

Drones for pollination, tractors controlled by tablets, electronic watering, mechanical pruning, and **technological use in the apple grower from Santa Catarina** boost production and stand out Santa Catarina in the national leadership.

Edição bilíngue online

Online bilingual issue

A Revista Fapesc ganhou uma versão em inglês Fapesc Magazine is avaliable into English

Scientist in Action

A paleontologist from Universidade do Contestado discover a new specie of Brazilian dinosaur

Thesis Defense

A researcher from Udesc presented a pioneering study about the hop grower in Brazil and became a reference in the country

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New challenges of science, technology, and innovation in SC

with dedication and collaboration. We will have other battles and trust in the force of human knowledge, in the collaborative action of people with the institutions to solve problems and forward demands and necessities of society. In this second edition, the Revista Fapesc - Science, Technology, and Innovation in Santa Catarina, one more time, we will present the successful research and innovations from our State, even as the power and challenges of our entrepreneurs, researchers, and institutions.

Santa Catarina has excellent teaching and research institutions, innovation centers, scientific technologic parks, and company incubators. We have a pulsating, mature, and in consolidation ecosystem of Science, Technology, and Innovation (STI), as you will meet through these contents and reports in this edition. We reinforced, in the last edition of Revista Fapesc, the importance of information, diffuse and connections for the advance of human knowledge and the development of our regions, because we believe in the generation of new research, solutions, business, and products, and, above all, in the development of Santa Catarina's regions. For that, we created opportunities for training and maintenance of our talents, even attracting talents from other states and countries.

This edition ends one more management cycle that began in 2019 and prepares the readers for a new one, which will end in 2026. For this time, with a trailing path. After all, the Revista Fapesc is an action to celebrate the 25 years of the Research and Innovation Support Foundation of Santa Catarina State (Fapesc), completed in 2022.

This movement of strengthened STI Santa Catarina ecosystem will not stop, we are sure. The researchers, entrepreneurs, and innovators from Santa Catarina are restless and active. Over these pages, you will meet inspiring histories of innovative and engaged people who changed their reality, surroundings, and regions, making a difference and reaching results of impact.

We are challenging the citizens and institutions, but also we are challenged by them. This virtuous cycle is under constant construction and is decisive for our reality improvement today and in the future. I reinforce what was previously said: use these cases and the information to learn, make connections, and develop business, partnership, and joint research. I end with a special thanks to the entire Fapesc team and State Government, as well as to all actors in the STI ecosystem in SC.

Good Reading!



The researchers, entrepreneurs, and innovators from Santa Catarina are restless and active. Over these pages, you will meet inspiring histories of innovative and engaged people

Fábio Zabot Holthausen Fapesc President

People who collaborated in the second edition

The Revista Fapesc is a collaborative publishing. The journalistic content production is made in partnership with the actors from the Science, Technology, and Innovation ecosystem from Santa Catarina. Our objective is to disseminate the successful initiatives of researchers, entrepreneurs, and innovators from the State and bring society closer to scientific and technological productions.

Join us! Send an agenda suggestion to revista@fapesc.sc.gov.br



Our pitch

Innovation and apples. In the second issue of the **Revista Fapesc- Science, Technology, and Innovation**, we gather two loves from Santa Catarina to demonstrate how technology can positively impact apple growth in Santa Catarina.

To know the successful projects made in the State, considered the most producer in Brazil, the journalist **Gisele Krama** visited the companies and orchards in the cities of São Joaquim, in the Mountain; Caçador and Fraiburgo, in the Middle-West. Along with the videomaker **Caroline Westerkamp Costa** and the photographer and designer **Gabriela Garcia Cera**, the team got closer to the work of growers who decided to invest in technologies to guarantee more competitiveness and profitability.

In Chapecó, in the West of Santa Catarina, the journalist **Milena Nandi** visited the Escola de Educação Básica Bom Pastor (Elementary School) to discover the secret of the award projects of the students from Santa Catarina, they collect trophies and stand out from the national and international competitions. The report is also the debut of the designer **Ana Sofia Carreço de Oliveira** on the team. Another debutant, the designer **Luiz Fernando Filho** signs the institutional pages.

With an eye on how inventions and scientific technological discoveries can reach and benefit society, the journalist **Maurício Frighetto** explains the essential role of Technology Innovation Centers (TICs), the project that unites the knowledge developed for Institutions of Science, Technology, and Innovation to companies, government, and society. The report has a quiz made by the designer **Sharlene Melanie**, to test the reader's knowledge.

Bilingual online contents

We close the year celebrating Fapesc's 25th anniversary with yet another novelty: the release of the Revista Fapesc bilingual issue. In the online version, it is possible to read and share all contents in Portuguese and English. No doubt, it is an important step to enlarge, increasingly, the dissemination of the expressive potential of the Science, Technology, and Innovation ecosystem from Santa Catarina, an achievement of the press officer of Fapesc, **Francieli Oliveira**, a partnership with the translator and proofreader, **Luana Nunes**.

In the pages of this printed issue, it is possible to read one of our reports in English and Portuguese, the report about Entra21, one of the largest technology training programs in Santa Catarina. On the Revista Fapesc website, all the reports are in English.

Discover our website, browse social media and send suggestions. Feel invited to join this community.

Regards,



Nanda Gobbi

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TIC - TECHNOLOGICAL INNOVATION

Bridge of knowledge b research and society

Technological Innovation Centers (TICs) are connected channels between Science, Technology, and Innovation Institutions (STIIs), companies, governments, and citizens, promoting innovation, intellectual property, and technology transfer.

Maurício Frighetto Fapesc mauricio.frighetto@fapesc.sc.gov.br

-apesc Explains

ne of the challenges of Science, Technology, and Innovation Institutions (STII) is to make knowledge reach society. How does an invention, a discovery, an industrial design, or a computer program come to companies, governments, and citizens? Helping to resolve this issue is the role of the Technological Innovation Centers (TIC), designed to be a kind of bridge between knowledge and society.

The first institution in Santa Catarina State to have a TIC was the Universidade Federal de Santa Catarina (UFSC) in 1981. Since 2004 with the Innovation Law, the centers began to be structured more systematically. The norm defined it as "a constituted center or body by one or more STII to manage its innovation policy."

"After the promulgation of the law, many universities and research institutes created working groups to reflect on 'what is this TIC.' Sometimes there was a structure, resolution, or normative statement focused on intellectual property (IP). Sometimes, this work was done by a person or by the legal office," reminds the president of the Research and Innovation Support Foundation of Santa Catarina State (Fapesc), Fábio Zabot Holthausen. "But it was very incipient."

In Santa Catarina, one of the first actions happened in 2007 through a public call from Fapesc that supported five centers. The following year, the Santa Catarina Arrangement of Technological Innovation Centers, Pronit, was created with 18 institutions. The foundation also supported the initiative, which received funds from Finep, a public company of the Ministry





Coloque o número correspondente à pergunta



It is the acronym for Science, Technology, and Innovation Institutions. They carry out basic or applied scientific or technological research or develop new products, services, or processes. These are, for example, universities and research institutes.



The National Institute of Industrial Property (INPI) manages intellectual property, such as patents, trademarks, and computer records. The TICss are responsible, for example, for analyzing research within the STIIs that may generate an intellectual property asset. They can also do prior art research, write patent letters, and file and manage patents.



Discover more about the Institute.



Implement and manage the institutional innovation policy of an STII.



Technological Innovation Center





A company may be interested in entering into a contract or agreement with an STII, obtaining patent licenses, or technology transfer. The inverse path can also be, in other words, STII looking for companies that are interested in its knowledge. TICs bridge this gap by negotiating contracts and agreements. One of these instruments is royalties when STII receives an amount for technology transfer.



It works to create or develop a culture of intellectual property (IP), innovation, and entrepreneurship. It usually promotes lectures, workshops, and fairs on these topics. It also meets the demands of students, professors, and researchers.



Altogether, Fapesc supported the TICs of Santa Catarina on four occasions. Check the details:

2006

Intellectual Property Management Program – PROGEPI Investment of R\$ 250 thousand to strengthen and expand five TICs.

2007

Arrangement of Technological Innovation Centers in Santa Catarina, PRONIT Investment of R\$ 350 thousand. With the funds from Finep and counterpart funds, the total amount was R\$ 1.8 million.

2019

Support Program for the Consolidation of Technological Innovation Centers of Science, Technology, and Innovation Institutions (STII) in the State of Santa Catarina R\$ 2 million.

2022

Support Program for the Consolidation of Technological Innovation Centers of Science, Technology, and Innovation Institutions (STII) in the State of Santa Catarina – 2nd Edition R\$ 2 million. of Science, Technology, and Innovation. Professors, researchers, and technical professionals were trained in project design, TIC management, intellectual property, and technology transfer. Over the years, Fapesc has invested more than R\$ 4.5 million in the centers.

Culture of innovation and intellectual property

Holthausen participated in the working group that created the TIC at Universidade do Sul de Santa Catarina (Unisul). "We decided to structure the TIC beyond its competencies defined by law. Because the Innovation Law has a much broader framework, such as the promotion, the development of research, and innovation. At that time, we created Agetec, the Entrepreneurship, Research and Innovation Agency." The agency had an entrepreneurship center, an intellectual property and technology transfer office, legal advice, a project and service office, a business incubator, and a technology park.

According to Holthausen, one of the first tasks of all TICs was to help develop a culture of innovation, intellectual property, and technology transfer. "Because nobody knew how it worked. The professor did not know how to relate to a company and doubted whether he or the university would own a patent. We had to work a lot with this issue of acculturation, both inside and outside the university. Because the companies did not know very well how to relate either."



Access the Furb website and discover more details about the first royalties received for developed products at the university.

The first royalties

At the Universidade Regional de Blumenau (Furb), the TIC is called the Technological Innovation Agency (Agit). Formally established in 2012, it began to take shape in 2016 based on strategic planning. "We started talking to professors, giving courses on Intellectual Property, going to graduate programs to explain what a patent is, what the legislation says. It was slow and hard work. And we were overcoming the barriers that existed. We can say that we started to spread the Intellectual Property culture. And it started to work. In 2022, we scored all the goals," says professor Vinicyus Rodolfo Wiggers, coordinator of the Centers.

In strategic planning, one of the objectives was to receive royalties. When an asset of Intellectual Property is licensed to a company, a contract defines the portion of the profits that go back to the university. And in April 2022, Furb received R\$ 2.583,94, the first transfer resulting from the industrial design of luminaires designed by students of the Design course in the "1st Innovation in Lighting Design Award," carried out in partnership with the company Blumenau Lighting. So far, this project has yielded R\$ 12.243,98 in four lamps.

At the same ceremony, Furb received R\$ 12.510,34, a transfer of know-how to the company Clarlei Tecnologia, from Rio de Janeiro, for the technology of a transformer test case. The product was developed by research pro-

Winner Girls

Thabata Figueiredo, Letícia Glau, and Larissa de Oliveira, creator of *Kina Light*, were in first place for the Innovation in Lighting Design Award in 2019 and received royalties for the product that they developed in 2022. fessors from the Electrical Engineering course, between 2011 and 2013, through a Research and Development project financed by Celesc. "The receipt of these royalties demonstrates that the knowledge developed at the university has application and can contribute to society. Technological innovation and technology transfer are one of the best ways to make this knowledge available to society," Wiggers at the day of the ceremony.

But the first contract signed is even more expressive in terms of values. It is a home run for Wiggers. It will yield R\$ 820 thousand to the university over the next ten years. In addition, the company also invests in scholarships for graduate programs. For strategic reasons, the researchers asked not to cite the project.

More investment in research

The Integrated System of Telemedicine and Telehealth (STT), developed at UFSC, will be used by Brazilian university hospitals. In exchange, the hospitals will invest in Research and Development (R&D) to improve that system. The agreement is an example of the importance of the TICs - the Secretariat of Innovation (Sinova-UFSC) mediated it, which sheltered the functions of the TIC.

"We have a technology that is 20 years of research and financed with public money. We were afraid that in negotiation, research would remain in the second plan," says the coordinator of the STT, Aldo von Wangenheim. "We were looking for models on how to transfer technology that resulted in a minimum set of requirements, which included investing in

research. After racking our brains and many meetings with the attorney's office and Sinova, we arrived at a model that establishes that other institutions can requirements of the Innovation use the system as Law and at the same time give more long as they contribtransparency to the process and ute to the continuity of development."

The STT has been continuously developed and implemented by UFSC since 1999. It is a set of technologies, medical work processes, test protocols, and clinical conducts for large-scale

remote diagnosis and patient follow-up within the context of the Unified Health System. Over the years, it has received funds from the State Department of Health of Santa Catarina, the Pan American Health Organization, the Ministry of Health, Fapesc, and Finep.

Present in all cities in Santa Catarina, the STT has already performed more than 10 million consultations, providing specialized medical care to the interior. Pilot projects are

taking place in Acre, Bahia, Mato Grosso, Mato Grosso do Sul, and Tocantins states and in the Air Force, Army, and Navy.

The Empresa Brasileira de Serviços Hospitalares (Ebserh), which manages 48 university hospitals, showed interest in the technology. And Sinova launched a Technological Offer Notice in August 2021 the first by UFSC. Ebserh signed a partnership, but all direct or indirect administration bodies, from all spheres, can also apply.

"The idea of carrying out a technological offer was to meet the requirements of the Innovation Law and at the same time give more transparency to the process and provide opportunities for the public health network throughout

Brazil to have access to the STT," explains Alexandre Moraes Ramos, who was Sinova's secretary when the deal was closed. "Any public hospital in Brazil can adhere to the notice and thus have free access to the system. On the other hand, it must sign provide opportunities for the public an R&D agreement health network throughout Brazil with the university and collaborate with financial, human, material, and infrastructure resources so that the evolution of the system, based on the development of new function-

alities, continues."

The idea of

carrying out a technological

offer was to meet the

to have access to the STT

Alexandre Moraes Ramos

UFSC Professor

Wangenheim points out that university hospitals will also be able to use technology to create disciplines aimed at teaching practical telemedicine - if anyone had any doubts, the coronavirus pandemic has shown the importance of making diagnoses and treatments at a distance. It is one more way for the knowledge produced in an STII to reach society.

Approaching the <u>State</u> Government of Science, Technology and Innovation Ecosystem to attend to the demands of the society from Santa Catarina







Focused on Innovation

Discover the Santa Catarina Environments for promotion and support of innovative entrepreneurship

Innovation Centers: approaching ideas, talents, and investmer

The journalist and writer Ana Lavratti, the IFSC professor Márcio Henrique Doniak, and the retired professor Maria Clara Kaschny Schneider, former rector of IFSC, are organizing a book to tell the **history of the Innovation Centers in Santa Catarina** and who are participating in this ambitious project: to do what does not yet exist. Follow the story and the backstage of this production

Ana Lavratti IFSC editora@analavratti.com.br

o be approved in the call for applications at Fapesc to write a book about the Innovation Centers from Santa Catarina, my biggest motivation was the geographic coverage because the Rede Catarinense de Centros de Inovação is composed of 15 buildings in 15 cities that promote the regional convergence. It did not take long to discover the ambitious plan to capitalize on the innovation in the State, but only nine were opened, which did not mean inefficiency. It is quite the opposite, showing the magnificence of the project.

