



Future in Industry 4.0

Intelligent, autonomous, and pioneering, the industries in Santa Catarina get out in front in the process of modernization and **innovation of the industrial** Brazilian branch, boosted by one of the best technological hubs in the country

Interview

The Secretary of State for Science, Technology, and Innovation details a program to boost SC

People who Innovates

In the Western Region of the State, Luzerna is the city with the most startups per inhabitant in SC

Fapesc Explains

What is intellectual property, and who can have this register to guarantee the right to creations

DNA Catarina

Luciane Ceretta assumes the presidency of Acafe and reaffirms the commitment to Higher Education



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to develop technological
and innovative solutions

+R\$ 30 million
in investments



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on the website!

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- ▶ **12** registered trademarks
- ▶ **9** new technologies
- ▶ **5** software developed
- ▶ **4** patent applications
- ▶ **3** products developed



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Jorginho Mello

Vice-Governor of State of Santa Catarina
Marilisa Boehm

Secretary of State for Science, Technology, and Innovation (SCTI)
Marcelo Fett

Secretary of State for Communication (Secom)
João Debiasi



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Administrative Center of the Government – 4600, SC 401 Highway
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Printing
Tipotil Indústria Gráfica

Circulation
5 thousand copies

free distribution

Reproduction Right
Republishing is free if the source
is cited.

August 2023 | Year 2, N. 3
ISSN 2965-3614



Revista Fapesc is a biannual publication. All the content is
available on the website, in addition to previous issues, versions
in English, and exclusive content.

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Technology and industrial revolution

We live in a time of significant and fast changes, which directly and irreversibly affect our routines. Currently, we can observe and list many examples, some emblematic, such as the current format of banking transactions. In 2020, with the arrival of Pix and instant electronic transfers and payments, we have gained more practicality. The method became popular quickly and impacted our routine and the modernization of the entire commercial network.

Other changes have affected our industries: In recent years, there has been a decrease in the number of driver's licenses issued to young people. The worldwide phenomenon is yet another reflection of the new ways in which we move and has repercussions in the different branches of the automobile industry and services related to passenger transport.

In addition, technological development, often portrayed as a new industrial revolution, can generate gigantic demands for companies and Higher Education Institutions. It means more control over processes and the use of data and more presence of Artificial Intelligence (AI) in decision-making. Therefore, the demand for trained and updated professionals has never been so high, opening a universe of opportunities for researchers and institutions.

In this edition of **Revista Fapesc - Science, Technology, and Innovation in Santa Catarina**, we have selected some technological highlights of our state. It is a meeting of part of the innovative work conducted by companies, universities, and, especially, people involved in Science, Technology, and Innovation (STI) activities.

I would also like to highlight the readiness and joy with which our communication team was received by the various actors presented in this publication. Thus, I am very grateful for all this appreciation, which drives us to continue the dissemination of our STI ecosystem in Santa Catarina. I take this opportunity to announce the recent launch of the FapescPod podcast, a new way of communicating, which chillingly addresses the pertinent issues of our day-to-day at the Research and Innovation Support Foundation of the State of Santa Catarina (Fapesc).

I hope you all enjoy the reading, be enchanted by the beautiful images, and be inspired by the stories of success and perseverance presented in this edition.

Good reading!



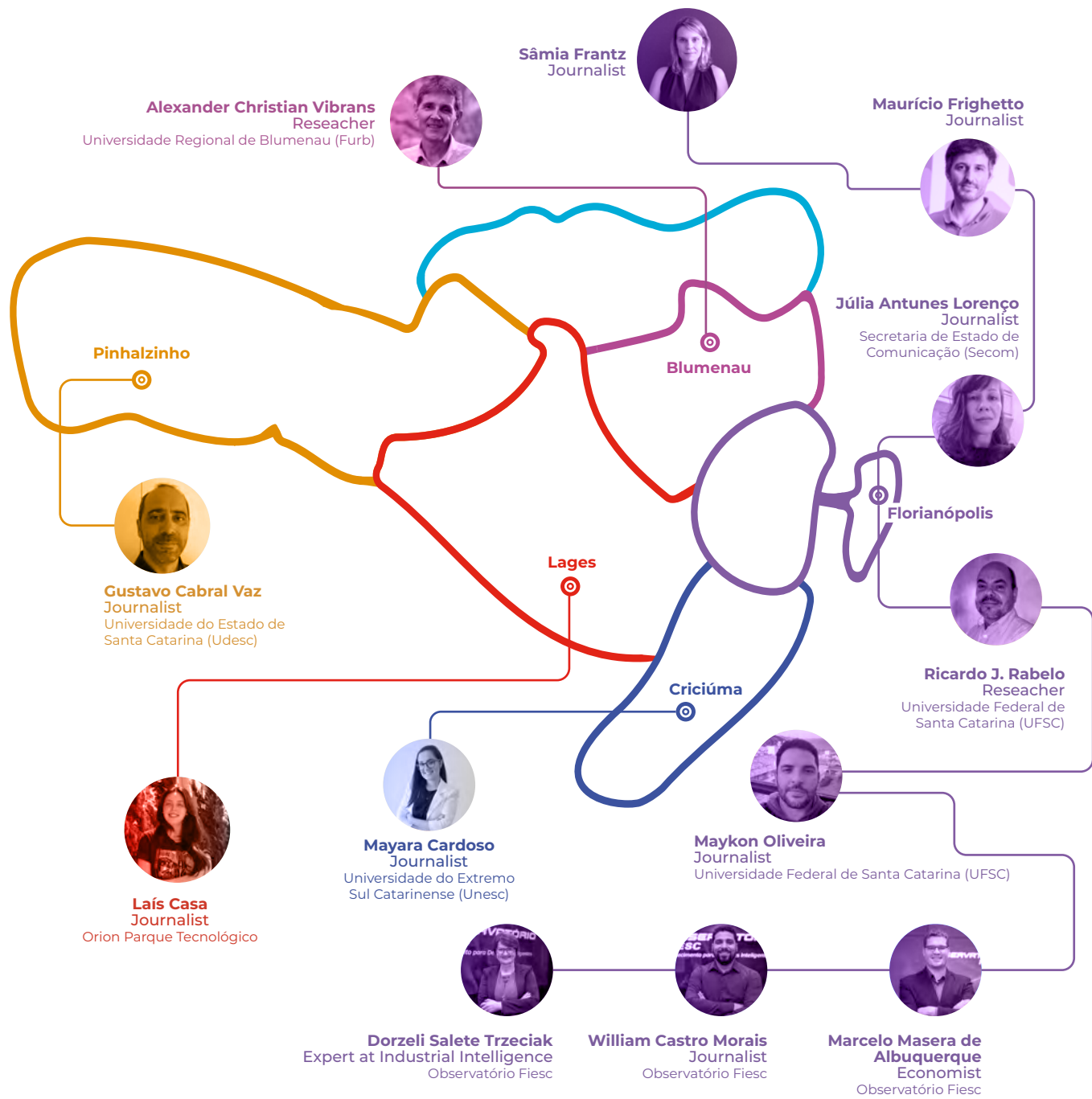
Technological development generates gigantic demands for companies and universities: more control of processes and use of data and more presence of Artificial Intelligence in decision-making.

Fábio Wagner Pinto
President of Fapesc

Contributors

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 goal is to spread 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

Santa Catarina collects many titles, among them being one of the most industrialized states in Brazil. A source of pride, Santa Catarina's industrial Competitiveness Index is practically equal to that of São Paulo, the national leader. In other words, we are entrepreneurial and competitive.

In the food sector, we are national leaders in the export of pork. In the textile industry, we produce three times more than the second-largest producer in the world. In addition, we are an international reference when it comes to the production of electrical equipment.

There is no shortage of examples, as the production of regional industrial centers presents high technological sophistication and diversity. In the information and Communication Technology (ICT) sector, for example, our productivity is three times that of China.

For all these reasons, the third edition of **Revista Fapesc - Ciência, Tecnologia e Inovação** dedicates 24 pages to disseminate the work of excellence of entrepreneurs, researchers, managers, and specialists of companies and industries in Santa Catarina.

In Jaraguá do Sul and Joinville, in the North region, two of the four Santa Catarina municipalities present in the list of the one hundred largest industrial cities in Brazil, we visited companies that invest in the new technologies of Industry 4.0 and stand out in the innovation process of the Brazilian industrial sector.

The role and goals of the unprecedented Secretary of State for Science, Technology, and Innovation of SC also gained space in this edition, as well as the profile of the new president of the Santa Catarina Association of Educational Foundations (Acafe).

From the west of Santa Catarina, we tell the successful trajectory of the small city of Luzerna, which concentrates the largest number of startups per inhabitant of the state; and the history of the University of the West of Santa Catarina (Unesc), the first institution of Higher Education in the region.

In addition, we continue with the series of presentations of the Innovation Centers, this time, focusing on the first hub of the Santa Catarina network, in Lages, in the mountains; we highlight the work of researchers from the Regional University of Blumenau (Furb), in the Itajaí Valley, who illustrate the publication with images recorded in our forests.

Finally, we gathered unpublished research, suggestions for open visitation to the community, and the necessary care for the registration of new trademarks, patents, and industrial designs.

Meet our website and browse our social networks. Feel invited to join this community.

Regards,



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FapescPod!
To know about all episodes, follow Fapesc on Spotify



Fapesquinha
Rafaela Antonioli Neves teaches children to experiment with biological yeast



The wait is over! Meet the finalists of the Santa Catarina Innovation Award

1 Innovation Agent

- > Clarissa Stefani
UFSC - Florianópolis
- > Leo Rufato
Udesc - Lages
- > Marcos Albuquerque Buson
Hards Investimentos e Participações - Florianópolis

2 Innovative Researcher

- > Cleonice Gonçalves da Rosa
Uniplac - Lages
- > Leonardo Araújo
Epagri - São Joaquim
- > Tiago Savi Mondo
IFSC - Florianópolis

3 Innovative University Student

- > Ana Luiza Leite
Udesc - Florianópolis
- > Dimas Rafael Broering
UFSC - Florianópolis
- > Mariana Rodrigues Marcelino
UFSC - Florianópolis

4 Innovative Professor

- > Eduardo Janicsek Jara
Udesc - Florianópolis
- > Oeliton Vieira Fortes
EEB Bom Pastor - Chapecó
- > Tiago Zonta
Unoesc - Chapecó

5 Innovative Young Student

- > Julia Freider
EEB Bom Pastor - Chapecó
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EEB Bom Pastor - Chapecó
- > Vittor Hugo Reolon
EEB Bom Pastor - Chapecó

6 Innovation in Service or Process

- > Stift - Florianópolis
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Marcelo Fett

“Innovation is an important competitiveness factor for the economy of SC”

Secretary of State for Science, Technology, and Innovation, Marcelo Fett tells how the new state secretariat is structured and what the population can expect from the unprecedented department in Santa Catarina

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Experience in public management

The lawyer was indicated for the position by the Santa Catarina Association of Technology (Acate)

Trajectory

Born in Florianópolis, Marcelo Fett is 45 years old. Graduated in law from the University of Vale do Itajaí (Univali - 2002), the Santa Catarina native has held other positions in the state Public Administration and important municipalities of Santa Catarina.

Public management

- **Since February 2023**
Secretary of State for Science, Technology, and Innovation
- **2021 - 2022**
Secretary of Economic Development of São José
- **2014-2017**
Secretary of Economic Development of Palhoça

Highlights

- **2017 - 2021**
Executive of Softplan, a company from Santa Catarina and one of the largest Brazilian IT companies
- **2013 - 2014**
2014 He chaired Itajaí Participações S/A
- **2011-2012**
Member of the Municipal Council of Science and Technology of Joinville
- **2011-2012**
Member of the Municipal Innovation Council of Florianópolis
- **2015-2017**
Member of the Palhoça Economic Development Council



Ricardo Wollfenbüttel, Secom

Secretary of State for Science, Technology, and Innovation of the State of Santa Catarina
Marcelo Fett

For the first time, Santa Catarina will have a state secretariat dedicated exclusively to the development of Science, Technology, and Innovation (STI). Arose in the administrative reform of the current government management, the Secretariat has the role of articulating with the sector, developing innovation in the state, both in the governmental sphere and in the services provided to the population, and using the STI ecosystem to leverage the economic development of Santa Catarina further. At the head of the unprecedented challenge is Marcelo Fett, a name indicated by the Santa Catarina Association of Technology (Acate). Acting in the area, the Secretary of State for Science, Technology, and Innovation brings experience in the private and public sectors. Next, check out the secretary's interview for Revista Fapesc - Science, Technology, and Innovation in Santa Catarina.

Why create a science, technology, and innovation Secretariat in Santa Catarina?

Innovation is a crucial aspect of the competitiveness of Santa Catarina's economy. Innovation can create productivity, competitiveness, better employment, and better wages, creating development. Innovation is a fundamental pillar of the state's economic development.

Second, innovation by itself is a social policy. When you see that the average remuneration of the technology sector is at least twice the average salary of the Santa Catarina worker, you already realize that it can bring a social impact.

Thirdly, science, technology, and innovation are responsible for solving society's problems. The issue of increasing life expectancy, for example, much of this is the result of investments made in medicine, in improving food, in short, in quality of life, so we can see that there are many of these areas, science, technology, and innovation, in improving people's lives. Finally, the technology sector of Santa Catarina currently represents 6% of GDP. There are about 60 thousand jobs and a wage bill of more than R\$ 3 billion. It means that there are 17 thousand companies that generate revenues of R\$ 20 billion. For these four points, I highlight how important is a Secretariat of Science, Technology, and Innovation covering these areas.

And does such a Secretariat exist in other states? Do we have initiatives like

this?

It exists in other states, in most of them. What changes from one state to another are the functions of the Secretariat. Some are more focused on solving the problems of Public Management. In others, there is more commitment to promoting science and technology as a development pillar. Assignments may vary slightly.

And what are the assignments in Santa Catarina? In the presentation of the Administrative Reform of the current management, was it

clear that it would be a department to attract internal and external investors? How will it happen?

First, understanding the structure of the Secretariat. The SCTI of Santa Catarina will have two pillars of action: the first is in planning public policies aimed at economic development through innovation. The second one is the consumer state of

these technologies to improve the provision of public services, whether internal services, as a reduction in bureaucracy, simplification of processes, or in those financial departments. We can take from technology to the Secretary of State for Health and the Secretaries of Education, Public Security, Mobility, and Civil Defense, among others.

So, it is two pillars. Within the pillar of economic development through innovation, we have two challenges in attracting investment. We must bring investments to finance

“The technology sector of Santa Catarina today represents 6% of GDP, more than 60 thousand jobs, and a wage bill of R\$ 3 billion. There are more than 17 thousand companies that generate revenues of R\$ 20 billion.”

Marcelo Fett



innovation in our state through projects and fundraising with BNDES and Finep. It involves creating mechanisms within the state legal framework, allowing companies to also participate in these investments, helping to develop the Santa Catarina sector. Besides this front, there is another that brings companies to Santa Catarina. Each of attracting investment fronts, whether for financing science, technology, and innovation or bringing companies, has its dynamics. These are different situations, but within the planning of the Secretariat, in this pillar of economic development through innovation, we have a specific role there dealing with investment attraction.

How does the creation of SCTI impact people living in Santa Catarina?

It is one of the reasons for creating this department. What is the purpose of the Secretariat?

And understanding the motivation people need to get how it can improve their lives. Then they begin to see the value, and thus

we increase the mass of people who understand the importance of Science, Technology, and Innovation and even strengthen the institutions that operate in this sector. It fortifies the Secretariat and the Government of the State of Santa Catarina.

Governor Jorginho always says that investing in science, technology, and innovation will pay off when a patient is cured by a technology funded by this State's STI framework. And how can it impact? To improve the understanding of the health area, either through telemedicine or speeding up procedures and examinations. In addition, it impacts health management so that more investments can be made in financial activity. In the matter of education, it can bring complementary training and technology into schools. It impacts the simplification of processes for entrepreneurs so as not to be trapped in a bureaucracy that today hinders the performance of their activities, and by hindering entrepreneurship, you do not generate employment. In gene-

ral, these are the main ways, in a didactic way, science, technology, and innovation impact people's lives.

Faced with so many significant assignments for the portfolio, did the state take time to create this Secretariat?

Well, better late than never, right? Governor Jorginho was very visionary when he saw for the first time in history the importance of giving prominence and having a structure dedicated to promoting Science, Technology, and especially Innovation in Santa Catarina. It was a visionary attitude.

Another challenge imposed on the IT sector is the skilled labor maintenance in Santa Catarina. Will SCTI also act in this regard?

Yes, it will. Look, it is interesting, one of the fronts of action of the Secretariat is precisely the issue of the formation of technical and socio-emotional skills for this new economy. It is a large bottleneck. This year we have approximately 6.7 thousand vacancies and we should reach around 20 thousand. What happens? We need to train this workforce to meet this demand. As we begin to increase the maturity of our ecosystem and companies can pay more, as Santa Catarina is a state with a high quality of life, the tendency of these people to go to work in other companies, from other states or other countries, is to decrease. Our strategy is that, based on the demands of these companies, we can guarantee an employability program to set up a journey of training technical and socio-emotional skills that will meet the eminent demand, but that will also form in young people those soft and hard skills, which we call the new economy. And

so, he can work here: in an environment that has good companies, that is, with maturity within our ecosystem, that can pay the necessary remuneration in a state with a quality of life.

For all that has been presented, the Secretariat needs to articulate with the sector. Has that work begun?

In addition to articulating with the sector, we must articulate a lot with universities, the training units of the third sector workforce, but especially with the productive sector. One of our focuses is that investments in science, technology, and innovation are primarily channeled into what we call a critical factor of production, which is to make these investments closer to the existing productive sector, the traditional sectors of the economy, as a way to on the one hand improve this maturity of the ecosystem, add value to the technology sector and on the other hand



Cristiano Andujar, Collection Secom

Unprecedented Secretariat in SC
Even before the inauguration in March, the Secretary of STI was one of the confirmed names in the state government.

