Connections for a **common purpose**

2020 SOFOFA Hub Annual Report

Index

We want to unite worlds, so that together we can achieve a common purpose. Because changes are not caused by a single talent; they happen when we build talented teams, when we unite what's distant and different, in a single place.
That is why we promote a collaborative space, that helps companies develop the capabilities they need to integrate into the economy of the future.

A new collective culture

I step down as chairman of SOFOFA after four fruitful years. I do so proud of having created a space like SOFOFA Hub; one of the legacies of this administration.

With the certainty that Chile has yet to develop a business culture based on a collaborative mindset, we created SOFOFA Hub in 2019, a space that unites companies that face common challenges and connects them with Chilean and foreign academic and research centers. Our logic is to build lighthouse company-clusters that commit to boost innovative projects and lead the way for other companies to follow.

While competition is usually the healthy alternative, there are times in which pre-competitive collaboration is the right path.

SOFOFA's essence is its commitment to challenges that, aside from their business value, are of interest to the public. That search is ingrained in our DNA, and we wish to instill it to the Hub. Challenges, such as lowering greenhouse gas emissions, achieving carbon footprint traceability or reducing water footprints, are what motivate us to pursue new solutions. Circular economy is another of our great interests. It poses a business challenge, which simultaneously entails a benefit for the country as well as the entire planet.

SOFOFA Hub's goal is to work to further these three (public, environmental, and social) dimensions, along with driving the regulatory changes needed to make innovation possible in these areas.

We clearly understand that innovation is not just about creating new technologies, but rather about developing a mindset that allows us to better adapt to the times. That is why, instead of thinking that technological innovation will be delayed by the crisis, my bet is that it will be the path that more and more companies will take in the future. It is during difficult times that we most require innovation, to drive the transformations that Chile needs.

"SOFOFA Hub's goal is to work to further these three (public, environmental, and social) dimensions, along with driving the regulatory changes needed to make innovation possible in these areas."

Bernardo Larraín Matte
Chairman of SOFOFA HUB
Chairman of SOFOFA

Our Proposal

We often hear that there isn't much innovation in Chile. Multiple indexes evidence an economy based on traditional industries, that invests little in research and development. The year 2020 put us to the test, with complex challenges within a context of permanent uncertainty and significant constraints for the country, both socially and economically.

Since 2019, SOFOFA Hub has been driving a collaborative ecosystem that connects companies, entrepreneurs, universities and research centers, with a clear mandate: to bring companies closer to the innovation ecosystem, in order to find solutions to the industry's and the country's main challenges. In March 2020, for the first time in recent history, we were faced with a problem capable of uniting all stakeholders around a common purpose: an unprecedented pandemic. This was the court that set the stage for an articulation game, where scientists and entrepreneurs took the lead in developing emergency solutions; where doctors and government joined forces to play defense; and where the business sector, through SOFOFA Hub and the SiEmpre fund, accelerated the game from the mid field.

The result surprised us all: in four months, Chile was able to design a clinical validation protocol that allowed testing and scaling 4 mechanical ventilation prototypes, which seemed impossible in a country with a 0.35% R&D investment and a business sector that, allegedly, does not believe in local R&D capabilities.

This experience, along with others that we summarize in this annual report, have led us to develop a hypothesis that is different to that which was initially proposed. Decades of investing in entrepreneurship and innovation policies have enabled the creation of development capacities, unprecedented in Chile. We believe that a great opportunity lies in the ability to articulate these capabilities, placing them at the service of our society's and our economy's main challenges.

To do this, linking these challenges with potential solutions will not suffice; achieving this requires exercising an articulation role that allows us to bring worlds together, to summon the best stakeholders, unify languages, share intentions, align interests, and build a common future through collaborative spaces. That is our motto at SOFOFA Hub.

However, going from big plans to concrete results through action, requires management, execution, and summoning capabilities, as well as the establishment of a neutral space for a global network of innovators and entrepreneurs. This collaborative space, has opened unprecedented opportunities, with an innovation model articulated through corporate collaboration; however, going hand in hand with Chile's and the world's innovation and entrepreneurship ecosystem.

Chile is currently beginning a new stage in its development. A stage in which the country is aware of the need for a new model for resilient, sustainable, and collaborative growth. It is here that addressing the challenges related to climate change and circular economy is crucial to our country's future. Neither the government, the companies, nor civil society will be able to find sustainable solutions on their own. We hope to contribute solutions to the challenges that we have placed at the center of our strategy.

Alan García Clydesdale
Executive Director of SOFOFA Hub

Our Journey

Since 2019, we have worked hand in hand with companies to turn SOFOFA Hub into a platform that transforms Chile into a more developed and sustainable country.

Since its creation, SOFOFA Hub's main interest has been to work with companies to collaboratively solve the industry's and the country's key challenges.

Origins

—The story behind SOFOFA Hub

A set of empty offices. This apparently anodyne real estate situation was the timely catalyst that originated SOFOFA Hub..

In 2018, the top floor of SOFOFA's headquarters had 200 m2 of underutilized area. The possibility of creating a coworking space was discussed, however, the idea did not convince everyone in the industry. Rafael Palacios, Public Policy Director at SOFOFA, was among those who were not excited and were considering a more ambitious idea. We set out to find a new formula; a model that would revolutionize Chilean companies, entrepreneurs and scientists through innovation. His ally in this endeavor was the researcher Andrés Couve, currently the minister of Science, and who at the time was the director of *Instituto Milenio* de *Neurociencia Biomédica*.

During their first meetings they tried to define a proposal. Their conversations were enriched by new ideas, some trips to Europe and California, as well as the desire to break new grounds.

Exchanges continued via e-mail, through which they started drafting the first agreements. They reflected on Sofofa's actual role in the research-innovation-enterprise connection, on the system's immaturity and on the need to increase R&D success cases within companies. This required identifying their needs and matching them with national and international solutions. They understood that SOFOFA's objective should be contributing to the establishment of more and better companies in Chile, as well as catalyzing the increase in R&D spending to make them more efficient, competitive and innovative. They pondered finding a hub model that could leverage both. They also knew that there was a cultural challenge, because this involved changing organizational schemes and the entrepreneurs' and scientists' perceptions.

With these incipient insights (and without knowing that the process would soon be precipitated) they were beginning to plant the seed of SOFOFA Hub. They were convinced and spread their enthusiasm

"We have to professionalize innovation and install it on a structural, powerful, regulated platform; and the models for that are available. The first part has already been done: the mentoring, innovators, ecosystems, universities, networks, CORFO. All that is missing, to fully take-off, are resources. In the world of innovation, SOFOFA Hub is a broker who must find the best solution for the best challenge."

Rafael Palacios
Public Policy Director at SOFOFA

to others in the industry sector's association: moving forward would have an impact on the industry's productivity and on the development of science in the country. To achieve this, it was necessary to bring companies, universities and technology centers together. This would be a unique initiative in Chile, because the business sector and academia were not used to working together; however, it meant building many bridges, something that -at that time. was an achievement that was difficult to picture.

THE IMPULSE OF BIOTECHNOLOGY

They began to better understand it after receiving the visit of Pilar Parada, the current general manager in Chile of Fraunhofer, one of the leading international applied research centers in Germany. Parada reached out to SOFOFA as its partner to participate in a process summoned by CORFO. Its goal was to create the first Translational Biotechnology Center in Chile, a public-private project, unprecedented in the country, to promote productivity through biotechnological solutions.

That was the momentum they needed. Through biotechnology, this new and emerging SOFOFA Hub could also open a path to turn Chile into a developed and inclusive country. "The idea took off," Palacios recalls. "We saw the opportunity to develop the innovation model that we had envisaged through this tender and this platform." SOFOFA was the right entity to lead that path because it knew the companies' problems better than anyone else and it had a privileged position to summon the entities able to solve them. Moreover, it could create a neutral workspace, where no interest prevailed over another. That was a good base to generate the economies of scale necessary to solve the problems that were shared by several companies.

It was clear that the biggest challenge would not be to promote innovations at the product or service level, but rather to install an innovative culture. "You can copy a process and install it, but something quite different is to install an innovative culture that is compatible with the times and proactive in its search for development opportunities. That is why we decided to promote a space to materialize this initiative," says Matías Concha, SOFOFA advisor.

Despite there were only two weeks left before the end of the call, an interesting variety of partnerships emerged with universities and research centers across the country, and thus SOFOFA Hub became a reality. CORFO was excited about the opportunity to actively work with the business sector.

Once SOFOFA Hub was awarded the tender, and with increasing clarity in the horizon, it became necessary to address practical issues: planning the governance of the new hub, assembling the board and committees, and drafting its bylaws. SOFOFA HUB was born in January 2019, with high expectation of several sectors of the country, and since then has emerged as a new protagonist in the innovation world, pursuing the goal of solving some of Chile's most difficult challenges, such as the low integration of the circular economy model or the water shortage generated by climate change, placing companies, talent and technology at the service of common objectives.

SOFOFA Hub's value for the corporate world

Francisco Guzmán
SOFOFA Hub Director
SOFOFA Advisor
(Chairman of the Chilean Venture Capital Association)

"SOFOFA Hub is an entity that encompasses projects that require different skills and specialties. For this we have designed a governance model with a robust corporate management, comprised of individuals of high technical level in their areas of expertise and competence. The board and executive committee work by gathering the needs and concerns of SOFOFA Hub's affiliated companies, to link them with the scientific world's capabilities. The Technical Committees evaluate and support alternatives to address the companies' unresolved issues and problems. In this way, SOFOFA Hub fulfills its role as an articulator between the scientific and private world, while promoting the development of technological entrepreneurship and providing space for the adoption of the best technologies."

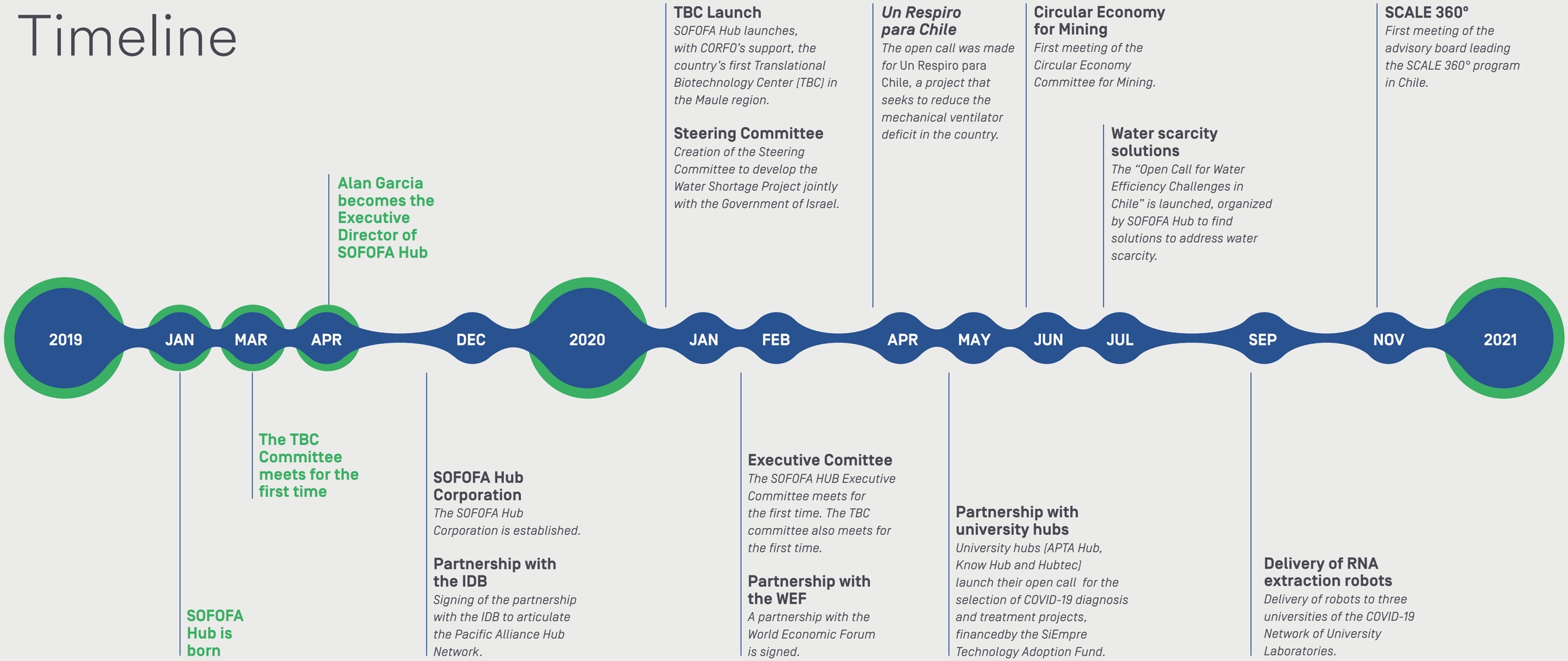
Matías Concha
SOFOFA Hub Vice Chairman
SOFOFA Advisor (Emiliana)