But the bigger surprise was to come: how much the hub was impacting the academic environment, the public administration and the civil society, young entrepreneurs, big companies, and entities that represent them. In eight months of searching for the book, I lost count of how many times we tried a new mindset with less stardom and more collaboration.





FOLLOW OUR SERIES

Do you want to know about startups, technological companies, researchers, investors, and talents that compose the ecosystem from Santa Catarina? In the next edition, we will introduce the *Centro de Inovação da Serra Catarinense* in Lages, the first to integrate the Rede Catarinense de Centros de Inovação.

Coffee time with the president

The president of the Associação Catarinense de Tecnologia (Acate), from 2016 to 2020, was honored with the Ordem do Mérito Empresarial, granted by ACIF in 2021, Daniel Leipnitz prepared in person the coffee that he offered me. To know about the book, the manager of Rede Catarinense de Centros de Inovação, Iuana Réus, already contacted me, making herself available to contextualize the situation. Driving a team pressed to go ahead of its time, they developed three guides that today are a hornbook for the Center implementation.

"The mayor that before looked for us interested in the building, wanting that the city had that structure, started to comprehend the construction is the hardware, but the software that will run on is much more important," explains Iuana, who used for almost ten years the concept of learning by doing. How to make what does not exist? The same analogy of the buildings we can use for teams: the results come from synergy, not the hierarchy.

Responsible for the management of the Centro de Inovação Blumenau, professor Udo Schroeder finished the interview by inviting me to do a tour. At 68 years old, he did not use the elevator and walked room by room, has lavished vigor. At 408lab, in Brusque, professor Günther Lother Pertschy got me at the parking lot with the energy of a student and Sapienza, who already was a rector. That is indeed magnificent: when knowledge inspires instead of intimidating.

Examples abound of how much it is possible to burst the fiction bubble, but I prefer encouraging the reader to know. The Innovation Center works as a shopping mall, with free access to the trends.

The website of the Rede Catarinense de Centros de Inovação brings a treasure map specifying how companies, startups, students, investors, who work as self**Managers of the Innovation Centers**



Udo Schroeder Blumenau



Michelle F. Haswanv Caçador



Günther L. Pertschy Brusque



Rodrigo Barrichello Chapecó





ecosystem from Santa Catarina in innovative business

employed, and just the author of an idea can insert into the ecosystem.

To be inserted in this showcase, there is coworking(it is like a competition to create solutions in a team). The pre-incubation and incubation program absorbs those who even have CNPJ (it is equivalent to ENI). Climber and accelerator to captain investments, laboratories, auditoriums, and an inviting Café. Yes, innovation is also for you!



More synergy, less hierarchy

The perception is consensus. The value of an Innovation Center is not in its physical structure but in the connection that it enables. Taking an epic of the innovation, the book The Act of Creation, published by Arthur Koestler in 1964, had already circulated the idea that the force of creativity emerges when different intellectual disciplines collide. When approaching universities, companies, government, and society, the network becomes an engine of a revolution. No barriers, no guillotines, no tolerance of prejudice, it has as the biggest trump the connection: to get closer to the distances between people and ideas, people and talents, and people and capital.

For Ricardo Fantinelli, Coordinator of Innovation of Ágora Tech Park in Joinville, not even the most inhospitable meeting is considered a waste of time. Every conversation is valuable in a flowchart where the mistakes gain a status of the lesson. "The talents are the main element in an Innovation Center," said the publicist, pleased to motivate non-filter relations, with people saying how they are feeling and inspiring others just because they are real.

Managers of the Innovation Centers



Lages







ChimaTalks and WineTalks

Even though it happens in Joinville, where the failures became scheduled, each Innovation Center found a custom solution to democratize access and diversify connections. There is the ChimaTalks (a reference to the Chimarrão, a typical drink in the South of Brazil) in Lages, the WineTalks in Videira, and the pre-incubation programs - which has an idea is an entrance guarantee - are offered in every unit.

In the workshop LabIC, created in Jaraguá do Sul to support social innovation, 70% of the participants had never entered the Novale Hub. In the Centro de Inovação Blumenau, low-income young people sit in armchairs

with laptops on their laps, and they stamp their passports for the market. In Lages, 38 social entities searched for guidance at Orion only in the first trimester of 2022 to have more sustainable management. For older people that need to increase their income but have some difficulties getting a job, the Centro de Inovação de Videira launched the Projeto Recriar for senior students learning to sew.

The fuel of changes, the connection reaffirms a survey of the last century. It comes from the beginning of the 1990s, the finding of psychologist Kevin Dunbar that "eureka" moments are more common in interaction than solitary retreat. As revealed by Steve Johnson,

author of the book "Where Good Ideas Come From," Dunbar proved that "the most important ideas emerged during regular meetings, where a dozen of researchers, or around this, introduced and discussed informally, in a laboratory, their most recent works."

Where everything began

Preparing the ground to connect fertile minds to companies starved for solutions, the Rede Catarinense de Centros de Inovação, based in the metamodel by Josep Miquel Piqué, mentor of the project 22@Barcelona, transformed an industrial area about innovation and quality of life.

Secretary of State for Sustainable Economic Development between 2011 and 2014, Paulinho Bornhausen launched the SC@2022 Plan, which included the Inovação@sc program. The Innovation and Technology Policies initially previewed 10 Innovation Centers with standardized buildings. With the maturation of the ecosystem, the composition increased to 13, reaching 15 municipalities, according to the territorial clipping of the Santa Catarina Federation of Municipalities (Fecam). "The Innovation Centers are the meeting points where the diversity materializes. They are the lighthouses that will light up the regions," prospects Paulinho about the elevation plan, the "state policy," able to keep evolving away from power changes.

To adopt a territorial concept that incites the cities to share their problems and potentials, take the Innovation Centers to respect the vocation of their region. In practice, the connection between the productive sector and academia prepares the students to act where they live, avoiding the exodus from the countryside. "The network has normative instructions that organize the work of the regionalization of the Centers as hubs

Managers of the Innovation Centers



Gabriel Santana Florianópolis



Rodrigo Duarte Itajaí



Severino De Déa Joaçaba





Giovani Bernardo Tubarão

of innovation connected to other innovative environments, as incubators, co-workings, and laboratories. With this, although their peculiarities, all evaluated in the same direction, preparing Santa Catarina for the New Economy", resumes the Director of Science, Technology, and Innovation of SDE, Moris Kohl.

For the secretary of SDE, Jairo Sartoretto, the connection among the Centers creates a great hall of innovation for the State, boosting the economy through innovation, science, and technology. "Innovation is a way to consolidate Santa Catarina's promising future," evaluates.



Innovation Centers

Since the opening of the first unit of Rede Catarinense de Centros de Inovação, in Lages, with the boost of the businessman Roberto Rogério do Amaral, the network comes evaluating systematically. With resources agreed upon among the State Government, city halls, and private sector, currently, there are ten regional hubs.



The *Inova Contestado* is a space of the Secretariat of State for Education in Caçador, and its enlargement predicts activities in three addresses.

JOAÇABA

CHAPECÓ

CAÇADOR

VIDEIRA

In construction

Working

Fapesc Resources



The Innovation Center from Videira attracted 30 students from public schools for the first edition of PlayLab Kids.



The Innovation Center from Chapecó influenced the ecosystem to the point that Unochapecó accepted a patent defense as an option for the thesis of a Master's degree. At the Innovation Center from Joaçaba, a partnership with the city hall and authors of the innovation and research projects can raise funds through IPTU (property taxes).

NOVALE

2020



The Innovation Center from Lages was the first to integrate the *Rede Catarinense*.

ORION PARO

The Innovation Center from Rio do Sul has the Museu da Madeira (museum of wood) that the protagonist is the freshwater, turns the water wheel, afterward returns to the river, and repeats its flow.



Infográfico: Ana Sofia Carreço de Oliveira, Fapesc

Focused on Innovation

FAPESC INCENT

ADESC INCENT

The Research and Innovation Support Foundation of Santa Catarina State (Fapesc) has a relevant role in the Santa Catarina Network of Innovation Centers - Rede Catarinense de Centros de Inovação. The partnership started with the promotion of the first project of the center constitution and continues until now, with programs that make possible reinforcement and activation in all Santa Catarina regions.

The Secretariat of State for Sustainable Economic Development - Secretaria de Estado do Desenvolvimento Econômico Sustentável (SDE) and the Fapesc are State Government bodies responsible for decentralizing resources for building construction that contemplate concepts of working. SDE is also responsible for the entire Santa Catarina Network of Innovation Centers' guidance.

Among the Innovation Centers that earned resources from Fapesc, the Innovation Center (IC) from Criciúma was contemplated with more than R\$7 million, and from Rio do Sul with XX million, the resources destined for work of enlargement and space finalization.

Beyond its contributions to building construction, Fapesc provides for ICs human resources and Internet links. It also promotes articulation actions with universities and the business sector to maintain and attract talent for these regions. It is from these cooperation born solutions to strengthen the Santa Catarina protagonism in the national economy. /

Fapesc in the Rede Catarinense de Centros de Inovação

 Support Program to the Activation of Science, Technology and Innovation
Ecosystem and Development of the Innovator
Entrepreneurship Culture:
Supports proposals of the projects for the

promotion measures of activation of the Science, Technology and Innovation regionals ecosystem.

Support Program to the Consolidation of the Science, Technology, and Innovation Ecosystem in the Santa Catarina Network of Innovation Centers:

Select proposals that allow the establishment of qualified human resources to carry out activities related to the functions of the Innovation Centers.

😓 Born Program:

Support for the ideas stays in a pre-incubation period and consolidates itself as a business. The Fapesc and the Brazilian Supports Service Micro and Small Business of Santa Catarina (Sebrae) initiative.

😔 Spark Program:

Stimulate the rise of companies and disseminates the culture of innovative entrepreneurship, encouraging the institutional mobilization and articulations of the actors in the local, regional, and state ecosystem of innovation in the country.

🏀 Speed Up SC Startup Program:

Pass along resources to speed up startups that joined the SC Startup program, developed by Sebrae/SC.

Encouraged Program to Santa Catarina Business Incubators:

Speed and enlarges the innovative and sustainable with impact on job and income creation.

SC Connection Program:

Support the realization of events of innovation, entrepreneurship, and technology on behalf of developing new businesses and solutions to the demands of society, products, and innovative services.



Fapesc Magazine is available into English

A Revista Fapesc ganhou uma versão em inglês



No site da Fapesc é possível ler e compartilhar todas as reportagens da Revista, agora traduzidas para o inglês.

On the Fapesc website, it is possible to read and share all the Magazine's reports, now translated them to English.







Professionals that contribute to the development of science and technology in Santa Catarina

Innovative entrepreneur and scientist

Scientist and inspiration for other women, **Betina Giehl Zanetti Ramos**, connects pharmaceutical knowledge, technology, and innovation to create a successful company with exportation for 49 countries on five continents.

Danieli Pulga Nanovetores contato@nanovetores.com.br

Santa Catarina DNA

B santa Catarina, in the city of São Miguel do Oeste, Betina Giehl Zanetti Ramos, since childhood, showed signs of a creative profile. Nature and beauty admirer, she enjoyed doing experiments with plants and leaves. It was through observation of the available matches at the house's garden where Betina had lived with her parents and sister that she understood, in a simple way, the reactions obtained with the experiments. And, intuitively, she discovered her scientific calling.

The curious and always optimistic girl grew up and moved to the Santa Catarina capital to study *Pharmacy at Universidade Federal de Santa Catarina* (UFSC). With much more responsibilities and autonomy, Betina emerged for personal maturation in the path of her professional life. Her goal was to graduate as a pharmaceutical and return to her hometown, where she would open a compounding pharmacy.

Over time this plan has reformulated, and she decided to dedicate herself to research. It was with the scientific research scholarship that she joined in the academic experiments, awakening the will to follow in graduate program studies. Following the undergraduate course, she began the first class of the Master's degree program in Pharmacy at UFSC, and after that came the graduate certificate program in biosecurity.

Along with research, she was a temporary professor at UFSC and did a Doctoral Degree in Chemicals at the same institution. Married to the entrepreneur Ricardo Henrique Ramos, they went to France, where she studied Physicochemical at Université Bordeaux, a reference in the encapsulation and nanoparticle field.



 a m so proud of being a pharmaceutical and scientist and to have developed a 100%
Brazilian technology that engenders a positive impact and is accepted worldwide, connecting two big passions: nature and nanotechnology.

Betina Giehl Zanetti Ramos

From the Santa Catarina West

Native from São Miguel do Oeste, Betina Giehl Zanetti Ramos did a graduate and Master's degree in Pharmacy and a Doctoral degree in Chemicals at Universidade Federal de Santa Catarina (UFSC). In France, she studied nanoparticles at Université Bordeaux



The compliments to her work, done by the binational examining committee during her defense, encouraged the couple, and thus was born the opportunity to create an innovative business. Together, they decided to undertake.

Betina did not imagine this new trajectory would put her in the leadership of a successful business, with the possibility of appearing on magazine covers. She did not also imagine that her work would make her a known person in other countries, putting her in a new future, in a highlighted place, being a reference and inspiration for many other women, as in entrepreneurship, as in the way to materialize science as a product to benefit the lives of people.



Nanotechnology Betina registered 13 patents in the technology field

From a Doctoral degree to a successful business

With 13 patents in the technology field and more than 20 published international articles involving nanotechnology, encapsulation systems, and biocompatible/biodegradable, it is also the author of the translation from English into Portuguese of the book "A *Practical Guide to Contemporary Pharmacy Practice*" by E. Thompson. The researcher and president of Nanovetores Tecnologia attended to a new and charming challenge: maternity when she gave birth to little Beatrice.

Gathering all her attributions, after selling her apartment to invest in the company, Betina was inclined to take the professor role after being approved in a public examination. However, the passion for entrepreneurship speaks loudly.

With her scientist dose, she dared

and directed the company business for the principle that moved her until then, the efficiency of cosmetic ingredients, cherishing sustainability, strictly tuned with science, technology, and innovation.

This plot made the researcher a protagonist of a successful history in the business.

In 2008, nanocapsules began integrating the hall of applied technology in cosmetics. The assets in invisible size, assertively reaching the action target and with a higher velocity of treatment, demonstrably being able to solve the pain of the cosmetic market: efficiency.

Nanovetores was the Brazilian pioneer company in the use of **nanotechnology** in the encapsulation of cosmetics assets. Like all good visionaries, the scientist seized the

Wil Koetzler



Nanotechnology is an invisible science. In the case of cosmetics, for example, is an alternative for the maximum performance of products, using small particles in a nanometric size (nm) to transport assets until the dermis and improve the efficiency. A nanoparticle can be identified as a structure of nanometric dimension (10-9m) whose size is in an interval between 1 to 1000 nm. Check out the picture comparing size on a nanometric scale.

Nanometric Scale



opportunity and applied all her expertise in the field, with authentic characteristics such as the use of natural ingredients and all care with protections for the environment and animals, which make Nanovetores a "Born Global Company," in other words, that was born with the technology of global acceptation, present in 49 countries.