“ One of the fronts of action of the Secretariat is the issue of the formation of technical and socio-emotional skills for this new economy. It is a large bottleneck. We have 7 thousand open vacancies and should reach around 20 thousand. Marcelo Fett



increase the competitiveness of Santa Catarina as a whole.

Fapesc is under the umbrella of this new Secretariat. What will be the role of the foundation in the current government?

We are close to Fapesc. Fábio [Fábio Wagner Pinto, president of the foundation] and I have talked a lot because Fapesc is an important arm of execution of public policies to promote science and technology. What we plan here within the Secretariat must necessarily be aligned with Fapesc, as the executing agent of these public policies. This unity is essential to succeed. /



Instagram SCTI

Instagram SCTI follow the Secretariat on social networks and stay on top of projects and news



Ricardo Wolffenbuttel | Secom

Commitment to SC

Fett promises to implement public policies to promote economic development from innovation

REDE CATARINENSE DE CENTROS DE INOVAÇÃO

The innovation is our great work



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



GOVERNO DE **SANTA CATARINA**
SECRETARIA DA CIÊNCIA, TECNOLOGIA E INOVAÇÃO



Intellectual property

A brand to call your own

Securing intellectual property is the first step to **turning ideas into successful businesses**; and provides security for entrepreneurs, promotes competitive advantage, and adds market value to intellectual creations.

Sâmia Frantz
Fapesc
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The business that worked for the fashion designer, Laís Zkaya, was not born with the name it has today. It was Zakii. Turned Zkaya. This change represented much more than a mere dance of letters. Because it was not a choice. It was not even in the plans. After almost three years of history, Zakii stumbled upon trademark registration.

It was a thud. Zakii was not available at the **National Institute of Industrial Property (Inpi)** but accompanied Laís for more than ten years, even before becoming the Santa Catarina company that manufactures and markets costume jewelry, bags, shoes, turbans, and cloth dolls with African prints and themes. There was an affective bond there: it was the name given to the first creations she

Trademark
Fashion Designer, Laís celebrates the registration of his company

made while still a teenager and to the closing show of the Fashion course. And, of course, it was also how customers recognized the brand.

Today, the new name, Zkaya, represents the business and has brought more power to the pieces because it translates the company's concept much better. "This exchange was not something simple. Today I understand that building a company is also strengthening its name. Not protecting itself with the registration of the brand is like acting on rented land: at any time, someone can take over from us and take all the work there," says Laís.

But not everyone understands the trajectory of Laís. Trademark registration is not always a priority for entrepreneurs - it does not even in the minds of many, who always end up leaving it for later, and it can be expensive.

The absence of registration can bring risks that go beyond the negative image. They can also lead to financial embezzlement, with compensation paid for the unauthorized use of another brand and even loss of investment in marketing, advertising, and dissemination. And the risk is not only that. Everything that involves the creation of the human intellect - called intellectual property - is also in danger of being lost.

Intellectual property is one of the most valuable assets of a company. It is a type of umbrella that brings together all kinds of protection regulated by the Inpi, from copyright to patent, for example. Protecting what is

"No business is born to be small. Any company that hopes to grow needs to worry about protecting what it offers to the market."

Camila Nunes
Intellectual property specialist

created by the human intellect is, first, safeguarding the company from competition, bad faith, and abuses such as imitations and unauthorized copies. This protection is as important as all the other efforts required of a growing business, such as building its image and reputation and gaining customer trust. This is what differentiates one company from all others.

"No business is born to be small. Any company that hopes to grow needs to worry about protecting what it offers to the market. It serves for those who go to a pitch round, seek investment, and intend to compete with big players," explains Fapesc's innovation projects coordinator, Camila Nunes, an intellectual property specialist.



Check out the step-by-step protection of intellectual creations on the site



Check out the tips of intellectual property expert Camila Nunes

Character sheet

Intellectual Property

Intellectual property refers to everything created by the human intellect and creativity and can be the object of commercialization.

Special skill



Bonus skill!



Source: Instituto Nacional da Propriedade Industrial (Inpi)

Characteristics

Related rights

It protects film production and broadcasting.

It protects the patrimonial and moral rights of people involved in artistic or cultural work.

50 years

Industrial Design

It protects the design from the product's external appearance if it is amenable to industrial reproduction (which does not include handmade or artistic products). It does not protect the product itself but its shape and pattern.

It guarantees the exclusivity of the use of the product in the market and prevents other companies from copying the idea without authorization.

Ten years, it is extendable for up to three five-year periods, totaling a maximum of 25 years.

Computer programs

It protects the operating instructions of automatic information processing machines, devices, instruments, or peripheral equipment.

It preserves technology from unfair competition and prevents it from being copied or transformed without authorization.

50 years

Brand

It protects the name, image, or any other sign that identifies a product or service and distinguishes them from competitors.

It helps differentiate the product or service from competitors, prevents confusion, protects the company's reputation, and allows the construction of a stronger identity.

Ten years, it is always extendable for another ten. It is the only asset with the possibility of eternal protection, with no chance of falling into the public domain.

Other protections

Geographic indication
It protects products and services which have a specific geographic origin.

Integrated circuit topographies
It protects the three-dimensional configuration of layers that compose an integrated circuit.

Traditional knowledge
It protects the knowledge do not formalize by science, which is isolated or communal.

Plants and cultivars
It protects the recognition of new varieties.

Folklore
It protects the traditional artistic heritage.

Copyright

It protects already existing literary, artistic, and scientific works, but this does not include the field of ideas.

It protects the author's property and moral rights over his work and guarantees recognition and respect for his creation.

It can protect for 70 years after the author's death.

Patent

It protects inventions related to functionalities, improvements, and ways of manufacturing, guaranteeing the exclusive right of use, manufacture, and sale. There are two types: invention (related to new creations) and utility model (improvement of existing ones).

It guarantees exclusivity of the use of the product in the market and prevents other companies from using it without permission.

Invention: 20 years from the date of filing.
Utility model: 15 years from the date of deposit.

! = Importance ⌚ = Protection time

Infographic: Luiz Fernando Filho, Fapesc



Protection even before the CNPJ

After returning from a post-doctorate in Health Sciences and Technology abroad, three Pharmacology researchers from the Federal University of Santa Catarina (UFSC) realized that the results of their studies on chronic pain could generate much more than scientific articles. There was a business there.

Thus, Techpain was born, a platform that monitors the evolution of the patient's pain and informs the doctor in real-time.

But all this was still an idea when the three decided to submit it to the Centelha Program, an initiative of the Research and Innovation Support Foundation of the State of Santa Catarina (Fapesc), which helps entrepreneurs transform innovative ideas into successful businesses. In the presented project, the budget includes not only technology development but also intellectual property and other

important considerations. In their case, the trademark registration, the software, and the patent.

"All of it represents a significant investment for a startup; it has limited financial resources but brings security and is fundamental for long-term success. It helps ensure competitive advantage and build greater market value. It can also be an attractive asset for investors and partners," says one of the partners, biochemical pharmacist Fabiana Noronha Dornelles.

After being selected by Centelha, the idea left the drawing board and gained its CNPJ. The trademark registration was Techpain's first expense as a company, the first invoice issued. The software appeared shortly after the complete development of the first version of the technology. The patent, in turn, will be the next and last step. /

Applications for registration in Brazil

Main assets

Trademark registration applications increased by 48% between 2019 and 2021, totaling 363,392 trademarks filed.

Among industrial properties, **patents** filed in the country have fallen by about 5% since 2019.

The registry of **computer programs** grew 92% between 2017 and 2021, rising from 1,692 to 3,259 in this period.



Fapesc Magazine is available in English!

A Revista Fapesc também está disponível 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 into English.





Focused on Innovation

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

Modern e innovative

The **Lages Innovation Center** is the first of the ten hubs of the Santa Catarina Network, the ambitious project to promote entrepreneurship, innovation, and economic and strategic development of the state.

Laís Casa

Orion Parque Tecnológico
lais@orionparque.com

The year 2015 was decisive for Santa Catarina. This year, in the city of Lages, the first Innovation Center of the state was born, a pioneering and fundamental space for the innovative and technological structuring scenario in Santa Catarina. Idealized by three entrepreneurs, Roberto Amaral, Valmir Tortelli, and Nelissa Gevaerd, the institution has the mission of providing the development of the Mountain Region of Santa Catarina by providing a favorable environment for the creation of companies and innovative projects in different areas, such as technology, health, energy, and environment. For six years, the Innovation Center of Lages has been investing and betting on the emergence and growth of businesses, promoting the generation of new jobs and the local economy strengthening alongside startups and entrepreneurs, and companies from other regions of the state and the country. Located in the Orion Technology Park, The Innovation Center is a partnership between the Government of the State of Santa Catarina and the City of Lages.

FOLLOW OUR SERIES

Do you want to meet startups, technology companies, researchers, investors, and talent from the SC ecosystem? Check out the series of reports on Innovation Centers.



To learn more about Santa Catarina's ecosystem of innovative businesses, point your phone's camera at the QR Code.

REDE CATARINENSE DE CENTROS DE **INOVAÇÃO**



Photos: Disclosure, Orion

ORION PARQUE TECNOLÓGICO
6
 YEARS OF CREATION
50
 COMPANIES AND STARTUPS
R\$ 200
 MILLION REAIS IN REVENUE



Lages Innovation Center
At Orion Parque Tecnológico



Coworking and free services

With a large structure to receive entrepreneurs and startups from different areas of activity, the Luiz Henrique da Silveira Innovation Center offers free coworking for the community and services for entrepreneurs who frequent the space, such as:

- meeting rooms
- technology laboratories
- event spaces
- mentoring services
- consulting and training



Where it is

The first Innovation Center in the state is located at Orion Parque Tecnológico, in



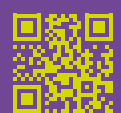
Lages, in the mountain region of Santa Catarina.



Social media



@orionparque



www.orionparque.com

Startup é destaque internacional

Elected in 2022 by the American portal TechCrunch, one of the 200 most innovative startups in the world, the Santa Catarina company Quiron Digital focused on solving complex forest problems using data from satellites and nanosatellites. The company's technical team, resident at Orion Parque Tecnológico, brings together experiences and knowledge in geodetic sciences and forestry engineering and develops specific

algorithms capable of understanding the particularities of each analyzed area. The startup ended last year with a cash flow of R\$ 1,3 million, which means a more than 300% increase in the period. It also received financial contributions from investors from Anjos do Brasil, and the London fund G-Force, from Founders Factory, focused on companies that seek to solve environmental impact problems.



Disclosure: Orion

Forest problems and nanosatellites

With experience in geodetic sciences and forestry engineering, the team develops algorithms for search

University entrepreneurship

In September 2023, another edition of the Santa Catarina Reuni Challenge will take place in Lages, one of the success stories of the Serra Innovation Center. The challenge, which defines the most innovative university in Santa Catarina, won the Vortex Award, in 2022, in the Ecosystem Initiative for Universities category. In four editions, more than a thousand students from approximately 30 universities were impacted by the university entrepreneur-

ship competition, which was created to encourage the development of innovative ideas among academics. PsiU, for example, was born in the Reuni Challenge. In 2021, the startup went to the podium and now is earning money with the gamified and intelligent metrication platform creation, focused on quality of life and the application of Artificial Intelligence (AI) to provide assertive and accurate indicators for people management. /

 ur mission is to strengthen the ecosystem of entrepreneurship and innovation in the Santa Catarina Mountain Region, supporting ideas and movements that bring opportunities to the region. And we are already reaping the results of the work that has been developed since 2016, with indispensable partnerships with the State Government, Fapesc, City Hall, universities, associations, and the community. We hope to strengthen Santa Catarina to turn it into a national reference in innovation.



Claiton C. de Souza
Manager of the Innovation Center of Lages

FOLLOW OUR SERIES

In the next edition, we will present the work developed at the Jaraguá do Sul Innovation Center, such as the Novale Edu program, with classes in robotics and systems programming for children and teenagers, and the open 5G internet project for startups.



Check out Issue 2 of Revista Fapesc for the first report on the Innovation Centers of Santa Catarina.



Indefatigable leader and award-winning



Recognized as one of the principal leaders of education in Santa Catarina, **Luciane Bisognin Ceretta** reaffirms her commitment to university education and public health in the presidency of the Santa Catarina Association of Educational Foundations (Acafe)

Mayara Cardoso
Universidade do Extremo Sul Catarinense (Unesc)
imprensa@unesc.net

The passion for health, especially public health, is the starting point of a history of over 30 years, marked by professional success and dedication to Santa Catarina society. Rector of the University of the Far South of Santa Catarina (Unesc), president of Acafe, full member of the National and State Education Councils, researcher, professor, and academic of the law course, Luciane Bisognin Ceretta, 52, brings together different facets with the disposition of those who are dedicated intensely to collective struggles.

Born in Faxinal do Soturno, in the interior of Rio Grande do Sul, Luciane left her homeland to study nursing at the Federal University of Santa Maria (UFSM). In the 1990s, she came to Santa Catarina, worked in the West of the State, and, three years later, went to Criciúma, in the south of Santa Catarina, where she created deep ties in the personal and professional areas.

Daniela Savi, Unesc

In Criciúma, she lived essential moments for her remarkable leadership formation, such as her work in the implementation of the Family Health Program, in 1994, as a collaborator of the Municipal Health Secretariat. In Santa Catarina, Luciane married the professor and researcher Renan Antônio Ceretta, had her daughter, Victoria, and year after year, she built an outstanding academic career.

"Much of what I do today came from my childhood dreams and wishes. I had a firm education and a happy childhood, a time to aspire, conquer professional space, and start a family", celebrates the president of Acafe. The desire to work in the Public Health and Health Management area was born at the time of graduation when Luciane discovered her vocation to work with the community. The president of Acafe is known for her work with the residents of Criciúma.

Woman example

While fulfilling intense agendas, not only in Criciúma or Santa Catarina but throughout the country and abroad, in search of experiences, partnerships, and learning, Luciane is recognized as an example of leadership.

Luciane has extensive professional and academic experience and is determined, firm, and attentive to details in educational projects.

As an active woman and present in spaces that still are predominantly male, the rector of Unesc knows the responsibility of being a mirror for many women: fellow managers, academics, and researchers, among many others who watch and applaud the highlighted performance. However, it is not gender that she assumes as a differential.

Mayara Cardoso, Unesc



Collective bias
Community
university defender

“Of course, it is challenging to occupy these spaces. Only I know the looks and responses I have received. Despite this, I do not allow myself to affect. I deal with people regardless of gender, color, race, or another characteristic. I offer everyone the same respect I demand.”

Luciane Bisognin Ceretta



"Of course, it is challenging to occupy these spaces. Only I know the looks and responses I have received. Despite this, I do not allow myself to affect. I deal with people regardless of gender, color, race, or another characteristic. I offer everyone the same respect I demand," she points out.

For her, differences are precisely the meaning of interpersonal relationships inside and outside universities. "We are plural, so different in many ways, and it would not even make sense to be the same. Respect for this multiplicity scenario is something I usually defend hardy and do not give up. It is part of our community identity, including, and is a means by which we learn a lot", she adds.

Interest in research

The girl who grew up in the open air did not imagine everything that was to come in the future. Interested in all academic activities, Luciane started dedicating to scientific research gradually. The first approach, during graduation, at the Federal University of Santa Maria (UFSM), in scientific initiation, further encouraged his interest in exploring science and ways to contribute to society. At the beginning of her university career as a student leader, the president of Acafe discovered and improved her leadership skills, willing to study and work for the community.

Despite the demands of her position at Acafe, Luciane remains devoted to scientific research. She is currently involved in a study on the correlation of blood typing of diabetics, with participants in the glycemetic Self-Monitoring Program (Pamg) of Unesc, with the severity of Covid-19.

"Women should occupy science spaces, and the intellectual output from these efforts produces a high-value impact on

Collection, Unesc



Women in Science Award

Luciane is one of three scientists to receive the National Award for outstanding scientific research annually from the Chamber of Deputies

society. I feel very honored, but also with expanded responsibility for other women, especially our students with whom I share the spaces of construction of knowledge. All of them can occupy these places if they wish, which requires effort and dedication", emphasizes the rector.

Since 2011, when she joined a master's and Doctoral Research Program as a re-

searcher and advisor, the rector of Unesc has worked on several important research projects. Luciane has published dozens of scientific articles; she has written 28 books as an author or organizer, book chapters, besides 18 technological products that impact university education and health.

"Among the many studies we participated in, I cite three main ones that greatly benefit society and, I believe, were decisive in this choice, all related to the effects of the pandemic on human life: intensive health education and self-care in primary health care for patients with Type 2 Diabetes: A Randomized Clinical Trial; COH-FIT: a collaborative study among 35 countries to assess the impact of Covid-19 on the mental health of the population; and the analysis of the impact of Covid-19 on memory and cognition patterns of the population, a study in collaboration with three universities from Santa Catarina", says the president of Acafe.

Among the recognitions in the research branch, Luciane Ceretta received the Women in Science Award Amélia Império Hamburger. The honor is awarded annually by the Chamber of Deputies to three Brazilian scientists who stand out in scientific research in the Exact Sciences,

“ I used to say that I like people, real people. Deep down, all that we do as university management, in the leadership of institutions that integrate Acafe, in education councils, or in many places we occupy, is with the proposal to change realities, create opportunities, and offer the best for people.

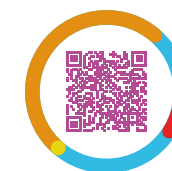
Luciane Bisognin Ceretta

Natural Sciences, and Human Sciences areas. In 2023, the rector of Unesc was the only representative of Brazilian community universities among the 35 nominated in the country to receive the award.