"Two very valuable elements coexist in SOFOFA Hub. One is the flexibility to find the proposal that best suits the nature of the challenge posed by the Hub's companies. Our network includes research and development centers, businesses and universities in Chile and around the world, allowing us to access experts who provide us with the best solution or propose alternatives that are jointly assessed with the teams formed with the companies. The second element is our strong public policy muscle. The world is changing very quickly, and rules and regulations are not always in tune with those changes; technology can be of great benefit, however, initiatives are often unsuccessful if said technology is not accompanied by a process that enables us to steer, test, develop, and communicate it, thus allowing it to become public policy."

Nicolás Uauy
SOFOFA Hub Director
SOFOFA Advisor (Aceros Aza)

"Technological changes, circular economy, and the greater demands of today's society create challenges whose resolution often requires forging bonds of trust and collaboration networks that previously did not exist between the players of an industry and its value chain. SOFOFA Hub seeks to be a protagonist in building those cooperation processes between companies, as well as with other public and private players, so that companies can jointly address these problems and challenges doing what we know best: the creation of value through innovation."

Timeline



SOFOFA Hub is born

Alan Garcia becomes the Executive Director of SOFOFA Hub

The TBC Committee meets for the first time

SOFOFA Hub Corporation
The SOFOFA Hub Corporation is established.

Partnership with the IDB
Signing of the partnership with the IDB to articulate the Pacific Alliance Hub Network.

TBC Launch
SOFOFA Hub launches, with CORFO's support, the country's first Translational Biotechnology Center (TBC) in the Maule region.

Steering Committee
Creation of the Steering Committee to develop the Water Shortage Project jointly with the Government of Israel.

Executive Comittee
The SOFOFA HUB Executive Committee meets for the first time. The TBC committee also meets for the first time.

Partnership with the WEF
A partnership with the World Economic Forum is signed.

Un Respiro para Chile
The open call was made for Un Respiro para Chile, *a project that seeks to reduce the mechanical ventilator deficit in the country.*

Partnership with university hubs
University hubs (APTA Hub, Know Hub and Hubtec) launch their open call for the selection of COVID-19 diagnosis and treatment projects, financedby the SiEmpre Technology Adoption Fund.

Circular Economy for Mining
First meeting of the Circular Economy Committee for Mining.

Water scarcity solutions
The "Open Call for Water Efficiency Challenges in Chile" is launched, organized by SOFOFA Hub to find solutions to address water scarcity.

Delivery of RNA extraction robots
Delivery of robots to three universities of the COVID-19 Network of University Laboratories.

SCALE 360°
First meeting of the advisory board leading the SCALE 360° program in Chile.

Strategic vision

—A transition around two axes: circular economy and climate change

The existence of a common purpose generates a network of trust to address challenges, aligning interests, incentives and objectives.
This is a new way of understanding innovation in Chile, starting from the demand (rather than the supply) for solutions.

Circular economy is by its very nature a collaborative economy, where different productive chains are integrated in order to systematize circularity models, such as reuse and valuation.

However, in addition to the rethinking of processes, the transition towards collaborative models requires a cultural change.

In this sense, initiatives with a greater collaborative interest will have a greater long-term impact, due to the opportunity of creating economies of scale, tackling new processes in a holistic manner, as well as the commitment generated during the process and its implementation.

That is why at SOFOFA Hub we have discovered that the willingness to collaborate (or the opportunity to bring together various players in the chain, to work together on the design and implementation of a new circular process) is a key variable when prioritizing initiatives.

In most cases, the willingness to collaborate also affects the potential impact of the initiative, another important variable that must be measured applying its economic, environmental and social component. In this regard, SOFOFA Hub has participated in the design of the circular economy road map led by the Ministry of the Environment. Progress has been made through the Innovation and Industries 4.0 Scaling Working Group, in connection to proposals that facilitate financing and activate the innovation ecosystem, the

Based on an agenda developed in 2020 jointly with its strategic partners (Agrosuper, Melon, Molymet, Pucobre, CCU and CMPC) SOFOFA Hub has drafted a work program to identify opportunities for industrial symbiosis that allow the short-term development of production chain integration projects.

technological prospecting and the development of specialized human capital.

The projects that SOFOFA Hub has led so far, and which cover the two axes defined since its inception (circular economy, climate change, as well as COVID-19 during the pandemic) have proven the impact of private sector articulation.

"The sustainability agenda will be marked by a resilient and sustainable recovery, with circular economy providing us with a unique opportunity to work together under this common purpose. This transition requires that new industry capacities be created in Chile, which will generate development opportunities through the creation of jobs and new companies," said Alan García, executive director of the hub.

"I believe in the capillarity of public-private collaborative spaces. Indeed, Chile requires spaces for large public policies, something that is directly handled by SOFOFA with the authorities or with parliament; however, we also need many spaces for cooperation. An initiative like the Hub allows us to say that we are also taking on the challenge at home."

Bernardo Larraín Matte
Chairman of SOFOFA

Circular economy

SOFOFA Hub has set out to lead the transition to the circular economy model, advancing towards an inclusive and intelligent future, articulating the ambition needed to achieve sustainable growth and adapt to a world with limited resources.

The circular model creates economic, natural and social capital, acknowledging the importance of the economy' performance at all levels: organizations and individuals, globally and locally, large and small enterprises.

Based on an agenda jointly developed with its strategic partners, SOFOFA Hub identifies industrial symbiosis opportunities that allow for the short-term development of production chain integration projects in the industry. The projects that emerge from this agenda are articulated by SOFOFA Hub, with the objective of developing new capacities, adopting new technologies to increase efficiency, generating economic benefits throughout the production chain, and achieving positive impacts on the environment.

COVID-19

The pandemic emergency and the health stringencies imposed by COVID-19, have resulted in the emergence of a new model of technological adoption in Chile. Such model is based on a collaborative process that links the efficiency of the private sector with the knowledge of academia, the agility of the entrepreneurial world and the support from the public sector to meet the challenges of this period of uncertainty.

SOFOFA Hub, from its neutral and proactive role, has articulated the development and productive scaling of innovative solutions raised between all sectors to face the virus.

"COVID-19 helped demonstrate that there are capabilities in Chile to develop and scale technologies, if the necessary spaces and incentives are created," said Alan García, executive director of SOFOFA Hub.

Climate change

The planet's situation is critical. That is why one of our main goals is to connect the power of science with the business sector's momentum. Joining these two worlds will enable us to achieve more sustainable solutions for the future. It is an ambitious goal that will involve many challenges, but that will transform Chile into a better country. Through innovation and creativity, we push new clean energy production proposals and aim to meet the country's goal of being carbon neutral by the year 2050.

How we select our projects

With the support of the Inter-American Development Bank, we have designed a model that creates a general framework for prioritizing projects according to economic, environmental, and social variables, considering that SOFOFA Hub is an articulator of circular economy projects with various origins, participants, and objectives.

Selection is kicked-off by raising potential projects that are aligned with SOFOFA Hub's strategic focus. That is, those that address the challenges common to several companies through technological innovation and generate opportunities to create economies of scale. They must also seek a positive economic, environmental, and social impact. Five variables are considered for these purposes:

Prioritization criteria

WILLINGNESS TO COLLABORATE

Refers to the industry's willingness to finance and participate in the project.

TECHNOLOGICAL MATURITY

Assesses its maturity from research and development, to production and marketing.

IMPACT POTENTIAL

Defines the scope of the project's impact and replicability.

ADOPTION FEASIBILITY

Defines the project's execution feasibility, in consideration to its implementation difficulty.

TIMING

Refers to their economic timing.

A knowledge generation report is drafted upon completion of the project, including its process, from its inception to its implementation, describing its results, the difficulties it faced and the lessons learned.

How do we work with companies to solve their challenges?

T he work process begins with a shared problem.

It can start because a company approaches us or because SOFOFA Hub identifies it and contacts the companies involved. In general, pre-competitive challenges (namely, those that are shared by a sector of industry) are prioritized, especially if they are linked to circular economy or climate change. Once SOFOFA Hub's Executive Committee prioritizes the challenge, it invites interested companies to find a solution.

The project is set up through an open dialogue, establishing a Steering Committee and appointing a project manager, hired by the Hub and financed by the participant companies.

Work is done to further adjust the problem through multidisciplinary workshops and meetings. It is a learning process, in which companies have the chance to listen to other perspectives. Beyond the participation in the resolution of a particular problem, this first stage of the process helps to generate valuable links and objectively understand the challenge that is being addressed.

Finally, and thanks to the contributions of the entire team, experts are invited to help find solutions to the challenge. That is the beginning point of the complex and stimulating road that leads to a new solution for the industry and

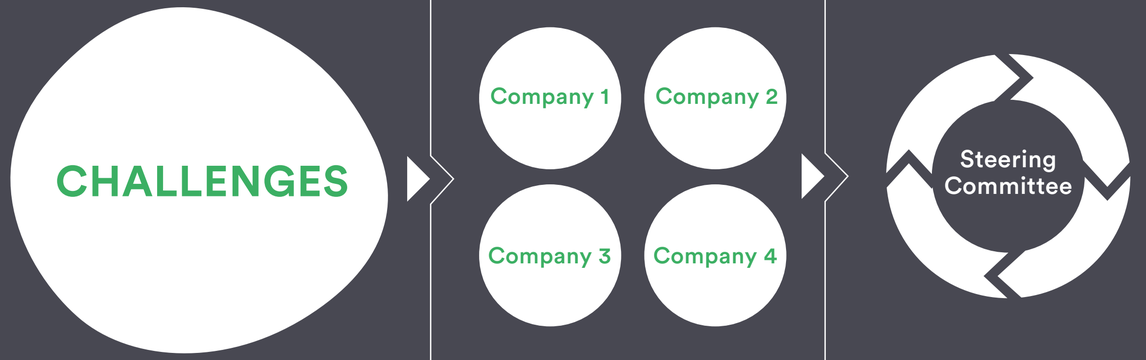
the learnings resulting from a collaborative work articulated towards a common challenge.

Company operation and participation model

Challenges common to multiple companies are identified

SOFOFA Hub summons the companies interested in jointly addressing the challenge

A SOFOFA Hub project or initiative is identified.