In this way, the company researcher brought to the market the technology of nanoencapsulation of asset ingredients, which potentialized the benefits and resulted in better efficiency of the products used in cosmetic treatments, the company core.

With a focus on sustainability and well-being, Betina implanted at the company that she is head of until now a technology lined in green chemistry, where all the production processes are clean, sustainable, and environmentally correct. The company does not use organic and polluting solvents, only water-based solvents.

Another characteristic that the researcher has carried since university time was the concern for animal life and health preservation, the tests of irritability of the products through the alternatives that do not use animals. From the accepted challenge to the won challenge, the scientist, inventor of the new technology, also has to specialize in catechizing the industry for the efficiency of the nanoencapsulation asset in comparison to free assets making the convincing of benefits. In this context, it is valid to emphasize that, one more time, the seal of approval and authority of researcher Betina was used to obtain this recognition.

With time and the quality of the delivered products whose performance and efficiency conquered the market, the new became an excellent alternative, attracting industry and big brands that adhered to the concept developed by the research and adopted the Nanovetores' technology.

Besides being engaged with the team to reach increased billings, these are not only the financial goals, the priority of this leader. Having a personal purpose linked to the purpose of the Nanovetores, Betina understands that the work dignifies people, one of the main ways to personal realization. It is, therefore, essential that the work environment and the team are pleasant and virtuous.

Thinking to increase the well-being of all workers, the president proposed the

realization of actions that positively impact everyone, installing programs for the internal development of workers and leaders, focusing on soft skills and happiness skills.

Nanovetores is a humanized company that cherishes a more positive attendance for partners and clients, besides carrying out community actions in its surroundings.



Brazilian technology

Together with the entrepreneur and her husband, Ricardo Henrique Ramos, Betina raises the first Brazilian company in nanotechnology with use for encapsulation of cosmetic assets

Artigos publicados



Characterization of horseradish peroxidase immobilized on PEGylated polyurethane nanoparticles and its application for dopamine detection (2013)



Characterization of Polymeric Particles with Electron Microscopy, Dynamic Light Scattering, and Atomic Force Microscopy (2010)



Dynamic light scattering and atomic force microscopy techniques for size determination of polyurethane nanoparticles (2009)

Entrepreneurship and technology

The assignments as a leader do not compromise the voluntary dedication to other causes, especially for the development of feminine entrepreneurship.

Engage at Comissão da Indústria do Conselho Regional de Farmácia and acts as director at Grupo Temático Mulheres Acate and includes subjects such as feminine causes, as themes such as the presence of women in technology and the potential of women to entrepreneurs.

At Sebrae, Betina is Ambassador of the program Sebrae Delas. At Associação Comercial e Industrial de Florianópolis, she had the opportunity to share her history after winning the 5th Edition of the ACIF Award for Women who Makes the Difference in the category of Businesses.

"With a board where women are 62% of the

workers, and they are in 50% of the leadership positions, the Nanovetores is an example of the good results that look different can bring for the organization. We carried out the change we want to see in the world," highlights the researcher.

In2022, tenyears after the Nanovetores company had received the Santa Catarina Innovation Award: Professor Caspar Erich Stemmer – in the category of Innovation, promoted by Fapesc, Betina, one more time, has her performance in Science and entrepreneurship recognized, with the title of the main character of Innovation in the Stemmer Award of Santa Catarina Innovation.

Owner of a contagious and inspired history, she continues at the spotlights, being the target of admiration and example for many scientist and entrepreneur women.

With a board where women are 62% of the workers, and they are in 50% of the leadership positions, the Nanovetores is an example of the good results that look different can bring for the organization. We carried out the change we want to see in the world.

Betina Giehl Zanetti Ramos



An innovative business Betina is the president and co-founder of Nanovetores Tecnologia in Florianópolis Photo Report

Science, technology, and innovation from Santa Catarina are in focus

Treasure under the feet

The natural heritage of Santa Catarina, the **underground reserves** of the Guarani and Serra Geral aquifer are abundant and of great quality in the State

Text

Imara Stallbaum contato@mafaldapress.com.br **Photos Antonio Carlos Mafalda** Mafalda Press

anta Catarina has a commendable water supply, even when the climate is imbalanced. This abundance is linked to regular rainfall and the several existing aquifers in the State: 158 of 295 cities from Santa Catarina are above the Guarani and Serra Geral systems. In addition, the two underground reserves supplied around 80% of the cities.

The water from both aquifer systems is related to a big desert whose composition began 180 million years ago when the dinosaurs inhabited the non-submerged lands on the planet.

Under the influence of the winds, enormous dunes dominated the central region of the Gondwana old continent. From this fragmentation emerged South America. During the slow separating process, the Atlantic Ocean was created. And the desert sands were covered with steamy lavas from a succession of volcanic eruptions.

The weight and heat of the volcanic spills converted the dunes into sandstone and permeable and porous rock, afterward saturated for rainwater, creating the Sistema Aquífero Guarani.

After cooling and solidifying, the lavas that covered the desert became rocks, with a predominance of basalts. Since then, they started to perform the role of a protective sandstone slab, although the rainwater continued to accumulate in the pores among the grains of the sands of the ancient desert.

The cover of the broken rocks came to build the Sistema Aquífero Serra Geral, the most used aquifer, currently in Santa Catarina, to be closer to the ground surface and, therefore, accessible from the excavated and tube wells between 60 and 400 meters deep. /

Water Abundance 158 of 295 cities from Santa Catarina are above the Guarani and Serra Geral aquifer systems





Sistema Aquífero Guarani

It is present in eight Brazilian states and is considered one of the longest worldly, extending to Argentina, Paraguay, and Uruguay



Reindeer Moss In hot weather, they are common in the shoal and rocky shore environments in Santa Catarina



Tectonic Fractures

Sandstone and basalt walls compose the aquifer waters spread in Santa Catarina, responsible for filling around 80% of the population in the State



Underground Drawings

The water from the aquifer Guarani and Serra Geral system originated in an old desert when dinosaurs had dominated the planet 180 million years old



Millennia-old sandstone and basalt In Nova Veneza, in the South of Santa Catarina, historical houses from the 19th century used rocks from *Formação Serra Geral*



Water drawings The meticulous and persistent work of the water drops sculpted the stalactites and stalagmites from the Botuverá caves in the Vale do Itajaí, in Santa Catarina



Access and discover the work Águas Subterrâneas, um Patrimônio, which gathers photographs of rivers and aquifers of several regions from the State.



Founded in 1909 as *Escola de Aprendizes Artífices*, the current *Instituto Federal de Santa Catarina* is one of the oldest education public institutions from Santa Catarina 's Capital and has 22 campuses throughout the State Ana Paula Lückman IFSC anapaula@ifsc.edu.br



The old *Escola Técnica Federal de Santa Catarina* (ETF-SC) in Florianópolis From the 1960s, the current IFSC began to consolidate itself as a reference education institution for the whole State , and the vacancies for technical programs, such as Surveying (pic), Buildings, Electrotechnical, Mechanical, Road, Sanitation, and Telecommunications, became more competitive

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Florianópolis Campus

In the Downtown of the Capital from Santa Catarina, on Mauro Ramos street, since 2017 are developed researchers focused on intelligent energy systems

he published report on the cover of the Folha do Comércio on September 2nd, 1910, registered the beginning of activities of Escola de Aprendizes Artífices (EAA) from Santa Catarina, less than a year after the Presidential Decree that raised the vocational schools in the country – one in each state capital.

"The Escolas de Aprendizes Artífices is elegant and properly installed at Paranhos farm, to the Almirante Alvim street, presenting in all compartments the pleasant and attractive aspects of the best vocational establishment. (...) Comprehend the primary education, drawing, typography, binding and layout, riverside carpentry, sculpture, blacksmithing, sawmilling, and mechanics workshops."

The dairy, founded and directed by the journalist, writer, and lawyer Crispim Mira used to be critical of government actions, but in the specific case of EAA, the tone of the news was of approval and expectation. The 80 students subscribed to the initial classes of the new public establishment, which offered primary and vocational education so they would be educated in an organized and equipped environment where, in the view of the editor, to be rendered invaluable services to the State.

After 113 years, the property where the Escola de Aprendizes Artífices installed still stands on the street now called Nereu Ramos and corresponds to a nobler area in the Florianópolis downtown. Today, the region is nothing that reminds the old neighborhood of Mato Grosso at the beginning of the 20th century, far away from the urban center of the Capital where there were farms. Furthermore, it was an area closer to the enlarged communities of the suburbs where the "disadvantaged" boys lived, being the institution's preferred audience. A portion of the population should learn a trade and "acquire useful work habits" far from "ignorant inertia," as



he wrote in the recital of President Nilo Peçanha's Decree 7.566/1909.

A few days after the school opening, a breath of modernity already enjoyed by some Brazilian capitals finally reached the isolated Capital of Santa Catarina: The replacement of kerosene poles for electricity in the public network. It was carried out on September 25th, 1910, in a solemnity highlighted in the Folha do Comércio de Crispim Mira. It was a relevant mark in the Capital development that, until then, even had the Hercílio Luz Bridge and also made available the service of piped water for the citizens.

Around 15 thousand inhabitants, according to the 1910 census, Florianópolis from the beginning of the 20th century, predominantly rural, began to take bigger steps towards a modernization desired above all by the elite. Brazilian society, founded on slave labor, passed through a radical transformation to give away free work, an essential condition for industrialization. In that scenario of development of the economic sectors more associated with urbanity, the rural yield was replaced by an increase in the services and industry sectors. And in this context, the training of boys in areas of acting of the Escola de Aprendizes Artífices intended to supply the necessity of qualified labor.



From Rio de Janeiro, Nilo Procópio Peçanha (1867- 1924) was the president of Brazil between June 1909 and November 1910. In order to create the Escolas de Aprendizes Artífices all over the country, through Decree 7.566/1909, it is considered the patron of Vocational and Technological Education.



Classes for boys and girls

Although in the 1950s some girls had already attended the tailoring training, only in 1967 women were allowed the entrance of the first women in the student body
Society changes, school changes

With 12 years of activities, the space is a property on the old Almirante Alvim street, current Neuro Ramos Street, let to be enough for the demands of the offered courses at Escola de Aprendizes Artífices, Which did not support its students and employees well. The institution moved to a mansion at Presidente Coutinho Street, which also exists now, that allowed a better structure for the activities of 133 students that attended mechanical engineering service, carpentry, typography, binding, and tailoring. Until 1922, the EAA had already trained more than 100 professionals that had acted in the companies of Florianópolis, Porto Alegre, Rio Grande, Santos, and Rio de Janeiro.

The series of institutionality changes that mark the evolution of the school, along over a century of history, began on January 13th, 1937, when the federal law n°378 changed the Escolas de Aprendizes Artífices in Industrial Lyceums. The intention was to spread and strengthen industrial education in the country, a process of national industrialization that asked more and more for specialized and qualified labor. The course profiles, however, remain unchanged at the Liceu Industrial de Florianópolis: machine mechanics, foundry, typography/binding, ceramic, carpentry, woodwork, sawmilling, and tailoring were the training options.

In 1942, another significant moment brought the organization base and teaching industrial system. With the law-decree n° 4.073, the lyceums assumed the name Industrial School. In the Florianópolis situation, the elementary industrial courses and the mastery continued to be offered. But a chief change happened in 1962 when the school began offering vocational training courses that are, until now, the apple of the institution's eye.

Another important event in 1962 was the beginning of the activities at the new building of the Escola Industrial, constructed over 20 years, on a broad ground at Mauro Ramos Avenue, which at that time was one of the most important streets of the city. At first, the structure supported 13 classrooms and laboratories. Three years later, there was one more name change – Escola Industrial Federal de Santa Catarina – for the identification adequacy of the institutions linked to the Ministry of Education.

It was in 1967 then Escola Industrial, the administrative board allowed the entrance of the first women to the student body. Although in the 1950s, some girls had already attended tailoring training, the decision in 1967 allowed the creation of "feminine profile" subjects, such as education for home and childcare, focused on students from high school.





Book IFSC 100 years: From Escola de Aprendizes Artífices to Instituto Federal de Santa Catarina

The path for the current setting

In the period as the Escola Técnica Federal de Santa Catarina (ETF-SC), the present IFSC began to consolidate as a reference educational institution for all states. The transition happened in 1968 when it was published by ordinance n° 331 of the Federal Government. In the same year, the mid-level technical profession regulation happened through federal law n° 5.524, representing a considerable valuation for the graduates.

In the 1990s, the vacancies by courses already disputed at ETF-SC, with the

highlight for Buildings, Electrical Engineering, Mechanical, Topography, Highways, Sanitation, Refrigeration/Air Conditioning, and Telecommunications - the two lasts offered at the first unit of the Escola Técnica outside of the headquarters city: São José. The school unit was installed in that county in 1987 in the Technical Expansion Education and Improvement Program created by the federal government. The São José unit was followed by the Jaraguá do Sul unit in 1994. The complexification of the structure took the organization of the ETF-SC System, with the Florianópolis, São José, and Jaraguá do Sul units - an embryo of the multicampuses system working today at IFSC.



Canoinhas Campus In the North of the State, the Agroecology and Urban Agriculture Extension Program, developed in 2013

The expansion process

The turn of the century brought more changes to the technical education captained by the Federal Government. In 2002, the ETF-SC changed in the Federal Center of the Technological Education from Santa Catarina (Cefet-SC), enlarging its action, until then restricted to technical courses. The objective passed to contemplate the offering of professional qualification courses, Continuing Education, and Higher Education, besides conducting applied research as a way to stimulate the development of technological solutions. In the same year, it carried out the first entrance examination for new technology higher courses.

More than an institution of vocational training, the Cefets established themselves as centers of Professional, Scientific, and Technological Education. This institutionality, however, lasted a short time. In 2005, it started the discussion about the expansion plan of the Federal Network of Professional and Technological Education, with the expectation of an increase in vacancies for the whole country. In Santa Catarina, the project started with the opening of the Joinville, Florianópolis-Continente, and Chapecó units and went on with more recent and institutional necessary personality change: in 2008, the Cefet-SC changed to Federal Instituto.

Together, the 40 institutions of the Federal Network of Professional, Scientific, and Technological Education sum more than 600 campuses in all regions of the country, taking professional, scientific, and technological education for the "disadvantaged" populations, such as boys from 1909, where they can find in the IFs opportunities for the public, for free, and qualified education in their place of origin, such as the work of the Embrapii)hub, in Florianópolis, which from 2017 has developed cutting-edge researches focused in intelligent energy systems./



In 2017, the Brazilian Company of Research and Industrial Innovation (Embrapii) selected IFSC to install its hub focused on developing technological solutions in intelligent energy systems. At the Embrapii-IFSC hub, the actuation fields are informatics systems for energy management, energetic efficiency, intelligent electric network, renewable energy sources, and urban mobility. The acting teams are selected by a call for applications and evolve students and professors of the energy field.



