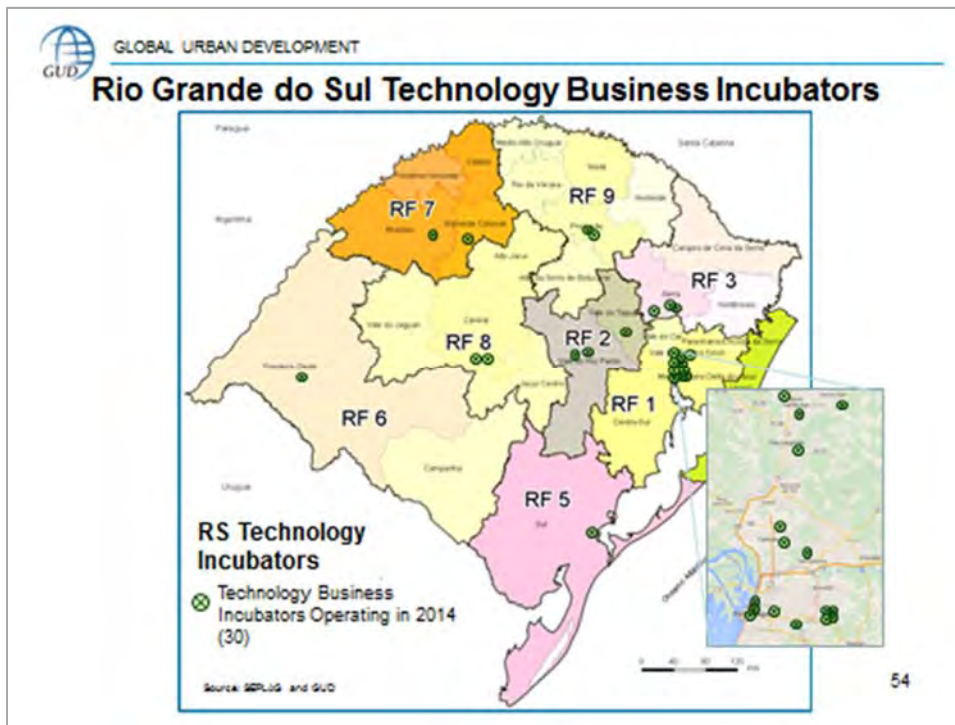
In Slide 38 we discussed Naturoils, an innovative "nutraceutical" (natural and herbal pharmaceuticals for nutrition and health) company in the Unitec incubator at Tecnosinos. Three other examples of RS Sustainable Innovation firms are Ressonare, located in the Inovates Innovation and Technology Center at Univates in Lajeado; Valoriza in Santo Cruz do Sul, a successful graduate of the Unisc Technology Incubator; and MVM Technologies, a new startup currently in the pre-incubation phase preparing to enter the CEI/INF Information Technology Incubator at UFRGS in Porto Alegre. All three are part of the emerging field of smart machines and digital technology, a Key Driver for the brighter economic future of Rio Grande do Sul.

Ressonare is an environmental technology company specializing in remote control monitoring equipment, software, and services for agriculture and industry, including solar-powered devices and systems. In addition, Ressonare manufactures industrial automation equipment, enabling firms to upgrade technology, save energy, and reduce waste. Ressonare designs weather stations and remote data collection communications networks for governments, corporations, universities, and other institutions. They both install the equipment and train the operators. These weather stations are increasingly in demand, especially in places with extreme and highly variable conditions where recording and disseminating real-time data is essential. Ressonare applies a similar approach to building and serving "limnometric" stations that continuously measure water levels in rivers and lakes and electronically transmit real-time information.

Valoriza is a mobile marketing company that has developed digital telecommunications software enabling businesses to send text messages (SMS) and pre-recorded audio messages to large groups of current and potential customers. These messages can be sent to landline phones, smartphones, mobile Internet devices, Facebook pages, and other social networking vehicles. Valoriza's software applications work with Apple, Android and Windows operating systems, generating thousands of messages per hour and facilitating interactive communications enabling people to directly reply to marketing messages. Capabilities include Text-

to-Speech (TTS) messages that convert to audio when connected. By popular online voting in 2013, Valoriza won a Communities/Social Network award from Tela Viva Mobile.

MVM Technologies is a new company planning to provide a car sharing service in Porto Alegre using small two-seat electric-powered vehicles that can be partly folded to fit into tight parking spaces. Car sharing is managed by SIVI, a digital electronic rental verification and payment system. The Hiriko Fold cars are manufactured in Spain, based on a model originally designed at MIT's Media Lab. MVM's founders includes Information Technology graduate students at UFRGS, where they work at NSCAD Microelectronics and participate in a business pre-incubation program. MVM Technologies has already graduated from the T2MA Competition, a Silicon Valley-based business startup support program co-sponsored by Intel and the University of California, Berkeley. Initially the electric vehicle sharing program only will be available to UFRGS students, faculty, and staff at the Campus do Vale, and eventually this service will be scaled up for all of Porto Alegre and for other RS cities.



Narrative for Slide 54:

Technology business incubators are vital organizations for promoting entrepreneurship and startups, new and advanced technologies, and Sustainable Innovation. Rio Grande do Sul is fortunate to have numerous incubators already

operating around the state. The next step will be to establish many more, and to invest additional resources in improving and expanding the physical space as well as the scope and quality of technical and financial services RS incubators provide.

Several RS technology business incubators have been mentioned previously in this report, including Raiar (Tecnopuc/PUCRS-Porto Alegre), Unitec (Tecnosinos/Unisinos-São Leopoldo), and ITSM (UFSM-Santa Maria).

In addition, Cientec, the RS state government's Science and Technology Foundation, maintains two technology business incubators, one in Porto Alegre and the other in Cachoeirinha. Together they currently serve 11 firms, and they have already graduated nine successful companies.

UFRGS operates five incubators in Porto Alegre:

- Hestia Technology Incubator (Engineering School and Physics Institute)
- CEI/INF Information Technology Incubator (Informatics Institute)
- ITACA Food and Agribusiness Technology Incubator (Institute of Food Science and Technology)
- IE-CBiot Biotechnology Business Incubator (multidisciplinary)
- Solidarity Economy Technology Incubator (Faculty of Economics)

Other university-sponsored incubators include:

- Weaving Ideas Incubator (IPA Methodist University-Porto Alegre), co-sponsored by the Porto Alegre city government's Office of Innovation and Technology (Inovapoa)
- ESPM Business Incubator (ESPM-Porto Alegre)
- ULBRA Technology Incubator (ULBRA-Canoas)
- Tecnosocial (Unilasalle-Canoas)
- ITEF Technology Incubator (Valetec/Feevale-Campo Bom)
- IES Solidarity Economy Incubator (Feevale-Novo Hamburgo)
- ITEC Technology Incubator of Caxias do Sul (UCS-Caxias do Sul)
- Inovates Innovation and Technology Center (Univates-Lajeado)
- Unisc Technology Incubators (Unisc-Santa Cruz do Sul and Unisc-Vera Cruz)
- UPF Science and Technology Park Business Incubator (UPF-Passo Fundo)
- Incubatec Innovative Business Technology Incubator (IMED-Passo Fundo)
- Unifra Technology Incubator (Unifra-Santa Maria)
- Criatec Innovation Business Incubator (Unijuí-Ijuí)
- Business Incubation Center of the South Region (UCPel-Pelotas)
- PampaTec Technology Incubator (Unipampa-Alegrete)
- URInova Technology Business Incubator (URI-Santo Ângelo).

Finally, there are several additional (non-university) technology incubators, including:

- IEITEC-Enterprise Institute Technology Innovation Incubator (Canoas)
- ITEL-Liberato Technology Incubator (Novo Hamburgo)

- Incmoveel-Furniture Industry Technology Incubator (SENAI and Bento Gonçalves city government).



Narrative for Slide 55:

An excellent example of a dynamic business accelerator is the MaRS (Medical and Related Sciences) Discovery District (<http://www.marsdd.com/>) in Toronto, Canada. According to the *Toronto Star*, “The MaRS Discovery District in downtown Toronto is one of Canada’s best-known research and innovation hubs...it draws on Canadian business know-how and scientific expertise to create startup companies in such fields as health, information and communications, and green technology. Gordon Nixon, who chairs the MaRS board, credits its mentorship, networking, market research and funding with having a CA\$ 3 billion impact on the economy. MaRS ventures have created 6,500 jobs, have raised CA\$ 1 billion in capital and earned CA\$ 500 million in revenue in the past few years alone. And a recent survey of nearly 600 of its 3,300 venture clients confirmed that the vast majority feel MaRS has contributed to their success.”

MaRS began when a key historic property at the corner of College Street and University Avenue in downtown Toronto was to be sold off by its owner, the University Health Network. The site was both historic and strategically located. It was the traditional research wing of Toronto General Hospital – a place where medical breakthroughs such as insulin, the artificial kidney, and the pacemaker

were developed. It is located at the epicenter of six teaching hospitals and the University of Toronto – which together undertake over one billion dollars of medical research each year.

Starting in 2004, John Evans, a former corporate chairman and President Emeritus of the University of Toronto (he passed away on February 13, 2015), convinced a number of private individuals to each contribute one million dollars to seed a non-profit charitable organization to secure the building site and develop a concept and business plan for a major urban innovation center. With this private sector leadership in place, Ontario's provincial government and Canada's federal government contributed over CA\$ 100 million to buy the property and redevelop it.

MaRS opened in September 2005 with 750,000 square feet of space – laboratories, office space, and meeting rooms. The initial plan was to co-locate technology-related startups and early-stage businesses along with the support services (legal, financial, management advice) that those companies needed. The center was soon fully occupied with tenants paying on average CA\$ 45 per square foot – the highest rents in Toronto – and planning began for Phase Two, which in 2013 added another 780,000 square feet of offices, laboratories, meeting rooms, conference facilities and a large auditorium in a new 20-story LEED-certified green building. The Ontario provincial government recently purchased an ownership stake in the Phase Two building for CA\$ 65 million, supporting startup entrepreneurs by enabling them to pay more affordable office rents.

MaRS provides education, information, advice, and access to early stage capital both directly and through multiple service providers and partners. It offers training on how to start a business through its Entrepreneurship 101 classes. Promising startups and people with potentially good business ideas can apply to become MaRS clients (whether or not they are located in the MaRS center). Becoming a client provides access to a MaRS adviser as well as market research materials and professional and technical assistance provided pro bono by companies such as Forrester, comScore, MedTrack, and Gartner.

Today, MaRS Discovery District has an annual operating budget of approximately CA\$ 40 million, with CA\$ 5 million coming from government grants. The vast majority of the MaRS budget is derived from office rents, fees for events and educational programs, corporate sponsorship, and client fees.

The MaRS Discovery District helped inspire Ryerson University's Digital Media Zone (DMZ), an innovative business incubator and coworking space in Toronto that opened in April 2010 (<http://digitalmediazone.ryerson.ca>). Since then DMZ has supported more than 130 startups. Together these new businesses have created more than 1,200 jobs, and raised over CA\$ 40 million in financing. In 2014 the University Business Incubator Index ranked Digital Media Zone as the fifth best university business incubator in the world.

GLOBAL URBAN DEVELOPMENT
RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY
KEY DRIVER:
INFRASTRUCTURE, TRANSPORTATION,
AND LOGISTICS

Marcopolo

aeromovel
 trensurb
 Mais uma integração com você

56

Narrative for Slide 56:

Rio Grande do Sul is fortunate to have relatively good infrastructure for Brazil, though most people in RS are well aware of the need for substantial improvements in many key areas, especially to deal with major logistics bottlenecks. Several plans address these various needs, most notably Agenda 2020 on an ongoing basis, including its most recent report in November 2014; Rumos 2015, a massive study published in 2005; the 2012 Competitive South recommendations for the three states (RS, PA, and SC); and the December 2014 AGDI Infrastructure Plan. These reports are too detailed to discuss in depth here, other than to say that most of the recommended investments should be implemented sooner rather than later.

Many of the proposed actions in the various reports focus on improving and expanding current roads, highways, and bridges, as well as building new ones. This is particularly important in RS, with its large industrial value chain for manufacturing cars, trucks, and buses, and its logistics requirements for transporting bulky and heavy goods to producers and consumers. The photo in Slide 56 of Marcopolo, a successful manufacturer of high quality executive coach buses, minibuses, and other products, is an example of the many thriving motor vehicle/transportation equipment/auto parts companies in RS. Unlike most other states in Brazil, many of these companies in RS, including Marcopolo, Randon, and Agrale, are locally based enterprises (though others, like General Motors and Dana Corporation, are foreign multinationals).

For Rio Grande do Sul to become the most sustainable and innovative place in Latin America by 2030, it is vital to do more than just expanding roads. Two of the most important investments over the next 16 years must be in dramatically improving and expanding water transportation services and rail transportation services, because they will substantially strengthen the speed, load, and efficiency of moving people and goods throughout the state, reduce motor vehicle traffic congestion and pollution, save on energy costs and resource utilization, and cut greenhouse gas emissions, among many other economic and environmental benefits.

Especially due to the recent growth of the Naval/Offshore Industry, using waterways to move goods by barge is becoming a very smart and strategic transportation option for RS, which is why it is pictured prominently in Slide 56. Obtaining financial support from the federal government to invest in dredging various lakes and rivers, building or improving local port facilities, recruiting water transportation companies, and modernizing vessels, are among the necessary tasks. Within a decade, much of the cargo from agriculture and industry can much more easily and efficiently be transported by water than by land.

ABTP, the national Brazilian Association of Port Terminals, represents 80 major companies and organizations engaged in commercial shipping through private port terminals, including agricultural and industrial producers, logistics firms, and private port owners and operators. Among its members are Arcelor Mittal, Braskem, Gerdau, Petrobras, Tecon, Wilson Sons, and Yara. In September 2014 ABTP-Sul in Porto Alegre proposed a major expansion of shipping on interior waterways in Rio Grande do Sul, which would directly benefit 66 RS municipalities with waterfront access to a potential 1,200 kilometers of navigable shipping. These 66 municipalities would be able to further develop commercial, industrial, and residential waterfront-related facilities to create many new jobs and business opportunities, and at the same time, the increased use of waterways to transport goods will substantially save on energy costs, relieve truck traffic congestion on the state's roads, reduce air pollution and greenhouse gas emissions, and facilitate greater export trade through the Port of Rio Grande. This excellent proposal for RS deserves serious consideration.

Water transportation should not just be restricted to cargo. People can move by water, ranging from daily commuting to work, to recreational trips, including on nights and weekends, as already happens between Porto Alegre and Guaíba. The more that RS becomes a state that moves by water, the more economically dynamic and globally attractive it will become, including expanding opportunities for regenerating waterfront areas in many cities and towns with modern commercial, residential, and recreational amenities, though this will necessitate the further cleaning of rivers and lakes to reduce water pollution.

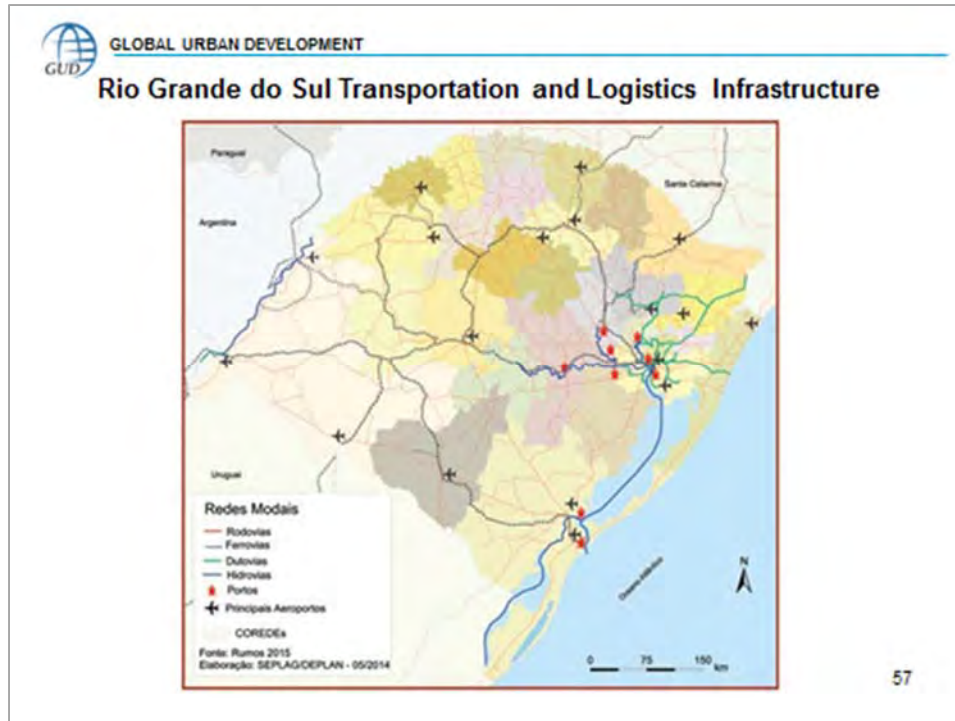
The same goes for rail transportation. Currently there is very limited freight rail service provided by América Latina Logística (ALL) for selected materials, mainly grains and fossil fuels. Mostly everything else moves by truck, with considerable

delay, waste, congestion, pollution, and other harmful economic, social, and environmental costs. It should be a very high priority for the federal government to invest in the proposed north-south and east-west trains to run through Rio Grande do Sul, strengthening key production and logistics centers in many cities and in all nine regions of the state. In addition, RS should explore the possibility of developing passenger train service. For certain well-traveled routes, this can be a more resource-efficient, cost-effective, rapid, enjoyable, and sustainable transportation alternative, as modern, high-speed European trains continue to demonstrate.