Strategic partners take the floor

“Innovation / Circular Economy
Collaboration / Node / Transversality
Sustainability / Connecting / Ambition
Cross-indrustry Collaboration / Exchange”

Why did they join SOFOFA Hub?

"We are living in a time of great change and learning, and experience has taught us that the most successful way to learn and advance, despite transformations, is to be part of ecosystems that unite groups of industries, civil society, institutions and citizens working together to address a common challenge. SOFOFA Hub promotes that integration, and we have great expectations for the learnings that we will be able to share, achieve and incorporate into the continuous improvement process, in our ongoing quest to create an increasingly sustainable business."

Paolo Pallotti
Enel Chile

"Listening and learning from others (companies, institutions, research centers, "gurus".) in topics such as productivity, biotechnology, and technological development. The Hub's powerful international networks. And contributing our specific innovation, biotechnology and productivity expertise."

Sebastián Ríos
PuCobre

"The possibility of addressing large challenges, which require collaboration between different stakeholders and sectors, from a common platform that concretely defines these challenges and adequately articulates the development of possible solutions. It also motivates us to have a space to discuss and open our minds, to achieve innovative solutions. Moreover, the capacity to connect with the world and to understand how others have addressed similar challenges is very interesting to us."

Felipe Alcalde
CMPC

"Ambition and the high quality of the ecosystem's participants, to find common challenges and solutions. It is a powerful source of inspiration and motivation to keep pushing for change."

Verena Sterzl
Melón

"We wanted to be part of a channel that summons various stakeholders concerned with the issues that we believe are fundamental in today's industry."

Juan Cristóbal Valenzuela
Molymet

"The Hub is a way in which large companies or corporations learn to collaborate. Regarding innovation, it is essential to make methodologies available to others and to jointly search with other companies for common solutions to help everyone. In this sense, SOFOFA Hub has been key to allow companies like Agrosuper to learn from this collaboration; it is a path where we yet have a lot to do."

Cristián Meyer
Agrosuper

"Ever since its inception, we were interested in participating in SOFOFA Hub, especially in the circular economy nuclei and the activities held to address challenges, connect, integrate, and scale technological innovations and solutions."

Jesús García
CCU

What changes would you like to see in Chile thanks to the Hub's actions?

"We would like it to display concrete results, because that will surely inspire others to come aboard the collaboration wagon. And it would further motivate Agrosuper to continue down this path!"

Cristián Meyer
Agrosuper

"Companies are a part of the society in which we operate and as such we must contribute to solving common problems. We need to get involved, either by proposing solutions or by helping to find them. Many challenges that affect us, also (more or less) directly affect the inhabitants of the places where we operate. We believe that by identifying common challenges (climate change, development of models that are more circular, efficient water use or fire reduction, among others) we can develop concrete projects that positively impact society. We would like to see SOFOFA Hub as a relevant player in this space."

Felipe Alcalde
CMPC

"Generation of standards, guidelines, success stories and tutorials that enable companies to connect, develop and grow, leveraging technological development and innovation."

Sebastián Ríos
PuCobre

"A stronger integration of circular economy in businesses in all industries. We have the great challenge of integrating sustainability into our cities and communities from a holistic perspective. In our case, this involves accelerating the decarbonization and growth processes of renewable, electrification and digitization capacities, without leaving circularity behind, which is the best way to address the environmental, social and economic challenges we are facing, both in Chile and globally."

Paolo Pallotti
Enel Chile

"We would like to see the citizen's and consumer's commitment to recycling, envisaged under the REP Law, become a reality. The task of raising awareness and training population is daunting and all stakeholders must be involved. SOFOFA Hub can be a catalyst for companies and the government in this issue. Moreover, we are betting that Chile will develop innovative recycling processes and cross-sectional collaboration between companies."

Jesús García
CCU

"The promotion of cross-industry and public sector collaboration to address common challenges that require innovative solutions."

Verena Sterzl
Melón

"We would like to see more companies motivated with jumping on the wagon promoted by the Hub, and a greater commitment to push forward the initiatives established in the lines of action."

Juan Cristóbal Valenzuela
Molymet

Center of Translational **Biotechnology**

cbT SOFOFA HUB

SOFOFA Hub has driven the creation of an unprecedented center in Chile, which seeks that companies integrate the full potential of biotechnology.

We clear the court

— The TBC creates conditions for the development of biotechnology in Chile

Biotechnology, that is, the use of biological systems to improve products and processes, has become one of the main current tools for industrial development.

Our country has great potential for its use: in the diagnosis and treatment of human and animal diseases, improving agricultural and forestry production or even the mining of minerals.

The TBC is born within the context of the 2030 biotechnology strategy developed by CORFO and is part of SOFOFA Hub, SOFOFA's innovation ecosystem. The TBC seeks to articulate and build the collaboration among various stakeholders, such as research centers, universities, companies, entrepreneurs and investors, generating real impact on the productivity of companies and creating enabling conditions for the development of the national biotechnology industry.

Although there is a potential demand for biotechnology solutions in the Chilean industry, it has failed to develop due to various reasons: unawareness, lack of qualified human capital, lack of technology scaling capacities, regulatory gaps, among others. The TBC's focus is precisely facilitating the scaling and adoption stages of these technologies, creating enabling conditions, breaking down barriers in the implementation stages and linking the main challenges of the industry with these type of solutions, from a demand standpoint.

This center arises within the framework of the strategy for the development of CORFO's technological centers which, as of 2021, will be transferred to the National Research and Development Agency (ANID) of the Ministry of Science, Technology, Knowledge and Innovation.

cbT SOFOFA HUB

Proyecto apoyado por CORFO

"It is common to face several barriers when attempting to bring biotechnology closer to companies: these may be cultural, regulatory, as well as related to information asymmetries, stakeholder discoordination or knowledge. When we create enabling conditions we break down those barriers and clear the court in such a way that a space is generated, bringing biotechnology closer to industry."

Alan García
Executive Director of SOFOFA Hub

"SOFOFA Hub moves between two very different cultures. While the academic institutions follow a non-profit culture, companies, on the other hand, seek to create value for their shareholders. Moreover, companies tend to keep their technologies confidential, unlike academia that seeks to apply and disseminate them.
For that reason, any transfer or successful technological development depends on the understanding of these different cultures and knowing how to build a bridge between them. Otherwise, success is impossible."

Isaac Kohlberg
Director of Harvard University's Office of Technology Development and independent member of the TBC Committee

“Biotechnology will be critical to overcome the challenges that humanity will face.”

Eduardo Abeliuk
Independent member of the TBC Committee

-What is the importance of the translational component in biotechnology research and development?

Biotechnology has developed enormously thanks to the development of various modern molecular biology techniques (from the sequencing of the first human genome to synthesizing the first synthetic chromosome) and it has opened up countless possibilities. However, the costs of developing biotechnological products is still high, and timeframes are extensive. Therefore, it is necessary to focus community resources on addressing specific problems and concentrate efforts on “translating” the relevant knowledge acquired via R&D, to clinics and the industry. In Chile, translational biotechnology efforts are beginning to show thanks to the input of academic, private and government entities, among which the TBC has an important role.

-How can the TBC participate in the construction of future biotechnology?

The pandemic has clearly evidenced the importance of biotechnology for the planet’s and the global economy’s well-being. Biotechnology will be fundamental to meet the obstacles we will face as a humanity in the next few decades, fighting new pandemics and addressing the challenges of population growth, global warming and the need to build a green and sustainable economy. The impact of biotechnology will extend from the biomedical sector to the forestry, mining, agricultural and aquaculture sectors. The TBC is in a unique position to facilitate instances where stakeholders share problems and solutions, and build bridges to maximize the advances stemming from biotechnology.

Eduardo Abeliuk
Founder of the biotechnology company Tesela Gen and independent member of the TBC Committee.

Why does Corfo support the SOFOFA Hub's TBC Project?

This project was born from the corporate productive sector to generate a trend shift in investment and private spending in biotechnology research, development, innovation and entrepreneurship, seeking to improve the competitive, productive, sophistication and sustainability capacities of companies.

The TBC signifies the entry of a new stakeholder, linked to the business sector and ecosystem, to strategically manage the needs, challenges, problems/opportunities and demands for innovative biotechnological solutions of the industrial sector, with the entrepreneurial and biotechnological offer available in the country and abroad, to accelerate its transfer and ensure the integration of high-value solutions in the large and medium-to-small-sized companies of the forestry, agricultural, aquaculture, mining and biomedical industries, boosting the local biotechnology field through the increase in the private investment and spending linked to it.

The center is also part of SOFOFA Hub, a broader innovation project, whose mission is to strategically manage the national and international supply and demand of innovative services and solutions in the areas of Biotechnology, Circular Economy and Digital Transformation or 4.0 Industry, to increase the spending and investment in research, development, innovation and entrepreneurship (R+D+i+e) of the companies operating in the country. This provides the TBC with greater visibility in the industry, due to the commitment of one of the largest industry sector associations in the country. In fact, the R&D articulated and supported by the TBC is key to being competitive in international markets, because the use of biotechnology allows to anticipate these markets' future requirements.

By Fernando Hentzschel
Corfo's Technology Capabilities Manager.

“SOFOFA Hub had the courage to embark on this unique initiative”

— TBC: A key player in bringing biotechnology to the productive sector

The incorporation of biotechnology solutions to meet the needs of the national industry and create value in sectors as diverse as aquaculture, agroindustry, forestry, mining and biomedicine, poses an opportunity to create value and inject innovation into our private sector.

Therefore, when Corfo opened its summon for the creation of the Translational Biotechnology Center in 2018, several scientific excellence centers saw it as an opportunity to materialize an initiative that we consider to be strategic.

To do so in partnership with the business sector from the very beginning was fundamental, and Cornelia Sonnenberg, Fraunhofer Chile’s Vice Chairman of the Board, proposed joining forces with SOFOFA, in order to involve 4,000 Chilean companies of the country’s main industries.

SOFOFA Hub was taking its first steps and they expressed their disposition to form an alliance to integrate biotechnology to the productive sector. The potential that SOFOFA Hub saw in this initiative led to its adoption as one of its main areas of work. That is how we began to structure the proposal that we submitted to Corfo, and that was awarded in 2018.

The TBC is a pioneering initiative that we are enthusiastic about due to several reasons. It involves all the system’s stakeholders: the corporate world, the universities and research centers, and the State (through Corfo). It also provides access to venture capital, allowing to scale projects with good potential. The value of innovation lies in the diversity of perspectives; and connecting all these worlds was something unprecedented in Chile. The birth of the TBC was a real and concrete opportunity to innovate. Almost three years after setting out on that path, we in the science field applaud SOFOFA Hub’s vision to embark on this unique initiative and we continue to work together to encourage Chilean companies to place R+D+i investment at the center of their business.

“The TBC is a pioneering initiative, that we are enthusiastic about due to several reasons. It involves all the system’s stakeholders: the corporate world, the universities and research centers, and the State (through Corfo). It also provides access to venture capital, allowing to scale projects with good potential.”

By Pilar Parada
General Manager of Fraunhofer Chile and member of the TBC Committee

— The TBC has contributed to the understanding of the private sector's challenges and needs, by bringing technological supply and demand together, and most importantly, by fostering their interaction. At the same time, it has identified the existing and required biotechnological capabilities and services, which has strengthened the link between academia, companies and the State. The need for a permanent upgrade of the existing capabilities in the country's universities and technology centers has been reinforced, helping to identify the companies' scientific-technological requirements, as well as the professional competences needed to address these challenges, together with the State's role in the encouragement of biotechnology development and its transfer.