• IFSC is a centenary institution that is renewing itself and cares about the community demands where our campuses are inserted and in tune with what happens in the world. When it works with education, science, and technology, this capacity to update itself permanently is fundamental for the service provided to society to be of excellence. There are a lot of challenges, but we work daily, aiming to fulfill our mission, which is to promote inclusion and offer professional, scientific, and technological education on behalf of the citizens.

Maurício Gariba Júnior Rector from IFSC, and professor in the institution since 1989



482 Courses





1st headquarter Victor Konder Street, Florianópolis

Technological Axes







Current headquarter of the Florianópolis Campus Mauro Ramos Street, Downtown





90 ergraduate

77 Graduate 738 Master's degree 698 Doctoral degree

220 Cities 22 Campuses + rectorate office



Students 47.050











Data that generate intelligence

Pioneer in the country, the Observatório da Federação das Indústrias de Santa Catarina (Fiesc) acts to give support to the competitiveness of the industry and to promote the analytic culture guided for data in Santa Catarina

Dorzeli Salete Trzeciak Julia Pitthan IEL/SC observatorio@fiesc.com.br



Information and Knowledge

At the situation room in Florianópolis, the structured and analytic system of data and intelligence of the Observatório Fiesc supports the competitiveness and development of organizations in Santa Catarina.



<u>Au</u>

L ibrelato annually manufactures more than 13 thousand units of road implements. They are trailers and semi-trailers used to transport grains, fuel, and every type of commodity for the roads of Brazil and the world. The numbers assure this company from Santa Catarina more than 13% of the market share, in other words, the degree of participation of a company in terms of selling a determined product in its action market, besides the position of the third greatest of the segment in Brazil and the second one exporter in the country.

Although the relevant performance, the challenge of following indicators and tracing strategies to growth is permanent. Because of this, Librelato decided to invest in a program of analytic culture in data. "We search to establish answers for strategic questions of our business and direct with great assertiveness our decision. We unified the strategic data in only one tool created collaboratively with the Observatório Fiesc," says the Librelato CEO, José Carlos Sprícigo. The work gathered 21 professionals of Librelato, who did a 60-hour training. Delby Machado, coordinator of Intelligence in Market, Development of Network, and Pricing of the company, says that, during the creation of the big data platform, collected data from official bodies such as the Internal Revenue Service, the National Department of Traffic and the Associação Nacional dos Fabricantes de Implementos Rodoviários (Anfir), linking the internal information of the organization.

"The Observatório presents advanced solutions in technicians of **big data** extraction, transformation, burden, and visualization of information, the way to promote, in time, information for making decisions," highlights Machado. After training, Librelato implemented a specific sector to treat the **data-driven** culture. The system was named LibreData. Besides unifying the information, Machado highlights that the program allowed Librelato to have access to strategic data in a few clicks. "If we carried out the search for information in the traditional way, it would consume hours or days of analysis, calculations, and studies," explains the coordinator.

Making assertive decisions

The Librelato is among hundreds of industries, governments, and organizations that the Observatório Fiesc has attended since the beginning of its trajectory.

Our work is to help to answer business questions. We support the manager to make the decision about the future and qualify the strategy of selling

Eliza Coral Executive manager of IEL/SC, is responsible for the Observatory coordination



A great quantity of generated data by different systems can be used as a source of information for strategic decision-making.

Systems of people, processes, rules, and technologies focus on data treatment and analysis. Its orientation is to make decisions based on data analysis.



Identifying where and who are the potential clients and competitors, pointing out the trends to develop new products and services, and identifying the most promising locations to install a new production unit are among the most common problems the Observatory used to solve when attending a company.

For this, Observatório Fiesc established a workflow in the logic of a PDCA, a known methodology of the theory of Business that aims to improve the process. At the Observatory, the method lays down an intelligence process where P represents *Perguntar* (verb to ask), D for Data, C for Compilation, and A for Analysis.

"In our situation, it is an intellectual process that starts with demand. For this, we elaborated on a question that needs to be clear and exact. From this, we set out to extract the data", explains Eliza Coral. The team identifies whether the existing public and private databases meet the demands or whether it is necessary to do some primary searches. In the later step, Compilation, modeling of the response to the problem takes place, which can be presented in a business intelligence dashboard, a graph, a newsletter, or a study. Finally, there is an analysis of the results that will then subsidize the decisionmaking process.

This structured method of attendance to demands is the result of the accumulated trajectory from the implementation of one of the first Intelligence Centers structured in the country.

If the pandemic speeds up the process of digital transformation in organizations, and today, the investments in data-driven and big data are the increased reality of demand for services of this kind, according to the search of International Data Corporation (IDC), the world spending with solutions of big data and business analytics (BDA) until 2025 must increase yearly by 12.8%. But after a decade, Fiesc had already awakened to the strategic importance of building a data culture.

Trajectory of the Observatório Fiesc

The Observatório Fiesc was one of the pioneers in Brazil in the diffusion of big data techniques and the construction of a situation room. In 2012 the first searches allowed the entity to deposit the foundations of this work for the launch of the Programa de Desenvolvimento Industrial Catarinense (PDIC) 2022. The field of Fiesc planning starts the PDIC with the identification of industrial segments with a good potential for development in the long term, focused on the six mesoregions of Santa Catarina.

However, the implementation of the situation room and the launch of the sectoral portal of Fiesc in the 1.0 version happened in 2015. These actions were the marks that officialized the constitution of the Observatório Fiesc. Since then, indicators, socioeconomic studies, and trends in Santa Catarina society have been made available. The website gathers this information that can be accessed online on different platforms- from a smartphone to a video.

"Fiesc is one of the first federations in the country to create a structured Intelligence Center. Besides the Paraná and Ceará federations, we



<u>..</u>

instituted know-how in analytics intelligence that accredited us to be part of the implementation group of the National Observatory," declares the manager of IEL/SC, Eliza Coral.

This initiative, led by the Brazilian National Confederation of Industry (CNI), consists of the formatting of a working model in a network, with support in the construction of methodologies and technologic infrastructure for the Intelligence Center that will attend to CNI and will serve to support the development of other observatories around the country. Fiesc will help the data load in the big data environment of the National Observatory. "From a model of opening innovation, we will collaborate with the sharing of data, information, and competencies to provide support to other observatories of the country and to contribute to the analytic culture in data," concludes her.

"The industry is the development engine of the State economy. We contribute 34% of the jobs generated in Santa Catarina and 26,6% of the State GDP. This information, which proves the relevance of the industrial contribution for regional development, are strategies and are available because of our work with data," affirms the Fiesc President, Mario Cezar de Aguiar. "The Observatório Fiesc is structured as a useful intelligence platform for the strategic management of governments, organizations, and companies. It is, mainly, a tool of support to industry competitiveness, with support to make strategic decisions of the entrepreneur," concludes Aguiar.

Big data technology and multidisciplinary team

In addition to the investment in infrastructure that allows Observatório Fiesc to update big data technology, another important asset is the multidisciplinary team. Made by data analysts and scientists, economists, and experts in industrial intelligence with Doctoral and Master's degrees, the staff supports the projects developed by the center. In Santa Catarina, Fiesc contributed to data culture. In a partnership with Sebrae/SC, it acted to structure the Business Observatory at the institution, committed to providing followup scenarios, trends, risks, and opportunities about the environment of small business in SC.

Setores industriais com maior potencial de desenvolvimento em SC



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Other initiatives are coming up in the State. In 2022, the Research and Innovation Support Foundation of Santa Catarina State (Fapesc) announced a call for applications to destiny R\$ 1.8 million focused on the realization of applied research for the entire State at the Observatories of Science, Technology, and Innovation (CTI). These resources are designated for different indicator mapping, creation of the platform for data availability, and sharing of public information.

The Fapesc president, Fábio Zabot Holthausen, points out that to advance the actions of STI, it is necessary to have state and regional data to help both private initiatives, governments, and public bodies in decisionmaking and investment. "The Science, Technology, and Innovation (ICTs) have created observatories to do mapping information

and development of actions for data analysis," explains. "The idea is that we can support one observatory in every mesoregion and connect them, using all this competence for having assertive data in real-time. This information is available on platforms for every person who needs it," concludes him.

Products focused on analytics culture

With accumulated experience in attendance, Observatório Fiesc launched products focused on the structuration of the analytic culture at organizations, such as Faros, created this year to qualify industrial sales from the strategic data systematization and the training of teams in analytics culture. To meet other products, access the QR Codes.

Cidade Única (2021)

The product is focused on developing the data-driven culture at the municipal public management and adds data from 5570 cities in Brazil.



Roadmap Integrated Strategic Plan for Agriculture and Fisheries in Santa Catarina (2021)

It gathers current studies of strategic initiatives of the rural and fishing environment from Santa Catarina, socioeconomic scenario, and the sectoral trends and opportunities.



Atlas da Competitividade da Indústria Catarinense (2022)

EAPESC INCEN

SC INCENTIN

It presents the sector's performance and includes the Industrial Competitiveness Index (ICI), which ranks Santa Catarina as the second most competitive state in Brazil.





Unpublished Survey

The publication launched in 2022 by Observatório Fiesc encourages the development of strategies in the medium and long term. It evaluates the performance of industrial sectors and the mesoregions in Santa Catarina.

The future and the trend tracking

Besides acting in products and solutions that help companies and organizations to read the scenario and make decisions, Observatório Fiesc has been developing projects that allow it to predict the future. Because of that, it is investing in predictive analysis techniques and building trend tracking of the main sector of the industry in Santa Catarina. There also is a creation front of a smart agent, the Center for Natural and Artificial Intelligence, Ciana. It is responsible for interacting with the public in experiment laboratories at the observatory, installed at the Fiesc headquarters in Florianópolis. The environment will be a space for new solution search and development. In the introduction, the character will expose information about the Santa Catarina industry and economy.

Allthese initiatives are focused on increasing the competitiveness of the industry and economy of Santa Catarina. "The goal is to seek ever higher levels of development in the industry. With information and intelligence, we can build the base for sustainable growth in the long term," affirms the Fiesc director of innovation and competitiveness, José Eduardo Fiates.

One of the examples of this work was the launch of the Programa Travessia, the initiative that brought proposals to help the companies to go through the crisis. Now, it began to name Reinventa-SC, a project that wants to integrate companies from the entire State, with an initial focus on sectors such as wood and furniture, foods and beverage, textile and clothing, and mechanical metal. The instruments like these will pave Santa Catarina's future. After all, as the Reinventa-SC slogan proposes, "the impossible does not exist." Nevertheless, we will carry it out with intelligence and work./



The predictive analytic models in the Artificial Intelligence field are math functions (algorithms) that allow predictions about future results using historical data mixed with statistical modeling, data mining techniques, and machine learning. The companies employ predictive analytics to find patterns in these data and identify risks and opportunities to predict trends or unknown events in the future.

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Special Report

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In the national leadership of apple growing, producers from the Mountain and Middle-West bet on the **technology used** to increase the competitiveness in Santa Catarina.

Red, sweet, crunchy. Who savors an apple does not imagine the complex production process behind one of the most lovely fruits in the world. It is necessary almost a decade between the sprout development and a mature tree to produce on a large scale. From farms to supermarket gondolas, it is a long way to go. All this path is around new technologies and innovations that are changing the way to plant, harvest, and process fruit.

And it directly impacts Santa Catarina's agribusiness. Santa Catarina not only wants to have the best apple in the world but also to search for more productivity and profitability. For that, the growers bet on drones for pollination, tractors controlled by tablets for fertilization and spraying, electronic watering, mechanical pruning, and a system for property management.

Part of processing and fruit packing is in the hands of a few people who control the automated system that selects and packs daily tons of apples. These changes are not part of the fruit-growing future but the present of these Santa Catarina companies and cooperatives.

For researchers from The Brazilian Agricultural Research Corporation (Embrapa), Marcos Botton, it is not enough to have the best apple in the world, it must get competitive in the market, and the development of new technologies is the way to guarantee more productivity and profitability.

"The apple sector is one of the most technological sectors we have in Brazil. It is not for amateurs because the orchard implementation has a high cost. All productive sectors need to reinvent themselves," he highlights.

Special Report

Technology assure productivity and profitability of apple from Santa Catarina

Drones and tractors for pollination

Santa Catarina today has over 15 thousand hectares of apple-cultivated area, with the dominance of fuji and gala varieties. For the fields to bear fruits and ensure good production, it is necessary to fertilize each one of the flowers.

Today, this process is done in a handmade way. Bee hives are installed in the middle of the plantations, precisely in the flowering period, for nature does its job. However, this scenario can change with the help of technology.

The Kolecti Serviços Florestais (a company that offers forest services), from Tijucas, a city in the Florianópolis metropolitan area, tested the use of drones to collect pollen, which is processed and taken back for cultivation with this tool. The solution came from the United States of America and is in the testing stage in Santa Catarina. According to the director and owner, Júlio César Soznoski, every drone can pollinate up to 30 hectares a day with selected pollen of the best quality.

There are regions with a big pollination problem, in sync between the pollinate and the fruit plant. It happens a lot. There are areas where we made the application and gave almost 200% increase, apart from the quality issue," he highlights. According to Júlio, the pollination service by drones is in the testing stage and can be available in 2023 for the market.



Air Technology

In the bee spots, the handmade traditional process of fertilization of apple flowers, drones are tested to collect the pollen



Scan the QR Code and watch the videos with apple growers from Santa Catarina who are bet in innovation

2 Tablet in the fields and the electronic watering system

Most apple growers in Santa Catarina are small. They cultivate up to five hectares and count on the family to do the daily activities in the orchard. Most of them have already joined new technologies and are seeing the results.

This is what happened with Lauro Zandonadi from Fazenda Postinho, a farm in São Joaquim. Since his return from Mato Grosso in 2019, after two years of working with grains such as soy and corn, he came determined to take the family farm and change the way to plant apples which have been in the family for at least three generations.

> To innovate, Lauro initially invested in an electronic watering system. Today, it has around 30% of the orchard with this structure, and the idea is to expand by another 30% by the end of the year. "Watering was not common, but the two seasons were dry in the winter. Luckily, I opted for this technology before," he comments.

The grower used the same system to do fertilizing and has already realized the results. The production increased by 35% compared with no-watering areas. At the same time, he implemented sensors in the pumps that spray inputs and pesticides with tractors.

"We need to look for new technologies and tools to help us to be more efficient in the field. It is what we need: to decrease our costs. The technology will support us to be more efficient and have more profitability," defends Lauro. With the help of a tablet in

his hand, Lauro follows the

results with the Field View tool. He knows, in real-time, how much product is applied, avoiding losses and waste.

The Epagri technician, Maêve Silveira Castelo Branco, believes that in a decade the reality of apple growing in Santa Catarina will be different. "These young people are already more adept at new technologies. They want to keep doing this activity, but they think about going a step further."



Third Generation

Apple growers in São Joaquim, in the Santa Catarina Mountain, Lauro Zandonadi takes the family farm and bets on the use of new technologies



In the hand With a tablet is possible to follow the positive results of the investments in technology, such as the new

electronic watering system

THE PERFECT APPLE CYCLE

The productive process of an apple is complex and requires work and dedication for the whole year. From the orchard to the supermarket gondolas, the cycle of the apple grower can take ten years to reach high production. Follow the stages from cultivation to handling and harvest.