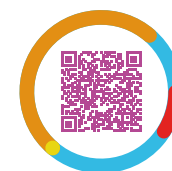
Published articles



Stress levels, psychological symptoms, and C-reactive protein levels in COVID-19: A cross-sectional study (*Journal of Affective Disorders*, 2023)



A systematic review and meta-analysis of the accuracy of SARS-COV-2 IGM and IGG tests in individuals with Covid-19 (*Journal of Clinical Virology*, 2022)



Colostrum for premature newborns: Systematic review and meta-analysis. JnN (*Journal of Neonatal Nursing*, 2022)



Marciano Bortolin, Disclosure

New challenge

Inauguration ceremony of the new management of Acafe, in December 2022, in Florianópolis

Higher education defender

At the head of Acafe, one of Luciane's main challenges is the community college strengthened in the state. Currently, the 14 associated institutions add up to more than 150 thousand students enrolled, from Basic Education to doctorate, all under the association umbrella.

When talking about the community-based institutions that emerged more than 50 years ago in Santa Catarina, out of desire and with the work of the community, Luciane's eyes shine and reflect something indisputable: her admiration for the teaching model, which year by year transforms Santa Catarina into a better state.

"We live in a privileged territory, which has developed and gained prominence from demands identified by people, focused on people and through people's work. Our institutions have made a difference in their local territories for over five decades with a global vision. It cannot

imagine the different regions of Santa Catarina without our institutions distributed in these spaces", she describes.

The rector of Unesc speaks pride about the Acafe system, highlighting its performance: 700 thousand trained professionals, who currently employ about seven thousand workers and have more than ten thousand teachers, almost 80% with master's degrees and doctoral degrees.

"If I embrace this cause with such dedication, giving up so much, including my personal life, it is because I believe so much in the role that this system has in Santa Catarina and how essential it is to maintain these institutions for the social and economic development of our territory. It is my choice. Community universities belong to everyone, they have no owner, they are not for profit, and everything they produce of wealth is, in the same way, for the benefit of all", she concludes. /

Academic production



16
book chapters



18
technological products produced on behalf of university education and health



28
books published



151
scientific articles



300
searches



Marciano Bortolin, Disclosure



Rafaela Martins, Disclosure



Rafaela Martins, Disclosure



Hannah Pires, Unoesec

Acafe inauguration

With the vice-president of Acafe, the rector of Uniplac, Kaio H. C. Do Amarante (above); the Secretary of State for Education, Aristides Cimadon (center); and her husband Renan and daughter Victoria



Unoesc Teaching and research focused on community

The first institution to act in **Higher Education in western Santa Catarina**, the University of Western Santa Catarina (Unoesc) unites teaching, research, and extension in the academic training of more than 60 thousand students who have already passed through one of the 11 units spread across the state

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



Photos: Disclosure e collection, Unoesc

Unoesc Rectory
Fundada há 54 anos em Joaçaba, a Universidade do Oeste de Santa Catarina colabora com a interiorização do Ensino Superior



Xanxerê Campus
Since its creation, Unoesc has followed the vocation of the Western Region: agribusiness

Imagine how much history fits into 54 years of existence? And when we talk about a Higher Education Institution (HEI), we need to include the stories of thousands of people. Unoesc has over 60 thousand students who have completed their academic and human training courses in one or more units of the institution, located in 11 cities in western Santa Catarina.

Founded in Joaçaba, Unoesc was the first institution to begin work on Higher Education in western Santa Catarina. Created by the Government, with popular support, the institution gave opportunities to students from the region who no longer need to travel to take an undergraduate course. The rector of Unoesc, Ricardo Antonio De Marco, points out that the installation of universities collaborated with the internalization of Higher Education in the state, transforming and positively impacting the social, cultural, and economic areas.

The entire development of Unoesc was based on the teaching, research, and extension tripod. In this direction, the institution developed activities that brought benefits to the population in various areas and, in return, collaborated with the academic training of students from many courses.

Agriculture as a starting point

Unoesc operates at all educational levels, from Basic Education through Higher Education to postgraduate lato and stricto sensu. When it was created, it directed the units according to the vocations of the cities and their surroundings, but without losing the focus of the West: agribusiness. As the institution developed, this division per city was left behind, adopting a concern to offer training in all areas.

“Our driving force has the pillars in agribusiness, the largest sector in the region. From it, we serve other areas. Our vision is generalist, and our position is clear: We are a community institution, and whatever society demands of us, we are committed to meeting”.

Ricardo Antonio De Marco
Rector of Unoesc



Innovation: a new moment for the university



Extension projects

Activities benefit the population and collaborate with the formation of students



The funds received through the public authorities, federal and state, collaborate with research projects aligned with the new moment of the university, such as the elaboration of a diagnosis of the West, developed to create the innovation ecosystem of Unoesc.

The project aims to cover the 11 cities of IES and nearby cities; demonstrating to the community that it is possible to develop new ideas using the structure and technical support of the university.

The institutional development plan will connect Basic Education to internationalization, demonstrating to the student that, even before Higher Education, it is possible to do an exchange during graduation, it is feasible to participate in international research projects, and still have a double degree.

Development of university research

The rector of Unoesc, Ricardo Antonio De Marco, highlights the role of Fapesc, responsible for encouraging research and innovation and distributing resources to the regions of the state. For him, investments in research projects, such as those of the Foundation, are significant, since they return to society as knowledge, scholarships, and services.

"When we have a distribution of resources, we manage through research to bring local answers to topics that we had difficulty with. The research format of the communities should be directed to applied research, with direct insertion in the industry and the promotion of the development of the regions," considers the rector. /

How it all started

Unoesc was born from the unification of three educational foundations in Joaçaba, Chapecó, and Videira.



1972, Frei Rogério School, the first space to have an administration course

Follow the evolution of the institution's 54-year history.



1970

The Joaçaba College of Administration and the Administration Course were created in 1972. In the same year, the first Higher Education course of Fundeste, Pedagogy, was also born in Chapecó. In Videira, the Foundation of Educational and Business of the Upper Valley of the Rio do Peixe (Femarp) appears.

1960

In 1968, the University Foundation of the West of Santa Catarina (Fuoc) was created in Joaçaba. Three years later, in Chapecó, the Foundation for Education and Development of the West (Fundeste) was born.

1980

In 1986, the Higher Education Center and the Higher Courses of History, Geography, Accounting, Law, Fine Arts, Administration, and Pedagogy were born in Joaçaba.



In the 1980s, the first Unoesc headquarters was in São Miguel do Oeste

1990

In 1991, Fuoc, Fundeste, and Femarp joined forces, expanded their structures, activities, and teaching staff, and formed Unoesc.



1991, signing of approval of the university with the State Board of Education

In the 1990s, the construction of the first structures of Unoesc: Joaçaba, Videira, and Xanxerê

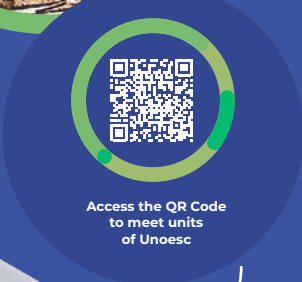


1996, signing of the accreditation of Unoesc by the then Minister of Education, Paulo Renato Souza



Unoesc is a non-profit institution under private law, created by the municipal Government of Joaçaba, with the participation of the community.

Founded
November 22, 1968



1. Campos Novos
2. Capinzal
3. Chapecó
4. Joaçaba
5. Maravilha
6. Pinhalzinho
7. São Miguel do Oeste
8. São José do Cedro
9. Videira
10. Xanxerê
11. Xaxim



First headquarters

Rua Frei Rogério, 596, Downtown, Joaçaba

Current headquarters

Getúlio Vargas Street, 2125, Flor da Serra neighborhood, Joaçaba

Structure

532
Laboratories

498
Classrooms

Library

248.203
Titles

Unoesc Publishing House

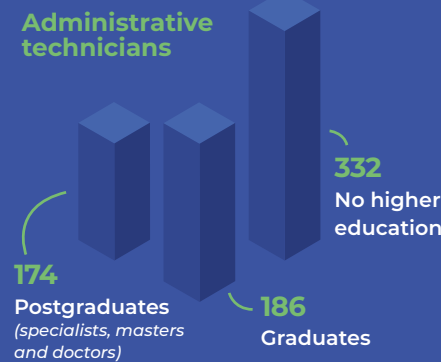
53
Published works

5
Scientific journals

Schooling

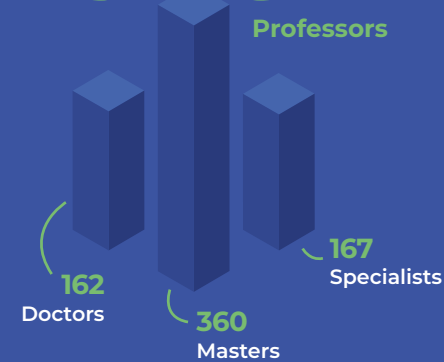
692

Administrative technicians



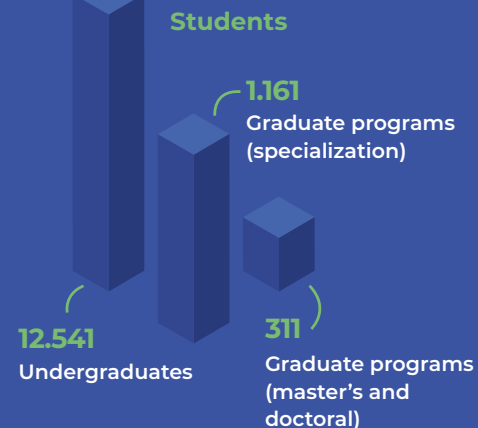
689

Professors



14.013

Students



Performance and research

Courses

128
Undergraduates (on-campus and distance learning)

74
Specializations (on-campus and online)

5
Masters

3
Doctoral

2
Technical courses

48
Extension (on-campus and distance learning)

★★★★★
Master of Business Administration
Concept 5 Capes



Research - Master and doctorate

64
Research groups

651
Researchers involved

806
Research fellows

Scholarships - undergraduate

139
Students with social support

136
Refundable student finance

8.779
Non-refundable student finance

Community Outreach

201.089
People attended

12.538
Students involved

Campus Joaçaba

Unoesc was created in 1962 from the unification of three educational foundations; in 1996, it was accredited by the Ministry of Education to act as a university.



Unoesc is distributed in the West of Santa Catarina and is strengthened by the differences in each city. This characteristic brings identification and creates a close relationship between society and Government. It is the approach that enhances our practice and projects and thus can improve our contribution to the economy, culture, and Society of Santa Catarina. Ricardo Antonio De Marco Rector of Unoesc.

Ricardo Antonio De Marco
Rector of Unoesc



fapesc Pod!



Guests and agendas related to the universe of Science, Technology, and Innovation!



To follow the episodes, subscribe to our YouTube channel!  @FapescGovSC



The forest census in Santa Catarina

What is the forest extension in Santa Catarina? Where are they located? What state of conservation? Where is there deforestation? Since 2007, the *Inventário Florístico de SC* (IFFSC) has sought these answers and studied the species of trees, wooden storage, biomass, and carbon from the forests, a word developed by researchers from the *Universidade Regional de Blumenau* (Furb)

Project Coordinator
Alexander Christian Vibrans
acv@furb.br

Photos
IFFSC Team
Furb





The Dangerous Access in Campos dos Padres

At the Mountain in Santa Catarina, between Bom Retiro and Urubici, surveys about grasses, herbaceous, and epiphyte flora complete the fieldwork documents



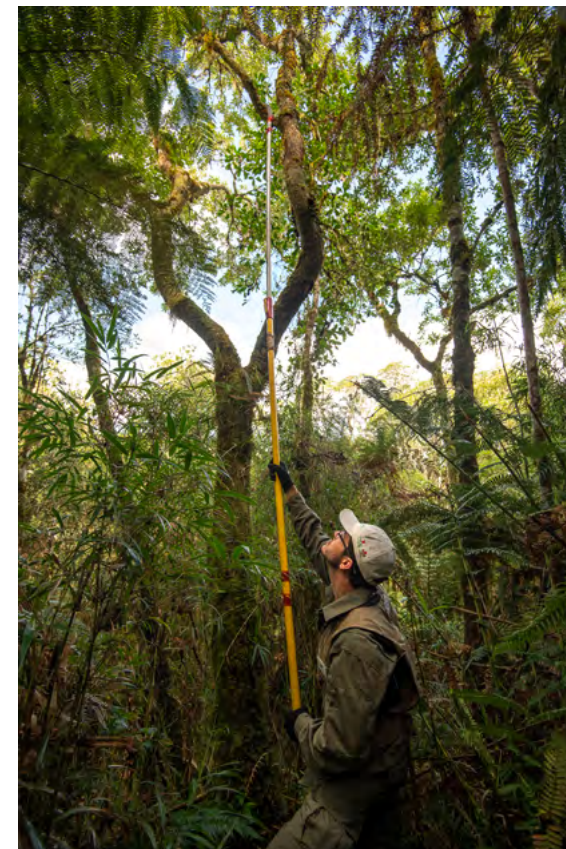
Growing and Mortality

The trees have their determined coordinates to be met again with every new measure



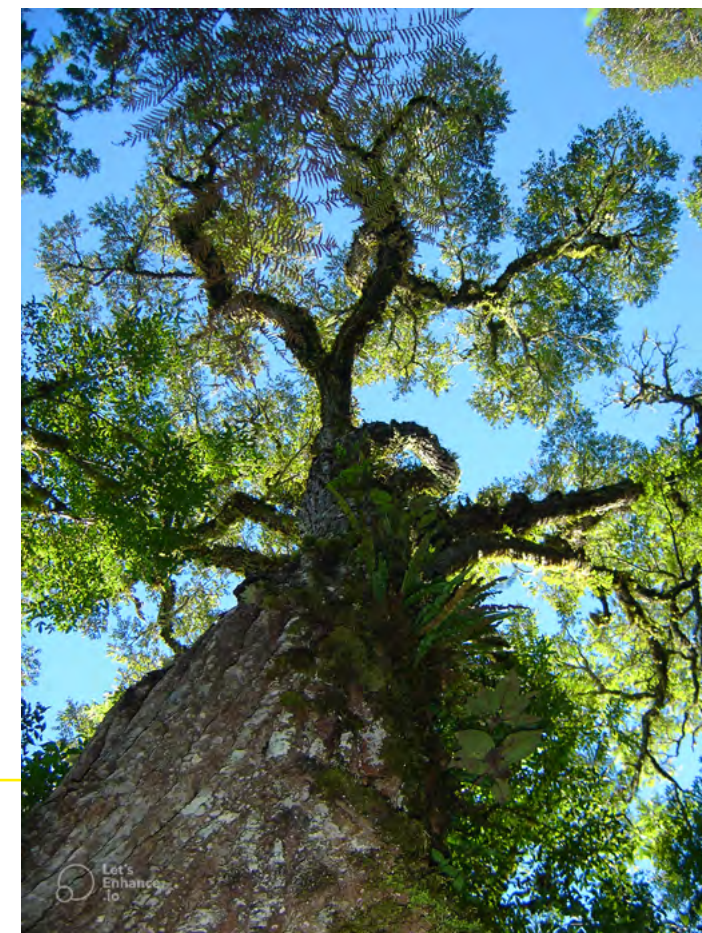
Araucaria angustifolia

The tree, popularly known as pine, is at risk but ensures the survival of many species in the forest



Tree measure

IFFSC researchers monitor more than a thousand sites of tree samples. Team access is not always easy and requires hours of walking and even camping in the forest

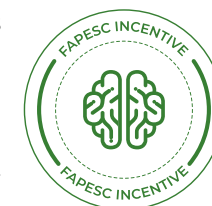


A noble of the Atlantic Rainforest

Versatile and much explored, the cedar tree (*Cedrela fissilis*) is in all types of forest formations in the Santa Catarina territory



The quality and detailing of information from the IFFSC are innovative and unprecedented in Brazil and had publications in Magazines such as *Nature* (2015, 2018, and 2019) and *Science* (2016). Data is used by NASA in the calibration and validation of sensors in new space missions. To know more about the forests in Santa Catarina, access the QR Code and meet the permanent program of the State Government of Santa Catarina, coordinated by Furb.





Special Report

Robotic • Big Data •

Industry 4.0
Artificial Intelligence
Machine Learning

Digital
Manufacturing



Cloud Computing

Internet of Things (IoT)

Digital Industries

Report Nanda Gobbi - nanda.gobbi@fapesc.sc.gov.br
Photos and Infographics Gabriela Garcia - gabriela.garcia@fapesc.sc.gov.br
Videos Caroline Costa - caroline.costa@fapesc.sc.gov.br

Scanning

Advanced
Robotics

Big data

Industries work 24 hours with machines and equipment integrated with internet networks. Sensors allow data analysis, tracking, and monitoring remotely of all processes. Programmed maintenance to predict and prevent failures. All are managed in real-time from different countries. It is the **future in industries** investing in new technologies of Industry 4.0.

In Santa Catarina, companies stand out in the innovation process of the Brazilian industrial branch. In the North of the State, the most industrialized region, there are a lot of examples of entrepreneurs who invest in new products and business models, boosting a change in the productive structures of manufacturing processes.

Innovation • Industry 4.0 •

Simulation Systems



FapescPod!

FapescPod! Do you know what Artificial intelligence is? The electronic engineering Sheila S. Travessa, a doctorate in Engineering of the IA area (UFSC), explains in the Fapesc podcast. Check it out!



Smart factory
Autonomous robots optimize manufacturing and intra-logistics operations and compose the scope of solutions aimed at Industry 4.0 at WEG

Instead of spreadsheets and notes in notebooks in the hallway of factories, sensors can be monitored remotely from anywhere on the planet. It is how Rodrigo Fumo, Global Director in Engineering and Technological Innovation at WEG, imagines the industry in the future.