Information has been systematized during these first years of implementation, facilitating the online search of the equipment and service capabilities available in the country, the design of a bio-business training program and a better understanding of the regulatory and public policy areas, together with the associated challenges. Furthermore, I highlight the support the center has provided to develop rapid solutions to the pandemic. Acquiring a deep understanding of the national ecosystem and its needs at various scales, has generated confidence among the different stakeholders; an aspect that is fundamental to the success of this initiative.

By Pedro Bouchon
Dean of Investigation at *Pontificia Universidad Católica de Chile*. Representative of the university partners on the TBC Committee for the 2019-2020 period.

— The center is rapidly advancing in linking companies, science and academia, possibly because innovation has become the main driver for economic growth and a key element for competitiveness. Although we still have a lot of road to cover, we see that there are more and more innovation areas or management divisions in companies, and that academia is moving forward to become a valid counterparty, contributing to the progressive increase of co-development projects, building a relationship of trust that is key to the promotion of joint endeavors.

Without this collaborative work, it would be very difficult to generate a leap in technology-based competitiveness, given that each stakeholder has a different scope for action, that they consider key for their success. To this we must add startups that, through their agility and flexibility, often succeed in accelerating the generation of technology-based innovations.

Growth for the global biotechnology market is projected at 7% per year, exceeding USD$800 trillion by 2027, providing us with a signal of the value that can be generated from it and the interest that currently existing this regard. Chile is an important generator of high-quality scientific knowledge, however, its translation into applied R&D, intellectual property rights and their transfer to the private sector is low; therefore, the TBC provides a unique opportunity to align visions and complement capacities that allow to significantly increase the value that Chile generates in the biotechnology field.

By Francisco Chiang
Director of Innovation and Entrepreneurship at the *Universidad Nacional Andrés Bello.*
Representative of the university partners on the TBC Committee since December 2020.

The TBC's services

After a series of studies, discussions, conversations, and adjustments that took place during 2020, the TBC began offering an array of services to transfer the academia's capabilities to the industry. These services include consulting to companies, venture capital entities, entrepreneurs and universities, as well as the articulation of innovation projects and access to resources that create enabling conditions.

CONSULTING SERVICES

- Study regarding the status of state of the art technology
- Comparative analysis regulatory study
- Technological due diligence

DEVELOPMENT PROJECTS

- Open innovation project
- Optimization for the production of recombinant protein at scale
- Development of new agricultural varieties through the use of biotechnologies

PLATFORM SERVICES

- Network resource platform
- Industry-applied biotechnology course
- Regulatory agenda (public policies)

Our **partners**

Partners are key to the achievement of our common goals.
That is why we generate synergies between the business sector, academia, government entities, other hubs and the civil society.

In 2020, SOFOFA Hub integrated six partners, nine universities and six research centers. They all seek to move toward a new work model

STRATEGIC PARTNERS

They are a select group of companies that finance the Hub's core structure and comprise its Executive Committee. In this way, they can participate in its strategic guidelines. The partners for 2020 were CMPC, Agrosuper, Melón, CCU, Pucobre and Molymet.

TECHNOLOGY PARTNERS

Nine universities and six local and international research centers comprise the Translational Biotechnology Center. These institutions offer their capabilities to develop solutions that can be transferred to the market.

"SOFOFA Hub's partner companies are leading the transition towards circular economy. To achieve this they rely on the collaborative work and opportunities provided by technology. By being able to decide what projects are carried out, they have the capacity to influence the Hub's strategic decision."

Alan García
Executive Director of SOFOFA Hub

"Our technology partners have been part of the TBC since its inception. They are the ones that hold the expertise, technical capabilities and infrastructure."

Tomás Mardones
TBC's Assistant Director of Technology

Governance model and team

MEMBER ASSEMBLY
Composed of strategic and technology partners

BOARD
Composed of nine members appointed by SOFOFA

Team

- **Alan García,** Executive Director
- **Tomás Mardones,** TBC's Chief Technology Officer
- **Andrea Guzmán,** Communications and Onboarding
- **Giovanni Cruz,** Head of Administration and Finance
- **Carolina Torres,** PMO

Executive Committee

3 SOFOFA REPRESENTATIVES

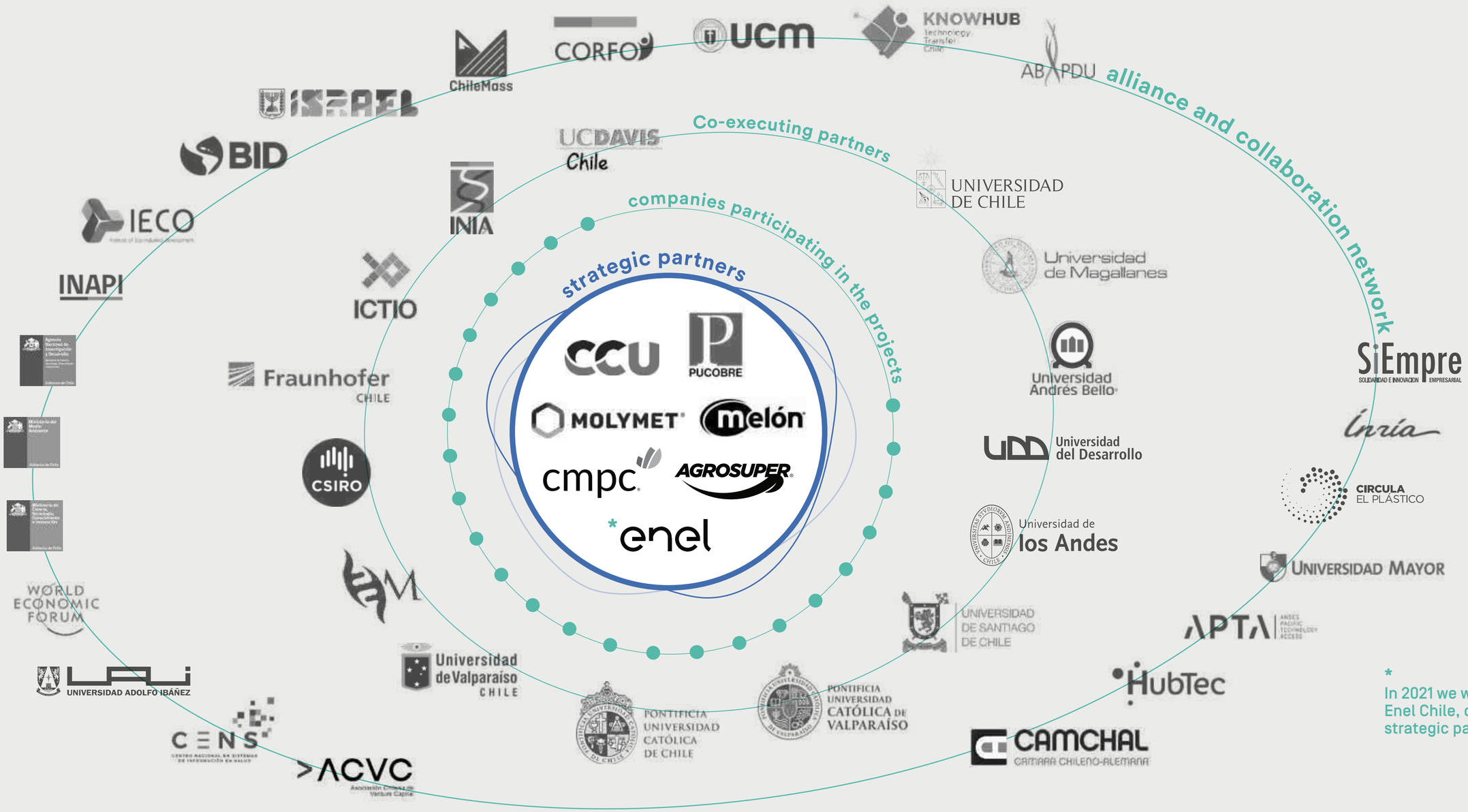
- Matías Concha, **Emiliana**
- Nicolás Uauy, **Aceros AZA**
- Francisco Guzmán, **Carey**

STRATEGIC PARTNER REPRESENTATIVES

- Cristián Meyer, **Agrosuper**
- Felipe Alcalde, **CMPC**
- Verena Sterzl, **Melón**
- Jesús García, **CCU**
- Sebastián Ríos, **PuCobre**
- Juan Cristóbal Valenzuela, **Molymet**
- Antonella Pellegrini, **Enel Chile**

TBC Committee

- Matías Concha, **Emiliana**
- Nicolás Uauy, **Aceros AZA**
- Francisco Guzmán, **Carey**
- Isaac Kohlberg, **Harvard University**
- Eduardo Abeliuk, **Tesela Gen**
- Francisco Chiang, representative for the universities
- Pilar Parada, representative for the research centers



* In 2021 we welcomed Enel Chile, our new strategic partner.

Initiatives and **projects for 2020**

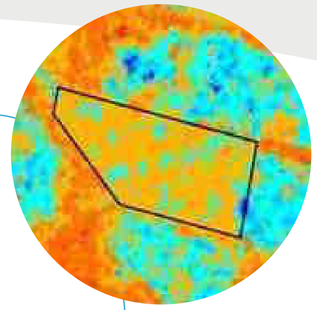
During the health emergency SOFOFA Hub generated a fundamental workspace to contribute with concrete and contingent developments.

COVID-19

Diagnose and treatment

Un Respiro para Chile

Climate Change

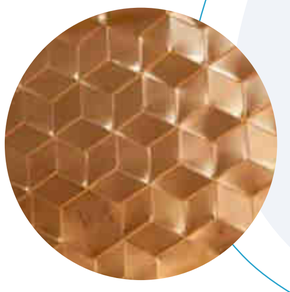


Water scarcity and precision farming

SOFOFA HUB

Circular Economy

360° SCALE Program



Circular Economy Committee for Mining

Pacific Alliance Hubs Network

Un Respiro para Chile

“Through this initiative we realized that Chile does have innovation capacity, but that it lacks articulation. At the beginning of the pandemic we set out to fulfill that role, because mechanical ventilation prototypes had been developed, but they were still far from reaching the market. Our role focused on coordinating medical societies with the government and the private sector, and working with them to break down barriers that prevented progress.”

Alan García
Executive Director of SOFOFA Hub

In an effort to increase the number of mechanical fans available in the national health network, faced with the threat of their potential shortage, SOFOFA Hub launched the "Un Respiro para Chile" initiative at the end of March, together with the CPC's SiEmpre fund, Corfo and the Ministry of Science, Technology, Knowledge and Innovation. SocialLab and the Inter-American Development Bank (IDB) also participated in this summon.

A multidisciplinary committee of experts invited by SOFOFA Hub evaluated 35 artificial ventilation prototypes presented by entrepreneurs, academic institutions, research centers, companies and the Armed Forces.

"The four helix collaboration (made up by companies, the State, academia and civil society) was key. This is the way in which the most innovative countries address society's great challenges. Today, this is known as purpose- or mission-oriented innovation," says Eduardo Bitrán, Corfo's former executive vice chairman and committee coordinator. "This approach could be applied to the sustainability challenges of the post COVID-19 Chilean economy, where climate action will become crucial to the competitiveness of countries, regions, sectors and businesses," he says.

Three prototypes advanced onto the scaling stage: DTS, a technology provider for Enaer and Famae; Asmar, who finally refrained from participating in the escalation phase; Unmanned, an alliance of three Valdivian companies (Allware, Unmanned and AndesVolt); and VEMERS UC, of Pontificia Universidad Católica de Chile.