Opinion: Leo Rufato, researcher from Udesc, Lages Technologies to increase the competitiveness of orchardists in the South of Brazil



STAGE 03: POST-HAR

STACE OZ: A

Removal of unnecessary branches



Thinning to remove the smaller fruits



Harvesting the fruits at the right time of maturation



Processing in autonomous water-based lines to not hurt the fruit



Packing the selected fruit by size and color

Storage in cooling chamber to reduce fruit breathing to ensure durability



Conservation

Special Report

Rootstock: the plant evolution

The traditional image of an apple tree in the shape of a tree is changing. Or better, it has already changed. The plant more and more resembles a bush. It gets smaller, narrower, with shorter branches. This change was possible through improvements made with research over decades.

If in the place of a tree, there are bushes, like a vine, it gets easier and faster to collect mature fruits, with no need to climb stairs or platforms. And if the plant takes more sunlight, the apples get redder and of better quality for the market.

However, for this change to be applied, it is also necessary to change the system that guides the apple tree growth. These chain techniques allow the best use of the plant and fruits.

"Today, we talk a lot about the driving system. It is the basic idea: to

develop an apple tree driving system that is competitive, that is technically, and economically viable." Explains the researcher from Embrapa, Marcos Botton.

The studies by Universidade do Estado de Santa Catarina (Udesc) and Epagri are necessary to develop these new technologies.

"In the past, you used to think of it as a Christmas tree. In the future, we will have a rootstock that adapts to the driving system as a grapevine. Thus, it will have better efficiency in harvesting, in the condition of fruit maturation and, mainly, orchard mechanization," highlights Leo Rufato, professor and researcher from Udesc.

Rufato tests a rootstock that shortens the necessary time of the apple tree development, helping the grower to harvest faster, and to pay the investment cost earlier.



Smaller and narrower More similar to bushes, the new shape of apple trees from Santa Catarina facilitate the harvest of mature fruits



guarantee some characteristics in the apple tree development, such as the height of the plant, productivity, quality of fruits, and the conduction of the plant. It also guarantees resistance to certain pests. So, there is great interest among researchers in developing and testing new varieties.

4 Genetic Improvement

Isadora is young, unknown, and with a promising career ahead. About to shine on the red carpet of international apple production, she is one of the highlights developed by Estação Experimental Epagri from Caçador in the Santa Catarina west.

Thick skin, resistant, but with much sugar. This young promise was made to shine the eyes of an Italian business people group. The reason is the durability of the fruit because it can get stocked for over a year in a simple cooling chamber without losing the softness and crunchy characteristics so appreciated in an apple.

Isadora with the sisters Luiza and Venice, varieties developed by Epagri, are part of an international cooperation agreement signed in 2022 that will allow the production in Italian lands, such as the Sâmboa brand. It already has 300 hectares of growth outside Brazil, and the goal is to reach 4 thousand worldwide.

"The expansion forecast is too big. We expect these varieties bring visibility gain for Epagri, Santa Catarina, and research. We are glad for this work, which has opened the doors to the world," highlights the researcher Marcus Vinicius Kvitschal, who leads studies of the genetic improvement of apples at Epagri.

While Epagri exports this technology, receives royalties for the first time for these varieties of research, granddaughter of the first fuji and gala sprouts in Santa Catarina.



The star called Isadora Developed by *Estação Experimental Epagri from Caçador*, in the Santa Catarina West, the apple with thick skin and much sugar is a hit worldwidely



Processing automation

The post-harvest system is one of the most technological inside the apple production process. They are the machines that command the processing and packing, called packing houses.

The cooperative Frutas de Ouro in São Joaquim invested in automation to gain agility and productivity at this stage in 2021. "I always liked to do better and to be ahead. I wanted the most modern," defended the president, Marilene Silva Castelo Branco.

The new machine can select the apples by category. The employee Francieli Ghidini de Lima, who has worked at the cooperative for 15 years, knows the difference between the old structure and the new one.

"The fruit selection was very manual. We separated by color, size, and weight. It was a lot of work. Now it is a machine that separates, and apples do not fall wrong. I just put it on the tray," she celebrates.

The fruit storage also required technology. The chambers undergo atmo-

spheric modification to lower oxygen, maintain the temperature between 0° and 1° with nitrogen, and reduce fruit breathing. It is like an induced coma, ensuring durability.

The challenge for the cooperative now is to enlarge the cooling chamber to handle the production. Today, the institution can keep 6,5 thousand tons of fruits, but they expect to increase to more than 2 thousand by the end of the year and reach 15 thousand in 2027.

6 Free technological solution

It is not only the private sector that offers technological solutions for apple growers. There are software and free apps for cultivation and property management. Check out! /



Uzum an app that gathers information about plant disease symptoms to do the self-diagnosis



Gestfruit a tool for the financialmanagement of rural property

The perfect apple choice Mother and Daughter, Marilene and Maêve Branco, bet on the post-harvest system to gain agility and productivity when packing the fruits

THE APPLE GROWER IN SANTA CATARINA

Santa Catarina is the biggest apple producer in Brazil.

The State concentrates on about 3 thousand growers and produces more than 600 thousand tons of apples per year.

2013	2017	2021		
530.725	679.936	635.681		
tons	tons	tons		
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Apple-cultivated area

Santa Catarina is the second Brazilian State with the largest number of productive hectares. The Rio Grande do Sul has the largest cultivated area but lower productivity compared to Santa Catarina.



Varieties produced in Santa Catarina Fuii: 47% Gala: 51%

Others: 2%



Six cities concentrate the apple production in the State four are located in the Mountain region, besides Fraiburgo and Caçador, in the Middle-West.



Number of producers	2072 São Joaquim	360 Bom Jardim da Serra	130 Urupema	95 Urubici	43 Fraiburgo	30 Caçador
Santa Catarina Cities						

Among the first in the world

Brazil is responsible for 1,4% of all apple production consumed worldwide. Discovery of the top apple-producing countries:





Improvement in the apple growing in Santa Catarina

he apple tree growing started in Santa Catarina between the 1960s and the 1970s, in the region of the Vale do Rio do Peixe until the Planalto Sul of Santa Catarina. Nowadays, it can understand that environmental and socio-economic factors put Santa Catarina in a prominent position in the national and international ranking of apple production and growth.

There are several factors that we must focus efforts on the development of the apple growing in Santa Catarina.

The research shows the advances in the new cultivar development and implementation, principally in the rootstock use more efficiently and with less plant vigor. In particular, the Geneva American series, which decreases the plant vigor, supporting the conduction and decrease of production costs, is one of the techniques for handling the production of improvement of the apple tree orchard in Santa Catarina.

The research has contributed to the definition of cultivars, clones, and rootstocks able to attend to the demands of consumers and the suitable handling technologies development and disease and pest control. However, facing the limitations of the apple tree growing, the researcher needs to offer technology options that allow a larger number of plants for planting area units and different conduction systems with multiple axes in two dimensions.

For these modern techniques to be adopted, it is necessary to have efficient

control of plant force, using rootstocks of less vigor besides the possibility of pruning adoption and mechanical harvest. Thus, the apple tree orchard development with modern growth techniques depends on the right choice, associated with several handling practices to increase the number of fruits packed out and then improve the quality of fruit productivity.

For that, the genetic improvement program of the University Cornell, in the United States of America, is developing rootstocks of the American Geneva series (G series) that are being evaluated and implemented in the pomiculture from Santa Catarina. These rootstocks are resistant to some diseases and pests that often occur in the orchards throughout Santa Catarina, in addition to inducted an increase in productivity, the capacity of improvement from sprout to the treetops, a better angle in the branch insert in the stalk, and lastly, but not least, the plant force.

It is important to highlight that the rootstocks of the G series have characteristics of required plants for use in orchards from Santa Catarina. In this way, it is necessary to deepen the studies about this development of G series technology in the different edaphoclimatic conditions in Santa Catarina and the South Region of Brazil.

The new orchards using these recent combinations of cultivars and rootstocks of the G series have guaranteed the producer more success in choosing the blend of planting density and training systems. Nonetheless, it should evaluate the implementation costs, conduction, and yield in these orchards to determine the economic viability of the future growth system.

In this context, the Research and Innovation Support Foundation of Santa Catarina State (Fapesc) supports these challenges of pomiculture in Santa Catarina.

The research has contributed to the definition of cultivars, clones, and rootstocks able to attend to the demands of consumers and the suitable handling technologies development and disease and pest control.

It allows the realization of efficient and profitable techniques, with the introduction of these materials of the G series being the most important change in the production and cultivation of the apple in Santa Catarina.

Lastly, it should emphasize that the main advantages of the modernization of the conduction systems are the increase in productivity, entrance precocity in production, the high quality of packed-out fruits, and less labor cost. /

Amauri Bogo

Full professor of the Graduate Program in Vegetable Production- CAV/Udesc, and at the University of Nebraska (USA). Ph.D. in Pathophysiology from Imperial College of Science (United Kingdom), Master in Pathophysiology from Universidade de Brasília, and Expert in Bacteriology from Università Degli Studi di Firenze (Italy). Researcher PQ and CNPq Area Committee member. Director of Science, Technology, and Innovation of Fapesc.



Glauco Olinger

Centenary memory of the apple

The Santa Catarina agronomist engineer relates the moments that made Santa Catarina the **biggest apple-producing State in the country**

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ALM

Agricultural pioneering

In 1956, Glauco was one of the founders of the current Empresa de Pesquisa Agropecuária e Extensão Rural de Santa Catarina (Epagri)

Realizations

1956

Founder of the *Serviço de Extensão Rural* in Santa Catarina, current Epagri

1957 to 1975

Executive Secretary at Associação de Crédito e Assistência Rural de Santa Catarina (Acaresc)

1960 to 1970

State Secretary of Agriculture in Santa Catarina

1976 to 1979

Founder and Director of the Agrarian Science Center at *Universidade* Federal de Santa Catarina (UFSC)

1986

Founder of Pro-rectorate of Planning at UFSC

1986 to 1988

Pro-rector of Planning at UFSC

2008 to 2011

Consultant for the Microbacias Project of the Government of the State of Santa Catarina

Since 2011

Exclusive dedication to writing books of memories and about agricultural production. Among them:

- Consideração sobre Planejamento e Avaliação em serviços de Extensão (2001)
- 50 anos de Extensão Rural (2006)
- Métodos de Extensão Rural (2011)
- Agricultura Catarinense Em Busca do Equilíbrio Ecológico (2014)
- Memórias da Vida Rural e da Política Agrária: e o Potencial do Brasil para a Segurança Alimentar (2016)
- Aspectos históricos da Extensão Rural no Brasil e em Santa Catarina (2020).



Researcher and writer Glauco turned 100 years old in 2022

Standing, Glauco Olinger sang the national anthem in a respectful position. He was in the rectorate auditorium at Universidade Federal de Santa Catarina (UFSC), where he received a special tribute. Three days later, he was there again to receive congratulations in an event at Epagri, where he helped plant a tree for the next generations. Those who see him walking quietly and so willing can not imagine the agronomist engineer who changed the course of rural production in Santa Catarina turned 100 years old on September 17th, 2022, longevity he attributes to the Santa Catarina apples. After all, he eats one fruit per day to keep the diseases away, says him with a big smile.

From Lages (a city in the mountain region of the State), Glauco rooted changes in the way of planting and harvesting throughout the State. He implemented the Extension Rural Service, the current Epagri; he founded the Agrarian Science Center at UFSC. And finally, he contributed to making the State a reference in agriculture, the hub in fruit growing, and the national leader in apple growing.



More than numbers and titles, Glauco is proud of the histories that he lived and likes to remember. An opportunity that he finds already starts to talk about when he was to Brasília, in the 1970s, with an apple box and an idea: to convince a friend and ex-minister of finance, Delfim Netto, to pay for a project of fruit growing in a temperate climate.

With a good mood and a dash of daring, Glauco got support from the federal government to subsidize new orchards in Santa Catarina. It was how to start the recent and fruitful applegrowing history in Santa Catarina land.

"What do you want, Olinger?". "Professor, I came here to bring an apple for you to taste". He rubbed an apple on the shirt, took a bite, and commented: "It is delicious, Glauco. Tell me where it is from. It can only be from California". "Negative". "So it is from Rio Negro, Argentina." "Neither". "So where is this apple from?" "It is from Santa Catarina!".

How did your career start in agriculture?

I graduated [in 1946] on day 15th there, in Viçosa, and on the 17th, I married a girl from Minas Gerais. I did not have a job, but I married a girl called Maria Auxiliadora, and I returned by myself.

Here, I went to the Secretariat of Agriculture to talk to the director of administration, doctor Arruda, who was from Lages. He told me: "We are after an agronomist engineer. We need a professor in Canoinhas and Lages." I vibrated. Lages is my hometown.

I stayed in Lages for less than one year [until 1948] as an Agriculture employee. I earned money only to pay for the hotel. Money did not leave. It was when I took the exam to work in the Ministry of Agriculture. I took first place.

I received from the Ministry of Agriculture the possibility to choose where I wanted to work anywhere in Brazil. I said that I wanted to work in agricultural promotion in Santa Catarina. The headquarters was Florianópolis. So I came to Florianópolis [in 1949], and there I started to work earning twice more.

I always had more luck than merit. I am too old to be charming. I recognize that I was so lucky. I have always been around competent people who work hard and, mostly, are honest.

How did your interest in making SC an apple reference begin?

One day, I had traveled through the countryside in Santa Catarina, and I received the news that Mr. René Frey, from Fraiburgo, was doing the fruit planting in the temperate climate, especially apples.

Some French Algerians, with the independence of Algeria, came to Brazil. Some went to Fraiburgo because they knew René and convinced him to experiment with the fruit from a temperate climate [from the 1970s].

When I arrived at Florianópolis, governor Ivo Silveira called me. I was secretary of Agriculture and director of Acaresc at the same time. He said: "Doctor Glauco, I want an impact in my government and the agriculture sector, something that will produce an effect." I remembered René Frey. In 15 days, I hired four agronomists to collect data. They gave me the elements, and I wrote the Profit (Fruit Growing Project of Temperate Climate).

I contacted René Frey and said: "You send me an apple box, the best that you have because I will travel to Brasília to seek resources for the fruit growing project."

I took the apple box and went straight to the minister of Agriculture, Luís Fernando Cirne Lima. I gave him an apple, and he tasted it and said: "It is delicious, Glauco." I said: "Yes, and I need financing. From three to four years grace period and from ten to 12 years to full payment."

This credit line did not exist in any bank, neither at the state bank nor the Banco do Brasil. I want to start with Banco do Brasil. He said: "Go to talk to Delfim." He was the minister of Finance at the time, Delfim Netto. He called Delfim and said: "Glauco wants to show a project for you. When can you have him there?." And he answered: "Now. Send him here now." So I went. Delfim was there, seated on his chair, wearing pants with suspenders. I am here with a project that needs financing that does not exist in a credit line. Delfim talked to advisors. After half an hour, he entered and said: "Glauco, go away. I already opened the credit line." It was what had facilitated the financing and the apple development in Santa Catarina and other fruits from a temperate climate.

Was it only then that apple cultivation began in Santa Catarina?

