

Industry-University Partnerships for Impact

A forum organized by the GFCC
and CNI-MEI



ORGANIZERS



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900 17th Street, NW, Suite 700, Washington, D.C. 20006

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Letter from the GFCC Leadership

The world is facing incredibly challenging times aggravated by the ongoing war in Ukraine. The war has caused tragic humanitarian loss, disrupted supply chains, raised fears of food and energy insecurity, and driven inflationary and recession pressures across nations. Never has there been a time so crucial to foster dialogue and strategic partnerships involving like-minded countries and cross-sector collaboration to meet global challenges, and to forge peace, competitiveness, prosperity, and economic growth.

In the spirit of learning and collaboration, we are pleased to present *Industry-Universities Partnerships for Impact*, a report documenting discussions held on March 11, 2022, in São Paulo, Brazil. The event marked the resumption of GFCC in-person activities since the onset of COVID-19 and represented another step in the engagement of the GFCC community with leaders and organizations in Brazil. Co-organized by the GFCC and our member, the Brazilian National Confederation of Industries (CNI), the Forum gathered C-suite leaders from more than ten countries. The discussions highlighted critical trends driving industry, government, and university partnerships, and catalyzed the exchange of ideas and best practices to advance innovation and foster new collaborations.

Higher education institutions and research organizations play pivotal roles in competitiveness and economic growth. They are critical components of innovation ecosystems, and serve as wellsprings of new knowledge and technology that function as the building blocks for new products, services, systems, and processes. They develop the talent needed for discovery and investment, and feed the pipeline of creative entrepreneurs who drive new business formation. When one looks at a global map of industry clusters and thriving start-up zones, seeing universities and research institutions anchoring the most innovative cities and regions should be no surprise.

The GFCC has advocated for strengthened ties between universities and industry since its inception. The creation of the University and Research Leadership Forum (URLF) in 2016 signaled this commitment, establishing a venue for GFCC university, government, civil society, and corporate members to identify and discuss ideas to optimize the university and research enterprises.

Throughout the years, the URLF has conducted timely reviews of universities' roles and strategies, highlighting ways for higher education institutions to become more innovative and engage in transformational technology projects. The reports released between 2017 and 2018 — *Convergence and Circulation*, *Speed and Leadership*, *Leveraging Extreme Innovation*, and *Optimizing Innovation Alliances* — showcase new models for university and research organizations.

CNI has been a long-standing partner in this process. As a GFCC sustaining member and a member of the GFCC Board of Trustees, CNI has contributed to building the URLF initiative, sharing experiences with university members, and articulating the importance of industry-university partnerships for technological development and innovation in Brazil.

On different occasions, GFCC members have had a chance to engage with CNI members and partners, including the leaders of the Entrepreneurial Mobilization for Innovation (MEI) and its Engineering Working Group. In April 2019, GFCC and CNI showcased the results of past URLF reports at a workshop focused on new trends having an impact on the higher education sector. In June 2019, the GFCC and CNI convened a workshop with Brazilian and GFCC university leaders at the global headquarters of Embraer, the Brazil-based aerospace conglomerate.

The most recent Industry-University Partnerships for Impact Forum in São Paulo provided an opportunity for leaders in the GFCC network to exchange best practices and experiences with their counterparts in Brazil, and to continue a dialogue that was started years ago.

Cross-sector dialogues are vital to driving sustainable development. The GFCC Frame the Future Conversation Series, hosted in 2021, highlighted the importance of including innovation, partnership, resilience, inclusiveness, and sustainability in competitiveness strategies. The São Paulo Forum reflected these imperatives.

Leaders founded the GFCC with the belief that fostering global, cross-sector dialogues would benefit universities, corporations, and governments. The reflections of the Forum proudly fulfilled this goal.



Charles O. Holliday Jr.
Chairman, GFCC



Deborah L. Wince-Smith
President, GFCC
President & CEO, Council
on Competitiveness

Letter from the President of CNI



Robson Andrade
President, Brazilian National
Confederation of Industry (CNI)

Business activity has gone through challenging times. All over the world, entrepreneurs need to adapt to the changes brought by the advance of technology and digitalization in production models and global value chains. They also continue to seek answers to the unexpected problems brought about by the COVID-19 pandemic, in addition to facing the economic turmoil caused by the war in Ukraine.

In this scenario, it is increasingly clear that science,

technology and innovation become even more important, as they will be the source of the solutions that companies and countries need in order to overcome contemporary adversities. Therefore, partnerships between academia and industry, which have enormous potential to develop and improve technologies, must occupy a strategic place in plans for the recovery of the world economy.

These partnerships can take different forms and involve providing services, supporting the identification of talents, and structuring joint research laboratories, among other activities. Regardless of the institutional arrangement, it is observed that an important part of innovation policies has supported cooperation between universities, research institutes and companies with the aim of strengthening systems or reducing the risk of innovative activities.

The Industry-University Partnerships for Impact Forum, carried out by the Brazilian National Confederation of Industry (CNI) and the Global Federation of Councils on Competitiveness (GFCC), with the support from the Entrepreneurial Mobilization for Innovation (MEI), showed that there are numerous possibilities and several types of cooperation arrangements. In Brazil, for example, the model of the Brazilian Company of Research and Industrial Innovation (Embrapii), inspired by the Fraunhofer-Gesellschaft, from Germany, has been a successful experience.

Anchored in the triple helix – government, academia, and industry – Embrapii has promoted public-private innovation and leveraged business investment in technology. Another Brazilian advance is the legal framework for ST&I. After years of discussion, we reached a more friendly legal framework, which facilitates the linkages between companies and academic and research institutions for scientific and technological development in Brazil.

MEI and CNI worked actively in defense of these initiatives because they understand the importance of the university-company relationship for innovation processes and for academic activity. There is evidence, in Brazil, that groups of researchers from universities that participate in innovation projects in cooperation with companies have higher scientific productivity than teams that do not have this type of partnership. It means that well succeeded cooperation is a win-win game.

For this reason, we defend the importance of holding Industry-University Partnerships for Impact Forum. In addition to reinforcing the benefits of university-industry cooperation, and the possible difficulties in working together, the event promoted sharing of good practices.