A clinical use validation protocol was created in unparalleled record time, together with the Chilean Public Health Institute, the Chilean Society of Intensive Medicine, the Chilean Society of Anesthesiology and the Chilean Society of Emergency Medicine, to guarantee that the devices developed in Chile have the necessary safety conditions to be used in COVID-19 patients.

The committee, in conjunction with the medical societies and universities involved, developed validation protocols using as a reference the models developed for similar cases in Europe and the United States. The difference was that the official certification standard was adjusted for such cases. "Chile is

"*Un Respiro para Chile* is an example of innovative, purpose-oriented public procurement. Lessons can be drawn from this initiative, about how the State, together with private stakeholders, can improve the resilience of the health system, and provide a local supply of critical resources while simultaneously developing a sophisticated industry, which can be exported."

Eduardo Bitrán
Coordinator of the multidisciplinary committee of experts summoned by SOFOFA Hub to evaluate artificial ventilation prototypes.

> **“Collaboration and alliances between the different social stakeholders have been key to confronting the tremendous health, social, and economic challenges that the pandemic has imposed on us.”**
>
> **Juan Sutil,**
> CPC Chairman

the only case in the world where a high-standard unofficial validation system was created. A remarkable achievement that shall remain as a valuable milestone in the history of this pandemic,” says Bitrán.

This project, like others promoted by SOFOFA Hub, demonstrated that the private sector can efficiently fulfill an innovation articulation role. “We have seen the potential that exists when we link the private sector’s agility, the public sector’s empowerment, academia’s knowledge, and the entrepreneurs’ passion. We sometimes doubt the technology-developing capabilities that exist in Chile, and this initiative has proven otherwise,” said Alan García, executive director of SOFOFA Hub.

MORE THAN 100 PROJECTS WERE PRESENTED

IN 2 MONTHS,

an unprecedented clinical validation protocol was developed in conjunction with medical societies.

35 PROTOTYPES

were evaluated by a multidisciplinary committee of experts from the summon issued in early April.

17 PROJECTS

entered the validation process that was placed at the ecosystem’s disposition.

4 PROJECTS

successfully completed the clinical trials, while three of them were supported by CORFO and SiEmpre to undergo a first productive scaling stage.

Un Respiro para Chile's numbers

CAPACITY INSTALLATION

35
Submitted prototypes

5
months

100+
participants

1st
clinical validation protocol in Chile

PUBLIC-PRIVATE ARTICULATION

20
Public-private stakeholders

- Academia
- Government (Ministry of Science, Ministry of Health and Ministry of Economy + Corfo)
- Multilateral agencies
- Industry sectors associations
- Medical societies
- Companies
- StartUps
- Armed Forces

THE ORIGIN OF A NEW INDUSTRY

2
commercial level models

2
interested countries in the region

MM$ 1000+
In public-private funds

"I have seen SOFOFA Hub's technical rigor in the work developed to carry out projects such as *Un Respiro para Chile*, and I congratulate its efforts, so necessary to continue advancing on the path of innovation and technological development, and to generate solutions to our country's current needs and challenges."

Juan Sutil,
CPC Chairman

COVID-19 diagnosis and treatment

Fast, efficient and high-quality responses were needed to face the health emergency in 2020. Eight projects proposing new COVID-19 diagnosis and treatment solutions were selected from among 58 applicants, by the SiEmpre Technology Adoption Fund, a fund that resulted from a public-private partnership between the Ministry of Science and SOFOFA Hub, generated from the 80-billion-peso fund managed by the CPC and its branches.
The proposal-selecting process was articulated by the TBC which, with Corfo's support, took on the mission of creating enabling conditions for the adoption of new biotechnologies in Chile, which has currently becomes relevant within the pandemic context.

Diagnostics

1. Robots to face the health emergency

— In September 2020, three Chilean universities were selected by the TBC and the Technological Adoption Fund to host [for two years] robots that automate the sequential extraction of nucleic acids for the detection of the SARS-CoV-2 virus.

The universities of Chile, Santiago and Playa Ancha received the technological equipment that, in addition to speeding up the diagnosis of the virus, at least tripled the daily sample process, radically reducing the possibility of error and the biological risk exposure of laboratory personnel. "Open automated platforms have several advantages, such as the capability of programming them to use any reagent. They also allow freeing up the manual work of the professionals in charge of them, who can allocate their time to other tasks. Automation allows for a fast and constant flow of processed samples, helping to deliver results in the shortest possible time," says the microbiology doctor, Fernando Valiente, associate professor and academic of the Virology Program of Universidad de Chile's Institute of Biomedical Sciences.

"This project had a real and measurable impact, spawned from the successful decision of the Ministry of Health and the Ministry of Science to involve university laboratories to increase the amount of tests they could tackle. These laboratories already had PCR equipment for their own research, however, they were operated manually. The purchase of the three robots has increased diagnostic capability by three or four times," describes Tomás Mardones, TBC's deputy technology director at SOFOFA Hub.

The Opentrons robot takes 1 hours and 10 minutes to process 96 samples, something that manually would take four hours. According to Dr. Claudio Sáez, director of the UPLA Environmental HUB Research Center, this meant that it increased the daily number of SARS-CoV-2 qPCR readings, from 80 to more than 350, thanks to the Opentrons robots' automated operation, providing greater speed, safety and accuracy, when compared to human manipulation.

Receiving the Opentrons robot was also an incentive for USACH's Virology Laboratory. "We feel this is a recognition of the work we do as a SARS CoV-2 diagnostic laboratory," says Dr. Ana María Sandino, its director. "We were the university network lab that processed the most daily samples and having the robot even allowed us to increase our capacity. Operating it, and validating the obtained results, has surely been an interesting challenge."

The teams will remain in the laboratory for two years and then they will be reassigned, through a public tender, in different public and private spaces, such as health centers, clinics and hospitals. This model ensures the best use of the infrastructure and prevents equipment from being left unused at the end of a project.

"Thanks to the Opentrons robot we increased the amount of SARS-CoV-2 qPCR daily readings, from the 80 that were carried out manually, to more than 350. It operates in an automated manner, faster, safer and more accurately, when compared to human manipulation."

Dr. Claudio Sáez
Director of the UPLA Environmental HUB Research Center

SUMMON IN CHILE

3
purchase of RNA extraction robots for qPCR analysis

MAIN IMPACT

Successful network infrastructure model (TBC)
tender process every 2 years

MAIN RESULTS

x3 Increase
in analysis capability in 3 laboratories

“Thanks to the support of private parties and the valuable collaboration of academics, staff and students, this robot allowed to speed up virus diagnosis in the clinical samples received by our School of Medicine and provided support to the testing strategy, completing more than one thousand PCR tests per day.”

Ennio Vivaldi
Dean of Universidad de Chile

Diagnostics

2. Quick olfactory kit

— Universidad Católica led the initiative to detect asymptomatic COVID-19 cases and install sanitary customs points, in companies and hospitals.

At the beginning of the pandemic, COVID-19 symptoms included dry cough, breathing difficulties, fever and muscle and throat pain, however, after the first few weeks other symptoms, such as anosmia (complete loss of smell) and hyposmia (partial loss of smell), were added.

In this context, Universidad Católica's Chemical Engineering and Bioprocesses researchers and DICTUC's Aromas and Flavors Center, together with the support of the company Alfa Chilena, developed a rapid olfactory kit (KOR) to detect asymptomatic cases.

The initiative (one of eight projects selected by the SiEmpre technology adoption platform) is capable of determining a person's olfactory status in less than five minutes. Unlike other tests, it does not require that it be performed by a health professional and its value of 250 pesos per unit makes it affordable.

The test subjects are handed strips of paper that are impregnated with fragrances that must be identified sequentially in a computer, that are then processed on a platform designed by *Instituto Milenio de Fundamentos de los Datos*. The program stores information in a centralized database and this allows for real-time analysis, resulting in a score, based on the likelihood of being infected. It provides recommendations in cases of suspected infection.

The test can be taken at a company's entrance, a primary health center, a public service, a mining site, among others, in order to isolate those exhibiting olfactory dysfunctions and subject them to a PCR test that confirms whether or not they are infected.

Walmart, Copec, Banco de Chile and Metro de Santiago are some of the companies that

have incorporated the test, using it as a sanitary customs point.

"The loss of smell is one of the first symptoms of COVID-19. With this test we can perform a very large screening process prior to performing a PCR-based diagnosis. This project also considered cultural variables and statistics related to odor recognition," says Tomás Mardones, TBC's deputy director.

The KOR's objective is to strengthen epidemiological surveillance and contribute to the safe reopening of companies, allowing to identify persons who are suspected to be infected, in order to proceed to conduct a PCR test.

The KOR was developed in May 2020, and by January 2021, 125,000 tests had been conducted in Chile and abroad.

"Sudden loss of smell is one of COVID-19's characteristics, along with fever, dry cough, or muscle pain. We designed and developed the Rapid Olfactory Kit to measure this particular symptom, just as thermal imagers measure fever. Our solution consists of a three-aroma test that identifies a person's olfactory status in less than five minutes, and we have the capacity to produce low-cost kits to evaluate thousands of individuals per week."

Eduardo Agosin
Professor at the UC School of Engineering and director of DICTUC'S Aroma and Flavor Center

Diagnostics

3. COVID PCR test manufactured in Chile

— This is the first national RT-qPCR diagnostic PCR test, developed in Puerto Varas.

One of the first alarms that was triggered during the pandemic was how to secure resources to detect those infected and thus prevent the virus from spreading further. In the face of the health emergency that was advancing throughout the planet, in southern Chile biotechnology company Kura Biotech focused its efforts on ensuring that there was no shortage of coronavirus diagnostic kits in Chile.

It took about five months to develop the RT-qPCR diagnostic kit, known as *Huemul*. This highly reliable testrequires a nasopharyngeal or saliva sample to collect the genetic material required to obtain conclusive results. "The initiative's contribution consisted in guaranteeing the availability of tests in Chile, at an appropriate cost. At that time, there was uncertainty about test availability, due to growing demand," says Tomás Mardones, TBC's deputy technology director.

From Puerto Varas, Kura Biotech (with the TBC's support), managed to supply private companies and the State, because it was awarded a tender to provide 200,000 PCR tests to the national public health system, and thus became the Ministry of Health's first national supplier.

"The traditional PCR kit is already being used by laboratories in the MINSAL's health network. Aside from diagnosing COVID-19, it can also be used for investigation and molecular analysis in various areas of research".

Olga Barbosa
Ministry Regional Secretary (*Seremi*) of Science Technology, Knowledge and Innovation, for the Macro South Region

Diagnostics

4. A new way to detect SARS-CoV-2 antibodies

— The initiative will reduce dependence on commercial kits.

The ELISA test (enzyme-linked immunosorbent testing) can detect antibodies in the blood and is therefore one of the most common laboratory test for identifying HIV-infected patients. Instituto de Ciencias e Innovación en Medicina (ICIM) of Universidad del Desarrollo's School of Medicine, in conjunction with Santiago's Clínica Alemana, developed an ELISA test to identify viral antibodies against coronavirus via blood sample. The project would allow to reduce dependence on commercial kits, which have limited stock, also providing COVID-19 antibody screening tests and increasing testing and distribution capacity to other laboratories.

The highly accurate ELISA test is able to detect the amount of antibodies present in the body. For this reason, work is being done in collaboration with Universidad de Chile and Universidad Católica, to create an effective method to measure neutralizing antibodies, which are responsible for blocking the entry of the virus.

Given that antibodies can be produced and stored, the project envisages that if the hospital's or clinic's laboratory is interested in using the test, it can order the protocol and even the antibody.