RS does have Trensurb, the widely used metropolitan commuter train service between Novo Hamburgo and Porto Alegre. This was a very wise and strategic investment that should be substantially expanded and upgraded (and may soon be supplemented by an underground subway train line in Porto Alegre). Recently Trensurb introduced a new Sustainable Innovation, the Aeromóvel tram moving people between the Trensurb Airport Station and the passenger terminal at Salgado Filho International Airport. Aeromóvel, pictured in Slide 56, was developed by the Coester Group in São Leopoldo as an innovative new technological breakthrough in energy efficiency and passenger safety. Soon Aeromóvel will be building an entire transit system in Canoas with multiple stops across the city, connected to the Mathias Velho Trensurb Station. Aeromóvel can become a model for RS, for Brazil, and for the world, in terms of resource efficiency and sustainable mobility, and the production (and export) of these innovative train cars should become a major new industry in Rio Grande do Sul. For example, currently Aeromóvel is being considered for inclusion in the sustainable urban mobility system as part of the clean energy/Sustainable Innovation redevelopment of Tegel Airport in Berlin, Germany.

Regarding air transportation, another strategic move that has consistently been recommended by infrastructure experts is expanding the runways, improving the passenger terminals, and extending air cargo service at Salgado Filho International Airport in Porto Alegre. This will enable Rio Grande do Sul to accommodate the new generation of large modern jet airplanes, becoming more of a global center for air travel. For example, currently American Airlines cannot use its most modern jet airplane equipment on its Porto Alegre-to-Miami direct flights, though this will change for the better as soon as key airport improvements are completed within the next few years. Similarly, air cargo service for lightweight, high-value goods will help reduce road traffic congestion currently caused by long distance ground transportation shipping by trucks.

Salgado Filho International Airport already has good highway and train connections, making its expansion and improvement an essential, cost-effective, and sustainable priority. Over the coming decade and beyond it also may be necessary to build a second international airport located somewhat closer to the Serra Gaúcha region, though it will take many years for such an airport to be constructed.



Narrative for Slide 57:

The map in Slide 57 illustrates the principal highways, train lines, airports, waterways, water ports, and underground pipelines in Rio Grande do Sul. In the narrative to Slide 56 we discussed waterways, trains, and the international airport, together with the exciting new opportunity of Aeromóvel. In this narrative we want to highlight some other vital infrastructure investments that will help enable Rio Grande do Sul to generate dynamic growth through the Leapfrog Economic Strategy of becoming the most sustainable and innovative place in Latin America by 2030.

A key 21st century Sustainable Innovation is electric cars and other motor vehicles. Because they are not powered by fossil fuels, electric vehicles are likely to become part of the wave of the future in urban mobility solutions. Tesla's recent rapid growth in the US is just the beginning of this potentially massive global shift in transportation technology. It should be particularly appealing in Brazil, where much of the electricity already comes from renewable sources. The first place in Latin America to become a producer of electric vehicles will enjoy a major competitive advantage over the next 16 years, and this place should be Rio Grande do Sul. RS will need a manufacturer, and the obvious candidate is General Motors, with its huge industrial complex in Gravataí. GM can use its RS factory to manufacture Chevy Volts, an already proven electric car in the US, and export them from RS to all of Brazil and Latin America.

To make such a strategic move possible, RS will need to become the first place in Latin America to develop an electric vehicle battery-charging infrastructure.

Focusing initially on metropolitan Porto Alegre, RS should be installing solar-powered electric car recharging stations and equipment in major public parking facilities ranging from airports and government buildings, to shopping malls, universities, technology parks, hospitals, corporations, and similar venues where large numbers of vehicles are frequently parked. Not only will this help to directly promote job and income growth through the entire value chain, it will also enhance the global image of RS as a world leader in Sustainable Innovation, which will attract additional investment, talent, and other valuable resources from Brazil and globally.

Another vital infrastructure priority is renewable energy production, distribution, and storage. Renewable energy and related clean technologies will be one of the most vital growth industries for Rio Grande do Sul, as discussed in Slide 42, and infrastructure will be a vital part of the overall value chain. For example, currently RS has much more capacity to generate wind power than it does to distribute or store it. Making key strategic investments soon will pay off many times over in the near and long-term future.

Further, RS should be investing in upgrading its information and communications technology infrastructure through high-speed broadband fiber optic cable lines, as well as wireless electronic transmission equipment. It is essential for RS to provide world-class standards of telecommunications services in order to be globally competitive and a world leader in Sustainable Innovation.

For intra-urban mobility, RS should be seriously studying the most recent advances in developing state-of-the-art infrastructure for innovative Bus Rapid Transit (BRT) technologies and services. Two international organizations operating in Brazil, EMBARQ (World Resources Institute, <http://www.embarq.org>), whose national office is in Porto Alegre, and the Institute for Transportation and Development Policy (<https://www.itdp.org>), located in Rio de Janeiro, are global experts on how to develop and manage cutting-edge BRT systems. In Rio Grande do Sul, BRT should be planned by all of the municipalities working together in urban regions, starting with metropolitan Porto Alegre.

In addition, RS should be promoting car sharing, such as Zipcar, currently operating in more than 250 cities and towns in the US, Canada, Austria, France, Spain, and the UK (<http://www.zipcar.com>). MVM Technologies, a new startup company incubating at UFRGS, is working to develop an electric vehicle car sharing service in Porto Alegre.

Similarly, RS should promote bicycle sharing, as Porto Alegre is now doing through its Bike Poa program with the Serttel Group and Itau Bank. Bike sharing works particularly well near colleges and universities. Also, RS should encourage the development of bicycling infrastructure, including dedicated bike lanes, as several RS cities have initiated, including Capão da Canoa, Lajeado, Montenegro, Osório and Torres. GUD Advisory Board member Jeff Olson, from Alta Planning & Design,

emphasizes the vital importance of providing modern bicycle infrastructure for Sustainable Innovation in his 2012 book, *The Third Mode: Towards a Green Society*.



Narrative for Slide 58:

One of the major infrastructure challenges facing Rio Grande do Sul is the lack of sufficient public sector resources to make the necessary strategic investments in the years ahead. Currently the state government is facing budget difficulties at the same time that the federal government is reducing its spending, and most RS municipalities do not have sufficient funds for expensive large-scale capital improvements.

This means that in order for Rio Grande do Sul to become the most sustainable and innovative place in Latin America by 2030, it is vitally necessary to utilize private sector financial resources and international capital as significant elements of overall infrastructure investment. In pursuing various forms of public-private partnerships, including with international investors and donors, the RS state government should be careful in structuring such deals to ensure that the private and international partners actually contribute real resources and put their own capital at risk. Frequently in such partnership arrangements, governments both subsidize the costs and guarantee the revenues for their private partners. In those situations, there is no net gain for the public sector in terms of significant private sector resources being contributed. If partnerships are well managed, then the

private contributions can be substantial, which is precisely what is most needed for RS to significantly upgrade its infrastructure in the near future.

In Slides 15-17 we discussed the 1998 NoMa (North of Massachusetts Avenue) strategic economic development initiative in Washington, DC, transforming a dilapidated and largely abandoned area of the city into one of the most rapidly growing and economically dynamic and sustainable communities in the entire region, with billions of dollars of new private investment and many thousands of new jobs. The lynchpin of the NoMa strategy to create a technology, media, housing, and arts district was the construction of a new Metrorail train station at New York and Florida Avenues NE

([http://www.globalurban.org/The Economic Resurgence of Washington, DC.pdf](http://www.globalurban.org/The_Economic_Resurgence_of_Washington_DC.pdf)).

The NoMa Metro Station created the identity of the area and made it very accessible by metropolitan public transportation, promoting bicycle use and walkability in what has now become a high-density mixed-use neighborhood

([http://www.globalurban.org/GUD OECD NoMa Report.pdf](http://www.globalurban.org/GUD_OECD_NoMa_Report.pdf)).

The NoMa Metro Station was the first new Metro station added to the regional system since it was first planned three decades earlier. It was also the first train station ever built on an existing train line between two operating stations while the trains kept running on their regular schedule. Building the station was an engineering challenge that ended up costing US\$ 110 million. When we started, the Washington Metropolitan Area Transit Authority (WMATA) did not have any capital funds, only an operating budget, and the District of Columbia government was not able to provide anywhere near the necessary total funding. So we ultimately turned to two non-traditional partners: 1) the private sector, and 2) the US government.

Slide 58 is a partial map of the current metropolitan Washington Metro train system, with a red arrow pointing to the NoMa Metro Station. Picture the map as it looked in 1997, when we first started working on this transit-oriented economic and community development initiative. At that time there was no station on the Red Line between Union Station and Rhode Island Avenue, and it was an extraordinary accomplishment when construction began on the new station in December 2000, and especially when the NoMa Metro Station finally opened in December 2004, seven years after we had first begun our difficult journey. Many people had tried and failed for three decades to get a station built at New York Avenue NE, and in 1997 and 1998, very few people really believed we would succeed. Amazingly, we did.



Financing NoMa Metro Station

- **Private Sector: \$35 million**
- **District of Columbia Government: \$44 million**
- **Federal Government: \$31 million**

59

Narrative for Slide 59:

As Slide 59 makes clear, the District of Columbia government was only able to come up with US\$ 44 million to build the NoMa Metro Station. The other US\$ 66 million came from two non-traditional sources for building local infrastructure, US\$ 35 million from the private sector and US\$ 31 million from the US government. This financial package was completely “outside the box” in terms of creative innovation. Such a three-way financial arrangement had never been done before, nor has it been done anywhere since then.



Financing NoMa: New York Avenue Metro Station Corporation



Groundbreaking for the New York Avenue station. From left, Metro general manager Richard A. White, Dr. I. King Jordan, president of Georgetown University, Thomas Walker of the North Capital Business Association, Dr. Marc Weiss, D.C. City Councilman Vincent Orange, Delegate Eleanor Holmes Norton, S.C. Mayor Anthony Williams, Metro Board member Gladys Mack, D.C. City Councilman and Metro Board member David Catania.

With bands playing and pennants flying, people thronged to the groundbreaking of New York Avenue station on Saturday, December 16, 2000. The turning of the earth for the first "in-fill" station came less than a month before completion of the 103-mile Metrorail system and the opening of the Green Line in Prince George's County, Md.

As with past Metro stations, New York Avenue station is at the core of a revitalization initiative. In this case, it's the redevelopment of Washington's New York Avenue corridor that is expected to emerge as a prime site for high tech companies, federal agencies and retail activity. The development plan for the new station comprises three funding partners: the District of Columbia, the federal government and private interests. Creation of this unique funding arrangement was spearheaded by a stakeholder group known as the New York Avenue Metro Station Corporation under the leadership of Dr. Marc Weiss, a District of Columbia public policy specialist.

60

Narrative for Slide 60:

The most challenging aspect of financing construction of the NoMa Metro Station was to obtain substantial funding from the private sector. Construction of all previous WMATA stations had been paid for entirely by the DC government and/or the Maryland and Virginia state governments. Private developers owning property near Metro stations paid higher taxes when their land values increased due to enhanced accessibility provided by frequent and convenient regional train service, but private property owners had never paid any upfront money to build the train lines and stations.

The site where we wanted to build the NoMa Metro Station was surrounded by large parcels of vacant land and abandoned old industrial and warehouse buildings that were owned by major commercial developers patiently waiting until their property would become ripe for large-scale modern high-value development. Before we approached these developers, first we conducted an engineering feasibility study demonstrating that it was technically possible to build the station where we wanted to locate it, despite a difficult curve on the existing train tracks that represented a significant engineering challenge. Also, we conducted a market feasibility study to demonstrate that the time was indeed ripe for development, if and only if there was a new Metro station to generate sufficient market demand and transportation accessibility.

Armed with these two professional studies, we asked the major developers if they would pay up to one-third of the cost of building the NoMa Metro Station. They

thought we were crazy, and they quickly declined. It took us an entire year, meeting for several hours every month, before we finally convinced them that it was in their best economic and financial interest to help pay for building the station. If they could get a station the normal way, with the government paying for all of it, of course they would have much preferred the “no-cost” option.

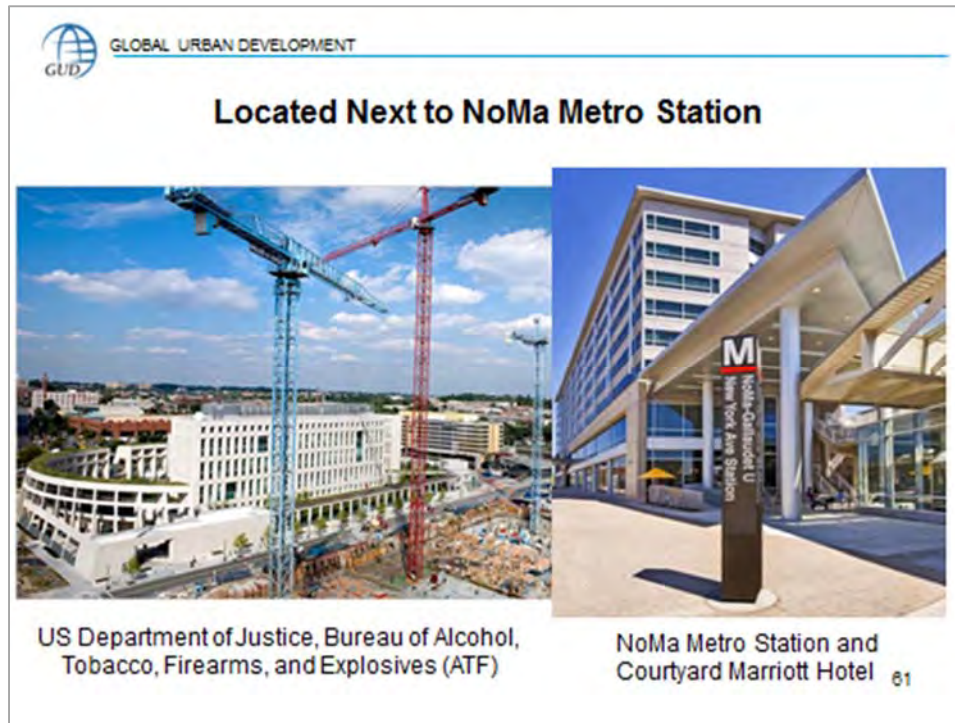
However, we were able to convince these developers that they would make millions of dollars if there was a NoMa Metro Station, and that without their financial commitment, there would not be a station, meaning they would earn very little money from their property. In other words, they finally realized that helping to pay for the station was not a cost or a tax, but a strategic investment with a very large potential rate of return. And that is how things turned out; all of the developers ultimately made lots of money, and every one of them would now agree that helping pay to build the NoMa Metro Station was one of their very strategic, smart, and successful private financial investments.

Once the developers agreed to pay their share, then we formed a non-profit corporation, the Action 29-New York Avenue Metro Station Corporation. The Action 29 portion of the name came from the 1998 strategic plan, *The Economic Resurgence of Washington, DC: Citizens Plan for Prosperity in the 21st Century*, which had 40 key implementation actions ([http://www.globalurban.org/The Economic Resurgence of Washington, DC.pdf](http://www.globalurban.org/The_Economic_Resurgence_of_Washington,_DC.pdf)). Action 29 was “Build a Metro Station at New York Avenue to Spur Development” and its close companion was Action 26 “Develop NoMa as a Technology, Media, Housing, and Arts District.” The name of the station was the New York Avenue Metro Station, starting from when we first proposed the idea in 1997, until it was officially changed in 2012 to become the NoMa Metro Station.

The Action 29-New York Avenue Metro Station Corporation (Dr. Marc Weiss served as the corporation’s Chairman from 1999 to 2006) represented the major private developers, other private sector CEOs, including from Sirius-XM Satellite Radio, Black Entertainment Television (BET), Verizon, and other corporations, plus representatives from the DC government, US government, WMATA, and community and civic leaders. Together we worked out the formula for the US\$ 35 million in private financing, and between 1999 and 2003 we actively engaged in collaborative monthly strategic planning discussions with all of the key stakeholders. This was a very successful model of public-private-citizen cooperation. The Action 29-New York Avenue Metro Station Corporation eventually was transformed into the NoMa Business Improvement District (NoMa BID), which was established in 2007 (<http://www.nomabid.org>).

The private sector contribution consisted of a special property tax assessment to be paid over 30 years as debt service to cover US\$ 25 million in DC government bond financing, plus a US\$ 10 million donation of land rights easements to WMATA. This meant that for their US\$ 35 million contribution, the developers were only paying several hundred thousand dollars per year for 30 years, yet after 2004 when the

NoMa Metro Station opened, these developers were able to build large new commercial office buildings, residential apartment buildings, hotels, and retail stores, earning millions of dollars long before their 30-year annual special tax assessments were paid in full.



Narrative for Slide 61:

Once we had the financial commitments from the private developers and the DC government, we still had a big shortfall in the budgetary resources needed to build the NoMa Metro Station. We solved this problem with help from the US government, which generally did not help pay for WMATA capital expenditures, even though the Metro System served the national capital region, and the majority of Metro riders either worked for or were visiting US government buildings and facilities. In addition, because the DC government was in fiscal distress and under emergency management by the Control Board, the US Congress was quite angry with the city's elected leadership and extremely reluctant to provide any additional financial assistance.

We solved this problem quite pragmatically by finding a win-win solution. The US Justice Department's Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) had US\$ 100 million to build a new office headquarters, but they did not have a parcel of land on which to build it. We approached them with a good deal: the DC government had a well-located site next to the proposed NoMa Metro Station that

was being used as a storage yard for trucks and other heavy vehicles and equipment. We offered to sell this site to ATF if they would agree to encourage the US Congress to help pay for construction of the NoMa Metro Station. Under US government rules for Washington, DC, all federal buildings must be located within 2,500 feet of a Metro station (walking distance), and our land was the only available building site in the entire city that fit these location requirements. It took months of negotiations because our site was not ATF's preferred location (in 1998 most of this area was an industrial wasteland), but because it was their only viable option, eventually the US government agreed.