WEG in 2050 will be an industry that will not stop, not a day of the week, nor a minute. With a lot of equipment working autonomously, what we expect is to be an even more connected industry. And we will find many ways to produce smartly using less natural resources to deliver the same performance.

Rodrigo Fumo
Innovation Director at WEG

The professional history of mechanical engineering is linked to the arrival of Industry 4.0 in Brazil. At WEG since 2002, when he was a recent graduate of the Federal University of Santa Catarina, Fumo followed the growth of the Brazilian multinational, the transition from manual labor to automation. "The advance of technology in the last 20 years is the same in the entire last century", summarizes the director of one of the largest industries in the country, founded in 1961 in Jaraguá do Sul, in the North of Santa Catarina. Fumo participated in the digital transformation of the Santa Catarina company, followed by the opening of factories abroad and the automation of software in the 2000s, and the acceleration of computer simulation from the 2010s.

WEG Trajectory

Learn about the events that marked the successful history of the Brazilian multinational

First factory



The idea of creating a company to produce electric motors was born in April 1961. In the same year, on September 16th, Werner Ricardo Voigt, Eggon João da Silva, and Geraldo Werninghaus founded WEG in Jaraguá do Sul, in the North of Santa Catarina.

Start of exports

In 1970 started exports, first to Guatemala, Uruguay, Ecuador, and Bolivia. Three years after, the sale of motors reached 20 countries. In 1975, the company from Santa Catarina produced the motor number "1 million".



Overseas branches

In the 1990s, the Brazilian multinational opened branches in the USA, Germany, England, France, Spain, and Sweden. In 1999, it achieved 79% of the market share in Brazil in electric motors and exported 29% of its production to about 55 countries.

WEG Digital



At the end of the 2010s, it entered the solution market for Industry 4.0 with a specific department creation for digital businesses. In 2020, it started the control of two startups: BirminD, a technology company active in the Artificial Intelligence market applied to Industrial Analytics, and MVISIA, which is specialized in Artificial Intelligence Solutions applied to computer vision in the industry.

100 million engines

The 2000s were marked by the acquisition of the first factories abroad, in Argentina, Mexico, Portugal, and China; the first billion reais of billing in a year and the production of the 100.000.000th engine.

Infographic: Gabriela Garcia Cera, Fapesc

New technologies

Artificial Intelligence

Application of advanced analytics and logic-based techniques to interpret events, analyze system trends, automate decisions, and perform actions.

Cloud Computing

Computing services distribution over the internet, including servers, databases, networks, and software, using memory and storage capacity.

Big Data

Big data refers to a method of handling data that involves large volumes and high speed.

Cyber Security

Set of hardware and software infrastructures that protect the information processed, stored, and transported by interconnected systems.

Internet of Things (IoT)

Interconnection between objects using enabling infrastructure (electronics, software, sensors), which can interact and be monitored remotely.

Advanced Robotics

Devices that act autonomously and physically interact with people or their environment based on sensor data.

Digital Manufacturing

An integrated system that consists of simulation, 3D visualization, and analysis to create definitions of manufacturing and product processes simultaneously.

Additive Manufacturing

Manufacture pieces from a digital drawing and a 3D printer with plastic, metal, etc.

Systems Integration

Union of different computing systems and software applications that act in a coordinated and integrated, enabling the exchange of information.

Simulation Systems

Digital models describe and display the interaction between the variables of a system, imitating real-world processes.

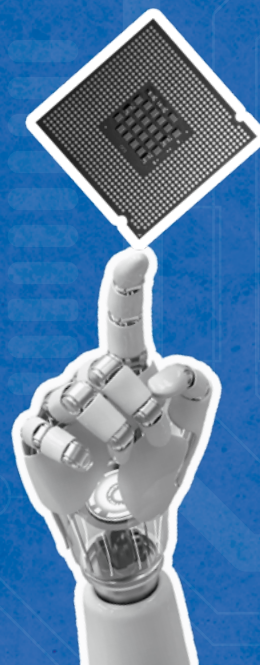
Scanning

Use of digital technologies to change the production process, development of products and business models, aiming at the optimization and process efficiency.

Source: Agência Brasileira de Desenvolvimento Industrial (ABDI), Sebrae, Portal da Indústria (CNI, SESI, SENAI, IEL).

Infographic: Gabriela Garcia Cera, Fapesc

Innovation • Industry 4.0



Industry 4.0 and Artificial Intelligence

WEG's Industry 4.0 pilot experiment, which also merges Artificial Intelligence (AI) concepts, began at the wire factory in Jaraguá do Sul five years ago, with the digital management installation and traceability devices capable of monitoring the production process in industries from a distance.

"With the pandemic, many processes involving AI increased. We realized the development in many countries. Unlike Brazil, the most mature markets already used Artificial Intelligence in decision-making, in the logistics part, for example, defining better routes, schedules, and costs", explains Fumo.

Using new technologies, the company from Santa Catarina began to develop its own sensors and diagnosis systems. According to the director of WEG, technological solutions with Industry 4.0 tools are used in all types of products in the industry, identifying anomalies in the default behavior of equipment.

The increase in productivity and competitiveness, for the director of WEG, is a reflection of the application of innovation and intelligence in the company daily. "What started with a small prototype in 2017 turned into the WEG Digital business unit, created last year. Today, we have more than 800 pieces of equipment installed worldwide, and we have increased our operational efficiency, which previously used 30% of the installed capacity of the machines, to 67%", celebrates Fumo.



Industry 4.0 solutions

Watch the video to learn about WEG's autonomous and mobile robots



WEG Digital

From trainee to Global Director of Engineering and Technological Innovation at WEG, Rodrigo Fumo has been involved in the company's growth since 2002

Disclosure: WEG



Smart Manufacturing: simple and affordable

Not only robots or augmented reality are foreseen in the future of industries. Technological solutions demonstrate that it is possible to implement transformative initiatives, digitalize industrial activities and change production forms and business models.

According to the director of Vertical Manufatura 4.0 of the Santa Catarina Technology Association (Acate), Túlio Duarte, entrepreneurs from Santa Catarina invest in accessible digital tools, such as cloud storage and small and innovative IoT (Internet of Things) sensors capable of managing and tracking the industrial production process, predicting and avoiding failures.

"Industry 4.0 is not synonymous with complex, expensive tools available only to large industries. Technology and innovation adoption in industrial production processes is not always linked and limited to the use of advanced robotization", highlights Duarte.

The director of Acate explains that in Germany, the first country to develop an industrial policy with new technologies, entrepreneurs have invested in autonomous robots production and automation-based technology.

"In Brazil, the prevailing style is not the robot, but smart manufacturing, the same used in traffic applications, for example.

Without the use of smart driving, it is possible to drive well, but drivers do not have much information about the traffic, i.e., it is not smart driving. Then, the Brazilians, with the creative feeling, will launch smart products, such as pillows that tell you if you slept well or not, and play the music you like to wake up", exemplifies Duarte.

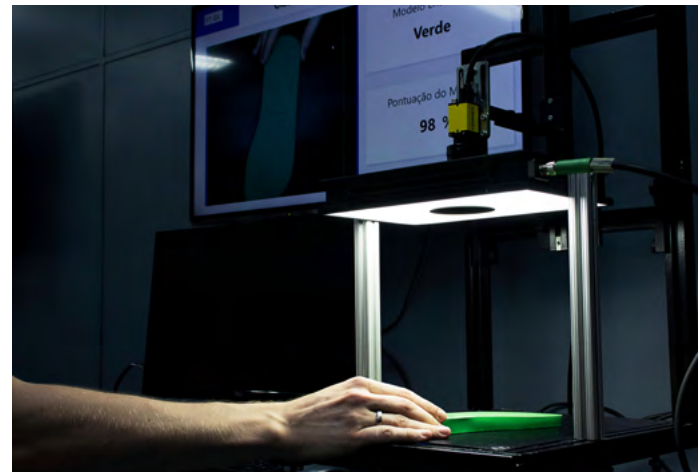
This manufacturing model uses integrated technologies capable of increasing performance and productivity, optimizing investments, and saving time and resources, ensuring more control and agility in production. "With smart manufacturing, it is possible to extract information from machines and predict failures, using four technologies: IoT, to extract the data from the machine; security, to traffic this information; cloud computing; and big data, a solution for analyzing large volumes of data," complements Duarte.

Industry 4.0 is not synonymous with complex, expensive tools available only to large industries.

Túlio Duarte
Director of Vertical Manufatura 4.0 of Acate



The HannoverFair is known as the most significant industrial technology event. The meeting occurs in Germany annually, showing trends and directions of the world industry and presenting innovations in sustainability and low carbon economy. In the first edition, in 1947, the fair gathered more than 700 thousand visitors from 53 countries for three weeks.



Inteligência Artificial

O uso da tecnologia permite reconhecer e classificar produtos, como identificar o tamanho e a cor de calçados (foto), para verificar, por exemplo, se os objetos estão de acordo com os padrões exigidos pelos fabricantes

High-speed changes

Unlike the First Industrial Revolution, which lasted for decades, the Fourth Revolution happened faster. In Santa Catarina, entrepreneurs who work with technology for manufacturing find in Acate a space to share knowledge, present trends, and seek innovations for their markets.

Vertical Manufatura 4.0, which integrates the business opportunities and Connections program, intends to accelerate the adoption of Industry 4.0 solutions in the Brazilian factory park.

"What differentiates one company from another is the implementation strategy of the to-

ols. Our goal is to contribute to this changing mentality process", highlights Duarte.

The digital transformation journey, according to Duarte, includes essential steps: increasing production using digital technology, creating new products in an accelerated manner, and generating new business models.

"The industry in Santa Catarina is learning more about digital innovation. And we have all the elements to shine on this path. You have to understand that this is the next step, that it is accessible, and it has to happen," he concludes.



Government actors, industrial representatives, and academia collaborate under the Ministries of Economy for Science, Technology, and Innovation to adopt 4.0 technologies in Brazilian industry.



1780

First Industrial Revolution

- Replacement of old hand looms with mechanized ones
- Steam engines appear

10 years of the Fourth Industrial Revolution

Learn about the history of the evolution of the industrial sector and how the adoption of new technologies transforms the industrial production process.

Industry 4.0
in Brazil and the world

Germany was the first country to develop a national industrial policy using new technologies, thereby improving the competitiveness of its industries. The term Industry 4.0, also known as Fourth Industrial Revolution, was coined in 2011 at the **Hannover Fair**. The following year, project developers produced a report with technological innovations for the industry. In 2013, at the same trade fair, the final version of the study on Industry 4.0 was released. Thus began the Industry 4.0 movement in the world. Brazil does not yet have a national industrial policy. The **Chamber of Industry 4.0** has been promoting actions since 2019 to organize state policy for the industry sector and encourage the introduction of the concept in Brazilian factories.

Robotic solutions



Divulgação: Pollux

Advanced robotics
José Rizzo Hahn Filho accompanied the birth of Industry 4.0 in Brazil.

José Rizzo Hahn Filho graduated in Mechanical Engineering from Iowa State University (USA), and in Brazil, he is one of the promoters of entrepreneurship and innovation. President of the Brazilian Association of Industrial Internet (ABII) since 2016, Rizzo has been working in the industrial automation area for over 25 years.

Robotized solutions in Joinville, in the north of Santa Catarina, the entrepreneur invests in the production of mobile and autonomous robots controlled by Artificial intelligence software.

Check out, alongside, the interview with the founder of Pollux, a Santa Catarina company of advanced manufacturing, robotics, and industrial internet.

5 questions

J. Rizzo Hahn Filho
CEO of Pollux

1. How was the process of implementing the Industry 4.0 concept in your company?

We work with the automotive, consumer goods, and food segments. Within this process, we saw the birth of the Industry 4.0 concept 12 years ago. And we embrace that. What we do is: beyond the part of the machines and robots, which are more visible, we insert the digital part of data. In Industry 4.0, factory equipment and computer systems are combined to improve manufacturing efficiency and connect with the entire logistics chain. That is the concept.

2. What will Pollux look like ten years from now?

We have a plan to transform Pollux into an international technology export platform. Our strategy is to have a center of excellence, not only in Industry 4.0 but also in digital transformation. And we want to do that with our engineers and programmers. All made in Joinville but for the whole world.

3. What is the situation of Santa Catarina Industries in the Brazilian context?

When we talk about technology, our indicators are ahead of other states. Our state is consistently ranked within the top five, with São Paulo, Rio Grande do Sul, Paraná, Minas Gerais, and Pernambuco also being notable.

4. From the point of view of technology, what is the differential of Santa Catarina?

We can take pride in our skilled workforce and thriving entrepreneurial culture. We have several technology companies that have succeeded and are spreading around the world. This union of good entrepreneurs with good professionals is our differential.

5. Como as indústrias de Santa Catarina podem ser ainda mais inovadoras?

Quando falamos de tecnologia existe um consenso: o que mais nos preocupa daqui para frente é de onde vão vir os novos profissionais. Porque notamos que a opção por carreiras tecnológicas segue minoritária ainda. Poucos jovens optam por Engenharia ou Ciência da Computação quando chegam às universidades para escolher uma carreira. Existe uma demanda muito grande por estes profissionais e uma oferta pequena. Então, é difícil preencher vagas. Esse é o grande desafio.



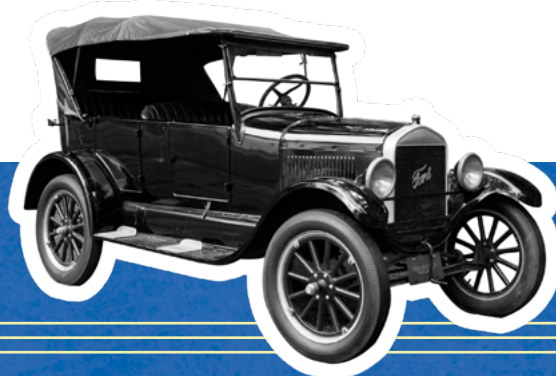
Check out the interview in full
Point your phone's camera at the QR Code, and it is ready!



1870

Second Industrial Revolution

- Creation of electric motors and use of petroleum fuels
- Inclusion of serial production line method



1970

Third Industrial Revolution

- Advancement of technology, computers, and robotics
- Beginning of industrial automation



2013

Fourth Industrial Revolution

- Combination of different digital technologies
- Autonomous processes



Smart Industries and 5G

To understand how 5G technology will contribute to the transformation of the smart industries of the future, with a high data transmission speed and low latency in signal response time, WEG took the lead in the digitization tests of the factory process in the country.

Guilherme Spina, CEO of V2Com, a WEG Group company, is the engineer responsible for the 5G project at the Brazilian multinational. The company has entered into a partnership with the Brazilian Agency for Industrial Development (ABDI) and has been experimenting with new technology in an industrial environment for three years. The stage of pioneering is the Santa Catarina factory located in Jaraguá do Sul, in the North of the State.

"WEG is primarily a capital goods company, which are assets that companies use to leverage productivity. If 5G is a productivity lever, we

want to know how this technology will work in factories," explains Spina.

Developing the project, in the first phase, three groups of 5G technology use cases were identified: industrial IoT or infrastructure virtualization, advanced robotics, and intelligent environment. "We went beyond the technical tests to lay the network and measure the data transmission speed because this was already being done. We measure processes and earnings, interview the people responsible and verify the economic value of the business", completes the engineer.

The tests at WEG demonstrated the potential that 5G technology has to raise the productivity and competitiveness of the Brazilian industry. The technical capabilities of the new mobile network have allowed the installation of innovative cases not possible in industrial Wi-Fi networks, such as inspection robots and smart cameras.



IoT and 5G

Devices pilot experiment carried out in partnership with ABDI supports Anatel in regulatory decisions for 5G networks for industrial use in Brazil.

The first case consisted of removing the old blue network cables, connecting to the local network, and checking the connectivity performance. The second experiment was carried out with the autonomous vehicles already used to transport parts within the factory, but previously with a limited amount of points connected in the Wi-Fi system.

Finally, the project includes camera use with Artificial intelligence and other sensors and provides real-time information for business processes. "From the first to the fourth generation, the focus was on the connectivity of people and people with the city. 5G promises to be the single communications network for peo-

ple and machines in every environment: city, country, and industry. But, likely, all this expectation of economic impact will only really emerge in the 2030s, with the advent of 6G maturing the technology that is being introduced now," analyzes the executive Spina.

The second stage of the connectivity project began in December 2022, this time focusing on the functioning of Internet of Things (IoT) technology within the 5G environment at the factory. Afterward, all indicators will be made publicly available to society and the National Telecommunications Agency (Anatel) to be used by all sectors of the economy. /

5G promises to be the single communications network for people and machines in every environment: city, country, and industry.

Guilherme Spina
CEO da V2Com



Disclosure: WEG

Fewer cables, more connectivity

Guilherme Spina conducts connectivity tests to the 5G network in one of WEG's most automated and robotized factories, in Jaraguá do Sul



12345.0

Santa Catarina industry strategy of the future

The concept of Industry 4.0 is maturing rapidly, and already talk of Industry 5.0. The industry model, as we know it, will change radically in a few decades, like the foresighted transformations, such as the fusion of the real and virtual worlds and spatial and quantum computing, permeated by Artificial Intelligence, the manufacture of parts or small personalized products, with intelligent and recyclable materials, made at home thanks to 3D and 4D printing; in addition to drones, autonomous humanoids, and self-reconfigurable machines, among other disruptive changes that are emerging.

The challenges of the industry transformation journey are immense and require resources, technologies, knowledge, and highly prepared teams. And they will get bigger and bigger if our industries do not even prepare for their survival.