"This project offers another diagnostic tool for laboratories with an ELISA reader, and generates a methodology to determine whether antibodies effectively neutralize the virus."

Tomás Mardones
TBC's Assistant Director of Technology

" So far, the results are encouraging. We are confident that achieving larger-scale antibody measurement will be a major contribution to the fight against this disease."

Felipe Alcalde
CMPC Innovation Manager

"National knowledge is needed to address problems at this stage of the pandemic. These funds allow private entities and universities to ponder together about the challenges we face today as a society."

Cecilia Vial
Researcher at the Institute of Science and Medical Innovation

Diagnostics

5. Molecular test

— The first COVID-19 quick test was developed by Kura Biotech, a biotechnology company based in Puerto Varas.

Avenire RESIST, the PCR-type quick diagnostic test developed by Kura Biotech (a biotechnology company located in Puerto Varas) was one of the seven projects, out of 58 applicants, selected by the SiEmpre Technology Adoption Platform, a private emergency fund established to finance solutions that collaborate in the midst of the health emergency and that originated from a public-private partnership between the Ministry of Science, SOFOFA Hub and the CPC.

Recognizing the rapid advance of COVID-19 in Europe, Kura Biotech refocused its research, development and production capacity and experience, to develop a quick PCR-type kit to detect the virus. It is based on RT-LAMP technology and, through saliva, allows to genetically identify it, from the very start of the contagion period. Using isothermal PCR technology, it can identify the virus in three hours, with a 95% match rate with the PCR examination.

"Kura Biotech developed a kit that lowers laboratory costs. It has been sold in the private sector as a complement for preventive testing. The advantage is its lower price, and if its results are positive, the person is subjected to a PCR test to confirm the diagnosis," explains TBC's deputy technology director, Tomás Mardones.

The Avenire RESIST kit became an effective, fast, affordable and reliable solution for companies. It allows implementing more affordable testing centers and test more than 200 people per day.

The kit, validated by the *Mutual de Seguridad* (among other laboratories and hospitals in the country), is used by companies such as Trendy, Multiexport, Aquafood and Integra Chile.

Moreover, this project's success has been such that Javier Gimpel, head of Kura Biotech's genetics department, was awarded the Innovative Scientific Award for 2020. This recognition, granted by Universidad de los Andes and the Ministry of Science, praises those who have led applied research endeavors that contribute to society.

"Feeling that we can make a difference is the reason behind our work. We feel we have a duty. I am very motivated by the idea that the country can move forward."

Manuel Rozas
Founder and CSO of Kura Biotech

"Kura has enabled us to guarantee that we have a healthy population, while taking on the responsibility of our community's health."

Gabriel Jordán
Headmaster of the Puerto Varas School

"The service provided by Kura to help control the pandemic is highly valuable, and we have applied it in different production sector of the Los Lagos Region. It has enabled us to operate our industry, particularly aquaculture, because business managers are taking care of their workers' health."

Harry Jürgensen
Former intendant for the *Los Lagos* Region

"Apart from its reliability, this methodology's greatest benefit is that it allows to immediately isolate the person and avoid further infections. In our company, we test 250 workers, twice a week."

Fernando Bueno
General Manager of Integra Chile

“When the coronavirus started, we realized that one of the problems of countries without a technological industry (such as Chile), was securing enough reagents to detect COVID-19. Therefore, we refocused to develop a coronavirus detection test. The support of the SOFOFA Hub’s TBC, Corfo and the Ministry of Science, were key. We felt that what we were doing was important, and that pushed us forward.”

Eduardo Wallach
CEO Kura Biotech

Diagnostics

6. A quick test based on RPA technology

— An ambitious proposal.

Innovation, even when we do not meet the expected results, is a learning process. Merken Biotech, a specialist in preclinical scientific studies and molecular bioanalytical services with potential therapeutic use, experienced this in the flesh. This interdisciplinary team submitted the most risky project selected by the SiEmpre fund. Its goal was to design, in record time, a quick Covid-19 diagnostic test, with fast visualization, similar to a pregnancy test.

Everyone knew from the get-go: the goal was ambitious. From a technological standpoint, it was difficult to achieve the amplification of the SARS-CoV2 virus and for results to be consistent with PCR testing. In fact, they were not reaching the expected performance after several lab tests.

"Although we were able to quickly detect high concentrations of the virus, which have been associated with the most contagious patients, we failed to reach the qPCR's sensitivity levels, which is considered the Gold Standard for these tests," says Jennifer Alfaro, Merken Biotech's scientific director. Additionally, some difficulties arose when evaluating negative controls.

The company set a deadline and hired more staff to solve the problem; however, when they failed to do so they decided to abandon the initiative. They assessed that they needed too much time to work, and the problem was immediate. Moreover, at that point several tests were already available. Since the SiEmpre fund established milestone-based project evaluations, it was possible to assess the feasibility of moving forward at a very early stage.

"It is essential that initiatives like these exist, at times as critical as a pandemic. Moreover, it is good that the awarding of projects be conditioned to continuity milestones, because it allows to rearticulate guidelines and objectives, without exhausting the entire allocated budget."

Jennifer Alfaro
Scientific Director of Merken Biotech

"They looked for all possible paths and made a huge effort. They were extremely serious about knowing when to launch. This is how technology innovation works: sometimes you work a lot and things don't work out at that time; however, everything that you learn will help you solve future challenges."

Tomás Mardones
TBC's Assistant Director of Technology

Treatment

Convalescent plasma-based therapies

— Three projects associated with the use of convalescent plasma were carried out: a clinical study and two series of treatments.

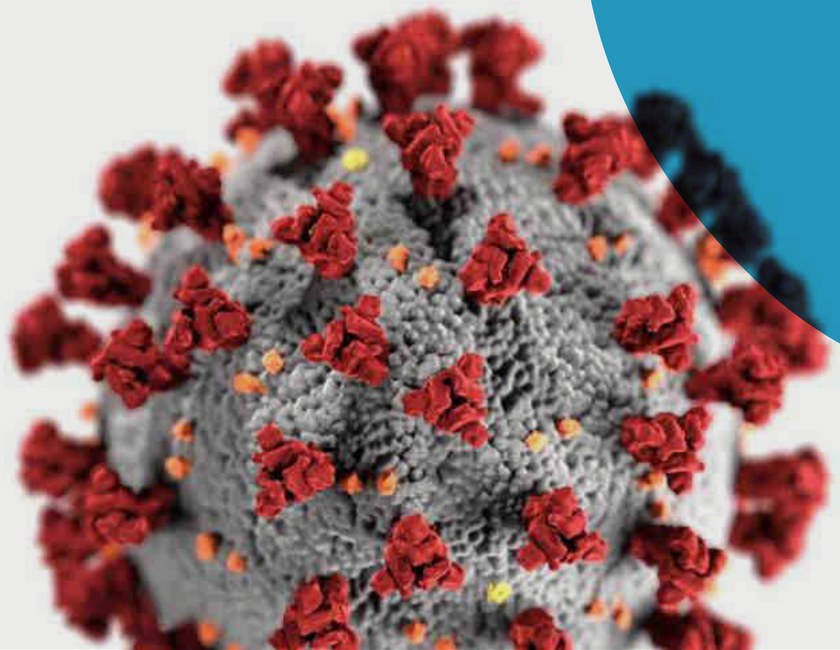
In August 2020, the U.S. Food and Drug Administration (FDA) authorized the emergency use of investigation-phase convalescence plasma for the treatment of patients hospitalized for COVID-19.

As of August 1st, Chile recorded 357,658 confirmed COVID-19 cases, and 9,533 deaths. By the end of that month, the number of infections had increased to 411,726 and the number of deaths to 11,289. There were 1,753 new cases in a single day.

Theory argued that, according to preliminary clinical studies, the blood of people who had survived COVID-19 could help those who were still fighting the disease, by preventing its serious evolution, reducing their hospital stay as well as the need for ICU mechanical ventilation.

Although neither the clinical trial nor the series of patient treatments evidenced positive results, obtaining scientific conclusions on the "non-effectiveness" of a treatment is a significant contribution during pandemic times. "In Chile, we are contributing to generating high quality scientific evidence," said María Elvira Balcells, an infectologist at Universidad Católica's Department of Infectious Diseases.

The results of these plasma-related Chilean initiatives are in addition to other serious studies conducted in China, the United States and India, which also have failed in demonstrating this treatment's effectiveness.



"This form of collaboration between the State, civil society, companies and universities is not only key to facing the current context, but also boosts our future ability to create value through the national scientific community".

Andrés Couve
Minister of Science, Technology, Knowledge and Innovation

7. PUC Clinical study

Financed by the SiEmpre Fund and the TBC, Pontificia Universidad Católica undertook a clinical study with convalescent plasma to assess its effectiveness in 58 patients infected with COVID-19.

1 CLINICAL STUDY

UNIVERSIDAD CATÓLICA

The clinical trial considered 58 patiens

hospitalized for COVID-19, who displayed symptoms for seven or less days, with risk factors, but without the need for mechanical ventilation. Convalescent plasma was randomly delivered to patients: 29 of them were treated on the first day, and the second half only if their health status worsened. “Although it was expected that the early administration of convalescent plasma would prevent the evolution to more severe forms of COVID-19, we found that the administration of plasma did not change the disease’s natural evolution”, said María Elvira Balcells, an infectologist who led the study.

8. Treatment series

In a similar line of research, Fundación Arturo López Pérez decided to perform a plasma treatment in a large number of infected subjects. The transfused plasma came from voluntary blood donors who had recovered from the virus.

Universidad de Chile also explored plasma treatment in infected patients, focusing on effectiveness and safety analysis.

2 TREATMENT SERIES

FUNDACIÓN ARTURO LÓPEZ PÉREZ

The clinical trial included

511 transfused patients. Plasma donation was conducted through the apheresis process, where the donor was connected to a machine that separates the components of the blood by collecting the plasma and returning the rest of it to the bloodstream. One donor allowed three patients to be transfused.

UNIVERSIDAD DE CHILE

La investigación se enfocó en

analyzing the effectiveness and safety of plasma in early treatment of the COVID-19 infection in hospitalized risk patients. It compared the benefit of administering this plasma in two stages of the evolution of the infection. After completing the plasma treatment, the clinical, radiological and virological evolution among patient groups was compared. The project only advanced up to the first stage.

COVID-19 diagnosis and treatment in numbers

SUMMON IN CHILE

58
Submitted projects to the SiEmpre fund

MAIN RESULTS OF THE PROCESS

MM$ 770
In public and private funds

1 purchase of 3 robots for qPCR analysis

+

7 projects approved and funded by the SiEmpre fund

x3 Increase
in analyzing capabilities in 3 COVID laboratories

- 5 tests
- 2 plasma treatments
- 1 plasma clinical study

PRIMARY IMPACT TO DATE

Tests
produced in Chile, for Chile

Installation
of test production capabilities in Chile

“Given the quick responses we required, the COVID-19 pandemic demanded a public-private alliance, that tested coordination capacities, collaborative intentions and interaction modalities. Those lessons must remain as an installed capability, to solve other also urgent and unavoidable challenges, such as climate change and the technological revolution.”

Andrés Couve
Minister of Science, Technology, Knowledge and Innovation

Scale 360° Program

“Chile’s participation in SCALE 360° must be seen as a commitment to unite our organizations under a common project to transform and improve how things are currently done in the business sector. We see opportunities in connecting our value chains, but we also understand that these changes must be based on commercial models that can only be enabled through technology and collaboration.”