Apple's history in Santa Catarina, officially and institutionally, started in 1895. At this time, in the Alto Vale do Itajaí, the main culture that supported the economy of the region was the cultivation of tobacco. Suddenly appears in the root a disease that starts to ruin plantations. And at that time, Alto Vale do Itajaí was under the jurisdiction of Hermann Blumenau. And he needed a technician to search for a solution for that disease.



Storytelling Glauco has collected history from the time he went to Brasília in the 1970s to promote the apple from Santa Catarina



For these accidents of life, an anarchist ran away from Italy to Brazil. And for other coincidences, this anarchist was an intellectual and kept correspondence with Hermann Blumenau. They were friends, one Italian and another from Germany.

Hermann Blumenau asked if he did not want to work in Santa Catarina and install an experiment station in Rio dos Cedros. He accepted at the time, and with this was done the project named Estação Agronômica de Veterinária de Santa Catarina, whose main objective was to find a solution that quells the attacks against the tobacco root. And he found it out.

But he was an anarchist and did not conform to that researcher's life. He

Before the

fruit culture project,

total production in Brazil.

Glauco Olinger

thought that could be successful the fruit plantation from a temperate climate. And then he went to search for sprouts, firstly, apples. Only of apples, he brought more than 30 varieties produces more than half of the from every part of the world. They were not only apples, but also pears, peaches, plums, grapes, and quinces. None of these existed in Santa Catarina.

And did the Italian's initiatives succeed?

In Lages, another Italian guy called Formolo was very innovative and had a good farm that is the public market today. The anarchist persuaded Formolo to do a great and diversified orchard. At that time, it was the biggest orchard in Brazil, with between two and three hectares of fruit.

This orchard was bought later by a farmer from Lages called Olívio Olinger, for these accidents of life, he became the father of Glauco Olinger. Who did not dream of the life that he spent on that farm would be an inspiration to write the project of temperate climate fruit culture that advanced the apple growing and made us free of imports, not only in Santa Catarina but also in Brazil.

Before the fruit culture project, we imported from abroad, such as California, over 200 thousand tons. Santa Catarina produces more than half of the total production in Brazil. The two biggest producers are: Santa Catarina and Rio Grande do Sul states, the last one inspired by the initiative from Santa Catarina.

Vale do Rio do Peixe, in the decade of 1970s, was entering socioeconomic decay. People lived from the work of raising pigs and plant-

ing corn and beans. In one hectare, you got an income with corn and could produce ten times more with apples. So you increase revenue in the same area, we imported from abroad, which is still a kind of vertical agrarian such as California, over 200 reform. thousand tons. Santa Catarina

> And what was the Japanese participation in apple growing?

One of the great encouragers of apple's technological innovations was Kenshi Ushirozawa. This guy was a Japanese

researcher that came to Santa Catarina.

How did he come? One day I was in my office, and the secretary came in and said: "Mr. Glauco, there is a man claiming to be a representative of the Japanese government, and he has a hearing with you."

I was executive secretary of Acaresc and secretary of Agriculture in the government of Ivo Silveira. Suddenly, a short, smiling Japanese guy appears. I said welcome and asked what the subject of interest was. He said: "Doctor Olinger, I have a meeting scheduled tonight

with the governor Ivo Silveira, a dinner, which I will ask for government support to install in São Joaquim a Japanese settlement aiming to plant apples." I said that matched our interests.

"So I will do a surprise for you. I will send to Santa Catarina to be a consultant in apple research, one of the five best researchers that we have in Japan, Mr. Kenshi Ushirozawa," he said to me.

This doctor Kenshi came and introduced himself to me. I got an interpreter who was the son of a farmer from a Japanese settlement that there was in Curitibanos called [Atsuo] Suzuki. This guy at that time was 15 years old. This boy came to study Agronomy and became head of one of the largest experiment stations in Santa Catarina, the Caçador one.

Doctor Kenshi, who directed the applied researcher unit in the orchard in São Joaquim, brought Brazil the fuji apple. And today, the best fuji apple is in São Joaquim.

At that time, nobody knew fuji in Brazil. It was completely unknown. He was who brought

it. He became so important that they made a medal with his name, the Kenshi Ushirozawa medal. Recently there was a celebration in Santa Catarina, and the guy who won this medal calls Glauco Olinger [LOL].

Why is fuji so good in Santa Catarina?

She found the ideal weather and soil in São Joaquim. Fuji has a visible dominance in the market. Today it is fuji that has the highest value.

Considering the new technologies, is it still possible to increase production in SC?

A lot. The keyword is productivity. What is it? It is the increased productive capacity of the plant, land, water, and human work through automation and mechanization.

The productive averages can increase a lot, even double, with the advent of genetic engineering. The best science for the future, agriculture, and productivity is Genetic Engineering. Here is the secret. /



From Mountain to the world In Florianópolis, where he lives now, the man from Santa Catarina remembers the beginning of the fruit culture project that contributed to the apple growing in Brazil



Access the videos to discover more about the Japanese influence and other histories of the beginning of the apple growing in Santa Catarina

$\overline{\mathbf{1}}$ **MULHERES** +TEC Support to startups from Santa Catarina led by women

24 Call for Applications in progress

R\$ 1,4 million in investment



Small and Toothless

Researchers from *Centro de Pesquisa Paleontológica* (Cenpaleo), the biggest paleontological archive in Santa Catarina, carried out the fossil excavations of a new dinosaur species from South America

Chayenne Cardoso e Danielle Farias Universidade do Contestado (UNC) danielle.farias@unc.br

Berthassaura Leopoldinae

Discovered between 2011 and 2015
Cruzeiro do Oeste, PR



Scan the QR Code and access the discovery publication hat happened in the world 542 million years ago? Which species live on planet Earth at this time? Between some doubts that fascinated the human mind, 300 kilometers the distance of the Santa Catarina Capital, in the North of the State, the Centro de *Pesquisa Paleontológica* (Cenpaleo), from *Universidade do Contestado* (UNC), give some clues and find answers for many humanity questions.

In November of 2021, a new dinosaur species was discovered for Cenpaleo, a partnership with the Museu Nacional from Universidade Federal do Rio de Janeiro (UFRJ). The coordinator of the Centro de Pesquisa Paleontológica, professor Luiz Carlos Weinschutz says that this story began ten years ago in the Paraná State.

The research was developed for UNC paleontologists in four stages of the field between 2011 and 2014. In this period, the Cenpaleo team carried out the systematic collection, in other words, they were responsible for leaving the squared area, taking perfect squares, before stamping and packing the material collected for studies.

"We collected 2 tons of material and went on researching," highlights Weinschutz. The researcher remembers the first contact of researchers from Santa Catarina with the fossil when a citizen found it in the city of Cruzeiro do Oeste, in the 1970s, during a visit to a university in Paraná.

Dinosaur Berthassaura leopoldinae

Named Berthasaura leopoldinae, the discovery was a dinosaur that lived between 70 and 80 million years ago. It was small, around 1 meter long. It is the first toothless species found in South America.

The fossil is one of the most complete, from the cretaceous period, already found in the country. The excavation work localized the skull, jaw, spine, pectoral and pelvic girdles, and front and back limbs.

"In the last decade, dozens of fossils were collected in the Parana northwest, provoking the description of new species, particularly pterosaurs. The discovery of a dinosaur, the second one in the region, demonstrates the importance of this fossiliferous place, known as pterosaur graveyard," explains the coordinator of the Cenpaleo.

There already is much material to be studied and other species to be discovered. For 25 years, the Cenpaleo carried out these researchers. Currently, the Cenpaleo acts with a research line of three geological eras: Paleozoic, Mesozoic, and Cenozoic, besides the Brazilian Navy's Antarctic Program.

"Our first publication about a fossil was a pterosaur in 2014. At this time, there were no registers about the species," finished the researcher.



They are about three significant geologic eras that indicate changes in our planet Earth. The Paleozoic, for example, has as its principal characteristic life diversification. The Mesozoic, in its time, is characterized by dinosaurs and large réptiles. Then, the Cenozoic period is represented by the largest mammals and the presence of women and men.

Paleontology survey and partnerships

During its 25 years of existence, the *Centro de Pesquisa Paleontológica* from UNC created a support network and national and international partnerships. This work in the group resulted, for example, in the participation of mapping of paleoburrows in the Caminhos dos Cânions do Sul Geopark. They are the undergrounded shelters excavated by mammals from megafauna or giant extinct animals that lived in the Prehistoric Era.

Located in seven cities between Santa Catarina and Rio Grande do Sul, the place was recognized by Unesco, in April 2022, as a territory of international geologic relevance. Since 2017, the Cenpaleo team has surveyed the paleontologic potential of the region.

"We have already done several campaigns of paleoburrows surveys because the region presents an exceptional quantity of these structures, and still there are more stages of the research, with the survey of new points of interest," contextualizes the Cenpaleo coordinator, Luiz Weinschutz.

UNC in the Antarctic

The Cenpaleo researcher team produced an unprecedented study about the Antarctic Paleoflora. In the **article** published in February in the Annals of the Brazilian Academy of Sciences, the researchers describe the evolution of flora in the Antarctic continent during the Mesozoic Era.



Scan the QR Code and access the never-saw publication about the Antarctic paleoflora



Cenpaleo Researcher Professor Luiz Carlos Weinschutz



Cenpaleo Discoveries



The new species of flying reptile was very large and lived between 110 and 80 million years ago in a desert environment where there was an oasis.



Illustration Maurilio Oliveira

Pterosaur Caiuajara dobruskii

🔎 Discovered between 2011 and 2015 📀 Cruzeiro do Oeste, PR

The excavations located 47 fossils of a new species of pterosaur. Known as the dinosaur cousin, it was a flying reptile that lived 80 million years ago in Brazil.



Access the publication

Lizard Gueragama Sul-Americana

🦻 Discovered between 2011 and 2015 📀 Cruzeiro do Oeste, PR

The new species is a dominant step for paleontology in Brazil because it enlarges the diversity of lizards in the Cretaceous period. It is the first register of this reptile group in South America.



Access the publication

Fapesc Incentive



The Centro de Pesquisa Paleontológica (Cenpaleo) has one of the better-equipped technical reserves in the country. And a lot of research needs investments.

In 2021, the space gained resources from Fapesc to invest in equipment and

important materials to continuethe research.

With investments, around R\$76 thousand, it was possible to acquire: a light table, camera, and lenses for the photographic laboratory and computers for scanning, besides air-conditioners and dehumidifier for climatization of the technical reserve, and storage box and usage hours of electronic microscopy. /



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Discover the academic researchers produced in Santa Catarina



Thesis Defense

Researcher: Mariana Mendes Fagherazzi Dissertation title Adaptabilidade de Cultivares de Lúpulo na Região do Planalto Sul Catarinense - The adaptability of the hop growing in the Mountains from Santa Catarina (in a free translation) Graduate Program in Plant Production from Centro de Ciências Agroveterinárias (CAV) at Universidade do Estado de Santa Catarina (Udesc) in Lages.



Access the researcher's dissertation

Pioneer research proves the viability of the hop growing in Santa Catarina.

The agronomist engineer **Mariana Mendes Fagherazzi** wrote the first dissertation from Brazil about the hop growing in the country and turned a national reference.

Tatiane Rosa Machado da Silva Universidade do Estado de Santa Catarina - Udesc tatiane.silva@udesc.br

B razil is the third world's largest producer of beer but needs to obtain abroad almost 100% of the principal raw material for the elaboration of the drink: the hop, which provides characteristics of bitterness, flavor, and smell. The import of this ingredient is around three thousand tons per year. And why not produce the Brazilian hop, reducing the necessity of importing?

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It was one of the questions asked by the researcher Mariana Mendes Fagherazzi, which gave rise to the dissertation Adaptabilidade de Cultivares de Lúpulo na Região do Planalto Sul Catarinense, defended in 2020, in the Graduate Program in Plant Production from Centro de Ciências Agroveterinárias (CAV) at Universidade do Estado de Santa Catarina (Udesc) in Lages.



The aromatic plant grown for industrial purposes, the hop is one of the necessary raw materials for beer elaboration. The strobilus, also called cones, are the reproductive part of the female plants that give beer the characteristic bitterness, providing the flavor. With antiseptic properties, it interferes with the conservation of the drink.

The hop growing probably had its beginnings in Eastern Europe, in regions of Bohemia, Slovenia and Bavaria, before the 8th century, and from there spread itself to other countries in Europe. The first evidence of the use of hops in beer was recorded in the Middle Ages, when the German nun Hildegard Von Bingen wrote the book, *Physica Sacra*, quoting the plant as beer conserved because of the antimicrobial properties present in the lupulin.

In the study, Mariana investigated and proved the viability of production of the different varieties of hop on the ground of Santa Catarina, with productivity and satisfactory quality, capable of offering raw material inside the necessary pattern for breweries in the State, reducing the necessity of importing.

The dissertation, pioneering in Brazil, is the first to broach specifically the hop growing in the country. The study characterized the vegetal-productive and qualitative adaptation of the four varieties in different micro-weather in the Mountains from Santa Catarina, specifically in the cities of Lages, São Joaquim e Palmeira. The research was guided by professor Leo Rufato, from the Department of Agronomy, with a doctoral degree in fruit growing from Temperate Climate, with a postdoctoral degree at Cornell University in New York.

"The results allowed management guidelines for hop producers in the region and boosted new searches in a more specific way, strengthening and engaging new demands from hop producers and the productive chain that is being structured," says Mariana.



Mariana Mendes Fagherazzi Researcher from Udesc



Production in Santa Catarina The search proves the viability



Hop in Santa Catarina Mountain Lages, São Joaquim and Palmeira

Four validated varieties

The researcher evaluated the adaptability of four varieties: Cascade, Chinook, Columbus, and Yakima Gold. The observed results demonstrated that the hops developed in the conditions, and the cone production happened since the first harvest.

To provide cones with chemical compositions inside the required pattern by the beer industry were analyzed in different compost: alpha acids that serve as a source of flavors, mainly the bitterness beta acid, which contributes more to the smell than the flavor, and the essential oils, that are highly volatile and responsible for the perfume. The studies verified the cultivation potential in all varieties, highlighting Yakima Gold, which reached the highest concentration of alpha acids. In the city of Palmeira, the Cascade stood out in the essential oil content, accumulating the production of 0.89ml/100g, considering the parameters, according to the literature, vary from 0,7 to 1.5ml/100g.

In São Joaquim, Columbus stood out in the production per plant, totaling 1,86 kilos of the cone, while the medium of varieties was 1,68 kilos. The selection already showed proper for three microregions of search to present high productiveness when compared to the others.

⁶The results in this search are of great value for the scientific community, therefore, growers that desire to begin the hop growing in Santa Catarina. The recent trends in the agriculture product trading, produced locally, can result in a greater appeal to craft breweries to use the Brazilian hop," highlights the researcher Mariana.

Search Variables

The research was based on the results of four varieties to prove the viability of production: phenology, vegetative and productive evaluations, climate, and chemical ones of hop cones at harvest time. As for phenology, they evaluated the leaf development, the side branches, and the main twig stretching to the cone's maturity and deployment. The vegetal and productive evaluations included data such as plant height, productivity for the plant, and estimated productivity.