In this sense, essential actions have been carried out, led by the Brazilian Agency for Industrial Development (ABDI), Brazilian Association for Industrial Research and Innovation (Embrapii), National Confederation of Industry (CNI/Senai), Brazilian Micro and Small Business Support Service (Sebrae), Brazilian Association of Industrial Internet (ABII), Santa Catarina Association of

Technology (Acate), Financial Agency for Studies and Projects (Finep), Federal University of Santa Catarina (UFSC), among others. However, mostly, they are isolated actions with low convergence and articulation and not always aligned with the strategic objectives of Santa Catarina.

We need a Santa Catarina strategy that considers our reality, vocations, and priorities, which acts as a guide for unified and convergent actions of the actors involved in the process of transforming our companies towards the future. A strategy that, despite the industry being one of the principal vocations and economic systems of the state, helps to reduce the deindustrialization of the country and increase productivity and quality levels; that further strengthens the role of industry and the innovation ecosystem in Santa Catarina, not only in the domestic market, but that contributes to making our companies considerable players in the international market, and actors in value chains. A state strategy, supra-partisan, in the long term, periodically refined in a way agreed upon by the actors of various governments; that is bold and an instrument that catapults our society to a new level of development.

Santa Catarina has developed essential elements: the industrial vocation and cutting-edge

companies that started the transformation process; the entrepreneurial culture; the highly organized Federation of Industries of the State of Santa Catarina (Fiesc); advanced technology parks; a thriving and growing innovation ecosystem; a banking and development system with products aimed at the modernization of industries; great universities, industrial vocational schools with modern laboratories; the modern and efficient Fapesc; and a culture of collaborative work. Santa Catarina has the knowledge, competence, and conditions to do this. /

“Santa Catarina has developed essential elements: the industrial vocation, entrepreneurial culture, technological parks, innovation ecosystems and great universities.”

Ricardo J. Rabelo

Full Professor of the Department of Automation and Systems of UFSC, general coordinator of the institutional program of Industry 4.0 of UFSC, author of the base text of the National Strategy of Industry 4.0 for the Ministries of Economy and Science, Technology, and Innovation, member of The Vertical Manufacturing 4.0 of Acate, member of several international scientific networks related to automation and industrial management, member of the Technical Board of the World Manufacturing Forum.



Read more!

Point your phone's camera at the QR Code and read the article in full



Gabriela Garcia Cera, Fapesc

Fast pace

The digital transformation journey in industries is a survival question



Featured industrial sectors

To compare the different productive chains of Santa Catarina, from economic, social, and cultural elements, the Fiesc Observatory launches the *Atlas da Competitividade da Indústria Catarinense*, highlighting 15 sectors and six mesoregions of the state that favor industrial development and the innovation ecosystem of Santa Catarina

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The *Atlas da Competitividade da Indústria Catarinense* presents different information and analysis on the regions and industrial sectors of the state compared to 126 countries and 26 states, and the Federal District. According to the report, Santa Catarina stands out in the production chains of food, electrical equipment, textiles, and clothing, and it performs well in the furniture and metallurgy sectors.



Point out your phone's camera to the QR Code and access the Atlas in full.

The publication of the Fiesc Observatory, launched in 2022, demonstrates the diversity of regional productive forces, presents the network of actors and resources existing in ecosystems, and highlights the level of industrial competitiveness.

The study is intended for industries, government, academia, associations, unions, and others interested in knowing the local potentialities to identify business opportunities. In its elaboration, different public and private, national, and international databases were used to conduct economic, productivity and competitiveness analyzes.

"Competitiveness is a fundamental issue

for Santa Catarina industry. We are among the most industrialized states in Brazil, a factor that contributes to the high rates of socioeconomic development in our territory. With a robust and diversified sector, we are proud of the companies that were born here, developed and today stand out for their capabilities," says Fiesc President Mario Cezar de Aguiar.

The document is composed of three axes, which address the Industrial Competitiveness Index (ICI) of Santa Catarina in comparison with the other units of the Federation and other countries; the competitiveness of Santa Catarina's sectors; and the competitiveness of the state's mesoregions.

"We are among the most industrialized states in Brazil, a factor that contributes to the high rates of socioeconomic development in our territory".

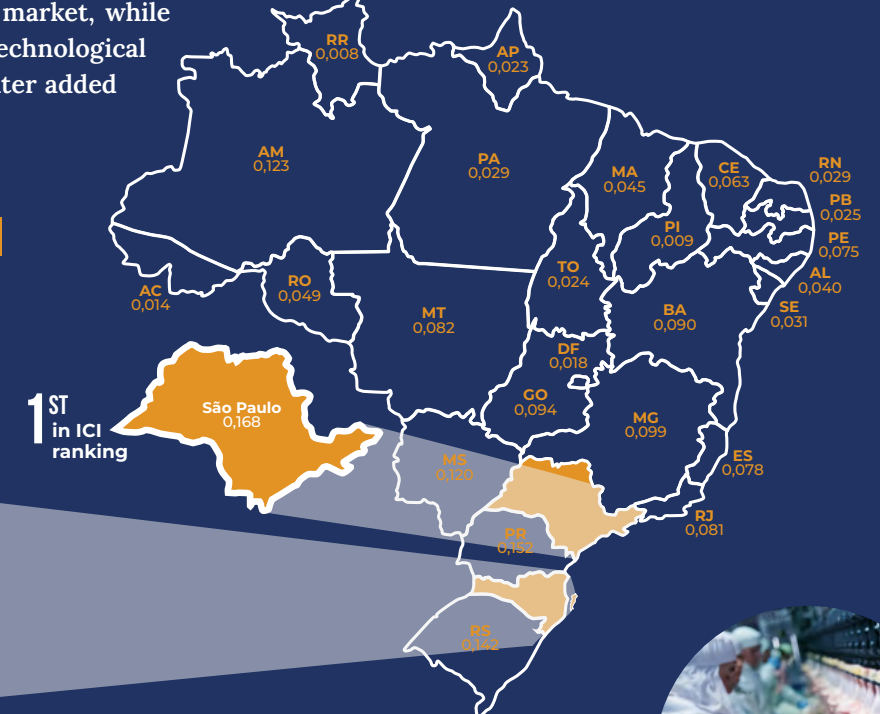
Mario Cezar de Aguiar
Presidente da Fiesc

Industrial Competitiveness Index (ICI)

The Industrial Competitiveness Index (ICI) is a methodology created by the United Nations Industrial Development Organization (Unido) capable of measuring the competition of countries. In Atlas, the methodology adapted to Unido was developed, capable of measuring the competitiveness of all Brazilian states. Thus, the ICI is the capacity of the country or region to increase industrial participation in the national and international market, while developing its structure in technological sectors and activities with greater added value.

Competitiveness in industry, measured by the ICI, is composed of two dimensions: the ability to produce and export industrial goods; and the deepening and technological update, measuring the complexity in industrial processes and international integration. Thus, the ICI identified the high performance of Santa Catarina (0.167) compared to the Brazilian reality.

In the ICI Brazil ranking, Santa Catarina was behind only the state of São Paulo.



"This result is supported by the combination of industrial and regional diversity, which includes technology-intensive companies, linked to a satisfactory level of global productive integration."

José Eduardo Azevedo Fiates
Superintendent of IEL/SC and director of innovation and competitiveness of Fiesc





Sectoral competitiveness of the Santa Catarina industry

Sectoral competitiveness is a key component in the evaluation of industry performance and strategic planning, as it reflects the ability to sustain or elevate a company in the market. In the Atlas, it is measured through three dimensions: productivity per worker, participation of each sector in the national market (market share), and participation in the global Environment (Export coefficient).

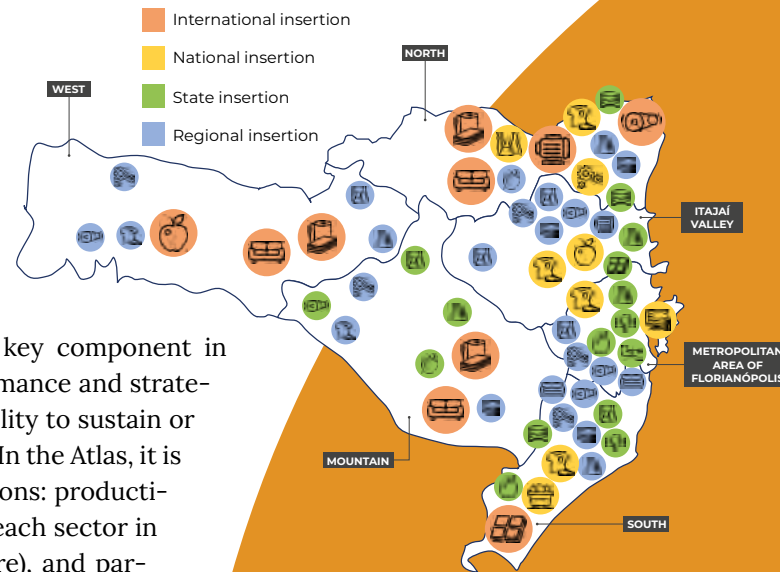
From the perspective of external competitiveness, the document compares the sector productivity of Santa Catarina to that of countries with high combinations of productivity and production volume. Concerning the scenario of internal competitiveness, the Brazilian states are compared.

The executive manager of IEL/SC, Eliza Coral, emphasizes that "the Santa Catarina industry is one of the most competitive in Brazil, characterized by entrepreneurship and a highly diversified and specialized production structure".

Mesoregions of SC

The Atlas also presents the characteristics of the mesoregions of Santa Catarina, addressing variables such as GDP, GDP per capita, and Municipal Human Development Index (HDI) (income, education, and longevity). In addition, industrial poles and their respective economic activities and the actors that contribute to sustaining regional competitiveness are identified.

"The industry of Santa Catarina presents great regional and sectoral diversity, in addition to high technological sophistication in the production chains. In this way, sectoral competitiveness is another relevant factor in evaluating the performance of the industry, also favoring strategic planning in the medium and long term, as it reflects sustainability and stimulates the economic development of the region," explains Fiesc economist Marcelo de Albuquerque. /



Industrial poles of Santa Catarina

The distribution of industrial centers in SC can be seen on the map above by dividing the mesoregions of the State (West, Mountain, North, South, Itajaí Valley, and Metropolitan Area of Florianópolis).

Check out the 15 sectors and their impacts in numbers*

*Source: Atlas da Competitividade da Indústria Catarinense, Observatório Fiesc, 2022



Meet the Fiesc Observatory program, with studies and analyzes focused on the productivity and competitiveness of SC industries, which assists in Fiesc's strategic actions.



FOOD AND BEVERAGES

- National pork export leader.
- 141.188 Jobs
- 4.112 Establishments
- US\$ 3,6 billion in Exports
- US\$ 1,9 billion in Imports



TEXTILES, CLOTHING, LEATHER, AND FOOTWEAR

- Productivity three times higher than the Second World producer.
- 161.281 Jobs
- 8.937 Establishments
- US\$ 299,5 milhões in Exports
- US\$ 1,7 bilhão in Imports



METALLURGY AND METAL PRODUCTS

- Productivity compared to the world's largest producers.
- 53.549 Jobs
- 3.978 Establishments
- US\$ 411,1 milhões in Exports
- US\$ 4,8 bilhões in Imports



CHEMICALS AND PLASTICS

- The second largest domestic producer.
- 56.983 Jobs
- 1.728 Establishments
- US\$ 455,6 milhões in Exports
- US\$ 6,6 bilhões in Imports



ELECTRICAL EQUIPMENT

- International benchmark of productivity.
- 31.474 Jobs
- 380 Establishments
- US\$ 819,3 milhões in Exports
- US\$ 2,0 bilhões in Imports



MACHINERY AND EQUIPMENT

- Production larger than India's.
- 52.976 Jobs
- 3.471 Establishments
- US\$ 619,0 milhões in Exports
- US\$ 2,1 bilhões in Imports



WOOD AND FURNITURE

- Productivity like China, the world leader.
- 71.009 Jobs
- 5.177 Establishments
- US\$ 1,8 bilhão in Exports
- US\$ 109,7 milhões in Imports



AUTOMOTIVE

- Highlight to produce parts and engines.
- 26.305 Jobs
- 538 Establishments
- US\$ 674,6 milhões in Exports
- US\$ 1,3 bilhão in Imports



CELLULOSE AND PAPER

- The third largest supplier of the domestic market.
- 21.370 Jobs
- 434 Establishments
- US\$ 287,6 milhões in Exports
- US\$ 157,3 milhões in Imports



CERAMIC

- Productivity is higher than that of Russia and India.
- 33.503 Jobs
- 2.398 Establishments
- US\$ 200,3 milhões in Exports
- US\$ 243,6 milhões in Imports



EXTRACTIVE

- Highlight for foreign sales of magnesium carbonate.
- 7.062 Jobs
- 477 Establishments
- US\$ 7,1 milhões in Exports
- US\$ 305,2 milhões in Imports



INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

- Productivity three times that of China.
- 7.490 Jobs
- 231 Establishments
- US\$ 31,9 milhões in Exports
- US\$ 1,5 bilhão in Imports



OIL, GAS, AND ELECTRICITY

- National leader in renewable energy investments in the industry.
- 9.127 Jobs
- 279 Establishments
- US\$ 3,5 milhões in Exports
- US\$ 162,3 milhões in Imports



BASIC SANITATION

- 90% of the population has access to clean water.
- 17.494 Jobs
- 855 Establishments



CONSTRUCTION

- Increased growth potential in the domestic market.
- 95.859 Jobs
- 17.187 Establishments



Talents in the industry

Maurício Frighetto
Fapesc
revista@fapesc.sc.gov.br

With the participation of the Research and Innovation Support Foundation of the State of SC, the Inova Talentos Program promotes **innovation projects in companies and industries** in Santa Catarina and trains professionals through scholarships



Filipe Scotti, Fiesc

Talent Training

Fellows in Fiesc: Lázaro Ismael Hardy Lins, Maruan Karím Alemsan, Amanda Almeida Müller, Matheus Costa Nunes, and Rudney Jaime Eller Junior (left to right)

Vanessa de Oliveira Gil holds a bachelor's degree in physics, a master's degree in computational modeling, and a doctorate in astrophysics. Even with this exemplary resume, he had uncertainties about his professional future due to a lack of experience in the labor market. Through the Inova Talentos Program, she became a scholarship holder at WEG. "The program was a fundamental piece to understand that all the learning from the master's and doctorate could be used in professional life," he said.

In a **statement about the project**, Vanessa said she wanted to work after her doctorate. "But how to enter the labor market without experience outside of academic life?" she used to wonder. Then he looked for the Euvaldo Lodi Institute (IEL), creator of the Inova Talentos Program, whose objective is to foster innovation projects in companies and train talents through scholarships.

Vanessa has chosen to work with a team that acted in Artificial Intelligence (AI). "Everyone learns together. This is cool in Inova Talentos. It allows continuing studying at the same time as working. You will evolve your technical capabilities while generating results. The program is fundamental to understanding that all I learned in the master's and doctorate could bring results."

History and goals

Inova Talentos began in 2014 through an initiative of the National IEL in partnership with the National Council for Scientific and Technological Development (CNPq). "The idea was to bring qualified people to develop companies' innovation projects. Projects with a beginning, middle, and end that would create an improvement or a more disruptive innovation", explained Eliza Coral, Executive Manager of **IEL/SC**. Santa Catarina was one of the first states to join the program in 2014. A new milestone occurred in 2019 when IEL sought a partnership with Fapesc. "We

wanted an approach with the local Research Support Foundation (FAP), which has as one of its objectives to encourage innovation by expanding private investment in innovation. And we understand that it could be a way to strengthen relations with state partners. And, to have complementarity with CNPq and make the process could arrive faster in the company", recalled Eliza. Since then, the partnership has brought good results.

"Inova Talentos is a necessary program for the foundation and an example of disseminating how it is possible to combine the knowledge of academia with industry," said Fapesc



Check out the Workshop on Best Practices in Innovation: how to attract the best talent to your challenges? With Program's successful stories



The Euvaldo Lodi Institute of Santa Catarina (IEL/SC) is an entity of the Fiesc's system that aims to transform companies and connect the knowledge centers to the industry challenges, has been a key-ally bringing new ideas for organizations through the exchange of innovation best practices, availability of strategic information to take the decision (competitiveness intelligence) and the selection and insertion of the best talents for companies, strengthening and adding to the innovation ecosystem development from Santa Catarina and for business innovation.



President Fábio Wagner Pinto. "It is the competence of Fapesc to promote in Santa Catarina, at all levels, the interaction of scientific institutions, business complexes, government, and society. Governor Jorginho Mello has as one of his directives precisely to create and strengthen initiatives that bring qualified professionals closer to business organizations. The winner is society as a whole."

Fapesc has an open **public call** that receives applications in continuous flow. Companies, Science, Technology, and Innovation Institutions (ICTIs), and third-sector entities based in Santa Catarina can apply. Project proposals in Research, Development, and Innovation (RDI) must contain radical or incremental innovation, through innovation in products, processes, organizational, design, marketing, and business model, with the aim of increasing competitiveness and social, economic, scientific, and technological development.

First, you must register your interest in the program with IEL/SC (see details on the side), which also provides technical advice and monitoring of the proposal submission on Fapesc's STI platform. After approval, the IEL presents a list of some professionals. Anne Priscila Trein Litaif, Coordinator of Inova Talentos, points out that the entire project is already aligned with the company that facilitates the choice of professionals. "We evaluate technical, behavioral issues, and information requirements. And from that, we started disseminating it in the right channels," she said. In addition to the platforms for hiring, the IEL uses its network of relationships with universities in the case of more academic profiles. "And we also do a process that we call hunting, which is to go after these talents."

Inova Talentos is a necessary program for the foundation and an example of how it is possible to combine the knowledge of academia with industry.