Bernardo Larraín Matte
Chairman of SOFOFA Hub and Chairman of SOFOFA

— Through the use of an outstanding global platform, SOFOFA Hub promotes circular economy in Chile (which uses fewer natural resources and reduce pollution) to address climate change.

Chile, through SOFOFA Hub and together with the World Economic Forum (WEF), is the second country in the world, after the United Arab Emirates, to join the Scale 360° initiative, a global partnership that seeks to accelerate circular economy through innovation challenges that reduce the environmental impacts of industries.

Circular economy is a regenerative approach to production and consumption, in which products and materials are redesigned, recovered, and reused to reduce environmental impacts. This transition could lead to $4.5 billion in additional economic production by 2030; however, as of today, only 9% of the extracted materials are reused. "Ultimately, it is an innovation issue. We need to rethink and redesign the system to contribute new ideas and attract entrepreneurs and new technologies," said Antonia Gawel, director of Circular Economy and Innovation at the WEF.

The Advisory Council in Chile is composed of representatives from the public, private and civil society sectors, who guide a collaborative effort to accelerate the transition to circular economy through innovation and technology.

For Alan García, SOFOFA Hub's Executive Director, this program represents a great opportunity to connect with those who are leading this transition around the world, while also showcasing what we are doing in Chile.

ADVISORY COUNCIL

The circular economy advisory board is led by SOFOFA Hub and is comprised of: Carolina Schmidt, Minister of the Environment; Bernardo Larraín, former SOFOFA Chairman; John Graell Moore, CEO of Molymet; Francisco Ruiz-Tagle, CEO of CMPC; Jesús García, Controller of CCU; Sebastián Rios, PuCobre; Petar Ostrojic, CEO of CIEC; Paolo Pallotiti, General Manager of ENEL Chile; Gonzalo Muñoz, Chilean COP Champion, CEO Tricycles; Pablo Terrazas, Executive Vice Chairman of CORFO; Antonia Gawel, Head of Circular Economy & Innovation at the WEF.

"Circular economy must be driven as a state policy that transcends the governments in office, and allows for the establishment of a circularity and climate action culture. To achieve this, it is a priority for both the public and private sectors, as well as entrepreneurs, to incorporate measures of circularity and climate action at the heart of their strategies."

Carolina Schmidt
Minister of the Environment and member of the Advisory Council

Circular Economy Committee for Mining

An unavoidable transition

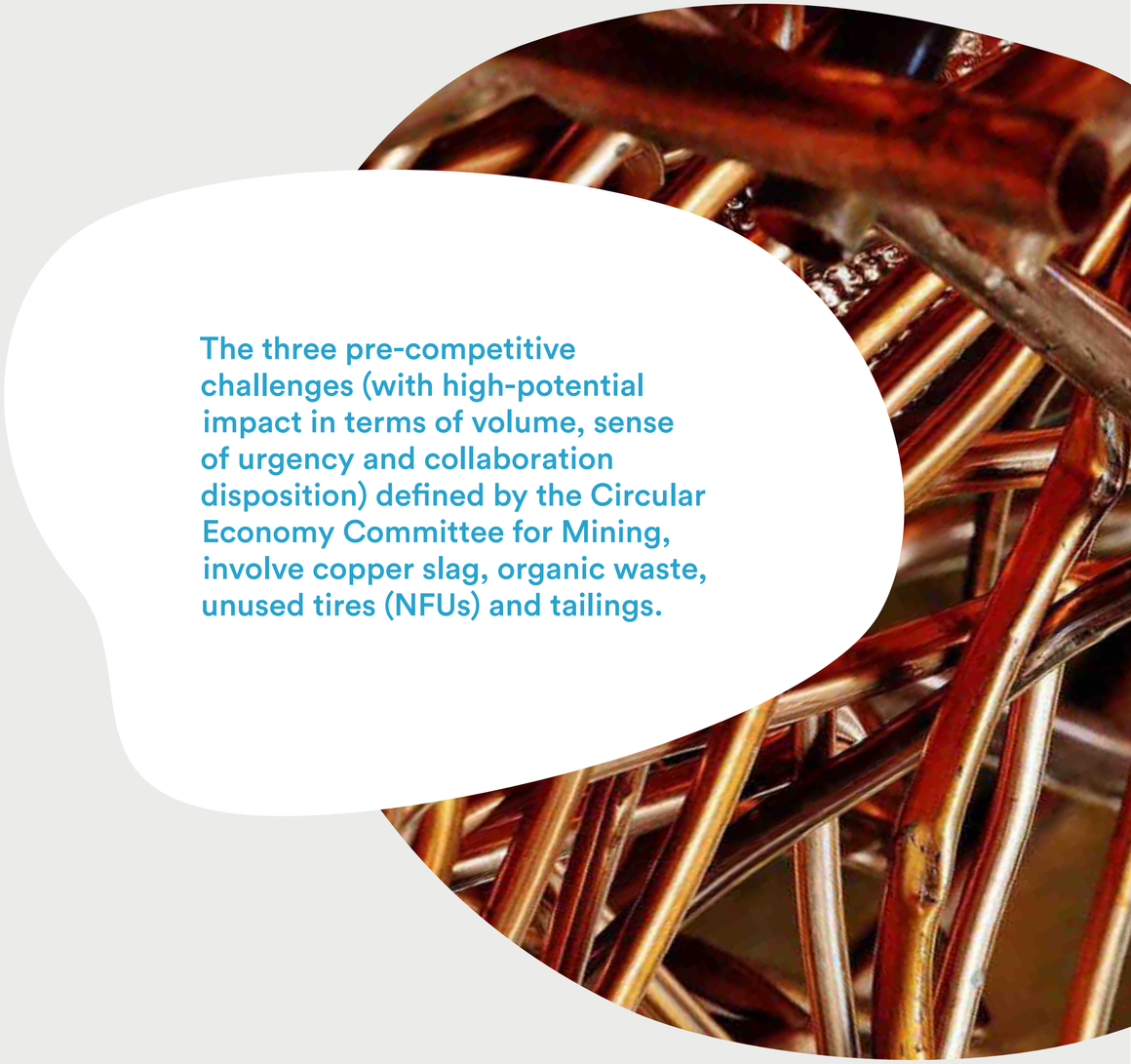
— The promotion of circular economy is one of SOFOFA Hub's strategic axes. In contrast to the linear production model (which extracts, produces and discards) circularity seeks to recover industry by-products. This is an unavoidable goal for businesses in the 21st century.

It is no longer a question of producing more, but of producing better, especially in mining, where transitioning to a circular model is a major technological and cultural challenge, because Chile is the largest copper producer and exporter in the world and the mining industry represents one of its economy's main drivers.
In this context, SOFOFA Hub, in partnership with CESCO (Center for Copper and Mining Studies), formed the Circular Economy Committee for Mining, comprised of four major mining companies as well as the Ministry of Mining.

Its goal is to create an articulation space for collaborative projects that facilitate the transition to circular economy through the search and testing of technological solutions, as well as the development of new business models and industrial symbiosis.

The Committee's first step was to define the lines of work by applying the initiative prioritization model developed by SOFOFA Hub with the support of the Inter-American Development Bank (IDB).
The participating companies (Anglo American, Codelco, Antofagasta Minerals and Teck) posed their challenges in the field of circular economy, with special focus on waste or by-product recovery, considering the current and future regulatory framework and its barriers. Together, they defined four pre-competitive challenges with high impact potential in terms of volume, sense of urgency and collaboration disposition: Copper slag, organic waste and tailings.

Subcommittees (each led by a different company) were created to address each of these

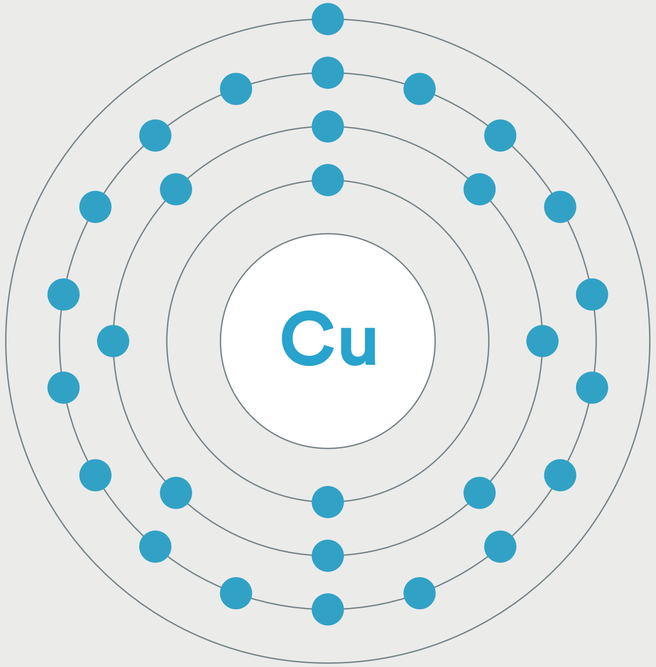


The three pre-competitive challenges (with high-potential impact in terms of volume, sense of urgency and collaboration disposition) defined by the Circular Economy Committee for Mining, involve copper slag, organic waste, unused tires (NFUs) and tailings.

challenges and find innovative solutions to revalue them, analyzing them using the management model's prioritization matrix.

The Slag Subcommittee, headed by Anglo American, works on different lines of action to give new uses to this mining industry by-product, for example, in road construction or cast concrete production, through agreements with companies and with the State.

By adding value to waste (through its reuse in its own production chain or by incorporating it into another industry's process using new technologies), mining can set the example of how companies can generate less environmental impact. At SOFOFA Hub we believe we are about to witness a transformative change: circular economy is changing the DNA of companies, and its effects in the mining industry will extend beyond Chile's borders. Considering that these are large-scale projects, its impact will be global.



THE COMMITTEE'S OBJECTIVES

1] To identify pre-competitive challenges, that is, those that are common to several companies in the industry, and that have a direct impact on the circularity of the operation.

2] To systematically prioritize challenges, in alignment with all participating companies, prioritizing the most relevant and urgent challenges.

3] To evaluate and select solutions for the prioritized challenges.

4] To test technologies together with the companies.

Pacific Alliance Hubs Network

A model that can be replicated in the region

The Inter-American Development Bank (IDB) considered that SOFOFA Hub's work could become a methodology worth sharing in the region and supported a program to create a network of Pacific Alliance hubs, under its leadership.

"Developing an agenda for sustainable economic development is a priority for the countries of the Pacific Alliance and Ecuador, and circular economy related to plastic management is a key aspect to achieve this. The Inter-American Development Bank (IDB), which supports this initiative, has generated the necessary knowledge to shape a circular economy development agenda. The IDB has also supported the creation of the SOFOFA Hub project portfolio management model. This strategy will enable the Pacific Alliance and its strategic partner, SOFOFA, to prioritize investment in projects that have a circular economy vocation," explains Germán Sturzenegger of the IDB.

The first meeting to launch the network was held in January 2020, in Medellín, Colombia, with the attendance of more than 35 representatives of business associations from Mexico, Colombia, Chile, Peru and Ecuador. Aside from sharing the Chilean hub's model, the meeting's objective was to get the ball rolling, to jointly lead the companies' transition towards circular economy and a more sustainable plastic management. The meeting generated a space to exchange experiences and identify the most important regulatory and market challenges between representatives of the plastics industry, recycling industry, and private companies in general.

During this first approach, there was consensus that synergy among companies is key to driving

According to estimates, only 8.6% of the world's economy is circular. To change this reality, it is necessary for companies to work collaboratively (integrating new technologies that lead them to develop more capabilities) with the government and consumers.

circular economy. The business sector must also be proactive in addressing regulatory and market challenges, and adopting innovative technologies to respond to change and create new value chains.