The ATF building was to be built for 1,200 permanent employees, and we successfully negotiated that its underground parking garage would include only 100 spaces for senior officials, so that most of the staff would ride the Metro to work instead of driving in cars. Since the ATF headquarters would be located directly adjacent to the NoMa Metro Station, this agreement enabled us to arrange for construction of a Courtyard Marriott Hotel plus several restaurants and stores on DC government-owned land next to the station, in order to provide services needed by ATF staff and their many official visitors, and to help promote vitally needed economic development in this underserved area of the city.

Slide 61 shows the ATF Building under construction in the left-side photo (with the hotel and station on the right), and in the right-side photo is the new NoMa Metro Station directly across from ATF, with the Courtyard Marriott Hotel just above (north) the station entrance. The NoMa Metro Station is located a few blocks walking distance from Gallaudet University, the US national university for deaf and hearing-impaired students, which is why the station's complete name is NoMa/Gallaudet U/New York Ave.

The US government ultimately provided US\$ 31 million for NoMa Metro Station construction costs, which included US\$ 6 million to build part of the Metropolitan Branch Trail, a pedestrian and bicyclist "hiking and biking" trail next to and running parallel with the elevated NoMa Metro train tracks. The Action 29-New York Avenue Metro Station Corporation reached out to the city's passionate bicycling and environmental advocates and included them in our broad stakeholder coalition. This was another example of a win-win solution, because they actively supported the station in order to obtain funding for this new segment of the Metropolitan Branch Trail, and they helped NoMa become a regional center of Sustainable Innovation, with many key features from green buildings to recycling to transit-oriented development to walkability. One of NoMa's most distinctive urban amenities is that it's very bicycle-friendly, and the Metropolitan Branch Trail really helped establish such a sustainable identity.

GLOBAL URBAN DEVELOPMENT

**RIO GRANDE DO SUL LEAPFROG ECONOMIC STRATEGY
KEY DRIVER:
SUSTAINABLE INNOVATION ZONES**



62

Narrative for Slide 62:

For Rio Grande do Sul's Leapfrog Economic Strategy to succeed in becoming the most sustainable and innovative places in Latin America by 2030, generating Inclusive Prosperity with more dynamic economic growth and enhanced quality of life, it will be necessary to do two things: 1) enable RS to become an international magnet for talented, motivated, and entrepreneurial leaders in many aspects of Sustainable Innovation in business, government, academia, and civil society; and 2) enable the RS economy to become much less bureaucratic and far more innovative.

To accomplish these vital goals over the next 16 years will be very difficult. Many of the necessary changes will follow a different path than the traditional pattern for RS and Brazil. In order to facilitate substantial progress moving in new directions, we recommend focused targeting and experimentation in particular areas of the state. From these learning experiences, the most effective approaches can be scaled up statewide, and less successful efforts can be modified and improved. The best way to accomplish this strategy is by creating Sustainable Innovation Zones.

Sustainable Innovation Zones combine six key elements:

1. Innovation and Technology;
2. Entrepreneurship and Startups;
3. Sustainability and Resource Efficiency;
4. Creativity and Collaboration;
5. Participatory Community Management;
6. Business-Friendly Environment.

Sustainable Innovation Zones are specially designated areas in Rio Grande do Sul that will become the main centers of advanced science and engineering research on product and production process development, the anchors for Sustainable Innovation business startups and fast-growing enterprises, and much more. They will be vibrant intellectual and cultural places where large numbers of people interact and collaborate together in newly creative and innovative ways. These zones will be located in urban communities where many people live, work, study, and play, near colleges and universities, technology parks, and technology business incubators (Slides 65-67), as well as offices, stores, services, housing, transit, and recreation.

Sustainable Innovation Zones will become the “think tanks” for disruptive technologies transforming RS into a more globally competitive and productive economy, dynamically leaping into the front ranks of Sustainable Innovation in the 21st century. These zones will be Key Drivers of Sustainable Innovation, both to strengthen existing RS agriculture, manufacturing, and services, and to grow entirely new industries based on state-of-the-art technologies.

Also, Sustainable Innovation Zones will be the models for the most advanced sustainability in RS. In addition to being the main areas developing new sustainable products and services, these zones will be highly sustainable in their own community operations and practices, like NoMa, serving as international examples of the very best in 21st century Green Places, or EcoDistricts (Slide 68).

Sustainable Innovation Zones will experiment with new forms of participatory and inclusive community management through Business Improvement Districts (Slide 69), introducing more flexible and creative public-private-citizen partnerships to promote cleaner, safer, more attractive, more vibrant, higher quality, and more innovative neighborhoods with much better services and amenities.

Finally, Sustainable Innovation Zones will experiment with reducing excessive regulations that impede innovation, entrepreneurship, and dynamic business growth, eventually opening up the possibility for RS to become a more business-friendly and citizen-oriented place. The zones will become state and national leaders in experimenting with reforming government-business-community relations, such that by 2030, RS will become highly ranked in the World Bank’s annual *Doing Business* index (Slides 70-73) and the World Economic Forum’s annual *Global Competitiveness Report* (Slides 74-76), setting new standards of excellence and nimbleness for Brazil and many other countries.

The two photos in Slide 62 symbolize the types of creative and dynamic activities that will become widespread inside Sustainable Innovation Zones. Nós Coworking, a collaborative economy space in Porto Alegre’s 4th District, is bringing together hundreds of young, innovative entrepreneurs and technologists working to create

new products and new possibilities for a better future in RS. Located on two floors of a renovated historic brewery building in Shopping Total, Nós Coworking is constantly filled with people, day and night, who participate in seminars and workshops, Hackathons (co-sponsored by the Porto Alegre city government's POAdigital, DataPOA, and Procempa), meetings, or just working with other people on their business ideas and strategies. Nós Coworking has helped energize and mobilize the region's talented innovators, and built a critical mass of young collaborators that will have a major impact on the state's future economic growth. Not only have they already doubled their workspace in Porto Alegre, they are also looking to expand to other cities in RS, including Santa Maria.

Mostratec is a world-class international science fair held annually for the past two decades during late October at the FENAC convention center in Novo Hamburgo. This international science fair is organized by the Liberato Technical School Foundation and financially supported by many corporate and government funders. More than 700 students aged 14-20 from every state in Brazil and over 20 countries worldwide compete for prizes (nearly R\$ 1 million), awards, scholarships (from many RS universities), and professional and business opportunities. Winners are invited to compete in other international competitions, such as Intel's annual International Science and Engineering Fair (ISEF) in the US.

Students participating in Mostratec are selected from among 20,000 students competing in 80 annual science fairs globally. They come from countries as diverse as Argentina, Canada, China, Chile, Costa Rica, France, Germany, Italy, Kazakhstan, Mexico, Paraguay, Peru, Poland, Portugal, Russia, Spain, Slovakia, Turkey, UK, US, and numerous others.

Mostratec and its related events – International Technical Education Seminar (SIET), Innovation Hall, and Educational Robotics Festival – receive 35,000 visitors each year from RS and many other places in Brazil and around the world. Mostratec is a major destination in RS for creating and learning about the exciting future of Sustainable Innovation, which is the major focus of the 350 science projects competing annually in 13 fields, including chemical, electrical, and mechanical engineering.

Many current RS leaders in business innovation and academic research previously participated as students in Mostratec. Several years ago the *RS Journal of Commerce* profiled several, including the R&D Director at CEITEC (semiconductors), the Marketing Director at Cigam (information technology), and the Science and Technology Advisor at the Brazilian Embassy in South Korea.

Corporations such as Braskem, Petrobras, CEEE, and others, recruit Mostratec participants for technical jobs. RS technology incubators assist successful and entrepreneurial competitors at Mostratec in launching and growing startup businesses. For example, a 1995 award-winning Mostratec science project by three Liberato students later led to the development of the Tecnodrill CNC machine tool

for producing electronic computer circuit boards. These students started their own company in 1995 to manufacture and market Tecnodrills, and until 1998 they were located in the Liberato Technology Incubator. Today the Tecnodrill firm in Novo Hamburgo has nearly 40 employees designing and producing a variety of machine tools and selling them to major corporations such as Embraer, Petrobras, Odebrecht, and Volkswagen, with annual revenues of more than R\$ 10 million. In 2012 Tecnodrill became a business supporter of Mostratec, donating one of its signature CNC milling machines and related high-tech equipment.

Organizations and activities like Nós Coworking and Mostratec should become major features of every Sustainable Innovation Zone in Rio Grande do Sul.



Narrative for Slide 63:

What GUD calls Sustainable Innovation Zones are a variation of a very recent global trend: large numbers of creative professionals, innovative entrepreneurs, and talented technologists congregating in urban neighborhoods, developing new ideas, goods, and services, and launching business startups to market innovations locally and globally. Most of these communities are primarily, though not exclusively, focused on digital technology and Internet-related activities. They are newly emerging in many countries, sometimes spontaneously, and in other cases, with active support from governments as well as private sector economic development initiatives. Often they are connected to anchor institutions, such as major universities, research centers, and urban technology parks. Porto Digital in Recife is the most successful Brazilian example.

In May 2014 the Brookings Institution in Washington, DC published a detailed analysis of this phenomenon for US cities, *The Rise of Innovation Districts: A New Geography of Innovation in America* (<http://www.brookings.edu/about/programs/metro/innovation-districts>).

In this narrative to Slide 63, we briefly discuss three important examples for Rio Grande do Sul: Barcelona, Freiburg, and London.

BARCELONA

Barcelona was the industrial center of Spain in the 20th century. In the 1960s and 70s however, the large textile industry in particular began to decline. Many factories closed and thousands of jobs were lost to deindustrialization. With dynamic new government, business, and civic leadership beginning in the late 1970s and early 1980s, the city successfully won its bid to host the 1992 Summer Olympics, and wisely used major Olympics-related infrastructure investments and urban redevelopment as an opportunity to transform their economy from the declining textile industry to rising business and professional services, commercial shipping (expanding the Mediterranean seaport), higher education, health care, tourism, international trade, and other sectors. Large areas of the Mediterranean waterfront were reclaimed and turned into attractive commercial and residential communities.

The initial Olympics efforts, while making key infrastructure improvements, bypassed the old industrial neighborhood of Poblenou, with its many deteriorated and abandoned factories, warehouses and rail yards (similar to NoMa in Washington, DC during the 1990s). The completion of the major new Diagonal thoroughfare in 1999 finally opened Poblenou to better transportation connections with the nearby city center and the waterfront, setting the stage for the very ambitious initiative that became known as 22@Barcelona: “The Innovation District” (<http://www.22barcelona.com/>).

In 2000 the land in Poblenou was rezoned from industrial to mixed-use, and the city government, led by its economic development agency, Barcelona Activa, launched what became a highly successful urban regeneration initiative. Today 22@Barcelona is a thriving technology innovation hub with more than 1,500 new companies (nearly half of which are startups) and nearly 56,000 new jobs over the past 14 years, plus 10 college campuses for 25,000 students, 12 research and development centers, and much more, including several thousand new affordable apartments. It also includes the iconic 38-story Torre Agbar office tower (designed by the famous French architect, Jean Nouvel) that is clearly visible in the photo in Slide 63.

22@Barcelona was conceived as a three-part initiative: Urban Innovation, Economic Innovation, and Social Innovation. In terms of Urban Innovation, much of the infrastructure has been modernized and rebuilt at a cost of 180 million Euros,

including streets, utilities, 28 acres of new parks and green spaces, extensive public transit, and much more. Some of this funding was tied to infrastructure investments made for the 2004 UN Universal Forum of Cultures, which, together with national and EU funding, helped supplement the city's resources. This enabled construction of the impressive Barcelona International Convention Center, together with hotels and many more public and private facilities. Today this site also houses the Smart City Expo World Congress, scene of major international meetings and expositions involving thousands of participants from business, government, and academia. Also, most of the buildings in 22@Barcelona either are newly built or have been renovated since 2000, and the area has significantly increased in building and population density over the past decade.

Economic Innovation focused on promoting the development of five key Industry Networks (clusters): Design; Information and Communication Technology (ICT); Energy; Media; and Medical Technology. Many supporting institutions were either established or attracted since 2000, ranging from incubators to universities, to help promote the growth of these five networks, each of which had their own geographic concentration area. Financial incentives such as lower taxes and subsidized land, combined with aggressive international recruitment efforts, succeeded in attracting investors, developers, and many new businesses, from small startups to multinational corporations.

Social Innovation included networking events and collaborative spaces to encourage extensive and intensive community interaction among talented and educated professionals, including the use of digital technology to promote active citizen engagement, leading to a vibrant community cultural life, and to dynamic technological innovation and business growth.

FREIBURG

Probably the world's best example of Sustainable Innovation is Freiburg, the German city that GUD Vice Chair Sir Peter Hall brilliantly profiled in Chapter 11 of his excellent 2014 book, *Good Cities, Better Lives: How Europe Discovered the Lost Art of Urbanism*. Freiburg is an ancient university town (the town was founded nearly 900 years ago, and the university was established more than 500 year ago), with a current population of 230,000 (the metropolitan population is 600,000). Freiburg is a prosperous city in the relatively affluent state of Baden-Wurttemberg (Stuttgart, the state's capital city, is the headquarters of Mercedes-Benz), located in southwest Germany near the border with France (Strasbourg) and Switzerland (Basel).

As Peter Hall explains, Freiburg has been a global leader in Sustainable Innovation for more than three decades. It has far more solar power facilities than anywhere else in Europe, and has substantially reduced its per capita energy consumption and greenhouse gas emissions through cutting-edge efforts to improve energy conservation and efficiency. Freiburg has built two large new neighborhoods, Rieselfeld (<http://www.freiburg.de/pb/,Lde/208560.html>), and Vauban

(<http://www.vauban.de>), that have become internationally acclaimed for their participatory community planning and design, quality of life, highly energy efficient buildings, district heating, waste recycling, and much more.

In the 1970s Freiburg wisely decided to retain and expand their light-rail public tram system when most other cities were getting rid of urban train tracks. Combined with an elaborate bicycling infrastructure, regional commuter trains, and pedestrian-friendly walkable neighborhoods, Freiburg has significantly expanded transit and bicycle use and substantially reduced automobile traffic over the past few decades, setting a very high standard for Germany and Europe.

Freiburg smartly understood that Sustainable Innovation could become a major economic growth engine for the city and region. It became home to the internationally award-winning Fraunhofer Institute for Solar Energy Systems (ISE) with 1,300 employees, including more than 550 full-time professional staff, 300 university graduate students, and an 86 million Euro annual budget. Fraunhofer ISE has already spawned six major private solar technology companies in Freiburg: Concentrix, Holotools, SorTech, PSE, SolarSpring, and Solar Building Engineers.

Freiburg also became home to the Fraunhofer Institute for Applied Solid State Physics (IAF), Steinbeis Technology Transfer Centers for Advanced Engineering and for Applied Biomechanics, and many similar Sustainable Innovation institutions and companies, including BioTechPark Freiburg, with nearly 20 firms. Freiburg's substantial research and development activities contributed to overall R&D expenditures in Baden-Wurttemberg at 4.8 percent of GDP in 2009, a European record-setting percentage.

All of this activity led in 2009 to the creation of the Green City Freiburg Regional Cluster (<http://www.greencity-cluster.de>), as pictured in Slide 63. Green City Freiburg, "The Business Network for Environmental and Renewable Energy Industries in Freiburg and the Region," currently includes 2,000 companies and 12,000 jobs in the rapidly growing fields of environmental and renewable energy technologies and services, now a major component of the metropolitan economy. Green City Freiburg has received financial support from the state of Baden-Wurttemberg, the EU's European Regional Development Fund, and many private sector partners.

According to the Green City Cluster Office, "The areas of research and development, technology transfer, and environmental education serve as motors in driving a regional economic portfolio covering solar and renewable energy technologies, energy efficiency, sustainability (also in buildings), and other green technologies. Especially important is the contribution of small- and medium-sized enterprises representing trades, crafts, production and services. The Regional Cluster Green City Freiburg builds on and extends the strengths of the region and ensures they reach international markets."

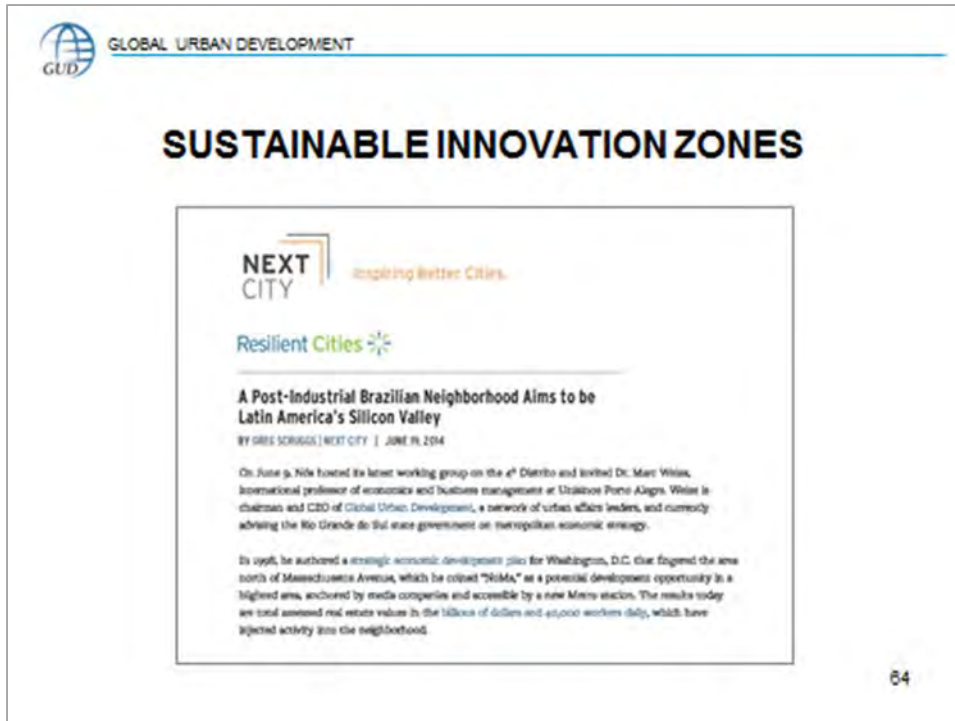
LONDON

London Tech City (<http://www.techcityuk.com/>) started in 2008 as a small group of digital-oriented startups clustered around the Old Street Roundabout in the Borough of Hackney, a somewhat deteriorated area of East London with relatively inexpensive office space. In that year it was dubbed “Silicon Roundabout” and began attracting many more similar companies, moving eastward into Shoreditch, or what is now called “Digital Shoreditch.” By 2010 the UK government and various local governments began encouraging the attraction and growth of digital technology companies in this area, renaming it East London Tech City, which now extends farther east to Olympic Park in Stratford (site of the 2012 Summer Olympics), where Cisco Systems is planning to build a new Innovation Center.