Fábio Wagner Pinto
President of Fapesc



Access public call and check out all the information about the Inova Talentos Program

INOVATALENTOS

In Brazil
(Since 2014)

+ 1.500 projects
+ 400 companies
+ 3.000 talents

In Santa Catarina
(Since 2014)

+ 250 projects
+ 65 companies
+ 400 talents

Inova Talentos with Fapesc
(Since 2019)

95 projects
47 companies
192 inserted professionals

R\$ 8 million invested



How companies can participate

1. The interested company seeks the IEL through the website:
<https://ielsc.org.br/pt-br/inovatalentos>
2. Together, The IEL and the company define the project scope.
3. The project is submitted to a public call for proposals, which can be Fapesc, CNPq, or IPT.
4. After being approved, the company defines the profile of the scholarship holder, and the IEL recruits the professionals.
5. The contracted fellow starts in the project and has access to coaching, courses, webinars, and workshops.



How professionals can participate

1. To participate, choose the opportunity that best suits your profile and register for the selection process through the address:
<https://iel-sc.pandape.infojobs.com.br>
2. If no vacancy fills the profile of the interested party, the professional can still register the resume.
3. In the Fapesc call for application, the value of the scholarships is:
 - Graduate: R\$ 3.500
 - Master: R\$ 4.500
 - Doctor R\$ 6.000



Three main reasons are usually pointed out by organizations to opt for the Inova Talentos Program. First, when a company seeks to develop an innovative project, for example but does not have the necessary knowledge.

The second reason occurs when companies have the knowledge but need to increase staff. "It is an excellent way to test future collaborators, to have relationships with researchers, with people who bring additional or complementary knowledge", evaluated Eliza. The data shows that the hiring rate is 60%, reinforcing the importance of testing.

The third reason is the possibility of an organization having professionals dedicated to a

specific project without them being dedicated to day-to-day tasks.

"Sometimes the company has difficulty providing a professional dedicated to a project", emphasized the Coordinator of Inova Talentos, Anne Priscila. In practice, however, it makes all the difference.

"What happens? Many times, the project is filed. In other words, it is not prioritized. A company that participated in the Inova Talentos Program, for example, had an unresolved problem for nine years. A fellow, in a few months, developed a solution. It is important to have a person dedicated to a specific project", pointed out Anne Priscila.

From a fellow to a collaborator

Maruan Karím Alemsan, 32, is a sanitary and environmental engineer. He became a fellow with the function of improving Fiesc's sustainability plan through improvements in processes, promoting sustainability and good socio-environmental practices. "I chose to be a scholarship holder because it was an opportunity for experience in my area and, especially, learning, which for me was two-way," he said.

According to Maruan, he applied his knowledge and added knowledge to the team whi-

le learning about the day-to-day of the sector and the work routine. "In addition to the technical knowledge, the coaching provided by the program helped my self-knowledge, develop behavioral skills, and communicate better. The Inova Talentos Program helped me not only in learning but also in my career". It is because the professional was made effective as a collaborator in the same sector he was working as a scholarship holder.



Filipe Scotti, Fiesc

Effective

Maruan Alemsan chose to be a scholarship holder to have an experience in his field and ended up being hired in the same sector.

Efficiency on the assembly line

A compressor from Embraco, a brand of Nidec Global Appliance, is assembled between five and seven seconds in the Joinville factories in the North of the State. With such a short manufacturing cycle, any problem can impact production. To prevent mishaps and increase the efficiency of the manufacturing line, engineers have developed an electronic system called call-off, which ensures that materials are in the right place, at the right time, and in the appropriate quantity.

The Inova Talentos Program was a found way to put the challenge into practice. After the project's pilot phase, it is expected that the innovation can be used in plants in countries such as Mexico, Slovakia, or China since Nidec Global Appliance has 11 thousand employees working in nine countries.

The project "Development of an Electronic System for Supplying a Manufacturing Line" was approved in the Fapesc Inova Talentos call in May 2020 and sought to innovate in the logistics engineering area. The goal was to move the materials in the shortest time possible, ensuring they were on the production line at the exact moment.

One of the reasons for the company to participate in the program was the possibility of having a professional dedicated entirely to the project. The program, which closed in February 2023, fulfilled

its goals. According to the company, the main results were the organization of the internal transport route, providing improvement of logistics of wooden pallets so that building more efficient routes, implementing new delivery windows, as well as balancing the volume of cargo in transport. The entire operation became more efficient, improving the existing condition. /



Meet the company

Nidec Global Appliance has 11 thousand of professionals in nine countries

Innovation in the factory

An electronic system (photo) has been developed by Inova Talentos fellows to improve assembly line efficiency



Disclosure: Nidec Global Appliance



Luzerna gains national prominence with a public incubator model

Santa Catarina pride
The city has one startup for every 284 inhabitants



Disclosure, Prefecture of Luzerna



Milena Nandi
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Technological Incubator of Luzerna (ITL) transforms the local scenario of the small municipality in Western Santa Catarina, and the **city conquers the most significant number of startups** by inhabitants of Santa Catarina

A Santa Catarina municipality with 27 years of history and less than 6 thousand inhabitants bet on collaboration among state, educational institutions, and companies and developed a prominent project in Brazil. **Located in the West of Santa Catarina, Luzerna** invested in the progress of its innovation ecosystem and partnerships in the educational area. A successful strategy for talents to undertake in the city.

The project was so successful that the Technological Incubator of Luzerna (ITL) became the brand of the municipality, which in March 2023 received the Entrepreneurial Cities Award, Prêmio Cidades Empreendedoras in Portuguese, organized by the National School of Public Administration (Enap). Luzerna was the winner in Category 3 - up to 50 thousand inhabitants. The Award recognizes initiatives in small-medium cities that contribute to local economic growth.

Luzerna is the city of Santa Catarina with the highest proportional number of startups per inhabitant: one for every 284 residents currently. According to data from the 2020 Census from the Brazilian Institute of Geography and Statistics (IBGE), there are 5,684 inhabitants. ITL is home to **20 startups, including pre-incubated, incubated, and assisted.**

According to the director of Economic Development and Innovation of Luzerna, who is also director of ITL, Ricardo Klein, the state does not have other municipalities with less than ten thousand inhabitants with an incubator. He points out that ITL seeks solutions to the needs of companies, both in terms of technology and production process, in addition to collaborating with the training of new professionals and giving space and support for entrepreneurs to transform ideas into businesses.

The initiative is the first public incubator managed by the state in Brazil. The activities count on the partnership of the Innovation Pole of the Rio do Peixe Valley (Inovale), the Innovation Center (CI) located in Joaçaba, linked to the Santa Catarina Network of Innovation Centers. ITL takes part, for example, in Fapesc's call for applications via CI in programs such as **Nascer.**



Startup: an emerging company that uses technology in its products or services, presents repeatable and scalable business models and develops solutions to market needs.

Pre-incubation: a set of activities to stimulate entrepreneurship and prepare projects with potential for future business. The goal is to generate and validate ideas beyond developing projects for the incubation process.

Incubator: a public or private program that provides help for a project to develop itself. The incubator offers physical structures with Basic Services such as water, electricity, telephone, and internet, as well as guidance and support in the accounting and legal areas.

Assisted companies: they are not technology-based or innovation-based, but these companies contribute to startups and the local ecosystem. Therefore, they can settle in incubators.

Graduation: occurs when the company has completed the incubation process and has developed sufficient skills and competencies to exit the incubator.

"There is no way to talk about the success of the incubator without talking about the partners, such as the Federal Institute of Santa Catarina (IFC) and Senai. There are technical and undergraduate courses that have been created from local demands. Most of the startups we have today are from IFC graduates. Some people were still studying when they set up the company and started billing," says director Klein.



A pre-incubation program for innovative ideas with a focus on the beginning of the entrepreneurs' journey



Investment in vocational training

The mayor of Luzerna, Juliano Schneider, recalls when the incubator idea began to leave the drawing board, and the survey demonstrates that more than 400 young people left the city to complete their studies or start their professional lives in other cities.

According to Schneider, it is part of the municipal planning to offer training for talent development since elementary school. In addition to regular classes, students develop extracurricular activities, such as in Hackspace at the Federal Institute of Santa Catarina and the Education for the World of Work Program in partnership with Senai.

The result of public-private partnerships, investment in education, and the generation of opportunities for entrepreneurship ensure the municipality's development. Enabling the graduate startups to continue their activities, the government will enlarge the Industrial District of Luzerna into an area for enterprises that need smaller lands. In addition, they are working on the future technology park design that will shelter the incubator and other initiatives.



“The project was created to retain local talent and provide opportunities for students to develop their potential here. A small city has difficulties remaining attractive to young people, and the government needs to do something to try to change the situation.”

Juliano Schneider
Mayor of Luzerna

Disclosure, Prefeitura of Luzerna

A project embraced by all

Born in Luzerna, the Secretary of State Administration, Moisés Diersmann, has a close relationship with ITL. During his tenure as mayor, these activities were initiated, and partnerships were established with educational institutions.

Diersmann was a professor at the University of the West of Santa Catarina (Unoesc) and was already in charge of the pre-incubator. The idea of creating the project in Luzerna arose after facing difficulties with the legislation in Joaçaba to install two companies selected through Fapesc's call for proposals. He, who had already been elected councilor of Luzerna, took the offer of an incubator in the models in Florianópolis but managed by the municipality.

In 2012, Moisés Diersmann was elected mayor of Luzerna, and in this period, the incubator was already active. Connecting young people to the productive system and fostering talents, public management expanded the partnership with Senai, and thus, from the sixth year, in the second shift, public school students could have contact with other areas of knowledge and their possible future professions. For him, it is necessary to make science and technology more practical, take them out of the theoretical world, and challenge young people.



“The years went by, and students started talking about starting startups. The entire ecosystem was created for this process, and we had the incubator as an innovation habitat. In 2019, we received representatives from 86 municipalities who went to see the model, which is not only educational and technological but economic.”

Moisés Diersmann
Secretary of Administration of the state of Santa Catarina

Cristiano Andujar, Collection Secom



Disclosure, Prefeitura Luzerna

Luzerna Technology Incubator (ITL)



Opening – in August 2010, the Luzerna incubator was opened. ITL is based in the historic building that the São João Batista Seminary, one of the largest in Southern Brazil, between the early 1940s and 1980s



Structure – the incubator shelters:

- Office of the National Employment System (Sine)
- Entrepreneur's room
- Luzerna Culture Directorate
- Music, dance, and arts room
- Economic Development Directorate
- Startup rooms, auditoriums, and coworking
- Maker space maintained by the Federal Institute of Santa Catarina (IFC), with prototyping laboratory, 3D printer, and places to perform various tests



Investment of the city of Lucerne - in 2022, R\$ 150 thousand were paid with ordinary resources directed to points, such as administrative expenses, consumable material and office hours, maintenance, interns, and acquisitions



Startups in numbers

- 20 installed, five pre-incubated, 12 incubated, and three assisted
- Between 2021 and 2022, the 20 companies had R\$ 6,003,230.87 of gross turnover
- Monthly rent* pre-incubated company – R\$ 70.00
- Monthly rent incubated company – R\$ 140.00
- Monthly rent assisted company – R\$ 175.00
- The incubator offers companies free of charge – spaces such as Auditorium, meeting room, coworking, meeting room, cafeteria, arena space, and outdoor area

* On average and according to the size of the room, included in this value is a private room of 20 m2, with internet, electricity, and printing services.



Areas of expertise

- Engineering services
- Healthcare
- Metallurgical services
- Software
- Machinery and equipment
- Industrial automation
- Electrical Material
- Solar Energy
- Service Agency
- Design



From a fellow to a speaker at the UN

In the history of Odeme Dental Research, a manufacturer and supplier of equipment for testing and dental materials validation, which serves 29 countries, there is a lot about the public entity's encouragement in research and innovation development. The founder and CEO of the company, Rafael Patzlaff, says that the idea of undertaking arose in working developed in the Dentistry Laboratory at the University of the West of Santa Catarina (Unoesc) when he was still a scholarship holder in scientific initiation.

At the time, Patzlaff was studying Production Engineering and helping teachers with research to develop tools and devices for testing. When he was almost graduating, the student realized that work could become a business. It is how he decided to participate in pre-incubation at the Joaçaba Innovation Center, where he remained from 2015 to

2018 until he went to ITL. Patzlaff was the first manager of the Luzerna incubator from 2010 to 2014 and continued to collaborate in management until 2016. After graduation, the company went to the Industrial District of Luzerna.

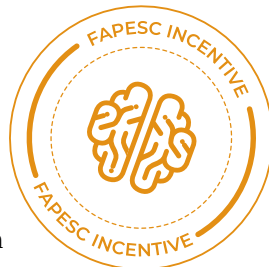
The entrepreneur points out that the incubator has proven that it is possible to do it in a different and innovatively anywhere. "People said it was not worth investing in an incubator in Luzerna. But we reinforced that it is people who make innovation. The internet allows us to be anywhere. That is how I was invited to speak about innovation at an event at the UN."

Odeme's manufacturing and operations base remains in Luzerna, but eight years ago, the company opened an office in the United States focused on the logistics part of the business.

Business development

Patzlaff points out that the research and innovation support foundation of the state of Santa Catarina (Fapesc) played a fundamental role in the development of Odeme Dental Research through the funding offered in several public notices. "When an entity like Fapesc believes in and helps companies' innovation projects, we can have much more results," highlights the entrepreneur.

In 2009, Odeme was contemplated by the CTI notice for the Regional Development of the state of SC; in 2012, it received first place in the Micro/Small Company category of the Santa Catarina Innovation Award - Professor Caspar Erich Stemmer; and incentives from the Innovation Grant Program in Micro and Small Companies of SC and the **Tecnova I and II program.**



Personal collection

From Luzerna to the United States
Patzlaff began to undertake in Western SC and today has an office abroad

Focus on public health management

The partnership between Felipe Petry and Mateus Calza began when Petry was a professor at Senai, and Calza, a student. In 2017, they decided to undertake, and a year later they were among ITL's startups. "The first impact was learning from other startups. Being at ITL makes it less painful for the company to grow," says Petry, co-founder and CEO of Prix Tech.

The prixNeuron, the company's main product, arose to solve a problem of the city of Luzerna in the management of Public Health. Created in 2020, the platform offers data, maps, and information based on Artificial Intelligence. By providing managers with population information and data from public agencies and the Ministry of Health, the platform presented a scenario, capable of subsidizing decision-making. Currently, the startup continues to provide Brazilian municipalities with a general overview of health.

The co-founder and CTO of Prix Tech, Mateus Calza, explains that, within the prixNeuron, there is Prix Saúde, an application that monitors the health of citizens daily. "We have achieved something new: showing data, bringing insights, and bringing the population closer to public health, not only as a user but knowing what happens," he comments.

In 2020, Prix Tech's work was recognized by the **Santa Catarina Innovation Award - Professor Caspar Erich Stemmer** from Fapesc. In



Disclosure: Prix Tech 2

Award-winning solution

Mateus and Felipe developed a platform with data based on Artificial Intelligence

the same year, the startup was second in the category of Civil society organizations, companies, and professionals of the Award for good practices in Public Management, organized by the State University of SC (Udesc). In 2021, the startup participated in the Startup SC program of the Brazilian Micro and Small Business Support Service (Sebrae) and was selected by the **Acelera Startup SC program of Fapesc** to receive a R\$ 50 thousand grants.

The company, which graduated in 2020, has a team of 14 employees, markets throughout Brazil, and is already rehearsing the first steps towards internationalization of the businesses. Recently, prixNeuron was presented to a team from Silicon Valley, United States. The next step is to expand the platform to other areas. /



Tecnova

Innovation Support Program, through economic subsidy, for the growth of micro and small companies.

Catarinense Innovation Award

Recognition of successful management efforts in the Science, Technology, and Innovation (STI) field.

Acelera Startup SC

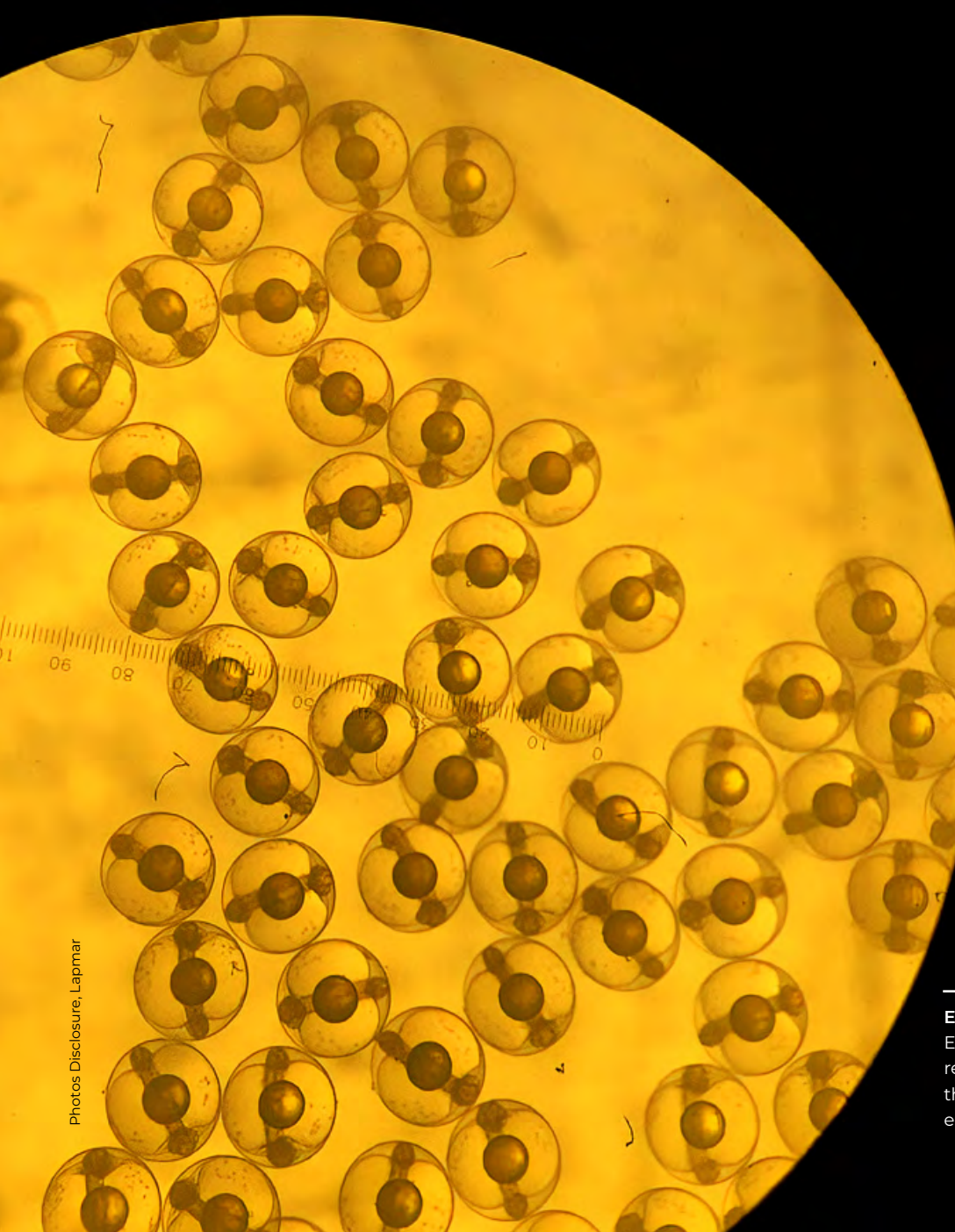
Fostering entrepreneurship and innovation for structured businesses prepared to grow.