This type of exchange is both desirable and necessary, especially in the current scenario of rapid technological changes and demand for solutions to complex global challenges. In this regard, I highlight the relevance of the partnership with the GFCC, which enabled the participation of experts from different countries and institutions who were able to exchange their experiences and points of view on the subject.

This document contains the essence of the debates in the Forum. We hope that it stimulates reflection and encourages the establishment of partnerships between universities and businesses in multiple innovation ecosystems.

Letter from the GFCC Executive Director



Dr. Roberto Alvarez
Executive Director, GFCC

You wouldn't be reading this text if I hadn't had access to higher education. I was the first of my family to do so, thanks to millions of Brazilian taxpayers who funded most of my education in the Brazilian public university system. And it is through my Brazilian eyes that I introduce to you this report that covers the Industry-Universities Partnerships for Impact Forum.

Brazil is a place full of contrasts and was unknown to many of the GFCC mem-

bers from Japan, Peru, Portugal, Qatar, Zimbabwe, the United Arab Emirates, the United Kingdom, and the United States who joined us in São Paulo on March 11, 2022. The same country where a sophisticated and innovative global company such as Embraer was born and is headquartered still has a way to go to modernize its institutions, improve the business environment, and close the gap between the public and private sector – not to mention to include the greatest part of its population in the 21st century innovation economy.

The discussions in São Paulo highlighted two important things. First, the challenges to bridge Brazilian universities and industry are not unique – actually, they are quite the same across the planet, with different countries and institutions developing their own solutions. Second, a lot of progress has been made in Brazil in recent decades to close the gap between industry and academia. To a great extent, advancements in legal frameworks are the result of the policy work of organizations like CNI's Entrepreneurial Mobilization for Innovation (MEI) and the leaders behind it, who hosted us in São Paulo.

Building on the previous work of the GFCC University and Research Leadership Forum, the leaders joining the activities in São Paulo exchanged best practices about how to advance innovation via industry-university partnerships. This report introduces relevant examples, as well as critical concepts that emerged from the conversations and interviews with GFCC leaders. Here are four of my favorites:

- To advance innovation, we must purposefully engage with new stakeholders.
- Institutional innovation can unlock innovation at speed and scale. It is happening.
- Universities must deploy novel organizational solutions to close the gap with industry.
- Sustainability and resilience will be dominant topics for industry-university work.

Higher education institutions have contributed immensely to humanity at all levels and our own individual lives. They strive to continue to do so, but are fundamentally challenged to change at the present time and to blend themselves with industry and society.

Never before has the theme of industry-university partnerships been so relevant and urgent worldwide. Being part of a conversation about this fundamental competitiveness topic was a privilege. It was also a total delight to be in-person again with so many friends and colleagues, in a room full of noise and exciting ideas.

I hope you enjoy reading this report as much as I enjoyed the Forum.

Letter from the CNI Innovation Director



Gianna Sagazio
Innovation Director, Brazilian
National Confederation
of Industries (CNI)

Since at least the 1980s, the country has sought to encourage cooperation between sectors, such as through laws and programs that favor the development of joint research and the transfer of knowledge. With the objective of debating the obstacles and, mainly, learning and exchanging good practices about this relationship (which is so necessary for innovation processes), the Brazilian Confederation of Industry (CNI) held in partnership with the GFCC Industry-Universities Partnerships for Impact Forum on March 11, 2022, an event organized with the support of the Entrepreneurial Mobilization for Innovation (MEI), a business leadership movement coordinated by CNI.

As pointed out in the discussions, Brazil registers efforts to improve the institutional and regulatory environment in order to strengthen the university-company relationship and bring

The importance of articulation between companies and universities/research centers for technological advancement and innovation is widely publicized in the literature and recognized by several countries. In these cases, stimulating the production of knowledge and its transformation into value is treated as strategic to generate competitive advantages capable of increasing and sustaining economic growth.

The United States is a clear example of this position.

the public and private sectors closer together. From this point of view, a very important step was taken with the adoption of a new legal framework for science, technology and innovation (law nº 13.243/2016 and decree nº 9.283/2018) from 2016. The new framework brought more flexibility and security for the university-companies relationship by reducing the bureaucracy of the process of technology transfer and investments in innovation; for example, through the exemption of bidding for the purchase or contracting of the State aimed at carrying out research and development activities.

This regulation represents a concrete advance for the Brazilian innovation system, but its application still faces resistance because historically Brazilians deal with a very rigid institutional and legal system with a lack of programs and support mechanisms that induce long-term partnerships and are oriented to solve major national challenges. In any case, Brazil has tools to bring the world and academia closer together. An example is the Brazilian Industrial Research and Innovation Company (Embrapii), whose model is oriented to finance cooperative projects between companies and research institutions in a fast and unbureaucratic way. Another one is the network of Senai Institutes of Innovation (ISIs) and Senai Institutes of Technology (ISTs), which brings together, respectively, 26 and 62 units spread across the country focused on promoting technological development and innovation in partnership with industry. In spite of these good practices, it is necessary to go further in the improvement of governance and incentives in order for the collaboration between universities and companies to become a key part of ST&I strategies, as observed in other countries. Hence the need for events such as the Forum to provoke discussion around this agenda and to disseminate successful experiences in the country and abroad.

From this point of view, some recommendations/reflections shared during the panel discussions are highlighted below:

- Build common agendas that reflect the demands of companies and academic interests, as this is the basis of cooperative agreements;
- Encourage the circulation of professionals, as the movement of people between the academic and business worlds deepens academic-industry connections;
- Rethink the educational model, placing problem-solving-oriented learning and the importance of diversity of people in environments that lead to innovation at the center;
- Expand partnerships that have shown to be a promising path for the emergence of startups and technological developments, and a source of economic growth;
- Establish cooperation agreements as a win-win game in which both sides must be open to learning (companies can benefit from increasing their scientific knowledge and universities can improve their skills and management models);
- Build global networks of cooperation to face contemporary global challenges, something that has proved essential – and possible – during the COVID-19 pandemic.