In 2012 Google built a seven-story building in Tech City called “Google Campus” to promote entrepreneurship and collaborative innovation, providing coworking spaces, courses and workshops, meeting rooms, technical advice, a wifi café, and other amenities and services. More recently, additional digital technology corporations, including Intel, Vodafone, and Facebook, have moved into Tech City. *Wired Magazine* estimated in 2012 that there were 5,000 technology companies with 10,000 employees located in East London’s Tech City.

The UK government created the Tech City Investment Organization in 2010 to promote and manage such rapid growth, and began providing various tax incentives and encouraging private venture capital and investor financing, including the Seed Enterprise Investment Scheme. The area is now home to several privately financed business accelerators such as Passion Capital, Seedcamp, and Techstars. In 2010 the Innovation Warehouse was created at Smithfield Market on the western side of East London Tech City as a 10,000 square-foot coworking space and business incubator for more than 50 startups, supported by an angel investor network, digital technology entrepreneurs, and the City of London Corporation.

To date Tech City has spawned hundreds of startups and attracted many larger firms, and the growth momentum is accelerating. Recently the UK government published a major report, *Tech Nation: Powering the Digital Economy 2015*, documenting the national expansion of digital technology businesses, with their epicenter in the East London Tech City area.



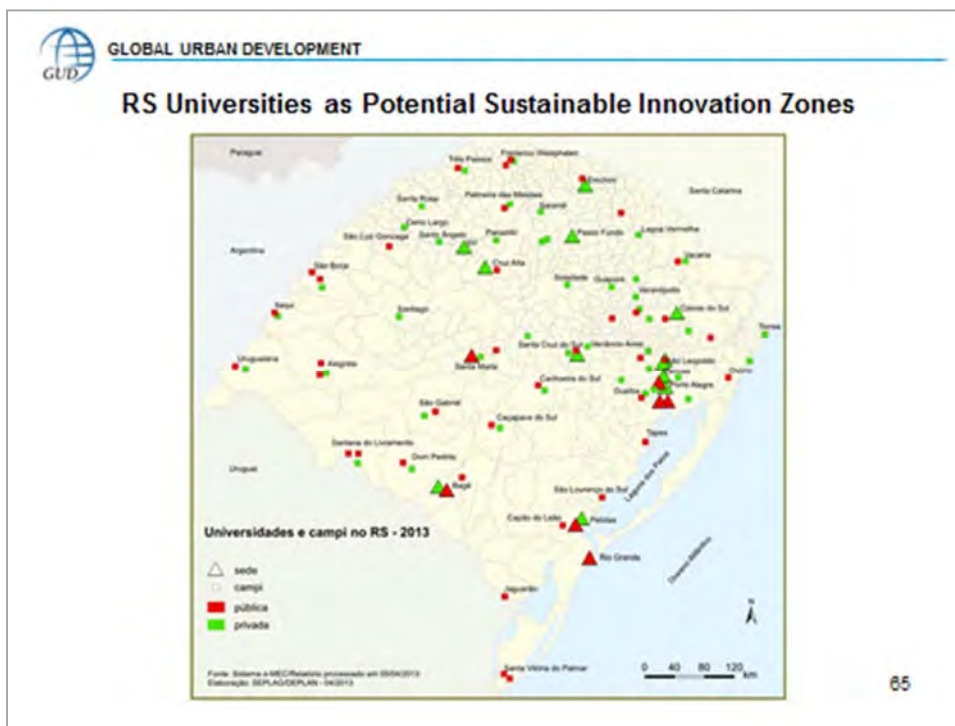
Narrative for Slide 64:

Slide 64 displays the cover of an article from a US online magazine, *Next City*, entitled “A Post-Industrial Brazilian Neighborhood Aims to be Latin America’s Silicon Valley” about Porto Alegre’s 4th District (<http://www.globalurban.org/Post-Industrial-Brazilian-Neighborhood-Aims-to-be-Latin-American-Silicon-Valley.pdf>).

This article describes a speech on “NoMa and the 4th District” that Dr. Marc Weiss gave at NÓS Coworking in June 2014, comparing the 4th District to NoMa in Washington, DC, and discussing key lessons from NoMa that can be applied in Porto Alegre and Rio Grande do Sul. The speech was informed by GUD’s work in October 2013 with Senta Belay, Sarah Larson, and Peter Miskiewicz from SAP’s Social Sabbatical team, collaborating with NÓS Coworking, CITE, Porto Alegre city government, and Pyxera Global, on a 4th District economic resurgence strategy (<http://www.globalurban.org/Resurgence-of-The-4th-District-Porto-Alegre.pdf>). The *Next City* article also describes other key 4th District initiatives, including NÓS Coworking, Vila Flores, Porto Alegre’s Innovation Law, and its Entrance to the City Integrated Program, plus the new subway line currently being planned.

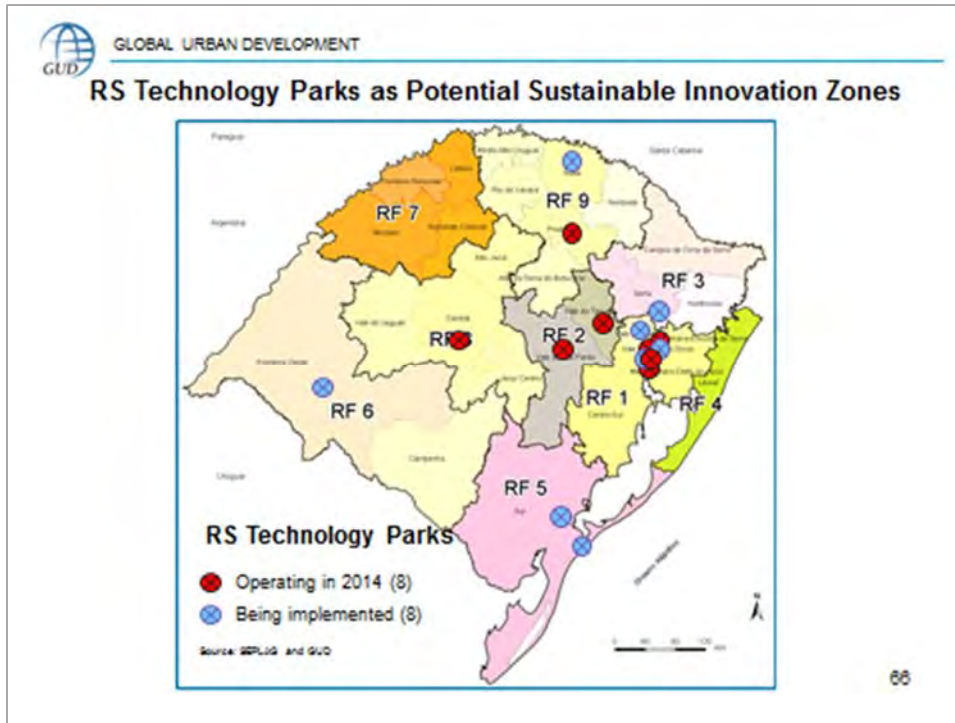
In December 2014 Dr. Weiss gave a similar speech at a Unisinos conference in Porto Alegre about the Floresta neighborhood in the 4th District (<http://www.globalurban.org/NoMa-and-the-4th-District.pdf>). He suggested that the 4th District could become one of the first Sustainable Innovation Zones in Rio Grande do Sul. In establishing this new zone, the RS state government should collaborate with the Porto Alegre city government, including: the Rockefeller

Foundation-funded Resilient City initiative led by César Busatto, Secretary of Political Coordination and Local Governance and Chief Resilience Officer ([http://www.globalurban.org/Participatory Budgeting Birthplace Uses the Mechanism to Build Resilience.pdf](http://www.globalurban.org/Participatory_Budgeting_Birthplace_Uses_the_Mechanism_to_Build_Resilience.pdf)); development financing initiatives, led by Secretary of Finance Jorge Tonetto; the Innovation Law and other related activities of Inovapoa, led by Secretary of Innovation and Technology Maria Fernanda Bermúdez; and the cutting-edge work of POAdigital and DataPOA, led by Coordinator Thiago Ribeiro. In November 2014, POAdigital was a Finalist in the annual World Smart Cities Awards at the Smart City Expo World Congress in Barcelona's 22@ Innovation District (see Slide 63).



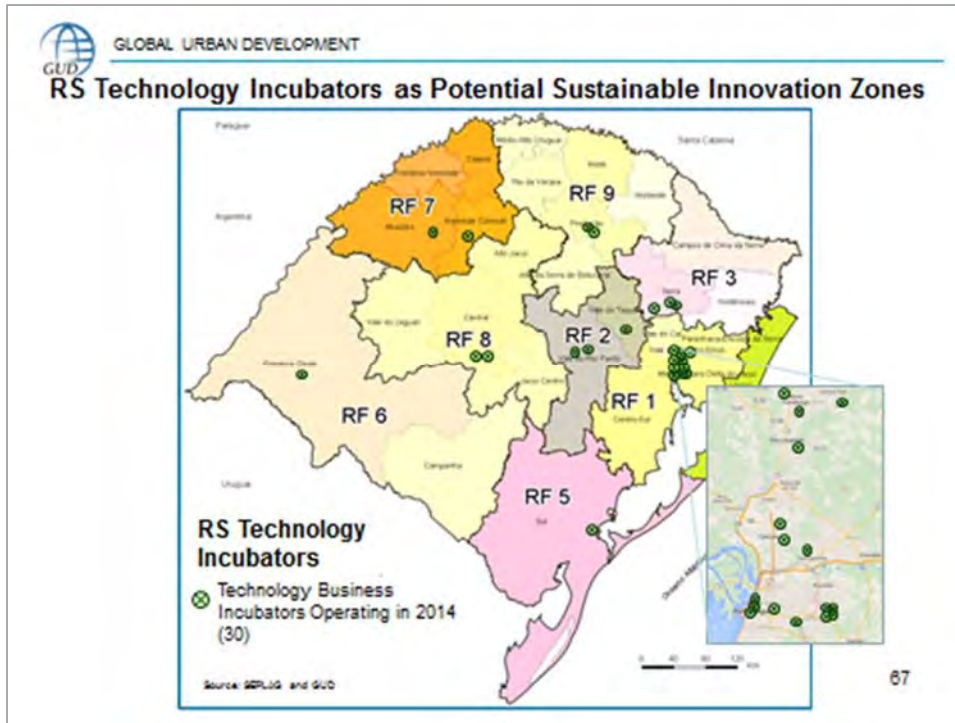
Narrative for Slide 65:

Where should Sustainable Innovation Zones be located in Rio Grande do Sul? One obvious candidate is around college and university buildings and campuses. The map of RS universities in Slide 65 illustrates potential venues.



Narrative for Slide 66:

Slide 66 is a map of technology parks in Rio Grande do Sul. The boundaries of Sustainable Innovation Zones should include such facilities.



Narrative for Slide 67:

Slide 67 shows the location of technology business incubators in Rio Grande do Sul, which should be inside the borders of RS Sustainable Innovation Zones wherever possible.



Narrative for Slide 68:

Sustainable Innovation Zones are places, through technology R&D, and through entrepreneurial business activities, accelerating the creation and growth of new innovative products, services, and production processes that are highly sustainable. In order to attract and retain talented people with advanced skills and strong interests in these types of activities, it will be necessary for RS Sustainable Innovation Zones to demonstrate best practices in terms of how communities are organized and how well they function in daily life.

Scholars, professionals, and entrepreneurs focused on Sustainable Innovation want to be living and working in places that are on the cutting-edge of sustainability. This will enable them to collaborate with many like-minded colleagues, to gain access to innovative ideas and practices and to technical and financial resources, to experiment with advanced methods at their workplaces and in their homes and communities, and to benefit from a healthier environment and enjoy a higher quality of life.

Currently there are a growing number of examples of this approach around the world. Slide 63 highlights Freiburg, one of the world's most sustainable cities. Other places, such as Stockholm and Malmo in Sweden, Copenhagen in Denmark, Totnes in the UK, Vancouver and Victoria in Canada, Songdo in South Korea, Masdar City in Abu Dhabi, Singapore, and many more, are generating global best practices in Sustainable Innovation.

In addition, there are numerous valuable lessons and standards currently being disseminated through various international organizations and movements, including ICLEI-Local Governments for Sustainability, Transition Network, UN Sustainable Development Solutions Network, Partnership on Sustainable Low Carbon Transport, UN-Habitat World Urban Campaign, LEED-ND for Neighborhood Development (US Green Building Council), Climate Positive Development (C40 Cities, Clinton Foundation, and USGBC), Living Community Challenge (International Living Future Institute), One Planet Living (Bioregional/BedZED South London Eco-Village), and the newly issued ISO 37120 standards for Sustainable Development of Communities (International Organization for Standardization-ISO). The ISO, with 163 member countries and 19,500 international standards, finally issued in 2014 its first comprehensive standard for cities and communities, with numerous indicators on service delivery and quality of life.

An excellent example of Sustainable Innovation in urban community development is Portland, Oregon, especially the EcoDistricts initiative (<http://ecodistricts.org/>). EcoDistricts grew from the 2011 Portland Metro Climate Prosperity Project (http://www.globalurban.org/Portland_ECPA_Curitiba_Presentation.pdf), a partnership of the Portland Sustainability Institute, Greater Portland Inc., Nike, Oregon Business Council, Portland State University, Oregon Institute of Technology, and other government, business, economic development, academic, and civic groups. Since 2011 five neighborhoods in Portland have become EcoDistricts: Foster Green, Gateway, Lloyd, South of Market, and South Waterfront.

Portland's EcoDistricts quickly became such an attractive model that in 2012 the EcoDistricts organization began spreading its approach nationwide, working with US cities including Atlanta, Austin, Boise, Boston, Boulder, Burlington, Cambridge, Charlotte, Charleston, Cleveland, Denver, Detroit, Los Angeles, Oakland, Orlando, Mountain View, Philadelphia, Pittsburgh, San Diego, San Francisco, Seattle, and Washington, DC, plus Ottawa and Vancouver in Canada, and Guadalajara in Mexico.

Washington, DC has three EcoDistricts: SW (Southwest), St. Elizabeth's, and Downtown DC. The SW EcoDistrict received an Innovative Smart Growth Initiative Award from the American Planning Association. The Downtown DC EcoDistrict is managed by the Downtown DC Business Improvement District, which we will discuss in Slide 69.

We recommend that Sustainable Innovation Zones in Rio Grande do Sul become the first EcoDistricts in Brazil and South America.

The EcoDistrict Protocol focuses on developing a Vision, Goals, Targets, and Indicators in eight performance areas: Equitable Development; Health and Wellbeing; Community Identity; Access and Mobility; Energy; Water; Habitat and Ecosystem Function; and Materials Management.

The EcoDistrict Framework follows four key steps: 1) Organization; 2) Assessment; 3) Projects (Buildings, Infrastructure, and Community Action and Programs); and 4) Monitoring. Soon there will be Toolkits available on Organization, Performance and Assessment, Financing, and Policy Support. EcoDistricts operates a new Target Cities program as a commitment with the Clinton Global Initiative; conducts extensive training in many cities for government officials and business and community leaders (including an annual Incubator in Portland); and organizes an Annual Summit. Senior RS state government officials might consider attending the next EcoDistricts Summit in September 2015.



Narrative for Slide 69:

Business Improvement Districts (BIDs) are innovative non-profit urban management organizations, primarily located in commercial business districts. They started in New York City during the 1980s with the Grand Central Partnership, 34th Street Partnership, and Times Square Alliance, combining public and private funding, including from local businesses and property owners, to supplement city government services in terms of cleanliness, safety and security, attractiveness, marketing and promotion, and other important services. Business owners and community leaders actively collaborate to make their areas more citizen-, customer-, and tourist-friendly. Today there are 70 BIDs in New York City, annually investing more than US\$ 100 million in programs and services in many neighborhoods. In the 1990s BIDs spread to many other cities, such as

Philadelphia's Center City District. Currently there are 1,200 BIDs in cities throughout the US, served by a non-profit organization, the International Downtown Association (IDA) (<https://www.ida-downtown.org>).

Business Improvement Districts have also spread to other countries, including Australia, Canada, Germany, New Zealand, South Africa, and the UK. BID-like organizations in the UK are called City Centre Management or Town Centre Management. There are more than 600 of these urban management organizations in the UK, served by the Association of Town and City Management (ATCM) (<https://www.atcm.org/>).

In Canada BIDs are called Business Improvement Areas (BIAs), with more than 400 nationally. Currently there are 78 BIAs in Toronto, 22 in Vancouver, 15 in Winnipeg, 14 in Montreal, 10 in Edmonton, nine in Calgary, and eight in Halifax. The province of British Columbia has 56 BIAs, including the very large Downtown Vancouver Business Improvement Association, and these BIAs have their own non-profit association, the Business Improvement Areas of British Columbia (<http://www.bia.bc.ca/>). The largest such provincial organization in Canada is the Ontario Business Improvement Area Association (<http://obiaa.com/>).

In South Africa BIDs are called City Improvement Districts (CIDs). The oldest and largest is the Central Johannesburg Partnership (CJP) (<http://www.cjp.co.za/>), founded in 1992 and led by its dynamic Executive Director, Neil Fraser (currently he is CEO of Urban Inc. and a member of GUD's Board of Directors). The CJP manages four major CIDs in the central areas of the city: Central Improvement District, Retail Improvement District, South Western Improvement District, and Braamfontein Improvement District. The CJP proved to be so effective that today Johannesburg has 15 official CIDs, plus another 14 in formation. It also became a model for other South African cities, such as the Central City Improvement District in Cape Town.