Mullet of Laboratory

Research developed at the Marine Fish Farming Laboratory (Lapmar) of the Federal University of Santa Catarina (UFSC) in Florianópolis is a **pioneer in species reproduction in captivity**

Maykon Oliveira
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Photos Disclosure, Lapmar

Embryonated eggs
Each female mullet can release between 500 thousand to 2 million eggs for fertilization

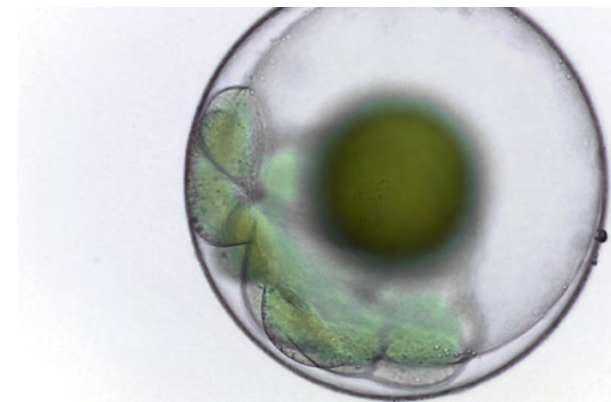
When May arrives and the cold intensifies, an assiduous visitor appears in the waters of the Santa Catarina coast: the mullet. With artisanal fishing, the fish is a traditional symbol but is still commercially underexploited. Searches developed at the Federal University of Santa Catarina (UFSC), however, can contribute to the birth of economically viable alternatives, guaranteeing the supply of mullet throughout the year and adding value to its production.

The Marine Fish Farming Laboratory (Lapmar) was the first in the world to reproduce the entire life cycle of the *Mugil liza* species in captivity. The project began in 2014 when 14 wild adult specimens (four females and ten males) were captured in Laguna in the South of the State and transported to the UFSC research unit, installed in Florianópolis.

The first batch of breeders was kept in a 12m³ tank, where the females received hormonal induction to release the eggs while the males when subjected to abdominal massages, liberated semen. Fertilization of this species occurs in water, and in the pioneering study, the hatching of the first larvae was recorded 48 hours after spawning. For five years, all spawning conducted at Lapmar used wild specimens. Only at the end of 2019, a few months before the pandemic, the experience consummated with the specimens of the first generation born in captivity, named F1.

The main contribution of the work conceived at UFSC was the domain of the species' life cycle. With the integral development of this generation in the laboratory, the researchers were able to follow the process of sexual maturation and found that the males had viable sperm around 11 months of age when they reached around 24 to 25 cm in length. Females, in turn, were fit for reproduction only at the age of three, about 40 cm.

The research proved regularity in spawning rates and egg quality, allowing an advance in the control of mullet reproduction outside its natural habitat. Mastering this technique makes it possible to produce the fish every month of the year and stagger its production. In the first half of 2022, the Lapmar team began to prepare for the spawning of the second generation (F2).



Second cell division
It happens between 15 and 20 minutes after fertilization



Newborn larvae
The head is still at the stage of eye formation



The microscopic phase
It occurs during the first 15 days after a fertilized egg hatches



The lapmar's origins

Lapmar was created in September 1990 to meet a demand to produce technologies and spread knowledge about marine fish in captivity, especially species present on the Santa Catarina Coast. It is now the oldest laboratory of its kind in the country dedicated to research, teaching, and extension. Installed in Barra da Lagoa, east of Florianópolis, it is part of the Professor Elpídio Beltrame Mariculture Station (EMEB) – an external unit of the Aquaculture Department of the Center for Agricultural Sciences (CCA) of UFSC.

The emergence and history of the laboratory are linked to the trajectory of a professional: Professor Vinícius Ronzani Cerqueira. The professor retired in April 2022 after dedicating more than three decades to UFSC and the supervision of Lapmar. While pursuing his doctorate in France, the homeland of his idol, the oceanographer Jacques Cousteau, Vinícius already planned that when he returned to Brazil, he would open a new line of research to

study our fish. The focus from the beginning was to explore Brazilian marine fish farming.

At first, the service was arduous and was conducted by Vinícius with the collaboration of his first advisor, the student Aliro Bórquez Ramirez, an engineer who graduated in Chile and is now rector of the Catholic University of Temuco, whose dissertation was the first defended in the aquaculture course of UFSC, in 1991.

Throughout his career, Professor Vinícius was divided between activities at Lapmar and teaching commitments at CCA, where he held the positions of head of department and coordinator of undergraduate and graduate studies. On many occasions, he took the family to the workplace on weekends. "It was a job I could not stop. Depending on the stage of development the fish were in, going two days without anyone checking on them was very risky," he recalls.

The project began with the study of the sea



Preliminary studies

The experience with the sea bass was a base to deal with other species

bass-peva (*Centropomus parallelus*) reproduction through research on the creation of larvae and juveniles – the latter is a phase of the fish's life that begins from 30 to 40 days after birth when it is between 2 and 3 cm and ends with sexual maturation. The experience was the basis for the work with the arrow bass (*Centropomus undecimalis*) shortly after.

Flounder, horse mackerel, whiting, and black kingfish have also been the subject of specific research by the laboratory team. In the last decade, however, studies with non-carnivorous species have begun by a method known as integrated Multitrophic Aquacul-

ture (AMTI), a production system integrates distinct species in the same growing environment, resulting in the conversion of waste from one of them into a food source or fertilizer for another.

The first fish studied at this stage was the true sardine (*Sardinella brasiliensis*), widely exploited commercially. Today, sardines are acclimated to confinement conditions, with spontaneous spawning (without hormone induction) during the year. The second non-carnivorous species was the mullet (*Mugiliza*), whose research began in the 1980s and has been resumed in recent years.

When we began, there was no research group with this aim: to study native marine species. It was hard to start something innovative. There were already publications on marine fish, but they were few. Therefore, I insisted on this area and took this opportunity to work.

Vinícius Ronzani Cerqueira
Professor da UFSC

Full dedication

Vinícius with his son in the facilities of Lapmar in 1990



At the moment, Lapmar maintains two active projects: the Research and Innovation Support Foundation of the State of Santa Catarina (Fapesc) funded the study of the intensification of the sardine reproduction processes, and the other, the result of a partnership between UFSC and the Federal University of Rio Grande (FURG) with resources from the National Council for Scientific and Technological Development (CNPq), deals with the efficiency of cultivation of mullet and *miragaia* (or *burriquete*), a native fish that are endangered and with fishing forbidden.



Queen of the waters in winter

Mullet is the designation of several fish of the mugilid family, which encompasses more than 70 species distributed in 20 genera. In Brazil, many species are also known by the names of *parati*, *saúna*, *curimã*, *tapiara*, *targana*, *cambira*, *muge*, *fataça*, among others.



A tainha *Mugil liza* é um importante recurso pesqueiro na região Sul do Brasil

531 kilometers of coastline SC is the largest producer of fish

45 % of the catch almost half of the fishing is from Santa Catarina

95 vessels are accredited for artisanal fishing in Santa Catarina

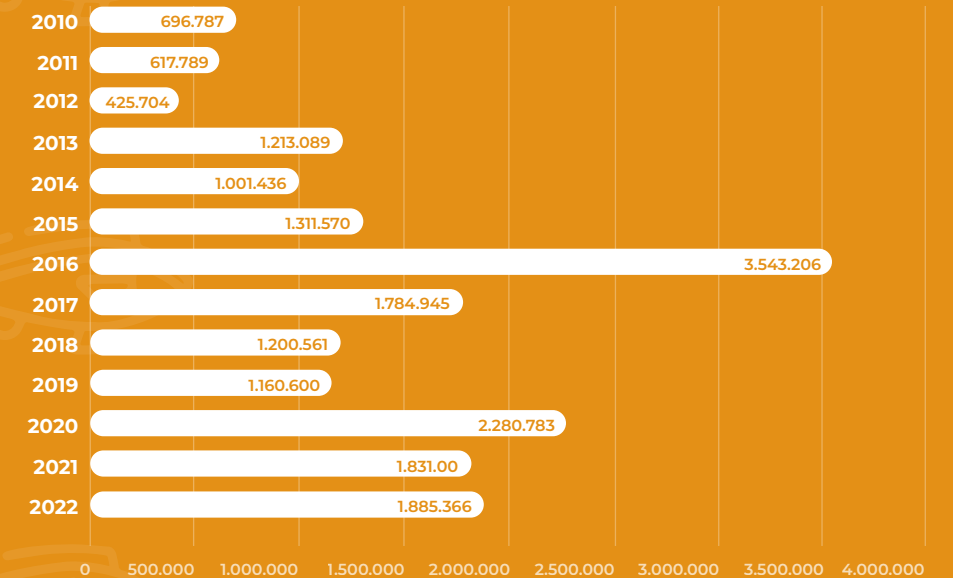
9 vessels are authorized for industrial fishing in the state of Santa Catarina

Nursery for research

More than half of the Brazilian states have already acquired species produced by UFSC

Mullet crops in SC (kg)

Source: Fepesc, 2023



An underexploited market

The *Mugil liza* mullet is a fundamental fishing resource in the southern region. Santa Catarina, with a coastline of 531 km (7% of the Brazilian Coastline), is the largest producer of fish accounting for 45% of the catch. Then comes Rio Grande do Sul, with 30%. That is, the two states account for 3/4 of the production in the country.

The Federation of Fishermen of the State of Santa Catarina (Fepesc) has been collecting data to survey crops for over a decade. According to the entity, 1800kg of mullet were caught in 2022.

Since 2018, the Brazilian government has adopted the quota system for mullet fishing. According to Fepesc, in 2022, 95 vessels were accredited for artisanal fishing, and nine vessels were authorized for industrial one.

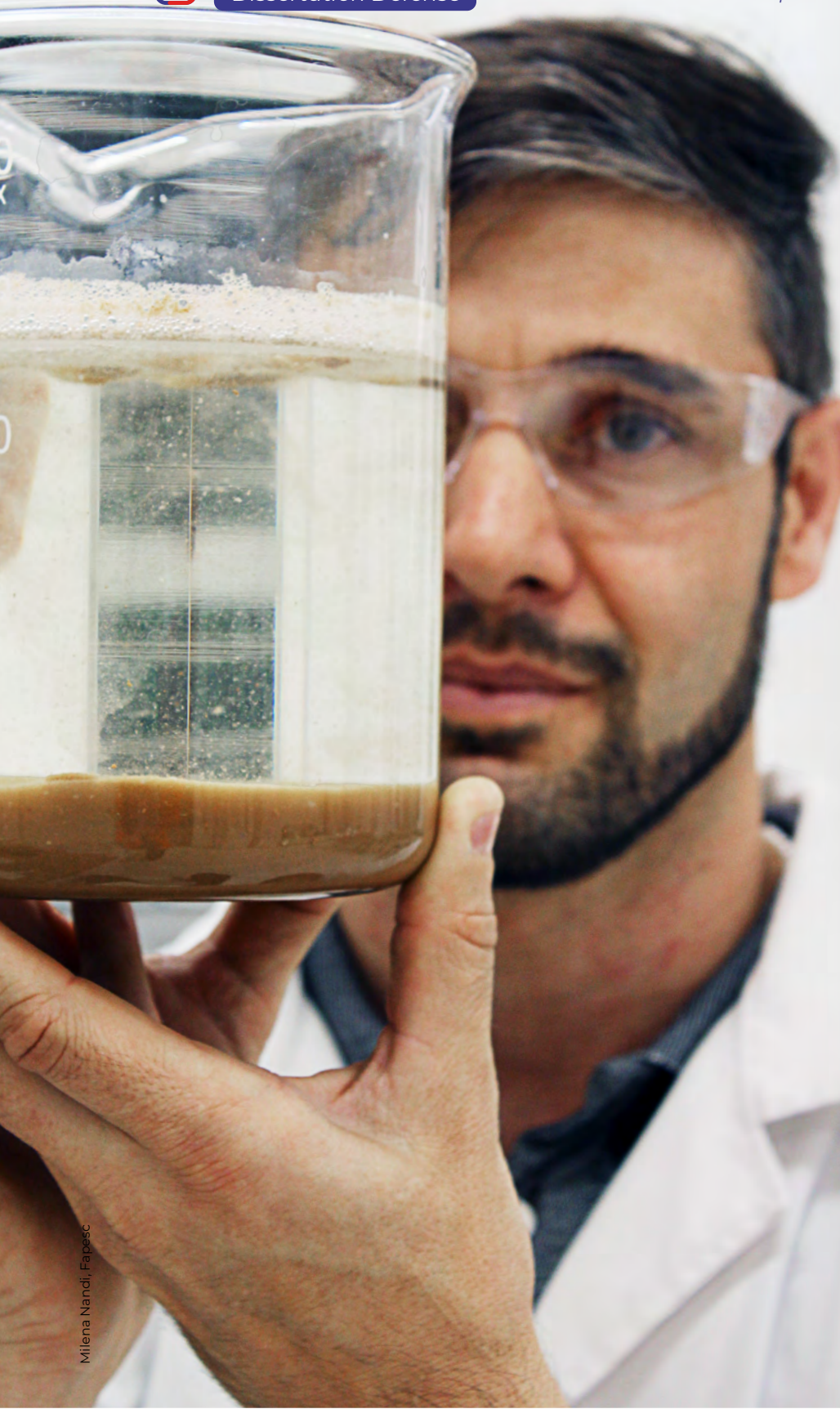
Now, UFSC is developing research with hormonal induction for the sexual inversion of fish, which will make it possible to cultivate a generation of mullets almost entirely composed of females. In addition to obtaining the eggs for commercialization in natura or the production of bottarga (desalted and dried version), this would result in a 30%

higher fish meat production since the males are smaller. The entire year could work with by-products from the fish, such as oils and flours, allowing the use of 100% of the animal. With the consolidation of the reproduction cycle of the mullet in captivity and the beginning of research with feminizing hormones, Lapmar intends to be a fundamental piece in what can mean a valuable market for the Santa Catarina economy. /

The report *Mullet of Laboratory* won 1st place in the institutional category in the 2nd edition of the Fapesc Journalism Award in STI - Science, Technology, and Innovation.

Access the QR Code to read the full article and learn more about the project!





Pesquisador:

Marcelo Guerreiro Crizel

Título da tese:

Desenvolvimento e Validação de um Reator Eletroquímico para o Tratamento de Efluente de Postos de Lavagem Veicular

Programa de Pós-Graduação em Ciências Ambientais da Universidade Comunitária de Chapecó (Unochapecó)

Researcher:

Marcelo Guerreiro Crizel

Title of the dissertation:

Development and Validation of an Electrochemical Reactor for the Treatment of Effluent from Vehicle Washing Stations

Graduate Program in Environmental Sciences at the Community University of Chapecó (Unochapecó)



Acesse o vídeo para saber mais sobre a tese
Access the video to learn more about the dissertation

Pesquisa aplicada transforma efluentes em água limpa

Applied research transforms effluents into clean water

Estudo pioneiro desenvolvido na **Universidade Comunitária de Chapecó (Unochapecó)** propõe tratamento da água de postos de lavagem de veículos e apresenta solução eficiente, acessível e capaz de preservar o lençol freático

en A pioneering study developed at the **Community University of Chapecó (Unochapecó)** proposes the treatment of water from vehicle washing stations and presents an efficient, affordable, and capable solution to preserve the water table

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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.

Em Chapecó, no Oeste catarinense, uma pesquisa brasileira inédita apresenta uma alternativa para o tratamento de efluentes gerados a partir da lavagem de veículos. A tese desenvolvida por Marcelo Guerreiro Crizel, para o doutorado do Programa de Pós-Graduação em Ciências Ambientais (PPGCA), da Universidade Comunitária de Chapecó (Unochapecó), validou o modelo matemático de um reator capaz de oferecer uma solução acessível economicamente, garantindo eficiência e o cumprimento da legislação ambiental vigente.