The climate rates considered data on temperature and hours of the sun in the cities were carried out experiments. The chemical evaluations of the hop cones at harvest time took into account mainly the concentration of alpha acids, beta acids, and essential oils.

The production in Brazil and the world

In beer manufacturing, hop is the component used in less quantity and the highest cost. Its use is essential to provide a characteristic aroma, besides being the chief ingredient responsible for the bitterness and the microbiological and physic-chemical stability of the drink.

In the dissertation she did at Udesc Lages, the researcher Mariana presents updated data on worldwide production based on information from the Economic Commission of the International Hop Growers Convention (IHGC), as shown beside, in the Hop Route.

The dissertation gives rise to a never-seen book

The lack of publications related to the hop growing in Brazil was one of the challenges that the researcher found during the search at Udesc Lages. In the parameter absence to validate the plant adaptability, Mariana developed her analysis parameters for the research.

The found results and the proof of the viability of the growing took to the publication of the book Aspectos Técnicos da Cultura do Lúpulo (2019) — in a free translation: The Technical Aspects of the Hop Culture. One of the first Brazilian literature related to the theme.

Published for the Udesc publishing company and organized by Mariana and Rufato, the work gathers the results of developed searches at the university to present elementary methods for the production of the hop in Brazil and to offer an overview for those that did not believe to be possible to produce with quality in Brazil.

"Searching for something innovative is challenging since Brazil imports more than 99.8% of its domestic demand for hops," writes Mariana. "I believe it is always easier to trail a path when there already is a beginning. I hope this work will be a source of inspiration for literary works about Humulus lupulus L.". / The countries located in the Northern Hemisphere are the biggest producers of hop.



The Hop Route 🚱

The United States and Germany represent more than 60% of the world's production, followed by the Czech Republic and China.



In Brazil, the hop culture began with the German and Polish immigrants, who settled in the Rio Grande Sul for over 60 years. But the (culture did not last, giving way to other economic activities.



In the last decade, hop culture has returned to being a subject due to the increasing number of craft beers registered.



There are reports of the hop growing in several Brazilian states, mainly in the South, Southeast, and Northeast. The Rio Grande do Sul and Santa Catarina have the most concentration of producers and the cultivation area, but with no registers or official estimates of production and productivity.

The Secret of Bom Pastor

Uniting **research and innovation**, Escola de Educação Básica Bom Pastor in Chapecó collects trophies and stands out in national and international competitions when the subject is technology

Milena Nandi Fapesc milena.nandi@fapesc.sc.gov..br

People who Innovate

hat does a state school from West of Santa Catarina have to do to receive so many awards, including international ones? What is the secret of the Escola de Educação Básica Bom Pastor, from Chapecó, twice awarded the Santa Catarina Innovation Award Professor Caspar Erich Stemmer? The answer may even seem simple in theory, but it requires effort and much dedication in practice. The Bom Pastor's secret is the people. Or rather, teachers and students are engaged and willing to make the school a teaching place that uses research and innovation as allies to expand the educational process horizons.

The principal of the educational institution, Jane Beatriz Mohr dos Santos, emphasizes the importance of teachers in promoting this movement which has led Bom Pastor to stand out. She has worked at the school for 25 years and believes in the projects developed to help with a student's differentiated training.



It is an incentive that recognizes successful efforts of the management of Science, Technology, and innovation (STI) for developing the innovative entrepreneurship ecosystem in Santa Catarina. The Fapesc is the organizer of the award, created through the Santa Catarina Innovation Law, and distributes R\$ 420 thousand between the 37 finalists of 10 categories in 2022.



The award school from Santa Catarina In the Robotic Class, students and teachers have won more than 40 trophies.

in Santa Catarina in number of students, the Bom Pastor School was founded in 1947



in Elementary and Higher School in 2022. The students come from Caxambu do Sul, Chapecó, Cordilheira Alta, Guatambu, Seara, and Xaxim, cities in Santa Catarina, and Nonoai in the Rio Grande do Sul state.

Source: Sistema de Gestão Educacional de Santa Catarina da Secretaria de Estado da Educação de Santa Catarina (Sisgesc/SED-SC)





Robotic Class Since 2014, teacher Rutz has coordinated the innovation works of students in Bom Pastor School

The collection of trophies

When the teacher Carlos Rutz met the Math Laboratory at the Bom Pastor School and began, in 2014, the Robotic Class, he did not imagine the proportion the project would take. Eight years later, the Robotic League, a school team that joins in regional, national, and international competitions of robots, collected more than 40 trophies and stood out in two categories on the Santa Catarina Innovation Award Professor Caspar Erich Stemmer.

In the beginning, small prototypes were built from students' ideas to solve problems. The work was evolving, and the submission in competitions started. In 2016, the team arrived, for the first time, in a championship final. Two years later, they won the International Tournament of Robots in São Paulo, which gathered participants from Brazil, Chile, Uruguay, Argentina, and Peru. In 2019 one more victory at the competition and recognition of the State Secretariat of Education, which includes the monitors of the Robotic Class at the Programa de Estágio Novos Valores. "The weekly meetings in the Math Laboratory started to be daily, and the project passed for another moment. We have included the research and writing of papers

that collaborate in the learning and give the students a feeling of protagonism and the responsibility for all they are doing," affirms Rutz.

> Jovens inovadores Os estudantes de Chapecó desenvolvem projetos de robôs do zero

64I was extremely shy. Suddenly, I was helping to build a robot that danced, and I was choreographing with the robot during a competition. The Robotic Class approaches the students and encourages social interaction.

> Gabriele Rosseto, Bom Pastor Student

The Robotic League marked my life: the integration with colleagues from other classes, the development of team projects, the participation in competitions, the contact with technology, the incentive to creativity, and the work as a monitor were important for my professional decision.

> João Pedro Brunoni Ex-monitor of the Robotic Class

Robot competitions

Discover the categories and subcategories of combats.



Point your cell phone camera to the QR Code and check out the videos of competitions, participation in fairs, and a series about astronomy recorded during the pandemic.

FIGHTS

There are three subcategories:

- **Sumo**: it consists in locating and pushing the opponent robot out of the circular arena. It played in the best of three rounds.
- **Tug of war**: two robots are attached at the ends of a force cable, and the best in three rounds is the winner.
- **Cliff Hanger**: this modality looks like Sumo but with an obstacle at the center of the arena.

CREATION

In this modality, there are **three subcategories**:

- **Dancing**: the teams must create a performance where one or more robots act, necessarily, with humans, in an organized and synchronized choreography.
- **Media Record**: the participants must make a product that represents, in the video, the team production, the competition, and their emotional environment.
- Impossible Mission: the competitors program a robot for a secret challenge, revealed less than 24 hours before the test.

RESCUE

In this category, there are four subcategories:

- Journey to the center of the Earth: the robot needs to go until the center of the spiral, where it captures a target object and returns with it to the initial position.
- **Rescue in the Plan:** the robots have to walk in lines and seek in environments the target objects that must be replaced in the respective destination place.
- **High-risk Rescue:** the robots do the same as in the Rescue in the Plan, but they have to overcome obstacles and ramps.
- **DRC Explorer:** it is a development of autonomous robots. The arena of DRC Explorer is a simulation of a building in ruins. The explorer robot must find the victims in this building and transmit rescue packs for them.

Source: torneiojrobotica.org e firabrasil.com

It is not only about robots

The performance of the Robotic League team also stood out at the Brazilian Fair of Science and Engineering (Febrace), when the project of an automated medicine box was ranked in second place. The idea was presented in English on behalf of the project, the school received a financial promotion from the American Embassy and created the Science and English Fair of the Bompa (FecieBompa) in 2021. Under the guidance of teachers, students of the High School had the opportunity to present their work through a pitch in English.

For Netaly Ghidolin Conte, 19, responsible for the project of the medicine box, the participation in the research process and product development was enriching. Today, the student is in the Physiotherapy course at the Universidade Comunitária de Chapecó (Unochapecó) Netaly enrolled in Robotic Class in 2018.

"Camila and I were invited to think about an important problem of our community and a solution. We remembered our grandparents, who needed to take some medicine but not always can do this correctly. We imagined this to be a problem for other old-aged people and a concern for many families. From this arose the idea of the automated medicine box," tells Netaly.

The project was developed in 2019 over seven months and evolved market and materials research, development of a model, and register of the process as an article. According to Netaly, the box has spots to save the medicines and emits beeps and lights to notify the person to take remedy on time. The artifact also has been written in braille and allows the family to follow the movement.



Smart Box

The research work of Netaly Ghidolin Conte and Camila Vanin was awarded at the Brazilian Fair of Science and Engineering.



Did you get curious? Access the video to meet the medicine box

Democratic Participation

The only requirement to join the Robotic Class for students at Bom Pastor is to be in high school. Every year, 20 vacancies are opened, 10 for boys and 10 for girls, who do not need to have knowledge of programming or be specialists in exact sciences.

In the first year, the participants receive guidance from the teacher Rutz and the students who are longer in the Robotic League – from the project's second year, the students who stand out can become monitors.

Solutions for Community

In 2021, from a challenge proposed for the teacher Oeliton Vieira Fortes during a math lesson in Bom Pastor's third high school class emerged the awarded project made by Méllany Brigo Rieger and her classmates Marcus Vinícius da Silva Bezerra and Ana Clara Demori, everyone is 18 years old.

The student idea of the school from Chapecó was to help patients who have Covid-19, develop a low-cost project, and be able to increase pulmonary capacity.

The result of the project was an RPC19 prototype that cost, on average, R\$7.30. The project had a test phase with volunteers, and it will still go through the validation of a group of researchers from the Nursing and Medicine course in the Chapecó campus at Universidade Federal da Fronteira Sul (UFFS).

The teacher Fortes said that while the activities were hybrid during the pandemic, he encouraged students to study the risk matrix of Santa Catarina. "We sought information, and the students did the research. This engagement yielded an article, an accessible prototype for the population, and went beyond: made a connection between school and university."

For Méllany, the project recognition shows

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The school can empower the student, and one of our goals is to encourage them to join in activities besides the classroom. We know the teacher can be a big inspiration for students and motivate them to seek more. Because of that, we believe in the power of the projects made here.

Jane Beatriz Mohr dos Santos Principal of the Bom Pastor

that it is possible to do innovation at school. "From a challenge, we could develop an award project which helped people. All this process changed my vision as a student. It was an amazing experience", says Méllany. "Receiving an award as Fapesc Innovative Young Student motivates me much more to follow focused on research, knowledge, and education," concludes the awarded student. /



Award at Fapesc

Teacher Oeliton Fortes (left) and the students Marcus Bezerra and Méllany Brigo in the ceremony of the Santa Catarina Innovation Award 2021, with the Fapesc president, Fábio Zabot Holthausen (right) The history and the incentive programs of the Research and Innovation Support Foundation of Santa Catarina State- Fapesc



Formação profissional para o mercado de tecnologia

Entra21 Blusoft/Fapesc Program: Professional training for the technology market

Desde sua criação, há 17 anos, a Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (Fapesc) apoia o programa de capacitação em tecnologia que nasceu em Blumenau e, atualmente, está presente em todas as regiões catarinenses

• Since its creation, 17 years ago, the Research and Innovation Foundation of the Santa Catarina State (Fapesc) supports the program of training in technology that was born in Blumenau, currently, it is present in all Santa Catarina regions

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Esta reportagem está traduzida em inglês para ampliar a divulgação do conteúdo. No site da Fapesc é possível ler e compartilhar todas as reportagens da Revista, traduzidas para o inglês.

This report is translated in English to enlarge the content dissemination. On the Fapesc website, it is possible to read and share all the Magazine's reports, translated them to English.





Aula magna edição 2022 | Magna Class issue 2022 Presidente da Fapesc, Fábio Zabot Holthausen Fapesc President, Fábio Zabot Holthausen



Programa de formação em tecnologia de maior empregabilidade em Santa Catarina, o Entra21 nasceu em 2005 em decorrência da falta de profissionais qualificados no setor de Tecnologia da Informação (TI). Todos os anos, centenas de pessoas são formadas, sendo que em 2022 mais de 650 profissionais se capacitaram em formações gratuitas, uma iniciativa do Polo Tecnológico de Informação e Comunicação da Região de Blumenau (Blusoft).

Com o objetivo de capacitar pessoas acima dos 16 anos para um mercado em ascensão, o programa apoiado pela Fapesc já formou mais de 5,5 mil profissionais, que foram absorvidos por empresas parceiras ou decidiram empreender na área.

A ideia de criação do programa surgiu de uma experiência norte-americana, que contava com recursos do Banco Interamericano de Desenvolvimento (BID) para empresas da América Latina e Caribe desenvolverem mão de obra voltada para a tecnologia. "Em 2004 começamos a trabalhar na concepção do Entra21. Fui para Colômbia e defendi a proposta de Blumenau. Voltei com o programa aprovado", lembra Sérgio José Tomio, coordenador do programa.

Tomio participa do projeto desde a sua concepção. Ele explica que o BID financiou 60% dos recursos, sendo o restante investido pela prefeitura de Blumenau, empresas âncoras e cotistas, e Governo do Estado, por meio da Fapesc, que fomenta o programa desde sua criação.

A iniciativa de capacitar profissionais no mercado de TI da região de Blumenau teve um resultado tão positivo que, a partir de 2022, os cursos em desenvolvimento e sistemas passaram a ser ofertados em outras regiões do Estado. A expansão foi possível com o aumento do fomento feito pela Fapesc, no valor de R\$ 2 milhões.

A ideia deu certo e a procura foi grande: mais de 11 mil inscrições. Uma delas a 470 quilômetros de distância da cidade sede do programa. O graduado em Sistemas de Informação, Odirlan Rodrigo Gazaniga de Oliveira, enxergou na primeira turma do Entra21 em Chapecó, no Oeste catarinense, a Training program in technology with greater employability in Santa Catarina, Entra21 was born in 2005 due to the lack of qualified professionals in the Information Technology (IT) sector. Every year, hundreds of people are trained, and in 2022 more than 650 professionals were trained in free training, an initiative of the Polo Tecnológico de Informação e Comunicação da Região de Blumenau (Blusoft).

With the objective of training people over 16 years old for a rising market, the program supported by Fapesc has trained more than 5,5 thousand professionals who were absorbed by partner companies or decided to undertake in the area.

The creation idea of the program arose from an American experience that counted on resources of the Inter-American Development Bank from Latin America and Caribbean companies to develop the labor focused on technology. "In 2004, we started to work on the conception of Entra21. I went to Colombia and defended the proposal from Blumenau. I returned with the program approved", remembered Sérgio José Tomio, the program coordinator.

Tomio has joined the project since its conception. He explains that the Inter-American Development Bank financed 60% of resources, the remaining was invested by the Blumenau city hall, anchor and shareholder companies, and the State Government, through Fapesc, that supports the program since the creation.

The initiative to capacitate professionals in the Information Technology market from the Blumenau region had a result such as positive that, from 2022, the courses in developments and systems started to be offered in other state regions. The enlargement was possible with the increase of support by Fapesc, in a value of R\$2 million.