CNI expects to promote other meetings like this one in partnership with the GFCC in order to stimulate the exchange of ideas and experiences. We know that there is no single formula to bring academia and industry together, but fostering dialogue between actors from national innovation ecosystems is an important ingredient to make this relationship progress. We believe that this edition of the University-Industry Forum contributed in this direction.

A Network of Global Leaders



The Industry-University Partnerships for Impact Forum provided exclusive networking opportunities for industry and academia leaders and policymakers. Senior leaders from Brazil, the United States, Japan, Peru, Zimbabwe, Qatar, the United Kingdom, and the United Arab Emirates had the chance to exchange contact information, cultivate a relationship with their peers, and share best practices in their areas.

For more than a decade, the GFCC has been a platform for leaders to identify new opportunities and exchange best practices within a highly selective network of C-suite professionals from more than 32 countries. [Please see membership levels and benefits on the GFCC website.](#)

Industry-University Partnerships for Impact Forum participants talk to their peers and exchange contact information March 11, 2022, in São Paulo, Brazil.



Lessons from the GFCC University and Research Leadership Forum

Universities and research organizations are key components of innovation ecosystems and play various roles in socio-economic development. They are indispensable for driving national competitiveness and for achieving higher living standards. They are also essential for building talent; creating new technologies, products, companies and industries; and developing local economies. But these roles are not static.

A rapidly transforming world puts pressure on universities and research organizations to adapt and play new roles. In response, new models are emerging globally, in an ever-evolving process that the COVID-19 pandemic has accelerated. The University and Research Leadership Forum (URLF) was created recognizing the importance of advancing a global discussion on the role of universities in the knowledge economy. It aims to shed light on and understand the challenges and opportunities in the higher education sector as the economy becomes more complex and digital.

During the Industry-University Partnerships for Impact Forum, GFCC Executive Director Roberto Alvarez reviewed the URLF's main activities during the past six years and the main lessons learned through its work.

The University and Research Leadership Forum Over the Years

The GFCC launched the URLF in November 2016 in London during a meeting with 38 university presidents and vice-presidents, C-suite philanthropy and business executives, and policy leaders from 20 countries.

On this occasion, two task forces were created to explore innovative practices and catalyze partnerships between universities and non-academic stakeholders. Following the inaugural meeting in London, the URLF met in Kuala Lumpur, Malaysia, in 2017 and in Buenos Aires, Argentina, in 2018.



Dr. Roberto Alvarez, Executive Director, GFCC, presenting during the Industry-Universities Partnerships for Impact Forum March 11, 2022, in São Paulo, Brazil.

The work cycle that started in London resulted in the release of two ground-breaking reports by the end of 2018: *Optimizing Innovation Alliances* and *Leveraging Extreme Innovation*. These reports display the toolkits available to universities for engaging in innovative projects using technology. They have been discussed in various global meetings, workshops, and forums.

In 2019, the URLF gathered during the GFCC Global Innovation Summit in Nur-Sultan, Kazakhstan. At this summit, URLF members agreed on developing a new model for technology-enabled and impact-oriented universities. Since then, the GFCC has organized a series of initiatives to discuss these ideas. It has launched three timely discussion papers on the future universities in partnership with the Queen Mary University of London, the University of Auckland, and RMIT Australia.

University and Research Leadership Forum Reports

Click on a cover image to download a PDF of the report.

2021



2018



2017



The GFCC also released an executive summary in partnership with the University of North Carolina at Chapel Hill on trends influencing higher education business models, and highlighting how changes in demographics, the emergence of new types of certifications, and shifts in the job market are reshaping universities' roles.

In parallel, since March 2020, the URLF has been involved in a series of initiatives to unpack the impacts of the COVID-19 pandemic on universities, including the execution of webinars with university members, interviews with university leaders, and the creation of a report covering the initiatives played out by universities in this disruptive period.

Lessons Learned

The COVID-19 pandemic has accelerated trends concerning roles, tools, organizational solutions, and the pool of resources in the higher education sector. There is a movement toward expanding and improving virtual access options, and many universities are making a significant effort to become attuned

to and support the needs of their local communities. However, a successful transition to the future will depend on universities adopting entrepreneurialism at their core and fostering partnerships across sectors and with multiple stakeholders.

Through the URLF, the GFCC wants to contribute to this endeavor by catalyzing information exchange, promoting discussions on new models, and sharing experiences and lessons learned.



Institutional Frameworks for Industry-University Partnerships in the United States and Brazil

MODERATOR

Mr. Cesar Ivan Gaitan Tovar

CEO, Cluster South America, Festo

KICK-OFF DISCUSSANTS

Mr. Rafael Lucchesi

General Director, National Service of Industrial Training (SENAI)

The Hon. Deborah Wince-Smith

President, Global Federation of Competitiveness Councils, and
President and CEO, Council on Competitiveness

The United States and Brazil have different legislations and institutional frameworks regulating the relationship between the public and the private sectors, impacting how industry and universities interact in both countries. The United States pioneered changes in legislation with the creation of the Bayh-Dole Act in 1980, helping to foster cooperation between corporations and universities. In Brazil, the lack of mechanisms regulating these relationships kept universities and corporations apart for most of the 20th century.

The Bayh-Dole Act was vital to accelerate the U.S. innovation ecosystem. It gave universities the rights of intellectual property (IP) generated from federally funded research and led to the creation of the biotech industry. Nowadays, it incentivizes research and development (R&D) and technology transfer between research universities and businesses in many industries. Throughout the years, other pieces of legislation were issued to update the legal framework for innovation in the United States. In 2004, Brazil approved for the first time a similar law (Innovation Law No. 10.973), regulating partnerships between corporations, public-funded universities, and research institutes.



Mr. Rafael Lucchesi, General Director, National Service of Industrial Training (SENAI); Moderator: Mr. Cesar Ivan Gaitan Tovar, CEO, Cluster South America, Festo; and the Hon. Deborah Wince-Smith, President, Global Federation of Competitiveness Councils, and President & CEO, Council on Competitiveness.