In 1997 Washington, DC created the Downtown DC Business Improvement District (<http://www.downtowndc.org/>). Dr. Marc Weiss, who officially coordinated the city's Strategic Economic Development Plan during 1997-99 (described in Slides 13 and 14), worked very closely with the Downtown DC BID, and even maintained an office there. The Downtown DC BID played a major role in Washington, DC's highly successful economic resurgence beginning in 1998. Richard Bradley, Downtown DC's Executive Director for the past 18 years, has managed extraordinary growth and accomplishments over the past two decades (he is a GUD Advisory Board member). Today the Downtown DC BID has a staff of 130 people, and it has helped spawn eight other BIDs in the city, including Adams Morgan, Anacostia, Capitol Hill, Capitol Riverfront, Georgetown, Golden Triangle, Mount Vernon, and NoMa.

As pictured in Slide 69 and mentioned in the narrative of Slide 68, Downtown DC is the first BID to manage an EcoDistrict, a good model for RS Sustainable Innovation Zones.

The NoMa story is discussed in Slides 15-17 and Slides 58-61. Part of that very successful strategic economic development initiative, as Slide 60 explains, was the creation of the non-profit Action 29-New York Avenue Metro Station Corporation, representing the major developers and property owners together with all of the key government, business, and community stakeholders. Dr. Marc Weiss served as Chairman of this corporation from 1999 to 2006, and many of the corporation's leaders helped organize the NoMa Business Improvement District in 2007 (<http://www.nomabid.org/>). Today the NoMa BID is a vital institution leading Sustainable Innovation development and transformation of the NoMa neighborhood and surrounding areas.

We recommend that Rio Grande do Sul create the first Business Improvement Districts in Latin America, and that all of the RS Sustainable Innovation Zones be organized as BIDs for effective and participatory community management.



Narrative for Slide 70:

For Rio Grande do Sul's Leapfrog Economic Strategy enabling RS to become the most sustainable and innovative place in Latin America by 2030, it will be necessary to substantially reduce excessive bureaucratic business regulations, making it much easier and faster to create and expand businesses and to obtain investors, financing, machinery and equipment, quality personnel, and many other vital needs. The extremely complex business regulatory system in Brazil has evolved over many

decades, and it will be difficult to reform it over the next 16 years, especially since much of it comes from Brasília and is not directly under RS control.

The best way to initiate a process of profound change is through Sustainable Innovation Zones. These zones can serve as bounded, low-risk experiments, where both state and municipal regulations can be reduced, approval processes can be expedited, one-stop state and municipal business service offices can be created for permits and other government transactions, fees can be cut or waived, and many other things can be done to improve the overall system for promoting business formation and growth.

Many regulations come from Brasília, so RS will need to ask for special permission to modify selected federal regulations inside Sustainable Innovation Zones. The US government now routinely grants special waivers to state governments in applying selected federal rules. This innovation began in the Clinton Administration with the “Oregon Option”, and the Obama Administration currently makes extensive use of special waivers for states in many regulatory areas, including environmental protection, health care, and human services.

Also, the RS state government and municipal governments should enable businesses located inside Sustainable Innovation Zones to benefit from targeted tax incentives promoting certain kinds of investment and employment. In addition, Sustainable Innovation Zones can experiment with tax simplification, potentially saving companies substantial time and money on tax preparation, even if tax rates remain the same. Tax simplification procedures, once they have been proved effective inside these zones, later can be applied to the entire state.

Slide 70 shows the cover of the 2015 edition of the World Bank’s highly respected annual *Doing Business* report (<http://www.doingbusiness.org/reports/global-reports/doing-business-2015>). This state-of-the-art report, now in its 12th edition, covers 189 countries, involves more than 13,500 professional evaluations by business and legal experts (including nearly 250 consultants from Brazil), and focuses on small and medium-sized domestic companies in the major cities of each country (São Paulo and Rio de Janeiro in the case of Brazil). The report evaluates 10 key processes faced by entrepreneurs in terms of both time and costs: Starting a Business; Dealing with Construction Permits; Getting Electricity; Registering Property; Getting Credit; Protecting Minority Investors; Paying Taxes; Trading Across Borders; Enforcing Contracts, and Resolving Insolvency.

As will be shown from the 2015 rankings in Slides 71-73, Brazil is ranked in the bottom third overall and in most of the 10 individual categories. Though there are no separate subnational rankings for states and provinces, probably RS also would rank in the bottom third. An important goal for RS in 2030 should be to rank in the top 30 overall and in every individual category of the World Bank’s *Doing Business* index.

**World Bank, *Doing Business 2015***

	Ease of Doing Business Rank A	Starting a Business	Dealing with Construction Permits	Getting Electricity	Registering Property	Getting Credit	Protecting Minority Investors	Paying Taxes	Trading Across Borders	Enforcing Contracts	Resolving Insolvency
Egypt, Arab Rep.	112	73	142	136	64	71	135	149	99	152	126
Philippines	113	111	66	96	21	71	103	132	106	127	167
Indonesia *	114	156	153	78	117	71	43	160	62	172	75
Ecuador	115	165	59	120	80	89	117	138	114	88	151
Maldives	116	50	24	106	109	116	135	134	132	91	136
Jordan	117	86	120	44	107	165	154	45	54	114	145
Senegal	118	148	69	54	120	160	109	61	91	170	71
Nicaragua	119	120	134	96	134	89	172	164	74	70	110
Brazil *	120	167	174	19	136	89	35	177	123	118	55
St. Kitts and Nevis	121	87	16	10	170	151	87	137	67	116	189
Cabo Verde	122	78	114	133	62	104	170	91	101	39	189
Guyana	123	99	30	156	103	166	135	115	82	71	150
Argentina	124	146	101	104	119	71	62	170	128	63	83

Source: Doing Business database.

71

Narrative for Slide 71:

Brazil has consistently placed in the bottom third in the annual Ease of Doing Business rankings, and the 2015 World Bank report reflects this same problematic situation. Brazil ranks number 120 overall out of 189 countries (as illustrated on the list in Slide 71, with Brazil ranked between Egypt at number 112 and Argentina at number 124). In five of the 10 individual categories – Starting a Business, Dealing with Construction Permits, Registering Property, Paying Taxes, and Trading Across Borders – Brazil has even lower rankings than its overall score.

GLOBAL URBAN DEVELOPMENT

TABLE 1.1 Ease of doing business ranking

Rank	Economy	Rank	Economy
1	Singapore	31	France
2	New Zealand	32	Poland
3	Hong Kong SAR, China	33	Spain
4	Denmark	34	Colombia*
5	Korea, Rep.	35	Peru*
6	Norway	36	Morocco
7	United States	37	Slovak Republic
8	United Kingdom	38	Bulgaria
9	Finland	39	Mexico*
10	Australia	40	Israel
11	Sweden	41	Chile*
12	Iceland	42	Belgium
13	Ireland	43	South Africa
14	Germany	44	Czech Republic
15	Georgia	45	Armenia
16	Canada	46	Rwanda
17	Estonia	47	Puerto Rico (U.S.)
18	Malaysia	48	Romania
19	Taiwan, China	49	Saudi Arabia
20	Switzerland	50	Qatar
21	Austria	51	Slovenia
22	United Arab Emirates	52	Panama*
23	Latvia	53	Bahrain
24	Ethiopia	54	Hungary
25	Portugal	55	Turkey
26	Thailand	56	Italy
27	Netherlands	57	Belarus
28	Mauritius	58	Jamaica
29	Japan	59	Luxembourg
30	Macedonia, FYR	60	Tunisia

Source: Doing Business Database

Top 5 countries worldwide

1. Singapore
2. New Zealand
3. Hong Kong SAR, China
4. Denmark
5. Korea, Rep.

***Top ranked Latin American countries**

34. Colombia*

35. Peru*

39. Mexico*

41. Chile*

52. Panama*

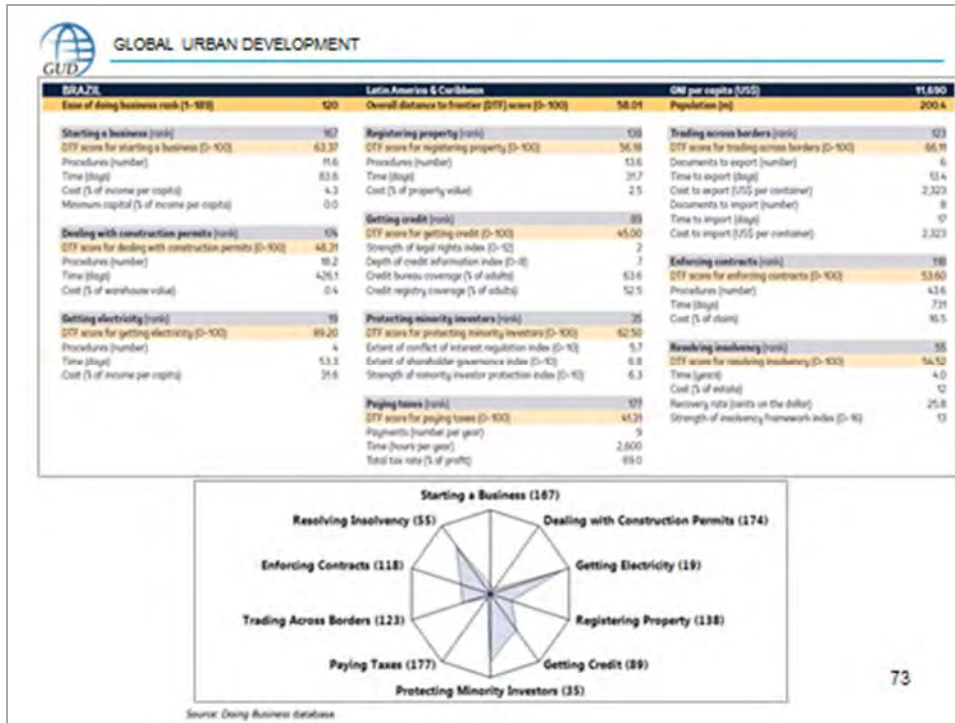
72

Narrative for Slide 72:

As a comparison, Slide 72 shows the top 60 countries on the World Bank's overall rankings in *Doing Business 2015*. The top 10 countries are Singapore, New Zealand, Hong Kong, Denmark, South Korea, Norway, US, UK, Finland, and Australia. Germany is ranked 14, Portugal is 25, Spain is 33, and Italy is 56. The top ranked countries in Latin America are Colombia at 34, Peru at 35, Mexico at 39, Chile at 41, and Panama at 52.

One notable characteristic of many, though not all, of the top 30 countries on this list is that many of them are not traditionally well endowed with an abundance and variety of natural resources. This is certainly true of at least five of the top 10 countries: Singapore, Hong Kong, Denmark, South Korea, and Finland. Because they have not generally been rich in natural resources, they have emphasized investing in educating, training, and empowering hard-working, skilled, and entrepreneurial people as their most valuable economic resource.

Brazil, of course, has always been very rich in natural resources, perhaps placing too much value on them and not enough on people as a high quality professional workforce. For RS to become much more innovative, sustainable, and dynamically productive by 2030, it needs to become as business-friendly as its highest-ranked economic competitors, including Asia-Pacific leaders Singapore, New Zealand, Hong Kong, South Korea, and Australia, and Scandinavian leaders Denmark, Norway, Finland, Sweden, and Iceland.



Narrative for Slide 73:

Slide 73 shows the rankings for Brazil in each of the 10 individual categories evaluated by the World Bank's *Doing Business 2015* report. These rankings include some relatively high scores, such as Getting Electricity at 19 and Protecting Minority Investors at 35. However, it also includes some of the worst rankings of all 189 countries in the world: Starting a Business at 167, Dealing with Construction Permits at 174, and Paying Taxes at 177. According to the World Bank's research methodology, Starting a Business takes 83 days, with multiple procedures and considerable expenses. Registering Property takes over 13 separate procedures and nearly 32 days. Dealing with Construction Permits takes 426 days (14 months), compared to 26 days in Singapore.

Clearly more rapid permitting processes must be high on the agenda of regulatory reform in RS, with initial experimentation in Sustainable Innovation Zones. Digital technology can play a major facilitating role, which offers the added benefits of promoting the growth of RS businesses involved with production and services for smart machines and digital technology.

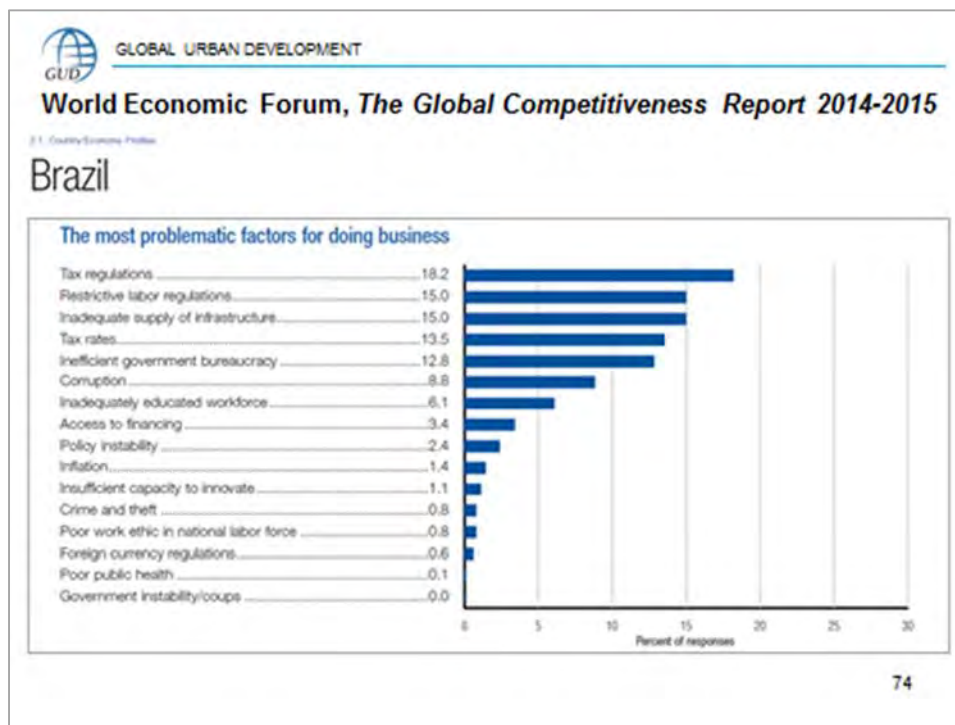
Paying Taxes involves 9 different annual payments requiring businesses to devote 2,600 hours per year for tax preparation, compared to 131 hours in Chile, 239 hours in Colombia, 293 hours in Peru, and 334 hours in Mexico. This suggests that tax simplification should be a major priority for RS and Brazil. Through fewer, simpler, easier, and more transparent tax filings, governments can collect more revenues by reducing tax cheating, and still save most businesses plenty of time and money that

they can then reinvest in their companies to modernize and improve their facilities, capital equipment, and workforce.

As the World Bank *Doing Business 2015: Economy Profile Brazil* states, “Economies around the world have made paying taxes faster and easier for businesses—such as by consolidating filings, reducing the frequency of payments or offering electronic filing and payment. Many have lowered tax rates. Changes have brought concrete results. Some economies simplifying tax payment and reducing rates have seen tax revenue rise.”

(<http://documents.worldbank.org/curated/en/2014/10/20342713/doing-business-2015-going-beyond-efficiency-brazil>).

Introducing more modern digital technology into the system will have the added benefit of promoting technological innovation in RS. Sustainable Innovation Zones can become a test case for tax simplification, perhaps in collaboration with attorneys, accountants, business expeditors, and notaries to help them make the transition to new and better systems for everyone, far different from the current complex and costly arrangements.



Narrative for Slide 74:

Slides 74-76 are from the World Economic Forum’s *The Global Competitiveness Report 2014-2015* (<http://www.weforum.org/reports/global-competitiveness-report-2014-2015>). This report is the 35th edition of a very important annual publication. The World Economic Forum (WEF) produces these reports in

collaboration with academic experts and a global network of Partner Institutes. Columbia University Economics Professor Xavier Sala-i-Martin, Chief Advisor to the WEF Global Competitiveness and Benchmarking Network, coordinated the research and writing for the 2014-2015 report together with Professor Klaus Schwab, Executive Chairman of the World Economic Forum in Geneva, Switzerland.

For Brazil, the WEF Partner Institute is the Innovation Center at the Fundação Dom Cabral (Business School) in Belo Horizonte. Carlos Arruda, Associate Dean for Business Partnership and Professor of Innovation and Competitiveness, and Associate Professor Herica Righi, coordinated the Brazil research for the WEF report.

The Global Competitiveness Report 2014-2015 ranks 144 countries based on a complex set of weighted variables called the 12 Pillars, which are grouped under three main categories:

- **Basic Requirements** – 1) Institutions; 2) Infrastructure; 3) Macroeconomic Environment; and 4) Health and Primary Education;
- **Efficiency Enhancers** – 5) Higher Education and Training; 6) Goods Market Efficiency; 7) Labor Market Efficiency; 8) Financial Market Development; 9) Technological Readiness; and 10) Market Size;
- **Innovation and Sophistication Factors** – 11) Business Sophistication; and 12) Innovation.

Brazil ranks number 57 out of 144 countries on this combined index of the 12 Pillars.

Some of the information in *The Global Competitiveness Report 2014-2015* is derived from official national and international research sources, such as Imports and Exports as a percentage of GDP. Most of the information came from a very detailed Executive Opinion Survey, conducted in 42 different languages between February and June 2014, with more than 14,000 business leaders in 144 economies worldwide participating in the survey, both in person and online.