SOFOFA Hub will spearhead the process for the development of local hubs in the Alliance's countries under mutual collaboration, in an initiative that demonstrates that the private sector can lead change across borders. The figure of business hubs in the region takes a relevant role in linking all stakeholders, incorporating companies and understanding their heterogeneity. The current challenge is to transfer public policy discussions and collaborative agreements into tangible circular economy projects.

With the IDB's support, SOFOFA Hub promotes that countries of the Pacific Alliance develop local hubs that collaborate with each other, demonstrating that the private sector can lead changes, beyond borders.

Water scarcity has been a problem for the national agroindustry for 20 years and is therefore a priority issue for Chile.

Water scarcity and precision farming

The new way of addressing common challenges

— In collaboration with the government of Israel, SOFOFA Hub summoned companies in that country to propose solutions to the water shortage requirements facing the agricultural industry in Chile.

The desertification threatening the central area of the country led SOFOFA Hub to summon six Chilean companies directly linked to the agricultural sector, to jointly identify the challenges associated with water efficiency, creating a collaborative process to search for and select international solutions and develop a collaborative pilot program of new technologies for this industry in Chile.

Viña Concha y Toro, Agrosuper, Agricom, IANSA and Hortifrut are the companies that participated in the discussion and who, together with the Israeli embassy, formed a Steering Committee that met periodically to discuss the water scarcity-related challenges they have tackled, the technological solutions they have considered, and their vision for the future.

With the embassy's support, the committee summoned companies and entrepreneurs in Israel devoted to the efficient use of water in the agricultural industry in a context of scarcity. Under the so-called **"Open Call for Water Efficiency Challenges in Chile",** they were invited to participate in the search for possible solutions to the challenges posed by Chilean companies.

The Australian Embassy subsequently joined the process and mapped companies and technologies available in its territory; however, it failed to reach the selection stage due to the global contingency experienced in 2020 due to COVID-19.

Eleven Israeli companies answered the international call, showing interest in participating in the project and attending a *Demo Day* in Chile, where they showed their own projects, provided explanations regarding their industries and exhibited technologies to fight water scarcity. The meeting took place in two stages, with the participation of the Chilean Venture Capital Association.

The Steering Committee selected two companies to work on the codesign of collaborative pilots, to

validate the use of its technologies in Chile and thus increase the water supply resilience of the agricultural industry in Chile.

One is ConserWater, which is jointly developing a pilot with IANSA and Concha y Toro. This company specializes in using satellites and artificial intelligence to predict the soil's moisture, its nutrients and carbon levels, anywhere in the world, at all times, without the need for connection.

The tests are being conducted separately on the premises of each of the Chilean companies. In the case of IANSA, they are being carried out in fields covering a hundred hectares in Parral and Linares, in the Maule region, where satellites are being used to determine if soil moisture and nutrient levels are adequate. In the case of Concha y Toro, work is underway in 10 fields with 21 headquarters, monitored in the Limarí, Cachapoal, Colchagua and Maule valleys. The objective is to compare ConserWater's technology with that currently used by the companies and, provided that the pilot evidences good results, replace or use it in a complementary way.

Agritask is the second company in Israel to carry out pilots on Chilean soil. It is a holistic platform for agricultural operations that is designed to facilitate decision-making through the integration of technologies, tools and data sources, through a system that analyzes and quantifies risks, and generates alerts and recommendations.

The initiative provides a digital agricultural management application through which the entire production process can be managed, with the aim of automating the work and discarding the use of tools such as Excel. Agricom, among others, is involved in this pilot.

"The success of this project is that we managed to get several companies that had never worked together to collaborate, share experiences, and execute projects together. This is a tangible example of private collaboration to address a country problem," says Alan García, executive director of SOFOFA Hub.

THE INITIATIVE, IN 5 STAGES:

2020		2021
January	Steering Committee confirmation.	Pilot development.
February	Establishment of common challenges.	
May - Sep	Summon and preselection.	
Oct - Nov	Pilot selection and codesigning.	

"It has been an incredibly positive experience to be able to sit around a table and talk to other companies with similar challenges (and pains), because it has enriched our Research and Innovation Center. In Maule, we have a large industrial pilot, more than 5 hectares of vineyards to validate the use of satellite technology to determine the moisture content of the soil; data is still being processed to get the final results; however, it is such a disruptive innovation that if it works as we think, it will be a huge advance for irrigation management, at least for vineyards."

Álvaro González
Director of the Research and Innovation Center of Viña Concha y Toro

Water shortage in numbers

CALL IN ISRAEL

28 Israeli start-ups

5 participating companies

11 evaluated solutions

7 selected solutions

PILOT CO-DESIGNING PROCESS

2 Collective pilots

Opportunities and initiatives were generated as a result of this process, between companies and Israeli suppliers, for private projects and prospects in Chile.

A NEW WAY TO ADDRESS COMMON CHALLENGES

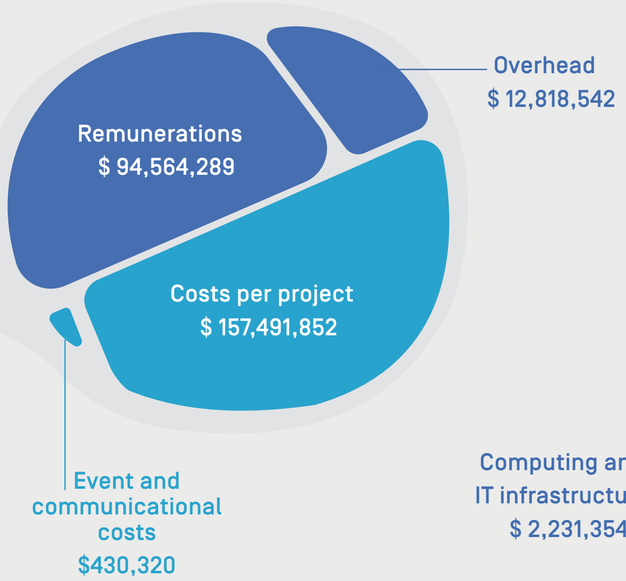
Steering Committee

it will continue to session to capitalize on learnings

Uses and applications of the funds*

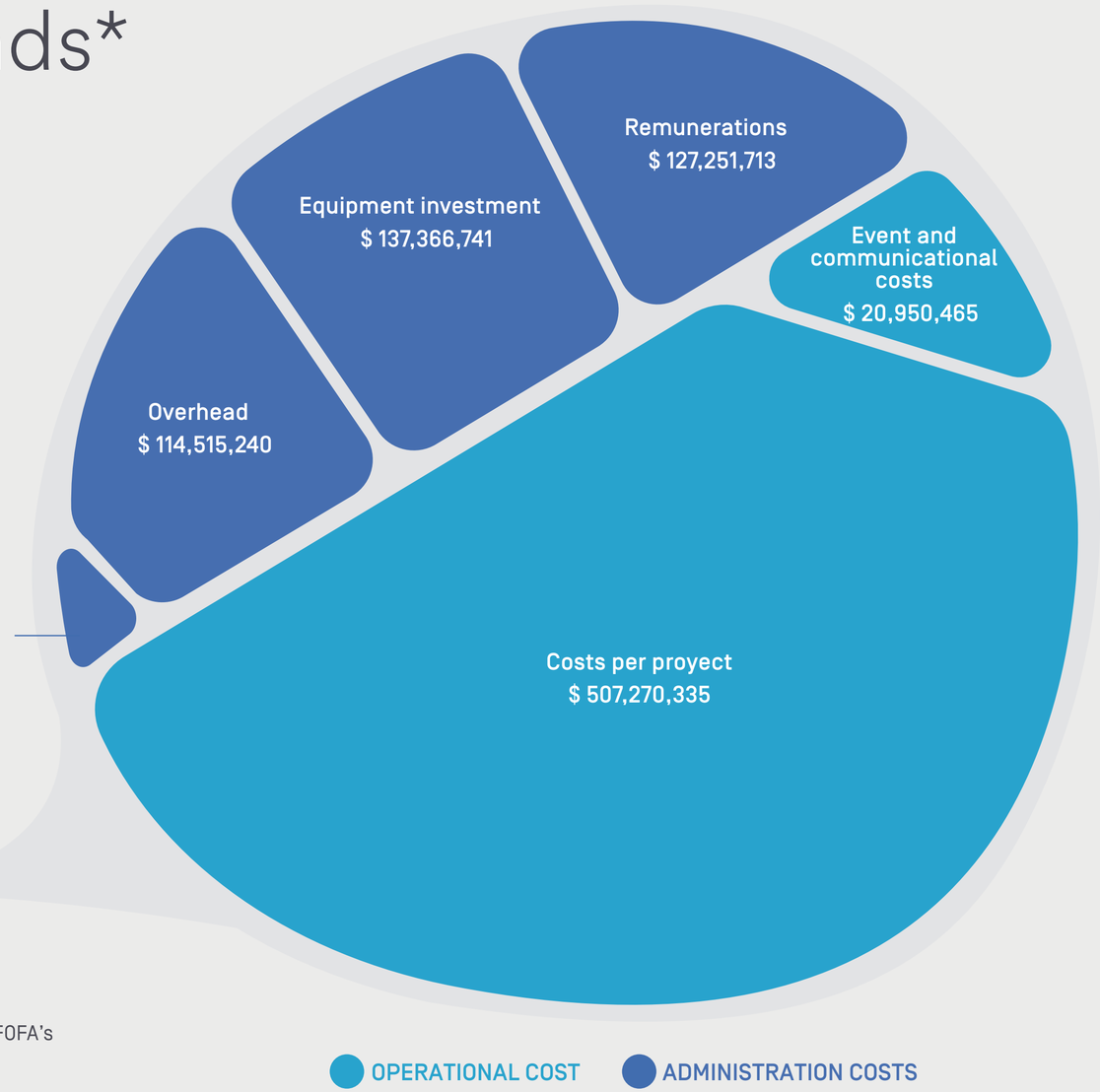
Hub

Memberships	$ 245,765,900
Proyects	$ 84,206,880
Total revenue	**$ 329,972,780**
Total costs	**$ 265,295,003**
Cash balance**	**$ 64,667,777**



cbt SOFOFA HUB

Funds reported as of Dec. 31st, 2019	$ 1,600,809,905
Private contribution to projects	$ 378,500,000
Total costs	**$ 909,585,848**
Reported balance***	**$ 1,069,724,057**



* The SOFOFA Hub's operations were managed by SOFOFA until 2020; therefore, this report consolidates information from SOFOFA's accounting plus the accounting information of the Corporation that assumed operations as of December 2020.

** Cash balance as of December 31st, 2020, executed during the first quarter of 2021.

*** Balance is broken down as follows: $1,012,424,057 to be returned to CORFO at the end of Stage 1 of the TBC program (2023); and $57,300,000 returned to the SiEmpre fund during the first quarter of 2021.

Some quotes included in this report were obtained from the websites of the following institutions: SOFOFA, *Universidad del Desarrollo, Instituto Milenio Fundamentos de los Datos, Instituto de Ciencias e Innovación en Medicina and Diario Sostenible.* Others were specifically compiled for this edition.

General Direction
Andrea Guzmán

Concept and Editing
Memoria Creativa

Art Direction
Camila Berger

Design
Antonia Berger

SOFOFA HUB

SOFOFA HUB

Av. Andrés Bello 2777,
Las Condes,
SANTIAGO, CHILE

Contact: andrea@sofofahub.cl