With shortened economic cycles due to accelerated technological change and the entrenchment of the global economy, it is crucial to update the legislation overseeing the relationship between the public and private sectors. These laws should reduce the friction that impedes partnerships between universities and corporations from being developed and executed, facilitating innovation and helping economies foster a competitive advantage.

Develop Models for Collaboration

Interested parties (including universities, corporations, governments, and civil society) need to discuss ways of collaborating in a win-win scenario, sharing assets and capabilities to create value for economies and societies. It is crucial to consider that different players, particularly universities and corporations,



Mr. Rafael Lucchesi, General Director, National Service of Industrial Training (SENAI); Moderator: Mr. Cesar Ivan Gaitan Tovar, CEO, Cluster South America, Festo; and the Hon. Deborah Wince-Smith, President, Global Federation of Competitiveness Councils, and President & CEO, Council on Competitiveness.

might operate with distinct time horizons, agendas, and missions. These are all important factors to consider for promoting and amplifying sustained impact.

Stimulate Talent Mobility

Academics work in a knowledge-intensive environment exposed to theoretical frameworks, historical patterns, and creativity. They often lack corporate experience, understanding of market needs, and the hurdles of commercializing new products. Stimulating talent mobility between academia and industry would benefit universities. Through hands-on experiences, academics could gain specific competencies and generic skills sought by employers in their sector which could, in turn, help them improve pedagogy to better prepare the future workforce.

Manage Contract Disclosure

Partnerships between corporations and universities often happen ad hoc without a corporate strategy, leading to lost opportunities or disagreements over research outcomes. The degree of disclosure of the results is an essential dimension of industry-university partnerships. Openness facilitates rapid publishing, while IP is the frontier of competitive advantage for companies that often seek to protect discoveries. The creation and the commercialization of the outcomes need to be discussed upfront and streamlined to forge long-lasting partnerships.

Accelerating Partnerships for Impact: Best Practices & Emerging Models

MODERATOR

Prof. Gustavo Donato

Dean FEI

KICK-OFF DISCUSSANTS

Mr. Paulo Roberto Gandolfi

Director of R&D Operations, 3M, and Volunteer Vice-President, 3M Institute of Social Responsibility

Dr. Jefferson Gomes

Innovation and Technology Superintendent, SENAI

Prof. Sally Morton

Executive Vice President of the Knowledge Enterprise, ASU

Dr. Bin Yan

Director of the Office of Technology Transfer, University of Miami



Dr. Jefferson Gomes, Innovation and Technology Superintendent, SENAI; Mr. Paulo Roberto Gandolfi, Director of R&D Operations, 3M, and Volunteer Vice President, 3M Institute of Social Responsibility; Prof. Gustavo Donato, Dean, FEI; Prof. Sally Morton, Executive Vice President, Knowledge Enterprise, ASU; and Dr. Bin Yan, Director of the Office of Technology Transfer, University of Miami

Accelerated technological change and global challenges impact societies and economies while pushing universities to experiment with new models and innovate. Partnerships with the business sector and government labs will be essential to help universities expand their outreach to local communities. Successful relationships between universities and non-academic stakeholders must address four main dimensions. The first concerns vision, leadership, and commitment from all parties involved in the innovation ecosystem, including universities, established companies, startups, governments, and other intermediary agencies. Universities need to reframe their operations to align with the economic agenda and social demands, while associating learning and research with public value. The second depends on companies' and universities' structures and organizational setups, which need to be prone to collaboration. Holding a department within the university or

an agency specializing in fostering partnerships and mediating relationships between researchers, faculty, and the private sector can be advantageous. Third is the overall culture of universities and companies. Universities need to become more proactive, offering opportunities to interested parties instead of only reacting to what has been proposed. Similarly, companies willing to partner with universities need to adapt by learning to connect with academics, understanding their timelines and vision over the outcomes. Fourth, the institutional frameworks and legislation that oversee these partnerships play a big role. In the United States, the Bayh-Dole Act issued in 1980 (see page 10) is a milestone in the development of industry-university collaboration. A new patent law could also help to overcome the persistent hurdles in IP management.

Arizona State University (ASU), a GFCC member, has been ranked the most innovative university in the United States for seven years. ASU's structure has been adapted to foster partnerships with interested parties and advance research with public value. The university is divided into three programs: Academic Enterprise, Learning Enterprise, and Knowledge Enterprise. This tripod setup aims to promote the university's mission of broadening access to higher education, advancing research that helps people, and demonstrating responsibility to the communities it serves. ASU uses a business concierge service that allows a company to come and connect with a professional immediately. This service is integrated into a database that helps faculty members keep track of proposals for future partnerships with corporations. ASU also established entities between the universities and the corporate sector with professional staff that work to meet corporate needs within the Knowledge Enterprise program. Finally, in terms of organizational structure, ASU removed regular departments and now operates in a transdisciplinary framework to foster innovative thinking.

Invest in Applied Learning

Undergraduate programs worldwide remain excessively theoretical, with students missing the opportunity to apply the knowledge and skills gained in the classroom to a hands-on experience in a real-world setting. A push towards applied learning can benefit students and help foster reciprocal opportunities and partnerships with communities, industry, and other stakeholders. Applied learning can include internships, service-learning, cooperative education, clinical education, student teaching.

Favor a Culture of Collaboration

A culture of collaboration between universities and industry is not enough to fuel an innovation ecosystem, but it is an important connector. Persistent discrepancies over social roles and values have kept universities distant from corporations, particularly in Brazil. A more dynamic university operating with the private sector to advance a national innovation agenda can be an asset to the socioeconomic development of any country.

Foster Win-Win situations

Collaboration between universities and industry is a critical component of an efficient innovation ecosystem, and it must be encouraged by fostering win-win situations. Streamlining processes and developing structured contracts with clear directives over desired outcomes and IP management can help make these relationships more valuable.