In Brazil there were 114 business executives surveyed, representing a scientific random national sample of large companies and small and medium-sized enterprises (SMEs) in agriculture, manufacturing and non-manufacturing industry, and services, including some firms with foreign investors, and covering both exporting and non-exporting businesses. These business executives were asked to respond to an extensive series of detailed questions, in each case with a numerical score ranging from 1 (worst) to 7 (best).

One of the many questions asked of these 114 Brazilian executives is about “the most problematic factors for doing business” in Brazil. The chart shown in Slide 74 summarizes those factors considered by these 114 executives to be the most problematic. From a list of 16 factors provided by the survey, respondents were asked to select the five most problematic and to rank them. The results were then

tabulated and weighted according to the rankings assigned by those surveyed.

The top eight items are: Tax Regulations, Restrictive Labor Regulations, Inadequate Supply of Infrastructure, Tax Rates, Inefficient Government Bureaucracy, Corruption, Inadequately Educated Workforce, and Access to Financing.

The RS state government should help address all eight of these major business challenges. RS Sustainable Innovation Zones can help solve some of these difficult problems.

GLOBAL URBAN DEVELOPMENT
 World Economic Forum, *The Global Competitiveness Report 2014-2015*
 2.1. Country/Economy Profiles
 Brazil

2nd pillar: Infrastructure, 1-7 (best)	76	4.0
A. Transport infrastructure, 1-7 (best)	77	3.5
Quality of overall infrastructure, 1-7 (best)	120	3.1
Quality of roads, 1-7 (best)	122	2.8
Quality of railroad infrastructure, 1-7 (best)	95	1.7
Quality of port infrastructure, 1-7 (best)	122	2.7
Quality of air transport infrastructure, 1-7 (best)	113	3.4
Available airline seat kilometers, millions of seats km/week	9	3827.3
B. Electricity and telephony infrastructure, 1-7 (best)	70	4.5
Quality of electricity supply, 1-7 (best)	89	4.1
Mobile telephone subscriptions, /100 pop.	37	135.3
Fixed telephone lines, /100 pop.	51	22.3

75

Narrative for Slide 75:

As mentioned in Slide 74, *The Global Competitiveness Report 2014-2015* covers 12 Pillars. Slide 75 shows the results for Brazil from the second Pillar, **Infrastructure**. The quality of overall infrastructure is ranked number 120 out of 144 countries, with problematic results for roads, railroads, ports, airports, and electricity supply. The one bright spot is mobile telephone subscriptions, where Brazil ranks in the top third at number 37. McKinsey estimates that Brazil needs to invest up to US\$ 4 trillion over the next 16 year in order to upgrade and modernize its infrastructure by 2030.

Though infrastructure is somewhat better in Rio Grande do Sul than for Brazil as whole, clearly it is a major challenge, and as Slides 56-61 discuss, much more will be needed from all levels of government, the private sector, and international investors

and donors, for RS to become the most sustainable and innovative place in Latin America by 2030.

GLOBAL URBAN DEVELOPMENT
 World Economic Forum, *The Global Competitiveness Report 2014-2015*
 2.1. Country-Economy Profiles
 Brazil

Metric	Rank	Score
12th pillar: Innovation, 1-7 (best)	62	3.3
Capacity for innovation, 1-7 (best)	44	4.1
Quality of scientific research institutions, 1-7 (best)	50	4.0
Company spending on R&D, 1-7 (best)	43	3.5
University-industry collaboration in R&D, 1-7 (best)	54	3.8
Government procurement of advanced technology products, 1-7 (best)	77	3.4
Availability of scientists and engineers, 1-7 (best)	114	3.3
PCT patent applications, applications/million pop.	50	3.2

76

Narrative for Slide 76:

Slide 76 shows the results for Brazil from the 12th Pillar, **Innovation**, from *The Global Competitiveness Report 2014-2015*. This is mostly a good news story, showing more positive results than infrastructure quality. Brazil ranks number 44, in the top third, on Capacity for Innovation, and the rankings for Quality of Scientific Research Institutions (50), Company Spending on R&D (43), University-Industry Collaboration in R&D (54), and Patent Applications (50) are relatively good. The most problematic ranking is Availability of Scientists and Engineers, at number 114, placing Brazil in the bottom third on this vital factor for successful innovation. This reinforces our recommendation that RS invest more of its public and private resources into higher education, research, and workforce development. Even more urgently, it strongly emphasizes the vital necessity for RS to become a magnet for attracting and retaining talented students and professionals, keeping local talent from leaving, and bringing more talent to RS from the rest of Brazil, and from the entire world.



Narrative for Slide 77:

Slide 77 reproduces an article from the September 16, 2013 issue of *Valor Econômico* (<http://www.globalurban.org/US-Brazil Innovation Summit.pdf>), the leading Brazilian national daily financial and business newspaper. The article features a photo of Dr. Marc Weiss and profiles him as a Leading Speaker in the Workshop on “Applying New Technologies for Greater Mobility” at the US-Brazil Innovation Summit hosted by BNDES in Rio de Janeiro during September 11-12, 2013
<http://www.globalurban.org/US Brazil Innovation Summit Agenda complete final version.pdf>.

The *Valor Econômico* article discusses the RS economic strategy, even though it was published six months before our project was officially launched. We include Slide 77 to affectionately highlight the fact that GUD has been working on the Leapfrog Economic Strategy for Rio Grande do Sul since November 2011, quite a long time, and even though Dr. Marc Weiss and Nancy Sedmak-Weiss, two of our three principal team members, are from the US (the third, Dr. Elaine Yamashita Rodriguez, is a Brazilian who lives in the US), we have now spent so much time living and working in Porto Alegre and RS that we feel like honorary Gaúchos in our hearts. Our proposed Leapfrog Economic Strategy is based on substantial knowledge of Rio Grande do Sul, both from research and from on-the-ground experience. We sincerely believe that if the strategy is fully implemented it will create a much brighter future for RS, for Brazil, and for the world.



For more information,

please visit the GUD website:

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email me at:

marcweiss@globalurban.org

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Narrative for Slide 78:

Our report, *21st Century Leapfrog Economic Strategy: Rio Grande do Sul Becomes the Most Sustainable and Innovative Place in Latin America by 2030*, is available as a free downloadable PDF file on GUD's website: www.globalurban.org

Many other related documents are available on the Publications page of GUD's website: <http://www.globalurban.org/publications.htm>. We welcome readers to visit and explore our site.

Also, we welcome feedback on our report, so please feel free to contact GUD by email at: info@globalurban.org.

You can directly email Dr. Marc Weiss at: marcweiss@globalurban.org.

Executive summary

Just a few short years ago, Brazil was brimming with optimism, as rising global demand for resources led to an export and consumption boom. Thanks to an expansion of the social safety net and falling unemployment, the official poverty rate was cut in half. When GDP growth hit 7.5 percent in 2010, it seemed that finally the “sleeping giant” was wide awake.

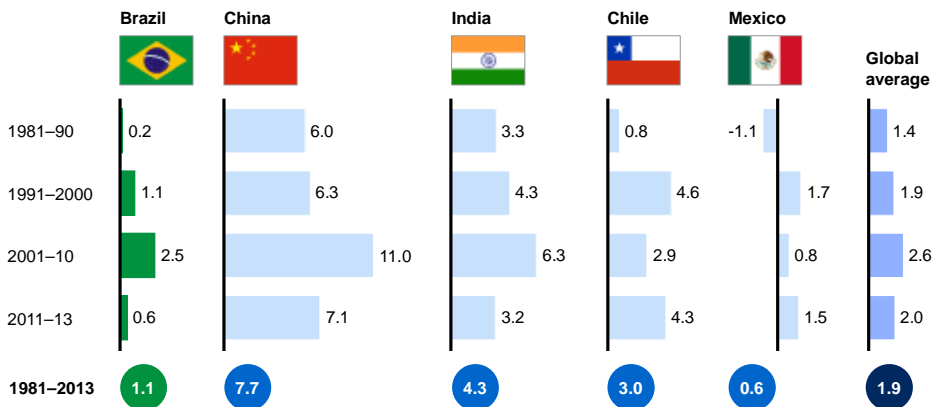
But Brazil's GDP growth slowed dramatically beginning in 2012, bringing the longer-term issues of weak income growth and productivity performance to the forefront (Exhibit E1). Brazil has become the world's seventh-largest economy, but it ranks only 95th in the world in GDP per capita. Most households have experienced only modest income growth, while inefficiencies and layers of taxes and tariffs push the prices of many consumer goods out of their reach. Having successfully lifted millions out of extreme poverty, Brazil now has to deliver on the promise of what a middle-class life really means. Productivity growth, which contributes to raising incomes and living standards, will be the key to empowering the aspiring middle class.

Exhibit E1

Brazil's income growth has lagged behind the global average for decades

Real GDP per capita compound annual growth rate

%



SOURCE: The Conference Board Total Economy Database, 2014; McKinsey Global Institute analysis

In the next two decades, Brazil needs to average 4.2 percent annual GDP growth in order to lift half of the still vulnerable population solidly into middle class—and our estimates show that expanding its global ties could get Brazil roughly a third of the way to this goal. Based on an assessment of how global networks influence economic growth, we estimate that Brazil has an opportunity to add up to 1.25 percentage points to its average annual GDP growth in the years ahead.

Deeper integration into global markets and networks could provide competitive pressures that spur Brazilian companies to innovate, invest, and modernize. For decades, Brazil's economic policy has focused on protecting local industries and drawing on the strength of its vast and expanding domestic market. But its inward focus has come at a cost to international competitiveness. As Brazil prepares to welcome the world to two major global events, this is an opportune moment to reconsider that inward focus.

This year also marks a half century since the beginning of a period of military dictatorship—and a quarter century since dictatorship gave way to democratic elections. Brazil finds itself at another turning point today, facing a choice between maintaining the isolation of the past or embracing the opportunities that are emerging in a more deeply interconnected and knowledge-intensive global economy.

Seizing these opportunities will require addressing some of the country's long-standing and homemade barriers to growth, from infrastructure shortfalls to a byzantine tax and regulatory structure. But it will also involve looking to the future by reorienting trade policy toward key markets and finding more effective ways to harness natural resource wealth for investment. Brazil can take a new approach to its growth policies by following the blueprint it has already established in successfully opening its agriculture sector and building a globally competitive aerospace firm. It can also foster a culture of entrepreneurship and innovation to provide the economy with a much-needed jolt of dynamism. Today Brazil needs a new catalyst for growth that can deliver broad-based prosperity to the vast majority of its citizens—and that catalyst could be found beyond its borders.

The tailwinds that lifted Brazil's economy are slowing

Brazil has made great strides in economic development. The most striking achievement has been a dramatic reduction in the official poverty rate, driven in large part by the Bolsa Familia program. Yet there is growing concern about the country's ability to sustain growth over the long term, as the trends that lifted the economy over the past decade are losing steam.

A commodities boom fueled much of Brazil's recent GDP growth; the country's share of global non-oil resource exports rose from 5 percent in 2002 to 9 percent in 2012.¹ Today commodity prices remain high compared with their historic averages, but the exceptional surge in both demand and prices has leveled off. Brazil will benefit from its resource endowments for decades to come, but it cannot count on a continued boom. It could, however, make more effective use of future gains by investing in the foundations of growth and making adjacent industries more competitive.

Both private and government consumption have been on the rise, but much of it has been fueled by debt and taxes. Household debt has grown from 20 percent of income in 2005 to 43 percent of income in 2012, and high real interest rates (averaging 145 percent on credit cards) make this a heavy burden for consumers. On the government side, federal expenses increased from 15.7 percent of GDP in 2002 to 18.9 percent in 2013. But it will be difficult to continue increasing

1 UN Comtrade via World Integrated Trade Solution (WITS).

public spending through further taxes and debt. Taxes have already climbed from 29 percent of GDP in 1995 to 36 percent in 2013, the highest level among Brazil's emerging market peers, and issuing additional debt would be costly. As a share of GDP, Brazil's gross debt is less than a third that of Japan, one of the world's most indebted nations—but its debt service costs are almost 15 times as high.

Resource exports and credit-fueled consumption have not translated into higher investment or productivity. Between 2000 and 2011, Brazil's overall investment rate averaged 18 percent of GDP, below that of other developing economies such as Chile (23 percent) or Mexico (25 percent), and much below those of China (42 percent) and India (31 percent). Infrastructure spending continues to lag behind the global average, while high interest rates and the complexity of obtaining reasonable long-term financing (especially for small and medium-sized enterprises) have discouraged many businesses from investing in machinery, equipment, and technology that could boost efficiency. A strong currency—the flip side of success in exporting commodities—has made manufactured goods less competitive in foreign markets, further discouraging investment.

Productivity gains are the key to broad-based income growth that can translate into wider prosperity. But Brazil's productivity has been almost stagnant since 2000; today it is just over half the level achieved in Mexico. Brazil can create new momentum by taking action on some longstanding issues:

- **Lower the “Brazil cost.”** In the World Bank's 2014 Doing Business index, Brazil ranks 116th out of 189 countries in terms of its regulatory burden. It fares even worse in the taxation category, where it ranks 159th in the world. It takes businesses a staggering 2,600 hours each year to prepare and declare taxes (vs. 318 hours in China and 259 hours in Indonesia). The costs to businesses are eventually passed on to consumers in the form of high prices and reduced purchasing power.
- **Continue to reduce the informal sector.** Smaller and less efficient firms operating in the gray market can gain cost advantages over more productive and law-abiding firms by ignoring quality and safety regulations or avoiding taxes. They also lack incentives to invest and achieve economies of scale. The informal sector is decreasing in size, but it still represents a continuing drag on productivity and calls for vigilant and ongoing enforcement.²
- **Expand infrastructure.** Brazil's investment in overall infrastructure has fallen from 5.4 percent of GDP in the 1970s to only 2.1 percent in the 2000s, while transportation infrastructure as a share of GDP has fallen steadily for decades from around 2 percent in the 1970s to less than 0.5 percent in the 2000s.³ The nation's rail network is limited, and only 14 percent of its roads are paved. Lines of trucks waiting to load or unload cargo at Brazil's shipping ports can stretch for miles.
- **Build human capital.** Brazil has reached 95 percent enrollment in primary education but still trails other developing economies in educational attainment—and quality is a serious concern. Brazil ranked 57th in the 2012 Programme for International Student Assessment (PISA) testing of 15-year-

2 *How Brazil can grow*, McKinsey Global Institute, December 2006.

3 *Brazil infrastructure: Paving the way*, Morgan Stanley Blue Paper, Morgan Stanley Research Global, May 2010.

olds in 65 countries around the world. Only half of Brazilian students who enter high school go on to graduate.⁴ A greater focus on education and vocational training will be crucial to Brazil's competitiveness and its ability to build more sophisticated industries.

Between 1990 and 2012, rising numbers of workers contributed 1.8 percent a year to Brazil's GDP growth. But the lift from the demographic dividend is tapering down as birth rates have declined and population is aging. In the next two decades, the expansion of the labor force is likely to contribute only 0.6 percent to average annual GDP growth—about a third of what it contributed over the past two decades. Unless it takes steps to boost productivity and become more competitive, Brazil's growth could decline to 1.8 percent a year. At the same time, Brazil's pension system is very generous by international standards,⁵ and the fiscal pressure of maintaining these spending commitments will only increase in the years ahead.

Adopting a new growth agenda is vital to the economic empowerment of Brazil's citizens

Brazil needs to solidify its recent progress in poverty reduction and build a better life for the aspiring middle class. Even after its citizens rise above the official poverty line, they face an ongoing struggle to meet basic household needs. The high price of consumer goods is diminishing their purchasing power and has led millions of households into debt.

Recent MGI research exploring this issue in India offers a framework that is also relevant in Brazil. It proposes a new and more holistic measurement of poverty called the Empowerment Line, which estimates the minimum economic cost for a household to fulfill its basic needs.⁶ Our initial estimate of the MGI Empowerment Line in Brazil (which takes into account the price of housing, food, transportation, education, and other basics) finds that it would take approximately R\$19–R\$27 in income per person per day (or R\$1,900–R\$2,700 per family per month) to attain an acceptable standard of living with a measure of economic security.⁷ Our preliminary research indicates that approximately 50 to 70 percent of Brazil's population remains either poor or vulnerable to slipping back into poverty (Exhibit E2).

Social transfer programs alone cannot solve this challenge. Brazil will need to take steps to unleash faster growth in GDP per capita, create better-quality jobs, and raise purchasing power by lowering the price of consumer goods. Without a demographic lift, favorable terms of trade for resources, and credit-fueled

4 *School census 2007*, National Institute of Educational Research (INEP), Ministry of Education.

5 *Brazil: Selected issues paper*, International Monetary Fund, IMF Country Report number 12/192, July 2012.

6 *From poverty to empowerment: India's imperative for jobs, growth, and effective basic services*, McKinsey Global Institute, February 2014.

7 Roughly US\$8–\$12 per person per day, or US\$800–\$1,200 per family per month. Assumes average family size of 3.33, according to IBGE. There are multiple assessments of the vulnerability of the population rising from poverty. See Francisco H. G. Ferreira et al., *Economic mobility and the rise of the Latin American middle class*, World Bank, November 2012, which finds that the risk of falling back below the poverty line in Latin America is significantly reduced only when incomes rise above the threshold of \$10 per capita per day.