The idea had worked, and the search was incredible: more than 11 thousand subscriptions. One of them was 470 kilometers away from the hometown of the program. The Information Systems graduate, Odirlan Rodrigo Gazaniga de Oliveira, met in the first class of Entra21, in Chapecó, West of Santa Catarina, the opportunity to recycle his knowledge and reinsert himself



oportunidade de reciclar seus conhecimentos e se reinserir no mercado de trabalho. Ao concluir a graduação em 2016, Oliveira optou por continuar com o seu negócio e não buscou oportunidades na nova área de atuação. Mas, no início da pandemia de coronavírus, ele resolveu vender a empresa.

"Em 2022 enxerguei no Entra21 a oportunidade de ficar mais próximo das empresas parceiras, recordar a formação que tenho e, no fim, poder ainda ingressar no mercado de trabalho", afirma.

As aulas de Oliveira iniciaram em abril de 2022, e um dos pontos positivos apontados pelo estudante são as disciplinas relacionadas às soft skills (habilidades interpessoais). "Não estudei só programação, mas empreendedorismo, desenvolvimento pessoal, finanças, inglês. Hoje um profissional de TI precisa ter outras habilidades, além das técnicas. As relações humanas são importantes", completa. in the labor market. When he finished his undergraduate degree in 2016, Oliveira chose to continue his business, an internet café and did not look for opportunities in the new area. At the beginning of the coronavirus pandemic in 2020, he decided to sell the business.

"In 2022, I saw a possibility to insert myself into the labor market again through the program. I found at Entra21 the opportunity to stay closer to companies that are partners, reminding me of the training that I have and, in the end, can insert on the market", affirms. The classes started in April 2022, and the strengths pointed out by the student are the subjects related to soft skills. I did not just study programming but also entrepreneurship, personal development, finances, and English. Today a professional in Information Technology must have other abilities besides techniques. Human relations are important as well.



Oportunidades em TI | *Opportunities in IT* Odirlan de Oliveira participa da primeira turma do Entra21 em Chapecó Odirlan de Oliveira joins the Entra21 first class in Chapecó

Milena Nandi



Em 2022, a expansão para as demais regiões catarinenses

O ecossistema de tecnologia de Santa Catarina é o sexto maior do Brasil, atraindo cada vez mais empreendedores para o desenvolvimento de startups, empresas consolidadas e até multinacionais.

Diante desse cenário positivo, a Fapesc entendeu a necessidade de ampliar as ações do Entra21. Assim, em 2022, em parceria com a Blusoft, foi definida a expansão do programa para as demais regiões catarinenses.

Segundo o presidente da Fapesc, Fábio Zabot Holthausen, a fundação está atenta a todos os movimentos do ecossistema de Ciência, Tecnologia e Inovação (CTI) no Estado. Desta forma, a carência de mão de obra qualificada na área de desenvolvimento e programação não passou despercebida.

In 2022, the enlargement to other Santa Catarina regions

The technology ecosystem from Santa Catarina is the sixth-greater in Brazil, attracting more and more entrepreneurs to startups, consolidated companies, and even multinational companies development.

Given this positive scenario, Fapesc understood the necessity to enlarge the Entra21 actions. So, in 2022, with a partnership with Blusoft, was defined the expansion of the program to other Santa Catarina regions.

According to Fapesc president Fábio Zabot Holthausen, the foundation is alert to all ecosystem movements of Science, Technology, and Innovation (STI) in the State. In this way, the lack of skilled labor in the development and programming area did not go unnoticed.



Entra21 em SC

Mais de 76 cidades catarinenses oferecem capacitação gratuita em 2022

More than 76 Santa Catarina cities offer a free training in 2022



Aulas presenciais On-campus lessons

Aulas online Online lessons

Tecnologia catarinense em dados Santa Catarina Technology in data

10 profissionais mais procurados 10 most wanted professionals



17,7 m empresas de tecnologia

17,7 thousand Technology companies

19,8 bilhões

faturamento do setor \$ 19.8 billion sector billing

67,8 colaboradores empregados

67,8 thousand employees

- Nº de Colaboradores Grande Florianópolis 5,8 mil R\$ 8,4 bilhões 32 mil Florianópolis 5.8 thousand R\$ 8.4 billion 32 thousand . Metropolitan Area R\$ 4.5 bilhões 4,7 mil 12 mil Vale do Itajaí 4.7 thousand R\$ 4.5 billion 12 thousand 3.4 mil R\$3,4 bilhões 11,4 mil Norte R\$3.4 billion North 3.4 thousand 11.4 thousand Oeste 1.8 mil R\$ 1.6 bilhão 5.6 mil West 1.8 thousand R\$ 1.6 billion 5.6 thousand Sul 1,6 mil R\$1,3 bilhão 4.3 mil South 1.6 thousand R\$1.3 billion 4.3 thousand 450 R\$ 606 milhões 2,5 mil Serra Mountain 450 R\$ 606 million 2.5 thousand
- 1. Desenvolvedor Full Stack
- 2. Desenvolvedor Back-end
- 3. Desenvolvedor Front-end
- 4. Analista de Serviços/Suporte de TI
- 5. Analista de Negócio

- 6. Analista de Controle de Qualidade
- 7. Desenvolvedor Mobile
- Gestor de Projetos
- 9. Design de Produto
- 10. Agile/Scrum Master



Como funciona o Entra21 How works the Entra21

O programa é voltado para pessoas a partir de 16 anos, com residência em Santa Catarina, cursando ou que tenham concluído o Ensino Médio ou Superior

The program is focused on people over 16 years old, who live in Santa Catarina, are studying, or have finished High School or Higher Education

Atende pessoas com deficiência e imigrantes que buscam colocação no mercado de trabalho It attends disabled people and immigrants that are looking for job placement

Oferece capacitação em 13 linguagens de programação, com carga horária de até 480 horas It offers training in 13 programming languages, with a workload of 480 hours

Inclui disciplinas de inglês, empreendedorismo e inovação, desenvolvimento humano e contabilidade

It includes the subjects of English, entrepreneurs, innovation, human development and accounting

A inscrições são anuais, sempre no primeiro trimestre, por meio do site www.entra21.com.br The subscriptions are annual, always in the first trimester, through the website

Para ingressar nas novas turmas, os inscritos participam de um processo seletivo To join the new classes, the subscribers participate in a selective process



Mire a câmera do seu celular para o QR Code e acesse o site do Programa Entra21

Access the Entra21 Program website using the QR Code!

Desde o início da nossa gestão, em 2019, estamos trabalhando para expandir a experiência bem-sucedida de Blumenau para outras regiões do Estado. Em 2022, em decorrência da crescente demanda de mão de obra de programadores, optamos por ampliar a atuação do Entra21, totalizando hoje sete municípios com aulas presenciais e mais de 76 cidades com aulas online. Assim, consequimos dar oportunidade para as diversas regiões catarinenses, oferecendo uma capacitação de qualidade e alinhada às necessidades do mercado.

> Fábio Zabot Holthausen Presidente da Fapesc

Com a ampliação das atividades, as unidades do Senac em Chapecó, Joinville, Florianópolis, Criciúma e Itajaí foram selecionadas para executar a expansão presencial.

"Since the beginning of our work in 2019, we have been working to enlarge the successful experience from Blumenau to other State regions. In 2022, we could enlarge, totalizing seven counties with oncampus classes and more than 76 cities with online lessons", affirms the Fapesc president.

With the enlargement of activities, the units of Senac in Chapecó, Joinville, Florianópolis, Criciúma, and Itajaí were selected to execute the face-to-face expansion.

Programa atrai empresas de tecnologia

The program attracts technology companies

Um dos pontos de destaque do Entra21 é o trabalho realizado para garantir a empregabilidade dos novos profissionais de TI, uma parceria com empresas como a Senior Sistemas, que participa desde a primeira edição do programa e absorveu mais de 90 alunos nos últimos três anos.

O gerente de Desenvolvimento da Senior, Maiquel De Luca Rochi, afirma que, geralmente, os novos talentos têm longevidade na empresa. "O Entra21 está cada vez mais forte e necessário. É uma importante iniciativa, tanto de cunho social, que permite a mudança da realidade das pessoas, quanto para o ecossistema de TI ", salienta Rochi.

O presidente da Blusoft, Bruno Tiergarten, comenta que o programa, além de fortalecer o setor de TI do Vale do Itajaí, é um dos fatores de decisão para grupos de tecnologia se instalarem na região. Para ele, o desenvolvimento do Entra21 depende de conexões essenciais entre o poder público e a iniciativa privada. "O programa é possível porque existe união de esforços, e este trabalho em conjunto só fortalece a área de TI em Santa Catarina", afirma Tiergarten.

Participação feminina

O coordenador geral do Entra21, Sérgio José Tomio, enfatiza a importância da Fapesc na expansão do programa. Para ele, a ampliação do programa beneficia os jovens catarinenses, que garantem empregos de qualidade.

Sobre o público do curso, a presença feminina tem espaço garantido.

"Sempre fizemos um trabalho para trazer as mulheres para o Entra21, e tivemos um cuidado especial no momento da seleção, apesar de não utilizarmos cotas. Desde a primeira edição, mantemos um índice entre 25% a 30% de participação de mulheres, número superior ao registrado no setor, tanto no Brasil, como em Santa Catarina", afirma Tomio. / One of the highlight points of Entra21 is the work realized to guarantee the employability of new professionals in Information Technology, a work realized in partnership with companies like the Senior Sistemas, which has participated since the first edition of the program and absorbed more than 90 students in the last three years.

The Development Manager of Senior, Maquiel de Luca Rochi, affirms that, usually, the new talents have longevity at the company. "The Entra21 is increasingly strong and necessary. It is an important initiative, as social that allows to change the reality of people as for the IT Ecosystem", Rochi points out.

The Blusoft president, Bruno Tiergarten, comments that the program, in addition to strengthening the IT sector from Vale do Itajaí is one of the factors in the decision for technology groups to settle in the region. For him, the Entra21 development depends on essential connections between public power and private initiative. "The program is possible because there exists a union of efforts, and this work in a group just strengthens the IT area in Santa Catarina", Tiergarten affirms.

Feminine participation

The general coordinator of Entra21, Sérgio José Tomio, emphasizes the Fapesc importance of the enlargement of the program. For him, the program enlargement benefits the young people from Santa Catarina, which has guaranteed quality jobs.

About the course audience, the feminine presence is guaranteed.

"We always have done work to bring women for Entra21, and we had special care at the selected moment, although we did not use quotes. Since the first edition, we maintain an index between 25% to 30% of women participation, a much higher number than recorded in the sector as in Brazil as in Santa Catarina", Tomio affirms. /



Innovation and scientific dissemination spaces open to the community



Conservation of Biodiversity The coordinator of the Botanic Garden at Univille, Karin Quadros, has followed the work since 2017

Teaching and research laboratory in the open air

The only Botanic Garden installed inside a university in Santa Catarina completes 15 years of contribution to research, biodiversity preservation, and environmental education at the Univille campus in Joinville

Diego Porcincula Univille imprensa@univille.br Fotos Leandro Moreira Univille imprensa@univille.br **P**or 15 years, the teaching, research, and extension activities have been carried out at the Botanic Garden at *Universidade da Região de Joinville* (Univille), strengthening the community DNA of the institution from Santa Catarina located in the North of the State.

Since 2007 many things have changed. It was necessary investment and dedication to get the project off the drawing board, earn more appeal and conquer visitors. Today, those who visit the space can know about the hanging trail in the forest or the *Serraria dos Khon*, a typical building from the region listed by the city's historical heritage and rebuilt at the Botanic Garden.

In recent years have created a collection of alive plants, sheltered at the Garden of medical and toxic plants, cactus place, the place of seeds, and at the theme gardens, such as the *Jardim Vertical*, *Jardim das Mulheres*, *Jardim das Gimnosperma*, *Jardim das Raulinoas* (with endangered plants) and the Alameda das Palmeiras.

Professor Karin Esemann de Quadros, the coordinator of the Botanic Garden, remembers since the beginning, the work was intense to guarantee the achievement of the goal of biodiversity preservation, the identification of native vegetation species, the conservation of the genetic heritage of plants, and the activity realization of environment education.

"I have followed evolution and achievements since the beginning. From the initial project, there is a lot to be executed. As with all the big construction, there are limitations, but the hope for a successful future.

The Botanic Garden is already unfinished work because we can always build new spaces, add other collections and do more research," finished the coordinator.

Beyond the space inside the university campus, the Botanic Garden is inserted in actions and projects of environment education and events, which take place in the city, expanding the dissemination of works and sharing knowledge.



Environmental Education Entrance to the Botanic Garden



Von Martius Trail Walking to open air and plant identification



House of Bees Space of stingless hive research



Sensory experiences in Joinville

This year, a Sensory Garden is under construction that promises to awaken different experiences in visitors.

The Sensory Garden gathers plants with sensorial characteristics, different colors, textures, and tastes

Karin Esemann de Quadros Professor from Univille and coordinator of Botanic Garden

According to the coordinator of the Botanic Garden, the space was designed to provide several sensations through visual and tactile stimulations promoted by materials and structures used in the construction.

The students of the Architecture and Urbanism course at Univille are responsible for the project, and the resources for the construction were captured by a call for applications, with the support of the Botanic Gardens Conservation International (BGCI), a nonprofit organization that promotes conservation biology and environmental education. The NGO is headquartered in London and works with 800 botanic gardens from 120 countries.

The strengthened actions in the network, the experience exchanges, and assure financial aid for the development of new activities, the Univille Botanic Garden integrates the Rede Brasileira de Jardins Botânicos (RBJB) and the Aliança Brasileira de Jardins Botânicos (ABJB), created in 2021 and gathers eight Brazilian botanic gardens. /

Univille Botanic Garden



7 thousand

visitors for the year

6 hectares of green area in Joinville

6 alive collections

cactus and succulents, orchid and bromeliads, gymnosperms with Pine trees and plants with naked seeds, palms, and plants with women's names and endangered species

6

scholarship holders of research, extension, and internship



Cactus Place The Botanic Garden sheltered several species of cactus and other succulent plants

Visit

Only six botanic gardens are maintained for Higher Education Institutions in Brazil. In Joinville, besides students and professors from Univille who attended the space to develop teaching and research activities, even as works of scientific research, internship, degree completion paper, dissertation, and thesis, the Botanic Garden is open to the public for visiting and activities of environmental education.



What you will find:

An ecological trail, a house of seeds, a cactus place, an epiphyte place, a house of bees, and a sawmill are listed as historical heritage.

Opening hours

Monday to Friday (except holidays and optional holidays) From 8 am. to 5 pm.



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Scheduling

Telephone: (47) 3461-9174 or email: visite@univille.br



Social Media

Follow on Instagram @jardimbotanico.univille



Where it is

10, Paulo Malschitzki Street, Industrial North Area, Joinville, Santa Catarina













Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina



For **25 years**, the main partner of anyone who wants to research, innovate and undertake in Santa Catarina



30 Programs of incentive for innovation and entrepreneurship

152 public calls*

1500 project in development in all regions of the Stateo

*between January 2019 and November 2022





Access our website







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