Partnerships to Seize the Sustainability and Resilience Opportunity

MODERATOR

Dr. Camila Gramkow

Economic Affairs Officer, Economic Commission for Latin America (ECLA)

KICK-OFF DISCUSSANTS

Mr. Daniel Leibfried

Director for Innovation, John Deere Latin America

Mr. Phillip Phiri

Executive Director, National Competitiveness Commission, Zimbabwe

Dr. Kazuyoshi Shimada

Director, Washington D.C. Office, Japan Science and Technology Agency (JST)

Prof. Alejandro O. Silva Vela

Director of the Science and Technology Park, San Agustín de Arequipa National University, Peru

Mr. Alex Fedozzi Vallone

Institutional Relations Coordinator, Institute for Technological Research (ITP)

Dr. Marianne Walck

Deputy Laboratory Director for Science and Technology and Chief Research Officer, Idaho National Laboratory

The competitiveness agenda has recently evolved to meet the demands of a new growth path in which sustainability and resilience are not seen as a cost or a barrier to development. Instead, they present opportunities for countries and businesses to innovate. In the *Frame the Future: Guidelines and Recommendations for Future Competitiveness*, the GFCC makes a case for including sustainability, resilience, innovation, inclusiveness, and partnerships into all competitive strategies



Mr. Daniel Leibfried, Director for Innovation, John Deere Latin America; Dr. Marianne Walck, Deputy Laboratory Director for Science and Technology and Chief Research Officer, Idaho National Laboratory; Mr. Alex Fedozzi Vallone, Coordinator of Institutional Affairs, IPT; Dr. Camila Gramkow, Economic Affairs Officer, Economic Commission for Latin America (ECLA); Prof. Alejandro O. Silva Vela, Director of the Science and Technology Park, San Agustín de Arequipa National University, Peru; Mr. Phillip Phiri, Executive Director, National Competitiveness Commission, Zimbabwe; and Dr. Kazuyoshi Shimada, Director, Washington D.C. Office, Japan Science and Technology Agency (JST).

and policies for the future. This paradigmatic shift has been pushed by growing concerns over climate change, the risks of biodiversity loss, the need for an energy transition, and other global challenges, such as the COVID-19 pandemic. Technological change and innovation are the primary enablers of new low-carbon production models and resilient infrastructure. They will be of the utmost importance to reduce the costs of the low-carbon transition and create new solutions to a zero-carbon development path. The *Frame the Future* report suggests implementing effective measures to put a price on carbon and triple investments in the development of clean technologies. University-industry collaboration is an essential part of the sustainable development equation. While universities can supply the industry with talent and expertise, they can also finance new



Dr. Camila Gramkow, Economic Affairs Officer, Economic Commission for Latin America (ECLA); Prof. Alejandro O. Silva Vela, Director of the Science and Technology Park, San Agustín de Arequipa National University, Peru; Mr. Phillip Phiri, Executive Director, National Competitiveness Commission, Zimbabwe; and Dr. Kazuyoshi Shimada, Director, Washington D.C. Office, Japan Science and Technology Agency (JST).

projects and share their capabilities to advance cutting-edge research and develop new products to reduce carbon emissions. It is also crucial to foster North-South cooperation to promote a just transition and avoid widening socioeconomic gaps due to technological development in the race for a green economy.

Use Precision Agriculture to Boost Food Production

Rural areas still lack access to digital infrastructure. Addressing this connectivity gap through investment in broadband internet access can be an asset in meeting the United Nations Sustainable Development Goals (SDGs). Brazil is a leading global exporter of grains, but has not yet developed its potential with

Precision Agriculture, which leverages technologies to enhance sustainability. Investing in the use of data and advanced technologies in the agricultural sector can improve crop efficiency, productivity, quality, and profitability. Better and more abundant crops can help the global population achieve food security and end hunger, meeting SDG number two, Zero Hunger.

Advance Innovation for Sustainable Development

The role of innovation is of the utmost importance to reduce the costs of a green economy and generate new solutions to achieve the SDGs. Innovation for sustainable development means investing in new business models and adopting new mindsets. For instance, innovation in how cities and nations finance development through green bonds and other investment models is essential to promote a competitive zero-carbon development path.

Invest in Circular Economy Business Models

Circular economy models can offer a competitive advantage to businesses in the future while also contributing to reducing waste and carbon emissions. However, there is growing awareness that transitioning to a circular economy model will only work with the engagement of multiple stakeholders. Therefore, incentivizing collaboration is a centerpiece of any strategy. The Idaho National Laboratory in the United States is working on circular economy technologies by developing plant-based alternatives to plastic. This project involves public and private entities, and it aims to spur the development of advanced manufacturing technologies that use less energy and generate less waste.

Industry-University Collaboration at Speed

A conversation with GFCC Chairman Charles O. Holliday Jr.

Mr. Charles O. Holliday Jr. is a global business leader with a long history of fostering public-private sector collaboration in research and innovation. He is a pioneer in framing discussions on sustainability in the corporate sector and was one of the first business leaders to publish a book discussing the topic. Mr. Holliday has chaired a variety of international projects related to clean energy and energy transformation, including the United Nations Initiative Sustainable Energy for All (SEforALL). Mr. Holliday is the co-founder and chairman of the GFCC, and has previously served as Chair of the Board of Royal Dutch Shell, Chair of the Board of Bank of America, and Chairman and CEO of DuPont. In this fireside chat, led by GFCC Executive Director Dr. Roberto Alvarez, Mr. Holliday shares his experience leading partnerships between industry and universities, emphasizing the importance of listening to all partners and planning for the obstacles upfront. He also comments on the need for an energy transition towards more sustainable methods.

Dr. Roberto Alvarez: What would you recommend to leaders in universities, corporations, and governments across the globe that want to forge sustainable industry-university partnerships?

Mr. Charles O. Holliday Jr.: About ten years ago, I had the honor of chairing a study on the future of research universities commended by the National Academy of Science in the United States. I have followed research universities since then. What stands out to me as the most successful way to have a partnership is listening. Universities need to listen to all their partners. I understand the partners to be the students, the faculty, the government supporting the university, and the companies hiring your students. Think broadly about who your partners are and be the best listener. If I had to look at my two years working on that commission, partnerships came up as critical during discussions. But I also found the universities didn't listen to the businesspeople as much when we said that they must run an



Dr. Roberto Alvarez, Executive Director, GFCC; and Mr. Charles O. Holliday Jr., Chairman, GFCC.

effective and efficient university. You can't waste resources. If you want businesses to invest and students to pay fees to attend your university, you need to use your resources wisely. If I had to recommend only one thing, it would be that: use your resources wisely.