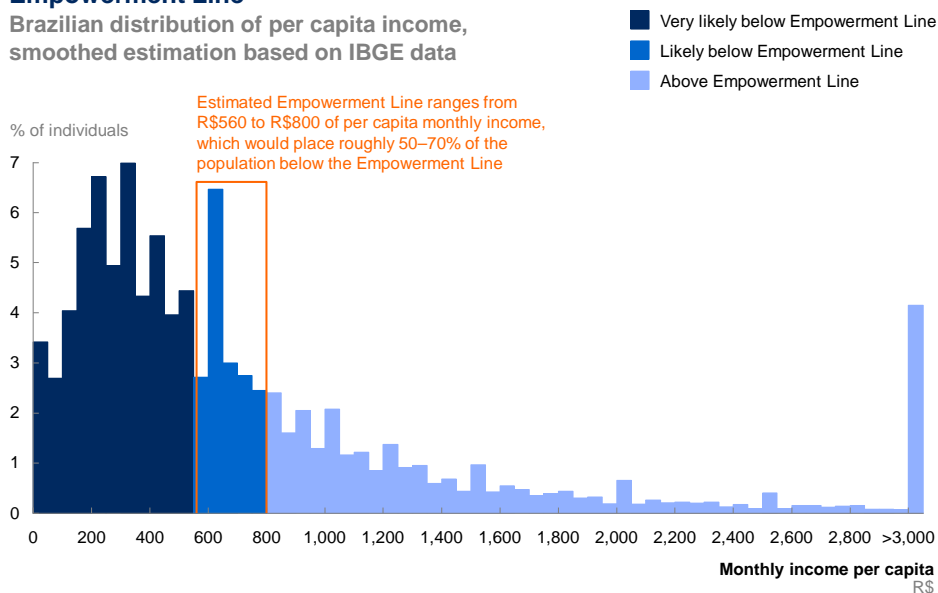
consumption to drive its economy, Brazil's productivity performance becomes the best line of defense for ensuring that the current stagnation does not become a long-term phenomenon.

If productivity growth maintains its current trajectory, GDP per capita will grow only 1.2 percent per year, far short of what is needed for most households to attain a better life. But if Brazil can achieve an average of 4.2 percent GDP growth in the next two decades, it can cut the share of population below the empowerment line by half. Doing so will require tripling the current rate of productivity growth; this could reduce population below empowerment to the range of 25 to 40 percent of the population (Exhibit E3).

Exhibit E2

Some 50 to 70 percent of the population falls below Brazil's estimated Empowerment Line

Brazilian distribution of per capita income, smoothed estimation based on IBGE data

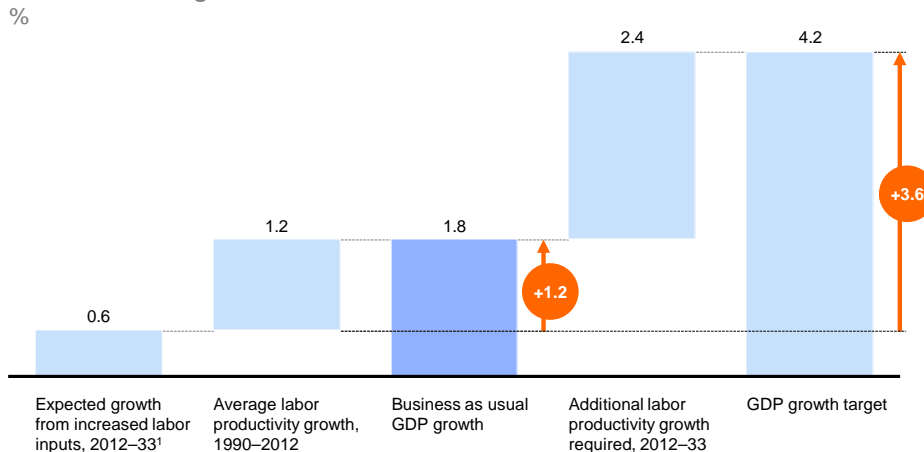


SOURCE: Instituto Brasileiro de Geografia e Estatística (IBGE); McKinsey Global Institute analysis

Exhibit E3

To lift half of the still-vulnerable population solidly into middle class, Brazil needs to step up productivity

Annual real GDP growth rates



1 Driven by additional workers joining the workforce due to demographics; employment rate assumed constant at 2012 level.

SOURCE: The Conference Board Total Economy Database 2013; McKinsey Global Institute analysis

The limited income growth of the expanding middle class is Brazil's greatest challenge—and its biggest untapped opportunity. Moving the bottom half of the pyramid to the “belly” of the middle class would build on the momentum of poverty reduction and create a source of sustainable and inclusive growth for the future.

Deepening Brazil's participation in global markets and global networks can provide the catalyst Brazil needs

Even as it has grown to become one of the world's largest economies, Brazil maintains relatively limited ties to the rest of the world beyond its resource exports. As new trade routes form, firms are racing to claim market share. Brazil, which needs a new catalyst for growth, cannot afford to be left behind.

To meet its goals for sustainable and inclusive growth, Brazil needs to continue looking for external opportunities. It has already benefited from rising resource demand, but there are other ways to ride the wave of global demand growth. In addition to entering new markets, Brazil can benefit from embracing the performance pressures that come with international competition. These effectively challenge local firms to evolve and become more efficient by, for example, implementing lean processes, investing in R&D, or integrating the latest technology. Global exposure also makes cheaper and more modern inputs available, and it enables companies to absorb more of the world's rapidly expanding flows of innovation, technology, research, and ideas.⁸

The global economy is increasingly characterized by an intricate web of connections that go far beyond the trade of goods. Flows of finance and services such as IT and business process outsourcing are expanding. Increasing numbers of tourists, students, and workers are crossing borders and exchanging ideas—and in the realm of digital communications, the concept of borders has all but disappeared. These evolving networks are redrawing the global economic landscape.

Recent MGI research finds that countries that are centrally connected within the various types of global networks can gain up to 40 percent more GDP growth from them than the least connected countries. But this same research ranks Brazil only 43rd in the world for “connectedness” (Exhibit E4).⁹ Not only is there ample room for improvement, but pursuing greater openness and engagement in all types of cross-border exchanges could yield large opportunities for productivity enhancements and economic growth.

8 There is extensive literature on the relationship between competitiveness, trade openness, and productivity. See, for example, Richard E. Baldwin, *On the growth effects of import competition*, National Bureau of Economic Research working paper number 4045, April 1992; Philippa Dee et al., *The impact of trade liberalisation on jobs and growth*, OECD trade policy working paper number 107, January 2011; and Otaviano Canuto, Matheus Cavallari, and Jose Guilherme Reis, *Brazilian exports: Climbing down a competitiveness cliff*, World Bank policy research working paper number 6302, January 2013.

9 *Global flows in a digital age: How trade, finance, people, and data connect the world economy*, McKinsey Global Institute, April 2014.

Exhibit E4

MGI Connectedness Index

Selected countries, 2012¹

Rank of participation by flow as measured by flow intensity and share of world total

Economy
■ Developed
■ Emerging

Connectivity Index Rank
■ 1–10
■ 11–25
■ 26–50
■ 51+

Rank	Country	Goods	Services	Financial	People (2010)	Data and communication (2013)
1	Germany	3	5	7	5	2
2	Hong Kong, China	1	4	3	14	(not available)
3	United States	8	9	5	1	7
4	Singapore	2	3	4	18	5
9	Russia	19	30	16	2	21
17	Australia	32	34	14	11	30
18	Malaysia	10	23	34	26	32
20	South Korea	7	14	25	58	34
25	China	5	21	6	93	33
27	Mexico	17	67	22	13	48
30	India	27	13	26	47	64
41	Chile	42	54	20	95	36
43	Brazil	39	40	18	115	38
47	Argentina	55	60	53	59	40
49	South Africa	43	50	49	56	73
56	Indonesia	31	49	39	113	65

¹ Index calculations use migrants data for people flows and cross-border Internet traffic for data and communication flows.
 SOURCE: Comtrade; IHS Economics & Country Risk; World Trade Organization; Telegeography; World Development Indicators, World Bank; McKinsey Global Institute analysis

Estimating the economic potential of greater global connectedness is, of course, an inexact science. This is in part because some of the steps required to deepen Brazil's connections with the global economy (such as infrastructure improvements) would also result in domestic productivity gains. But based on an assessment of how global networks influence economic growth, we estimate that Brazil has an opportunity to add up to 1.25 percentage points to its average annual GDP growth. In order for Brazil to cut the share of population below the empowerment line by half, it needs to generate 4.2 percent average annual GDP growth over the next two decades. Greater global connections could help Brazil get approximately one-third of the way toward this goal.

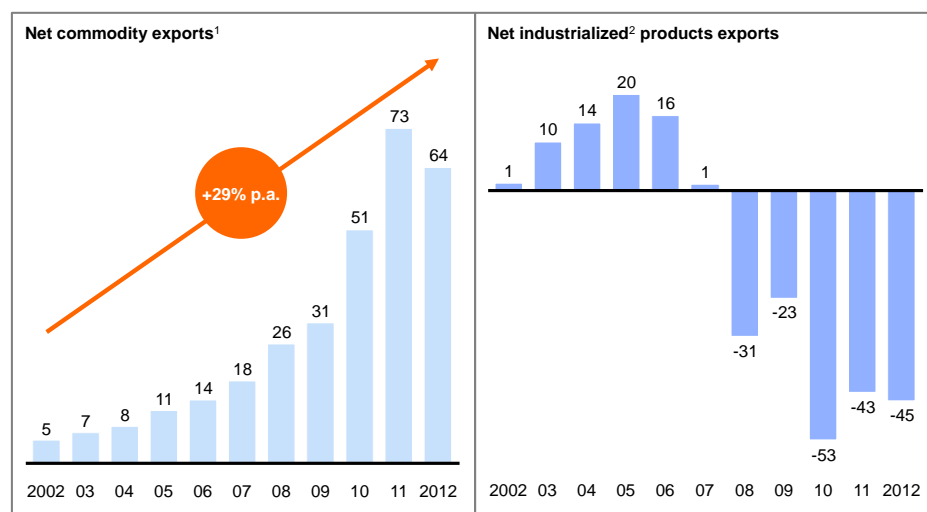
BY REMOVING BARRIERS AND EMBRACING COMPETITION, BRAZIL COULD INCREASE ITS SHARE OF GLOBAL TRADE

From 2005 to 2012, Brazil's commodities exports increased from \$11 billion to \$64 billion—but over the same period, a trade surplus of \$20 billion in manufactured goods turned into a trade deficit of \$45 billion (Exhibit E5). As the commodities boom caused the real to appreciate sharply, Brazilian goods have become less cost competitive in global markets. Brazil's exports are equivalent to 13 percent of GDP, far below India (24 percent) or Mexico (33 percent).

Exhibit E5

While Brazil's commodity exports have increased, its net exports of manufactured goods have declined sharply since 2005

\$ billion



1 Non-industrialized products, according to external commerce ministry.

2 Industrialized products, according to external commerce ministry.

SOURCE: World Trade Organization; McKinsey Global Institute analysis

Brazil can assume a bigger role in global markets by addressing some of the barriers that have constrained trade growth. The World Bank ranks Brazil only 124th in the world for ease of trading across borders—and it notes that the cost of exporting a container from Brazil is \$2,215, more than double the Organisation for Economic Co-operation and Development (OECD) country average.¹⁰ This is mainly due to poor road and rail infrastructure combined with cumbersome procedures and inadequate capacity at Brazil's ports.

Demand for imports is constrained because tariffs inflate the cost of goods to Brazilian consumers. In 2011, Brazil's mean tariff rate was 7.8 percent, higher than its BRIC counterparts of Russia, India, China, and most of the developed world.¹¹ In addition, high federal and state taxes are applied to most products, including vehicles. As a result of all the various taxes levied, a Brazilian consumer will pay around 150 percent more than a US consumer to purchase a Toyota Corolla, even though it is produced locally. After releasing its PlayStation 4 in 2013 with a

¹⁰ *Doing business 2014: Understanding regulations for small and medium-size enterprises*, World Bank, 2013.

¹¹ The rate is the average weighted mean tariff rate of all products; World Bank (China, 4 percent; Russia, 5 percent; Europe and the United States, 1 to 2 percent).

Brazilian price tag of \$1,700, Sony explained that almost 50 percent of that cost was a result of taxes.¹²

Brazil has undertaken some trade liberalization, mainly after 1990, but reform has been uneven; some sectors remain heavily protected and taxed, while others have been more exposed to global market forces. Comparing sectors shows that openness to global competition has been more effective in boosting sector productivity.

The heavily protected automotive industry is a case in point. Brazil is the world's seventh-largest producer of automobiles, but it ranks 21st in automotive exports. Only 15 percent of vehicles manufactured in Brazil are exported—and a disproportionate share goes to Argentina, its Mercosur trading partner. High automobile import tariffs have encouraged foreign carmakers to establish production within Brazil and create local jobs, but this approach has not helped Brazil integrate into global value chains. Brazil's automotive industry now lags behind the productivity of peers such as Mexico, which has developed world-class assembly plants and rapidly gained global market share. Mexican auto plants churn out twice as many vehicles per worker as Brazilian plants, even though a much higher share of their output consists of mid-size and large vehicles, while Brazil's plants typically produce 85 percent of small cars.¹³

This performance stands in sharp contrast to Brazil's success in cultivating an aerospace industry. Embraer was created in 1969 as a state-owned company, and the government ensured its early growth by providing production contracts and imposing import tariffs. But in the case of aerospace, it also took concerted steps to develop specialized talent and to create R&D infrastructure for continuous innovation. Eventually the government reduced its direct involvement, and in 1994 the company was privatized. Since then, Embraer has gone head-to-head with global competitors for international contracts—and has thrived as a result. Today the company has offices, subsidiaries, and joint ventures around the world. Brazil has lifted import tariffs on aircraft components, allowing Embraer to source from global suppliers.

Brazil's agriculture sector, too, has grown more productive since it was gradually opened. Beginning in the early 1990s, Brazil began eliminating price controls and marketing boards that regulated production of certain crops; it also reduced export tariffs and import restrictions. This caused an initial wave of disruption, but the sector eventually reconfigured and emerged in stronger form. Brazilian farmers and agribusinesses took steps to boost their efficiency, generating positive spillover effects. Production of tractors and other agricultural equipment, for example, has quadrupled in the past three decades, and exports of these machines have increased 24-fold since 1970. Today the yields for Brazil's main crops are on a par with those of developed economies, thanks in part to a strong tradition of R&D in agriculture. Again, reducing direct market intervention and developing R&D muscle has paid off in higher productivity and increased exports.

12 Sony press release, October 2013.

13 Mexico's auto plants produce 53 cars per worker per year vs. 27 in Brazil, even though 85 percent of the cars produced in Brazil are small vs. 54 percent in Mexico. Associação Nacional dos Fabricantes de Veículos Automotores (ANFAVEA); Instituto Nacional de Estadística y Geografía (INEGI), Mexico; and Organisation Internationale des Constructeurs d'Automobiles (OICA).

BRAZIL ATTRACTS SIGNIFICANT FDI, BUT IT COULD HARNESS GREATER FLOWS OF VENTURE CAPITAL AND LONG-TERM FINANCING

With high volumes of inward foreign direct investment (FDI) and cross-border lending, Brazil is more closely linked to global capital markets than to other types of global networks. It ranks seventh among all countries in attracting FDI, with an annual average of some \$57 billion in inflows from 2008 to 2012. Investment has flowed into commodity sectors such as mining and oil, but the lion's share has gone to manufacturing for Brazil's domestic market. FDI has brought in new technologies, innovation, and best practices developed in other countries, but it has not translated into significant exports in the same sectors.

Brazil can deepen the benefits of FDI and widen access to global financing. Foreign multinationals already have an exceptionally large existing presence in Brazil.¹⁴ They can be important catalysts for productivity growth and global expansion among their local suppliers. Executives tend to prefer to move to locations where multinationals are already present, and with improved infrastructure and business climate, Brazil can build on its current base to attract additional competitive manufacturing and service firms. But Brazil should reconsider its approach to realizing the benefits multinationals can bring. As the auto industry example illustrates, the protection afforded by high tariffs on imports has raised domestic prices without making local production (even by multinationals) globally competitive. The lessons learned from Embraer and the agriculture sector suggest that Brazil can become a more successful base of production for multinationals by investing in local expertise and R&D while relying on competitive pressures from global markets to encourage productivity.

Inward FDI could also be channeled to more innovative sectors. Today there is a growing trend toward cross-border flows of venture capital, and improving mechanisms that connect Brazilian entrepreneurs with foreign investors could propel growth. In addition, further developing Brazil's capital markets could attract global investment to meet the economy's long-term financing needs, particularly in infrastructure.

WITHIN TRADED SERVICES, BRAZIL HAS A UNIQUE OPPORTUNITY TO CAPTURE A GREATER SHARE OF GLOBAL TOURISM

Brazil has a lower participation in the global trade of services than most of its peers. Service exports represent 1.8 percent of Brazil's GDP, below the Latin American average of 4.1 percent and far below India's 8 percent. Language barriers are one constraint: not only is Brazil the only Portuguese-speaking nation in Latin America, but one global survey ranked Brazil 38th out of 60 countries for English-language fluency.¹⁵ To increase its ability to do business globally, Brazil will need to expand foreign-language skills.

Within traded services, the most immediate opportunity is growing Brazil's tourism industry. Since 1999, the country has lost 38 percent of its share of South America's inbound tourism and 30 percent of its share of world inbound tourism.

14 São Paulo ranks sixth in the world for its number of large foreign subsidiaries, the top city among all emerging markets. *Urban world: The shifting global business landscape*, McKinsey Global Institute, October 2013.

15 English Proficiency Index, Education First, 2013.

However, the World Cup and the Olympics are about to provide a once-in-a-lifetime boost in global visibility and media coverage, and it will be crucial for Brazil to sustain that momentum. The government can play a coordinating role and make targeted infrastructure investments, following the successful templates that have been set by other destinations such as Mexico and Dubai. Regaining just the share of world tourism it has lost since 1999 could add 0.25 percentage points to Brazil's annual GDP growth through 2030.

TAPPING INTO DIGITAL AND PEOPLE FLOWS COULD STRENGTHEN BRAZIL'S CAPACITY FOR INNOVATION AND ENTREPRENEURSHIP

Brazil is increasingly relying on exports of raw primary goods rather than moving up the value chain with exports of more sophisticated, skill-intensive products. This is cause for concern, since research has shown that producing and exporting more sophisticated goods is correlated with economic growth.¹⁶ To create higher-quality jobs and increase productivity over the long term, Brazil needs to promote entrepreneurship and innovation. Digital and people flows represent valuable exchanges of ideas, innovation, and skills, and policy makers and business leaders must consider how to harness their potential to push the boundaries of innovation.