Bacharel em Química Industrial, em 2013, e mestre em Química, em 2015, pela Universidade Federal de Pelotas (UFPEL), Crizel faz parte da primeira turma de doutorado do PPGCA da Unochapecó. Ele conta que o projeto surgiu a partir da observação dos serviços de lavagem de veículos no município. “Verifiquei que havia muitos locais de lavagem e tive a impressão de que a água da rampa ia diretamente para cursos d’água. Me interessei em pesquisar algum tipo de tratamento desse efluente líquido, até porque em 2019, quando entrei no doutorado, Chapecó sofria muito com problema de estiagem”.

De acordo com o doutorando, em 2020, havia cerca de 192 mil veículos automotores registrados em Chapecó e, conforme o cadastro da prefeitura, cem estabelecimentos prestavam serviços com características de lavações, em 2019. “Se ao menos for feita uma lavagem de toda a frota por mês, com o uso de água por veículo, que pode variar entre 150 e 600 litros, é possível imaginar o volume de efluente gerado. E o líquido após a lavagem tem carga contaminante”, destaca.

Nesse contexto, o pesquisador aponta que o maior agravante é que a maioria dos estabelecimentos não emprega nenhum tipo de tratamento ao efluente gerado, e



os poucos que realizam têm um simples processo físico, em caixas separadoras de água e óleo, sendo lançados, geralmente, em riachos e córregos, podendo inclusive contaminar o lençol freático.

In Chapecó, in Western Santa Catarina, unprecedented Brazilian research presents an alternative for treating effluents generated from the washing of vehicles. The dissertation developed by Marcelo Guerreiro Crizel, for the doctorate of the Graduate Program in Environmental Sciences (PPGCA), at the Community University of Chapecó (Unochapecó), validated the mathematical model of a reactor capable of offering an affordable solution, ensuring efficiency and compliance with current environmental legislation.

Bachelor's degree in industrial chemistry, in 2013, and a master's degree in chemistry, in 2015, from the Federal University of Pelotas (UFPEL), Crizel is part of the first doctoral class of Unochapecó's PPGCA. He says that the project arose from the observation of vehicle washing services in the city. "I saw that there were several

washing places, and I realized that the water from the ramp went directly to the waterways. I was interested in researching some kind of treatment of this liquid effluent, even because in 2019, when I entered the doctorate, Chapecó suffered too much from a drought problem."

According to the doctoral student, in 2020, there were about 192 thousand motor vehicles registered in Chapecó and, according to the city registry, one hundred establishments provided services with washing characteristics in 2019. "If at least one wash of the entire fleet is done per month, with the water used per vehicle, which can vary between 150 and 600 liters, it is possible to imagine the volume of effluent generated. And the liquid after washing has a contaminant load," he highlights.

In this context, the researcher points out that the biggest aggravating factor is that most establishments do not employ any type of treatment for the generated effluent, and the few that do have a simple physical process, in water and oil separator boxes, being thrown, usually, into streams, and may even contaminate the water table.



Da observação à prática
Doutorando utilizou efluentes reais na pesquisa
From observation to practice
Doctoral student used real effluents in research

Milena Nandi, Fapescc

Resultados da análise *Results of the analysis*

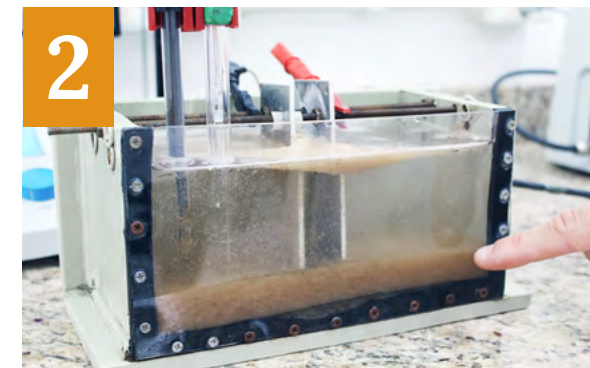
Confira, a seguir, as fases do projeto desenvolvido na Unochapecó
Check out the stages of the project developed at Unochapecó

Passo a passo | *Research phases*



Fotos | Photos Milena Nandi, Fapescc

Coletas semanais | *Weekly collections*
Em média, as amostras de efluente utilizados nos testes continham, por litro, entre 50 e 80 miligramas de surfactante; e, entre 450 e 800 miligramas de DQO, a demanda química de oxigênio necessária para decompor a matéria orgânica. Valores acima do estipulado pelas resoluções do Conselho Estadual do Meio Ambiente (Consema): 2 miligramas de surfactantes e 210 miligramas de DQO, por litro. *On average, the effluent samples used in the tests contained, per liter, between 50 and 80 milligrams of surfactant; and between 450 and 800 milligrams of COD, the chemical oxygen demand required to decompose organic matter. Values above those stipulated by the resolutions of the State Council for the Environment (Consema); two milligrams of surfactants and 210 milligrams of COD per liter.*



Carga contaminante | *Contaminant load*
O estudo revelou que o tratamento deve ser realizado, no mínimo, em um período de três horas, para que a carga poluente do DQO seja reduzida conforme a legislação. Mas são necessárias seis horas para que o surfactante atinja os parâmetros legais. *The study revealed that the treatment must be conducted for at least three hours so that the pollutant load of the COD is reduced according to the legislation. But it takes six hours for the surfactant to reach the legal parameters.*



Redução de Poluentes | *Reduction of pollutants*
Após um período de seis horas no reator, os efluentes sofreram uma redução de 90% a 95% nas cargas de metais, surfactantes e DQO. Além disso, a água, que antes era turva, ficou bem mais próxima da transparência. *After six hours in the reactor, the effluents suffered a 90% to 95% reduction in metal, surfactant, and COD loads. In addition, the water, which was once cloudy, was much closer to transparency.*



Tese da Unochapecó é inédita no Brasil

Unochapecó's dissertation is unprecedented in Brazil

De acordo com a orientadora da pesquisa, a doutora Josiane Maria Muneron de Mello, a tese desenvolvida na Unochapecó é inédita no país. Além de usar efluentes reais, o projeto utiliza a eletrocoagulação, uma metodologia conhecida no meio científico, mas nunca utilizada no tratamento de resíduos líquidos de postos de lavagem.

Além disso, a professora da Unochapecó destaca que boa parte dos estudos realizados nas universidades estrangeiras utilizam efluentes sintéticos, desenvolvidos em laboratórios, e não avaliam todas as condições estudadas por Crizel.

Josiane explica que existem outros processos para tratar resíduos líquidos, sendo o biológico o mais difundido e utilizado. No entanto, têm desvantagens, como a necessidade de uma área maior e de um técnico para operação. “O projeto do Marcelo demanda uma pequena área, é de fácil operação e precisa de pouca manutenção. A maioria dos postos de lavagem são negócios pequenos e se você oferecer uma estação de tratamento cara, a comercialização se torna difícil”, complementa a orientadora da pesquisa.

Esse tipo de efluente, estudado na Unochapecó, apresenta composição complexa e a tese se concentrou em realizar um estudo **eletroquímico** para reduzir materiais orgânicos; além de surfactantes, como sabão e detergente; e turbidez. Inicialmente, a pesquisa comprovou que a água tratada por eletrocoagulação pode ser direcionada aos cursos d'água sem prejuízo ambiental. No entanto, novos testes ainda devem ser realizados para avaliar a viabilidade de reuso do líquido pelos estabelecimentos.

According to the research supervisor, Dr. Josiane Maria Muneron de Mello, the dissertation developed at Unochapecó is unprecedented in the country. In addition to using real effluents, the project applies electrocoagulation, a methodology known in the scientific world, but never used in the treatment of liquid waste from washing stations.

Furthermore, the Unochapecó professor points out that most of the studies carried out in foreign universities use synthetic effluents developed in laboratories and do not evaluate all the conditions studied by Crizel.

Josiane explains that there are other processes to treat liquid waste, with biological ones being the most widespread and used. However, they have disadvantages, such as the need for a larger area and a technician for operation. “The Marcelo's project requires a small area, is easy to operate and needs little maintenance. Most washing stations are small businesses and if you offer an expensive treatment station, marketing becomes difficult.”

*This type of effluent, studied at Unochapecó, presents a complex composition and the dissertation focused on conducting an **electrochemical** study to reduce organic materials; besides surfactants, such as soap and detergent; and turbidity. Initially, the research proved that water treated by electrocoagulation can be directed to watercourses without environmental damage. However, new tests must still be conducted to assess the feasibility of reuse of the liquid by establishments.*



Ramo da Química que estuda as reações químicas que produzem corrente elétrica ou são produzidas pelas correntes elétricas.
Branch of Chemistry that studies the chemical reactions that produce electric current or are produced by electric currents.

Estudo em parceria com iniciativa privada

Study in partnership with private initiative

A tese chamada *Desenvolvimento e Validação de um Reator Eletroquímico para o Tratamento de Efluente de Postos de Lavagem Veicular*, que será defendida no segundo semestre de 2023, é um dos exemplos de pesquisas aplicadas desenvolvidas a partir da parceria entre universidades e empresas privadas.

O estudo de Crizel teve apoio da Kemia Tratamentos de Efluentes. A empresa de Chapecó ofereceu equipe técnica, laboratórios para testes em maior escala e o piloto do reator, e forneceu materiais para a construção do equipamento.

A pesquisa contou com a coorientação de Márcio Antônio Fiori, da Universidade Tecnológica Federal do Paraná (UTFPR). Os docentes integram o Grupo de Pesquisa de Materiais Multifuncionais, da Unochapecó, que desenvolve estudos em parceria com empresas, a partir de demandas do mercado. A equipe ainda é formada pelo estudante de iniciação científica de Engenharia Química, Tiago Barreto.

The dissertation called Development and Validation of an Electrochemical Reactor for the Treatment of Effluent from Vehicle Washing Stations, which will be defended in the second semester of 2023, is one of the examples of applied research developed from the partnership between universities and private companies.

Crizel's study was supported by Kemia Effluent Treatments. The Chapecó company offered technical staff, laboratories for larger scale tests and the reactor pilot, and provided materials for the construction of the equipment.

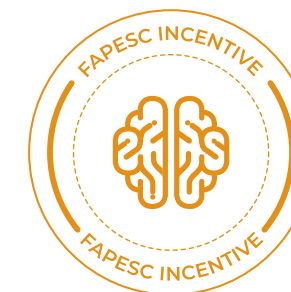
The research was co-oriented by Márcio Antônio Fiori, from the Federal Technological University of Paraná (UTFPR). The professors are part of Unochapecó's Multifunctional Materials Research Group, which develops studies in partnership with companies, based on market demands. The team is still formed by the undergraduate student of Chemical Engineering, Tiago Barreto.



Milena Nandi, Fapesc

Equipe completa | Full team

Marcelo, a orientadora Josiane de Mello, o coorientador Márcio Fiori e o bolsista Tiago Barreto
Marcelo, supervisor Josiane de Mello, co-supervisor Márcio Fiori and scholarship holder Tiago Barreto



A Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (Fapesc) também contribuiu para o desenvolvimento da pesquisa. Com o valor aprovado de R\$ 50 mil, o projeto adquiriu um potenciostato, equipamento que gera a corrente elétrica para o sistema utilizado por Crizel na realização dos testes. /

The Research and Innovation Support Foundation of the State of Santa Catarina (Fapesc) also contributed to the development of the research. With the approved value of R\$50 thousand, the project acquired a potentiostat, equipment that generates the electric current for the system used by Crizel in conducting the tests. /



Designed Universe

Opened in 2022, the *Planetário Digital Udesc Oeste* incentives interest in science and astronomy

Gustavo Cabral Vaz
Udesc
gustavo.vaz@udesc.br

About one year ago, the West region of Santa Catarina had new equipment for educational and scientific activities: the *Planetário Digital da Universidade do Estado de Santa Catarina* (Udesc) in Pinhalzinho. The State has only three fixed digital planetariums but is the only one within a radius of 5km, which has attracted a growing number of visitors.

The experience is worth it: the digital technology promotes an enhanced quality of image, and the public watches comfortably, immersed in a structure that looks like a science fiction movie. Seat down under a dome, the spectator observes planets and stars in a cloudless sky, walks among them, and gets closer until they notice details that never even imagined existed.

The planetarium was implemented with an investment of R\$752 thousand and is the result of a partnership among Udesc, through the *Centro de Educação Superior do Oeste* (CEO), the City Hall of Pinhalzinho and the Legislative Assembly of the Santa Catarina State (Alesc), which contributes to the project with amendments of the parliamentarians from the region.

Its creator is professor Danial Iunes Raimann from the Department of Food Engineering and Chemical Engineering at Udesc West. With a teaching degree, a master's, and a doctoral degree in Physics, Raimann dedicated



Milena Nardi Fapesc

himself to actions of extension to improve the teaching-learning quality of the Exact Sciences, especially in the West of the State. For 17 years, the professor has developed the *Ciência Viva Udesc Oeste*, a permanent extension program at the university, to which the new equipment is linked.

Before the fixed planetarium, between 2014 and 2019, Raimann's program acted in the region with a mobile planetarium, digital

indeed. At this time, the methodology was different and included visits to schools and participation in events with sessions of up to 40 minutes. The program served about 20 thousand people, including students, professors, and the community.

Raimann affirms that the planetarium is a space designated for scientific-technological dissemination. "Among other goals, the planetarium was created to help the improvement of Elementary and High Schools and Higher Education, to receive

Look beyond the horizon

The planetarium provides opportunities for children, young and adult people to live an experiment, with sound and image in high definition and valuable information that add learning and help to enlarge the look at the universe



actions of teaching, research, and extension, besides encouraging regional tourism in an educational route. It is an innovative project that is improving the reality of the West of Santa Catarina," emphasizes the teacher.

The team at the planetarium is composed of Raimann and professor Leda Delevatti Thomae, from the municipal education network of Pinhalzinho, besides scholarship holders and volunteers of the *Ciência Viva Udesc Oeste*. Raimann and Leda drive the sessions with the support of students. When the public is from school, the contents are presented beside the suitable grade to deepen what they studied in the classroom with teachers. "The sessions are organized to happen in a moment of ambiance, followed by the movie, and after all, and finished with a discussion," explains Raimann. Besides the planetarium, visitors can see the structure of the university.

Preparation for the *Mostra Brasileira de Foguetes*

Between the actions of the planetarium are extension programs, such as the preparation for the *Olímpiada Brasileira de Astronomia e Astronáutica (OBA)*, one of the most important competitions of knowing in the country, that evolve the build and launch of the prototypes at the *Mostra Brasileira de Foguetes*.

In 2022, 1.2 thousand students trained at the *Planetário Digital da Udesc* to join the event, which happened in may and mobilized, in total, almost 1.2 million students from 12.5 thousand schools. This year, teachers and students from Santa Catarina schools in nine cities are doing the preparatory course.

The deployment of a pedagogical project is on the agenda, as well as the building of complementary ditactic spaces, the creation of a support group, courses for training people who want to work in a planetarium, besides the partnership to increase the number of fixed planetariums in the State. For them, the sky is the limit.

Futuristic Aesthetic

For those who visit *Planetário Digital*, the futuristic aesthetics of the building provide a suitable environment for the experiences lived inside. The powerful Fulldome Optima 4k digital projector allows one to simulate the starry sky and show celestial objects, from a day or night sky, from any region of the Planet or time of the year.

The technology also enables the display of scientific films and animations, providing a 3D immersion effect. The projection is in a dome nine meters in diameter. The public can watch everything comfortably in 56 reclining armchairs, in addition to accessibility and specific space for wheelchair users, all in an air-conditioned environment.

The external appearance of the planetarium dome is a constructive and innovative solution developed by a company from Santa Catarina: it was made with ACM outer covering, aluminum composite material filled with polyethylene. The choice was decisive to the project viability because it reduced the work cost by 80% compared with conventional planetariums of the same size and project pattern. /



Julio Cavallheiro, Collection Seccom

Innovative construction

A company from Santa Catarina developed the Digital Planetarium at Udesc in Pinhalzinho

Visit *Planetário Digital Udesc Oeste*

The *Planetário Digital Udesc Oeste* was opened on March 21st, 2022, and receives groups of students, teachers, and the community on tour. To visit the space is necessary to do a pre-scheduling. In the first year, almost 11 thousand people visited the planetarium, thereabout 270 sessions, including schools from 38 cities of Santa Catarina, Paraná, and Rio Grande do Sul.



What you will find

Nine different sessions are presented, lasting between 60 and 90 minutes.

- Chronicle of a trip to Earth
- Adventure in the Solar System
- Formas espaciais - Spatial shapes
- Celestial clock
- Measuring the space
- The secret of the paperboard rocket
- From the Earth to the Universe
- Two little piece of glass, telescope history
- Live session of sky presentation

For the general public, the session dates and times are on the Udesc website and Instagram.



Website



Instagram

Scheduling

The group of students and teachers are received at pre-scheduled times via email: planetario.ceo@udesc.br



Where it is

Udesc Oeste (Pinhalzinho unit). BR-282, km 573, Linha Santa Terezinha, Pinhalzinho (SC)



Besides the Digital Planetarium at Udesc in Pinhalzinho, there are two other fixed digital planetariums in SC: one from the *Universidade Federal de Santa Catarina (UFSC)* in Florianópolis, built 50 years ago and another one from the City Hall of Criciúma, opened in January 2023.

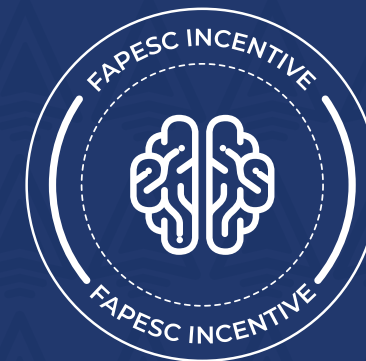
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- ▶ Product Management
- ▶ People management

50 companies
selected
in 2023



R\$ 1,6 million
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