Dr. Alvarez: You are a global energy leader. What would you have to say about the energy transition and the energy crisis due to the invasion of Ukraine?

Mr. Holliday: I served on the Shell board for ten years, and it was an incredible ten years because the speed of the energy transition increased dramatically during my tenure. We've had multiple energy transitions in the world before. I count about four. You could get more if you use a different definition. We are clearly in an energy transition now. It is going to happen. But there are two big unknowns: what the new energy system will be and when will the energy transition happen. We must take steps forward now, but recognize that there are a lot of unknowns. When I think about the situation in the world today, the aggression of Russia in Ukraine, a tragic loss of life, this is terrible for all of us. But perhaps this war will help us understand that if we

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"After COVID-19 and this terrible war, all countries will spend time analyzing how they can be more self-sufficient in several areas. That's one of the reasons why there will be a resurgence in investments in locally produced energy - wind and solar, for example. We will also find ways to make critical materials available, such as personal protective equipment."

Mr. Charles O. Holliday Jr.
Chairman, GFCC.

had moved faster with the energy transition, we could have dealt better with this situation. One good thing that will come out of this tragedy is that other nations will start moving faster on the energy transition to the forms of energy that are truly sustainable in the long term.

Dr. Alvarez: You have advocated for strengthening sustainability and resilience practices in the business sector for a long time. How could universities and industries work together to advance these agendas?

Mr. Holliday: I would focus on universities forming relationships with the organizations that can help them become more effective going forward. Look for things in your community that don't connect well. Deborah Wince-Smith will remember when the U.S. Council on Competitiveness organized regional forums and visited local communities to understand how they could be more competitive. We found that the lines of communication between universities and businesses weren't as strong as they should be. For instance, a company would pick out a university to approach for a new project. They would talk to them, but if it wasn't a good fit, that university wouldn't say there's another university that could help. It is important to put things in place in your local community and link things going forward.

Dr. Alvarez: With the COVID-19 pandemic and the war in Ukraine, we have learned that both the United States and Brazil depend on certain materials to run the economy and that we can't be entirely dependent on outside sources. This situation can be an opportunity for industries in Brazil to invest in the development of products and materials that were traditionally imported from other places. What role can government, companies, enterprises, and universities play in preparing the country for extreme situations?

Mr. Holliday: After COVID-19 and this terrible war, all countries will spend time analyzing how they can be more self-sufficient in several areas. That's one of the reasons why there will be a resurgence in investments in locally produced energy - wind and solar, for example. We will also find ways to make critical materials available, such as personal protective equipment. We learned during the pandemic that we can't be dependent on only one or two countries. We're going to find ways to produce these materials effectively. Our colleagues in the U.S. Council on Competitiveness know that resilience is the keyword. We must build resilient systems inside our countries and our companies because we cannot predict the next disruptive issue. We can't predict the next pandemic, the next war, or whatever else will happen. So we need more resilience in companies and governments.

Dr. Alvarez: Are you making a case for counter-cyclical investments to build the future?

Mr. Holliday: Absolutely. But we should not underestimate the amount of courage it takes to make those counter-cycle investments. I sat on the board of Shell for ten years. We knew when there was the right time for counter-cyclical investments. But that usually wasn't when we had a lot of cash available. When you are in one of those times, you need to have the courage to make the investments when you don't have so much money. It's very easy to say; it is harder to do.

Dr. Alvarez: One of the key challenges hindering industry-university collaborations is incentives. What is your take on the use of technology challenges and prizes, for instance? How can you align industry interests, driven by corporate objectives, to university interests, driven by research objectives, to solve the world's greatest challenges?

Mr. Holliday: Grand prizes play a very important role. Creating a meaningful prize and celebrating it on a special occasion can help align interests. But I don't think that only setting up prizes would be enough. It takes quality time and sitting down with the right people to make industry-university collaborations work. The discussions around possible obstacles and project deliverables need to happen upfront. When I worked at DuPont, we had a major alliance with the Massachusetts Institute of Technology (MIT) around using biotechnology to replace petrochemical materials. In total, we had 17 individual projects. We decided to staff teams for each project with half MIT professors or students and the other half with professionals from DuPont. We also created a DuPont office on campus at MIT. So we would post our people there, and the people come by and talk and be open to talk about problems when they came up. Three of those 17 projects became very successful commercial products besides moving the technology. But I would say that we would have been delighted if we had gotten only one out of the 17.

Dr. Alvarez: What's the relationship between the unknowns in the energy transition and the role that universities can play by partnering with the industry?

Mr. Holliday: Universities could help companies understand the science. If you look at the United Nations reports on the science of climate change, you will find that they are broad and don't talk about specific regions nearly as much as they could. Companies need great scientists housed at these universities to help them interpret what climate change and the energy transition mean to them, how they will impact their business, and how they will affect their employees, customers, and suppliers. So I think universities can be trusted advisors to companies.

This interview was edited and shortened to fit this format. We thank the participation of Dr. Pedro Wongtschowski, Chairman of the Board of Ultrapar, Prof. Ted Zoller, TW Lewis Professor & Director Center of Entrepreneurship, UNC Kenan-Flagler Business School, Prof. Peter G.R. Smith, Associate Vice-President International Projects of the University of Southampton, and Dr. Nkem Khumbah, GFCC Senior Fellow and Chairman of the Africa Development Futures Group.

Designing Future Industry-University Partnerships

MODERATOR

Dr. Pedro Wongtschowski

Chairman of the Board, Ultrapar

KICK-OFF DISCUSSANTS

Prof. Mahmoud Abdulwahed

Director, Office of Strategic Innovation, Entrepreneurship & Economic Development (SIEED) at the President's Office, Qatar University

Mr. Luis Carlos Affonso

Vice-President of Technology, Engineering, and Corporate Strategy, Embraer

Prof. Peter Smith

Pro Vice-Chancellor, International, University of Southampton

Prof. Jay Walsh

Vice President for Economic Development and Innovation, University of Illinois System

A rapidly transforming society puts pressure on universities to adapt and play new roles. Sustainability has permeated the research agenda, and there is growing awareness of the importance of universities giving back to their communities and fostering a positive social impact. In response to these changes, new models for collaboration between universities and industry have emerged, along with a call to develop new capabilities and align incentives.