Global flows of data and communication are becoming critical to productivity and growth. As more of our world is transformed into digital form, new online platforms have emerged for e-commerce, file sharing, collaboration, and finance. There is growing trade in digital goods, and digital tracking is transforming the way physical goods are traded. Individuals, small firms, and entrepreneurs now have lower barriers to participating directly in the global economy. Brazil cannot afford to miss out on these trends.

Brazil is rapidly becoming a digital nation, which offers a solid starting point. Its online population has quadrupled over the past decade, and today almost 50 percent of Brazilians have regular Internet access. There are more than 60 million Facebook users in Brazil, which is more than 30 percent of the population. Perhaps the next global social media company will be founded in Brazil (and not by a Brazilian who moved to San Francisco, as Instagram co-founder Mike Krieger did).

But Brazil is not highly connected to international data flows, which underpin the cross-border exchange of goods, services, capital, and people. Its international data traffic per inhabitant is only 5 percent of what flows through Germany, the global leader. Yet the intensity of domestic use shows that Brazil has the potential to play a bigger role in the digital economy.

Global talent and knowledge pools are increasingly connected through digital networks. Digital technologies have made it possible to collaborate remotely on new scientific theories and innovations, but Brazilian scholars have produced relatively few academic articles with foreign coauthors. International student

16 See, for example, Ricardo Hausmann, Jason Hwang, and Dani Rodrik, "What you export matters," *Journal of Economic Growth*, volume 12, issue 1, 2007; Ricardo Hausmann and Cesar Hidalgo et al., *The atlas of economic complexity: Mapping paths to complexity*, MIT Press, 2011; and Rahul Anand, Saurabh Mishra, and Nikola Spatafora, *Structural transformation and the sophistication of production*, IMF working paper number 12/59, February 2012.

exchanges are an important mechanism for initiating this kind of collaboration, as well as building personal business relationships and acquiring advanced skills. Since 1999, the number of Brazilian students studying abroad has almost doubled. Programs such as *Ciência sem Fronteiras* (Science Without Borders) can continue to build this trend and promote innovation.

Skilled migrants have been critical to the growth of some of the world's leading hubs of technology and innovation, from Silicon Valley to Ireland, India, and Taiwan. Already a leader in the life sciences, Israel is now building capabilities in the emerging field of neurotechnology, in part by attracting leading international scientists.

Brazil can do more to attract the best foreign talent. Although it is a nation with an immigrant heritage, only 0.5 percent of Brazil's workforce is foreign born, down from more than 5 percent in the early 1900s. But according to the Ministry of Labor and Employment, the number of temporary work permits increased 137 percent over the three years to 2012. These immigrants tend to be highly qualified managers and supervisors, and an increasing share of them have master's degrees or PhDs. Brazil could grow these numbers in a way that contributes to its long-term growth and productivity by adopting a more comprehensive skills-based approach to immigration. Meeting industry's needs for college-educated workers today can also facilitate the transfer of skills to their companies and colleagues—thus building capabilities for the future.

How Brazil can connect, compete, and thrive

Our research points to seven major priorities that could allow Brazil to restore growth, become more competitive, and sustain broad-based prosperity.

1. **Shift the focus of economic development to investment.** Resource windfalls and rising debt will no longer be able to sustain consumption-led growth. For the middle class to make real income gains, Brazil has to expand the productive capacity of the economy by investing in infrastructure, machinery, and skills. This requires boosting domestic savings and making it more attractive for companies and individuals to invest—by simplifying unnecessary red tape, more closely integrating states into a single domestic market, and creating incentives for capital and R&D investments. Brazil will continue to benefit from its rich resource endowments and could draw on them for building a more diversified and resilient base for long-term growth.
2. **Reorient trade policy to achieve closer integration with major markets.** In recent years, Brazil has increasingly focused on establishing international trade partnerships with other developing economies and strengthening the Mercosur trade bloc. But its emphasis on forging “South-South” agreements is not likely to open up large markets for high-value trade in the near term. Pursuing agreements with larger and more developed markets would allow Brazil to increase trade volumes, integrate more fully into the production networks of multinationals, and increase its access to leading-edge technology and processes. Brazil has spent a decade negotiating with the European Union (EU) on an agreement that is still not finalized, and no talks are under way with the United States. Policy makers will need to re-evaluate

the trade barriers that prevent Brazil from connecting with the most potentially valuable markets.

- 3. Redesign growth policies to compete in a more global and knowledge-intensive economy.** Government subsidies for certain industries now total almost 6 percent of GDP. Subsidies, import tariffs, local content requirements, “Buy Brazilian” procurement rules, and similar policies have introduced distortions and disincentives for companies to modernize. Brazil will need to rationalize this system and shift the focus from protecting incumbents to building competitiveness. A more effective pro-growth policy requires assessing its current competitive strengths and determining which industries are best positioned to move up the value chain and create positive spillover effects in related industries. Brazil’s key advantages include not just its rich resources but a large consumer market as well as diverse and well-developed manufacturing and industrial sectors. Policy makers will need to cultivate distinctive skills to make non-resource industries competitive, and make sure the necessary foundation of physical, regulatory, and financial infrastructure is in place for growth. To create an ecosystem that encourages innovation, Brazil can become more connected to global flows of data and knowledge as well as boost its R&D investment, which is currently below the world average for upper-middle-income countries. A focus on higher-value-added products and services can help Brazil’s economy become more modern, diversified, and resilient.
- 4. Build 21st-century infrastructure that integrates Brazil’s economy and connects it to the world.** One of the most important opportunities to improve Brazil’s global competitiveness and increase trade connections lies with addressing its transportation network. Brazil needs a long-term, integrated national infrastructure plan that is insulated from shifting political agendas. One option to consider is an independent oversight body that could prioritize the most important projects while considering how overall systems should work together. Brazil will need to explore new funding models and focus on efficiency and execution to attract a greater share of private investment. Projects in Brazil are constantly interrupted for various reasons, but this issue can be controlled by establishing clear and appropriate procedures for challenges and setting strict time limits for resolution. The infrastructure planning process should also consider strategies for maximizing and refurbishing existing assets, which may offer a better return on investment than new construction.
- 5. Improve competitiveness by lowering the “Brazil cost.”** Brazil has erected too many homemade barriers to growth, and its business environment needs serious reform to match the ease of doing business offered by other countries. Transparency is a key element; where trading procedures and payment requirements are clear, for example, customs brokers and trade consultants are less necessary. Brazil could also benefit from revisiting its tax structure—not only to reconsider taxation levels through the lens of global competition but also to simplify its convoluted, multilayered tax code. Gradually removing steep import tariffs on certain products (such as auto parts and vehicles) could allow Brazil to find new growth markets for its products. These tariffs are not applied consistently across all products and sectors, and a careful review is needed to ensure that Brazil opens the most relevant and competitive industry sectors.

- 6. Make the public sector more productive.** When Brazilians took to the streets in the summer of 2013, they were expressing widespread frustration with the poor quality of public services they receive in return for their taxes. Citizens are demanding better performance from their schools, transit systems, and the public health system. One critical step toward achieving that is implementing more robust and flexible systems for managing government workers at all levels. Rethinking the public sector's overall incentive structure can shift the focus from following procedures to achieving clearly defined results. Few of Brazil's government departments have gone fully digital, so there is ample room to make large gains in efficiency by integrating technology solutions.
- 7. Focus on education and training to develop human capital.** Brazil needs a skilled and productive workforce that can continuously deliver products that keep pace with a fast-changing marketplace and incorporate the latest generations of technology. While the country has made great strides in expanding primary education, there is still a long way to go in terms of reducing dropout rates, improving learning outcomes, and expanding secondary and tertiary education. The private sector can play a role in expanding training programs and apprenticeships; it can also partner with local education providers to design curricula targeted to the workforce skills that are in demand. A greater emphasis on developing human capital would have the double benefit of making Brazil's industries more competitive while also creating better career pathways and widening economic opportunity for all Brazilians.



Brazil's economic development has reached an inflection point. With extreme poverty in decline, the next challenge will be delivering higher living standards for the entire population. Now that the drivers of its recent economic growth are running out of steam, Brazil will have to accelerate productivity growth—and building deeper connections with the rest of the global economy could provide the opening to do just that. The task of “connecting Brazil” has multiple dimensions. At its most basic level, it is about dismantling barriers to increase the movement of goods. But it also entails becoming more deeply immersed in the world's flows of ideas, innovation, and people. To shake off its current stagnation, Brazil needs a broader and more integrated vision that looks across markets and across the world.

GLOSSARY

ABDI	Brazilian Agency for Industrial Development
ABINEE	Brazil Electric and Electronics Industry Association
ABTP	Brazilian Association of Port Terminals
Agapan	Gaúcha Association for Environmental Protection
AGDI	RS Gaúcha Agency for Development and Investment Promotion
AGS	Gaúcha Association of Startups
ALL	Latin American Logistics
AMCHAM	American Chamber of Commerce
APLs	Local Production Chains/Clusters
ASSESPRO	RS Information Technology and Software Industry Association
ASSINTECAL	Brazilian Association of Leather Components and Shoe Manufacturers
BADESUL	Development Bank of Rio Grande do Sul
Banrisul	Bank of Rio Grande do Sul
BID	Business Improvement District
BNDES	National Bank for Economic and Social Development
BRDE	Regional Development Bank for the Far South
BRT	Bus Rapid Transit
CA\$	Canadian dollar
C40	C40 Cities Climate Leadership Group
CDES	Council for Economic and Social Development
CEEE	RS State Company for Electric Power
CEGOV	Center for International Studies on Government
CEI/INF	UFRGS Informatics Entrepreneurship Center/Informatics Institute Technology
CEITEC	National Center for Advanced Electronic Technology
CEMIG	Energy Company of Minas Gerais
CETA	SENAI Center of Excellence in Advanced Technology
CETEMO	SENAI Furniture Technology Center
CETEMP	Precision Engineering Technology Center
CETEPO	SENAI Innovation Institute in Polymer Engineering
CIC	Chamber of Industry, Commerce, and Services of Caxias do Sul
CIENTEC	RS state government's Science and Technology Foundation
CITE	Citizens, Innovation, Technology, Entrepreneurship
CNC machine tools	computer numerical control machine tools
CNI	National Confederation of Industry
CNTL	National Center for Clean Technologies
COFIP	Petrochemical Pole Industrial Development Committee
COREDES	Regional Development Councils
CRIATEC	Innovation Business Incubator, UNIJUI
DEPLAN	RS Department of Governmental Planning
EBR	Shipyards of Brazil Ltd.
Ecovix	Engevix Oceanic Construction SA
ECPA	Energy and Climate Partnership of the Americas
Embraer	Brazilian Aeronautics Company
ESPM Business Incubator	Superior School of Advertising and Marketing Business Incubator
FACCAT	International College of Taquara
FACOS	Osorio Community College
FAFOPEE	Teachers College
FAPERGS	Foundation for State Research of Rio Grande do Sul
FARSUL	Federation of Agriculture of Rio Grande do Sul
FBDS	Brazilian Foundation for Sustainable Development
FECOMERCIO	Federation of Commerce of Rio Grande do Sul
FEDERASUL	Federation of Trade Associations and Services of Rio Grande do Sul
FEE	Economics and Statistics Foundation
FEEVALE	university, Novo Hamburgo and Sinos Valley Higher Education Federation
FENASOJA	National Soy Fair in Santa Rosa

GLOSSARY

FEPAGRO	State Foundation for Agricultural Research
FIEMA Brasil	International Environmental Technology Exposition
FIEMG	Federation of Industries of Minas Gerais
FIEP	Federation of Industries of Paraná
FIERGS	Federation of Industries of Rio Grande do Sul
FINEP	Fund for Innovation and Research
FUNCEX	Foreign Trade Studies Center Foundation
FURG	Federal University of Rio Grande
Gaúcho/a	people from Rio Grande do Sul; cultural description
GBP	Global Business Project
GBP	pound sterling, official currency of the United Kingdom
GDP	Gross Domestic Product
GFCC	Global Federation of Competitiveness Councils
HP	Hewlett-Packard Company
HUD	US Department of Housing and Urban Development
IBB	By Brazil Institute
IBRAVIN	Brazilian Wine Institute
IDEA	PUCRS Research and Development Institute
IE-CBiot	Biotechnology Business Incubator
IEITEC	Canoas Enterprise Institute Technology Innovation Incubator
IES	FEEVALE Solidarity Economy Incubator
IFF/RS	Federal Institute of Farroupilha
IFSUL	Federal Institute of Education, Science, and Technology-South Rio Grande
INCMOVEL	Furniture Industry Technology Incubator
INCUBATEC	IMED-Passo Fundo Innovative Business Technology Incubator
Inovapoa	Porto Alegre Innovation and Technology Office
INOVAPUCRS	Innovation and Entrepreneurship Network
INOVATES	Innovation and Technology Center of UNIVATES
IPA Methodist University	Porto Alegre Institute Methodist University
ISO	International Organization for Standardization
ITACA	Food and Agribusiness Technology Incubator
ITEC	Technology Incubator of Caxias do Sul
ITEF	Technology Incubator of VALETEC/FEEVALE
ITEL	Liberato Technology Incubator
ITSM	Technology Incubator of Santa Maria
IFSUL	Federal Institute of Education, Science, and Technology-South Rio Grande
ITT Chip	Technology Institute of Semiconductors
ITT Fuse	Technology Institute for Tests and Functional Safety
ITT Nutrifor	Technology Institute in Food for Health, Nutrition, and Nutraceuticals
ITT Performance	Technology Institute of Construction Performance
LEED	USGBC's Leadership in Energy and Environmental Design
LEED-ND	LEED-Neighborhood Development
MaRS	Medical and Related Sciences Discovery District
MBC	Brazilian Competitiveness Movement
MDIC	Brazil Ministry of Development, Industry and Trade
METROPLAN	RS Foundation for Metropolitan and Regional Planning
MGI	McKinsey Global Institute
MIT	Massachusetts Institute of Technology
Mostratec	Brazil Science and Technology Fair
NAGI	PUCRS Support Center for Innovation Management
NCEA	National Classification of Economic Activities
NEPIs	Productive Innovation Extension Centers
NoMa	North of Massachusetts Avenue
OCEANTEC	FURG Ocean Science and Technology Park
OECD	Organization for Economic Cooperation and Development

GLOSSARY

PA	Paraná
PAMPATEC	UNIPAMPA Technology Park
PCI	Canoas Innovation Park
pdf	portable document format
PMI	Project Management Industry Association
POA	Porto Alegre
Procempa	City of Porto Alegre Data Processing Company
PRONAF	National Program for Strengthening Family Agriculture
PUCRS	Ponticifal Catholic University of Rio Grande do Sul
PwC	Price Waterhouse Coopers
R\$	Brazilian reais
R&D	research and development
RAIAR	PUCRS/Tecnopuc Incubator
RS	Rio Grande do Sul
SC	Santa Catarina
SCIT	RS Department of Science, Technology and Innovation (now in SDECT)
SDECT	RS Department of Economic Development, Science and Technology
SDPI	RS Department of Development and Investment Promotion
SEBRAE	Support for Micro and Small Enterprises
SEMA	RS Department of the Environment
SENAI	National Industrial Apprenticeship Service
SEPLAG	RS Department of Planning, Management, and Citizen Participation
SEPLAN	RS Department of Planning and Regional Development
SESAMPE	RS Department of Solidarity Economy and Support of SMEs (now in SDECT)
SIET	International Technical Education Seminar
SINDIEÓLICA	RS Wind Industry Association
SINDILOJAS	RS Retail Trade Association
SINDMÓVEIS	RS Furniture Industry Association
SINDUSCOM	RS Construction Industry Association
SMEs	small and medium-sized enterprises
SoHo	South of Houston, neighborhood in New York City
TECNA	Tecnopuc Audio-Visual Technology Center
TECNOPARQUE	Santa Maria Technology Park
TECNOPUC	PUCRS Technology Park
TECNOSINOS	Unisinos Technology Park
TECNOSOCIAL	Solidarity Economy Enterprise Incubator
TECNOSUL	Pelotas Technology Park
TECNOUCS	UCS Technology Park
TECNOUNISC	UNISC Technology Park
TECNOVATES	UNIVATES Technology Park
Trensurb	Porto Alegre Urban Train Company
TriBeCa	Triangle Below Canal Street, neighborhood in New York City
TTS	text to speech
UAVs	Unmanned Aerial Vehicles
UCPEL	Catholic University of Pelotas
UCS	University of Caxias do Sul
UERGS	RS State University
UFCSPA	Federal University of Health Sciences
UFFS	Federal University of the Southern Frontier
UFPEL	Federal University of Pelotas
UFRGS	Federal University of Rio Grande do Sul
UFSM	Federal University of Santa Maria
ULBRA	Lutheran University of Brazil
ULBRATECH	ULBRA Canoas Technology Park
UNEMAT	University of the State of Mato Grosso
UNICRUZ	University of Cruz Alta

GLOSSARY

UNIFRA	Franciscan University Center of Santa Maria
UNIJUI	University for the Northwest Region
UNILASALLE	La Salle University Center of Canoas
UNIPAMPA	Federal University of the Pampa
UNISC	University of Santa Cruz do Sul
UNISINOS	University of the Sinos River Valley
UNISUL	University of South Santa Catarina
UNITEC	Tecnosinos Incubator and Technological Complex
UNIVATES	University of the Taquari Valley
UPF	University of Passo Fundo
URCAMP	University of the Campanha Region
URI	Regional Integrated University of Alto Uruguai and Missões
URINOVA	URI-Santo Ângelo Technology Business Incubator
US\$	US dollar
USGBC	US Green Building Council
USP	University of São Paulo
VAB	Gross Value Added
VALETEC	FEEVALE Technology Park
WBG semiconductors	wide bandgap semiconductors