Across the globe, there are multiple examples of innovative models played out by educational and research institutions. The Qatar University is implementing a new operating model tied to the Qatar National Vision 2030 for economic development, focused on transforming the country from a commodity-based



Prof. Peter Smith, Pro Vice-Chancellor, International, University of Southampton; Prof. Jay Walsh, Vice President for Economic Development and Innovation, University of Illinois System; Dr. Pedro Wongtschowski, Chairman of the Board, Ultrapar; Mr. Luis Carlos Affonso, Vice-President of Technology, Engineering, and Corporate Strategy, Embraer; and Prof. Mahmoud Abdulwahed, Director, Office of Strategic Innovation, Entrepreneurship & Economic Development (SIEED), and President Office, Qatar University

economy to a knowledge-based economy. The university aims to become a catalyst for socioeconomic development, a goal that has been reflected across education and research initiatives. For that to happen, the university had to create an organizational structure that was more solution-oriented and aligned with national needs. In addition, entrepreneurship is now part of all education programs from the undergraduate to the graduate level. Qatar University founded a holding company to transfer research into economic development, with multiple subsidiaries to work with industry.

In the United States, the University of Illinois has a long history of working with industry partners. A commitment from high-level leadership, coupled with incentives for faculty to manage a cultural shift, were crucial. Among other examples,

the university has been involved in a state-wide initiative with six entities (two public universities, two private universities, and two national labs) to advance a battery consortium pushed by state senators who wanted to foster more collaboration between industry and universities. More recently, the University of Illinois closed a partnership agreement of more than 200 million USD with IBM to develop quantum research in the next ten years.

Some businesses are eager to develop talent to fuel their corporate development strategy and get involved in education. That was the case with Embraer, a Brazilian aerospace manufacturer that engineers and manufactures aircrafts, defense materials, and airspace systems. The company has designed and offers a professional graduate degree in aeronautic engineering in partnership with the Technological Institute of Aeronautics (ITA, acronym in Portuguese), a Brazilian public-funded education institute. In addition, Embraer is also working with FAPESP, a research funding organization in the state of São Paulo, and ITA on the development of low-carbon technologies for aviation and advanced manufacturing.

Building a Global Research Organization Set Up for Impact

A conversation with Dr. Ray O. Johnson

The United Arab Emirates (UAE) wants to move away from economic dependence on oil and gas and transition to a knowledge-based economy. One of its key strategies is building up investments in innovation and R&D. In 2020, the Abu Dhabi government, through the Advanced Technology Research Council, set up the Technology Innovation Institute (TII), a GFCC member organization led by Dr. Ray O. Johnson.

In this interview, conducted by Mr. Chad Evans, GFCC Treasurer and Executive Vice-President of the Council on Competitiveness, Dr. Johnson comments on TII's role in driving the future of the UAE, its focus on applied research as an organizational pillar, and how the institute has been working to attract global talent. Dr. Johnson has more than four decades of experience in global technology leadership. He is the former Corporate Senior Vice-President and Chief Technology Officer of the Lockheed Martin Corporation and was previously a military officer.

Mr. Chad Evans: What is the importance of being a global research organization to advance national and local research needs?

Dr. Ray O. Johnson: One thing that has been made very clear about TII is that it will always be a global institute with global talent, doing world-class research and addressing globally relevant problems. We have roughly 500 people from 62 nationalities. We used to have 72,000 people inside Lockheed Martin, where I served as CTO, and we would get two million resumes a year to choose the top 10,000. I thought we were getting the cream of the crop. But we were getting the cream of the crop from a narrow audience because they were all American citizens. I would say that to my delight when I got to TII, I was able to see a high level of talent in the organization at all levels. The talent that we can attract to this global institute is fantastic.

Mr. Evans: How was TII set up, and how is it beginning to evolve from that initial setup?



Dr. Ray O. Johnson, Chief Executive Officer, Technology Innovation Institute (TII); and Mr. Chad Evans, Treasurer, GFCC, and Executive Vice-President, Council on Competitiveness.

Dr. Johnson: To answer the question, I need to review the macrostructure to which TII belongs. First of all, the Advanced Technology Research Council, a government entity, has been charged by the Abu Dhabi government to be the technology and innovation engine behind the transformation of the local economy and, more broadly, the UAE economy. The UAE wants to move from a commodity-based economy to a knowledge-based economy. So what is needed to do that? TII was the first organization set up, with seven technology research centers explicitly selected because they were able to address technologies and innovations that would feed solutions to other enterprises in the ecosystem. The second organization set up was Aspire, which worked on the lab to the market concept. Aspire has a program management arm, and they bring challenges back to TII. We may be working on solutions for those problems we need. But if we are not, we will start working on those solutions. When you think about the UAE, you probably do not think about a large industrial base. To create this innovation ecosystem, we realized

we needed an innovation engine in R&D. To answer what has changed, we recognized that we needed to add a new component, a third organization: Venture One. Venture One is an incubator and accelerator that can take TII's technologies and innovations and work on licensing agreements. We know that there are other important areas that we were not addressing in the first setup. Those three new centers are biotechnology, renewable energy and cleantech, and propulsion and space.

Mr. Evans: Even in a decade-long period, other nations have not been able to move that fast to implement the changes you have described. What is it about Abu Dhabi? Is it the leadership, or has the culture enabled this pace of transformation?

Dr. Johnson: This is a national-level commitment. The leadership of the UAE and the leadership of Abu Dhabi are 100 percent committed to this project. The UAE got to where it got in 50 years because of that commitment. The UAE is also fortunate to have the resources today to fund new initiatives and make things happen. You can see that in other areas. There is a Minister for Artificial Intelligence (AI), and there is a national plan for AI. AI has been broadly integrated into every government agency in every aspect of government. The elephant in the room, of course, is climate change. The petroleum economy will eventually go away. The UAE has a national plan that by 2050, they will be reducing their dependence by 50 percent. UAE is a petroleum-based economy that recognizes the need to transform into a knowledge-based economy and also recognizes the need to develop cleantech technologies.

Mr. Evans: How do you engage and attract the best and brightest to your project? It looks like you are competing globally with giants like Meta and Google. How is that working, and how do you do that?

Dr. Johnson: What do top-level scientists and engineers want? They want to work on very difficult problems with very smart people in a non-bureaucratic, frictionless environment in which the decision-making is very simple. At TII, they do not have to go through a big bureaucracy. They have the resources they need. They do not have to worry about Congress funding their project or getting a grant the next year because the funding is unavailable, and they get a good salary. All of these things enable us to attract and retain the best and brightest people from around the world.

Mr. Evans: It looks like part of your role is being a technology innovation diplomat. How do you see the role evolving in the coming years?

Dr. Johnson: One of the clear attributes of the UAE is its desire and demonstrated ability to work with countries from around the world. This diplomatic posture is one element that answers the question you asked before about how you get people to

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 "The elephant in the room is climate change. The petroleum economy will eventually go away. UAE is a petroleum-based economy that recognizes the need to transform into a knowledge-based economy."

Dr. Ray O. Johnson
 Chief Executive Officer, Technology Innovation Institute

come here. In TII, we have people from 62 nationalities — a total of 500 people and 104 nationals. It is a place where people from around the world in all walks of science and engineering can come and work. The world is becoming more polarized now. We have the Ukraine and Russia war. But once that is in the rear-view mirror, what will come back is this big problem between the United States and China and the technology developments in both countries. I think that is part of the diplomatic positioning. I see that the UAE does not want to play in that game. I think what we want to do is be an alternative place where you can work far from a polarized environment.

Mr. Evans: You come from a deep industrial experience. You were also in the military sector, and you have had incredible experiences in the venture space. What are you taking from all of those experiences and bringing to TII?

Dr. Johnson: Talent is the most important component of our success. I have a lot of experience in leading technical talent, and it is not the same as leading other kinds of talent. You might say that there are unique attributes that very smart people bring that you have to adapt to in the way you lead them. I think I am good at that. The leadership piece in leading large organizations that have technical talent is one piece. The other part is focus on outcomes. It is one thing to have a problem that you want to work to solve. It is another thing to achieve mission success. From my experience at Lockheed Martin and in the military, I think focusing on mission success and having a can-do attitude are essential. Often technical people, especially if they have an academic background, will get wrapped up in the perfect being the enemy of good, and they do not ever quite get the answer. We are going to force them to get to the answer, and then we can upgrade the solution through block upgrades or improvements.

Bringing Collaboration to the Forefront

MODERATOR

Dr. Sebastião Lauro Nau

Head of R&D, WEG

KICK-OFF DISCUSSANTS

Mr. Rafael Gonçalves Bezerra de Araújo

Dean of Undergraduate Studies, Senai-Cimatec

Dr. Nkem Khumbah

Chairman, Africa Development Futures Group

Ms. Maria Norton

Head of International Partnerships, University of Southampton

Prof. Eduardo Jorge Oliveira

Head of the Center for Strategic Technologies in Health, Paraíba State University

Ms. Martha Novelli Oliveira Penna

VP of Innovation, Eurofarma

Prof. Ted Zoller

TW Lewis Professor & Director Center of Entrepreneurship, UNC Kenan-Flagler Business School

Tools and methodologies can facilitate collaboration between universities and corporations, and turn relationships into practical projects. For instance, designing templates for intellectual property management, creating special licensing mechanisms, and streamlining international funding systems can simplify technology transfer and the commercialization of research



Mr. Rafael Gonçalves Bezerra de Araújo, Dean of Undergraduate Studies, Senai-Cimatec; Prof. Eduardo Jorge Oliveira, Head of the Center for Strategic Technologies in Health, Paraíba State University; Ms. Maria Norton, Head of International Partnerships, University of Southampton; Dr. Sebastião Lauro Nau, Head of R&D, WEG; Dr. Nkem Khumbah, Chairman, Africa Development Futures Group; Ms. Martha Novelli de Oliveira Penna, VP of Innovation, Eurofarma; and Prof. Ted Zoller, TW Lewis Professor & Director Center of Entrepreneurship, UNC Kenan-Flagler Business School.

outcomes. Both universities and corporations have a role in restructuring their processes, adjusting performance metrics, and shifting mindsets to foster strategic partnerships.

On the corporate side, companies have a key role in investing in internships and scholarships and strengthening strategic relationships with university partners. On the university side, university leaders have a key role in adapting universities to be more reactive to community and industry needs. Universities can create a specific organizational setup, like an industry partnership office, to partner with industry in a faster timeline with a focus on applied research and product development. A commitment from high-level leadership is crucial to mobilize and engage faculty to collaborate with industry, fostering mutual benefits.

In Brazil, SENAI-CIMATEC is an education provider founded as a technological center to promote innovation. It has been working with industry since its foundation. In Brazil, Paraíba State University, a GFCC member, tailored a specific model to work with the health sector, separating academic activities from innovation. A branch of the university was set up solely to provide services to companies. Another department operates a professional graduate degree focused on research outcomes that can later be licensed and developed to support company needs.

However, different regions in the world face different problems. While in the United States, collaboration between universities and the private sector has been institutionalized for a long time, there is more resistance in other regions of the globe. For instance, African universities lack autonomy due to the extensive control governments have over the higher education sector. In Brazil, there are still difficulties concerning mindsets, with some faculty and university leaders maintaining that universities should not pursue deeper relationships with the private sector.

Finally, South-South collaboration between developing regions around the globe, such as between Brazil and Africa, could be a step toward advancing scientific discovery and fostering new models for partnership and innovation. Developing regions can set up institutions to encourage and guide South-South processes targeting common challenges in public health, food security, climate change, and energy.

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GFCC

Global Federation of
Competitiveness Councils

Global Federation of Competitiveness Councils

900 17th Street, NW, Suite 700

Washington, D.C. 20006

USA

T +1 202 969 3382

www.thegfcc.org

info@thegfcc.org